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HISTORICAL ECOLOGY  
OF  
ALIEN WOODY PLANTS  
IN THE VICINITY OF  
CAPE TOWN, SOUTH AFRICA

BY

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SCHOOL OF ENVIRONMENTAL STUDIES

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## ABSTRACT

The reasons for the success of certain alien plant species in the vicinity of Cape Town (i.e. the northern Cape Peninsula and the adjoining Cape Flats) are examined by a consideration of their history at the hands of man. Attention is focussed on 13 woody species that are considered to threaten the natural macchia-type vegetation (fynbos) of the region. They comprise *Acacia* (6 spp.), *Albizia lophantha*, *Hakea* (3 spp.) and *Leptospermum laevigatum*, all from Australia, and *Pinus* (2 spp.) from the Mediterranean region. The method of approach is historical and the research is based primarily on manuscript documents in the Cape Archives used in conjunction with annual reports of governmental bodies, especially the forestry authorities, and other contemporary accounts.

The date of the first known occurrence of each of the species in the south-western Cape is documented, the earliest being the period 1685-1693 for *Pinus pinaster* and the latest 1865 for *Acacia pycnantha*. The introduction of most of the species is shown to be related to the intense interest in exotic plants that was characteristic of Britain and its colonies in the early and middle 19th century.

A major outcome of the research is the presentation of a chronology of man's relationship with these species from 1845 to 1975. This includes information on the history of the development of Cape Town, its suburbs and the surrounding areas. It is shown that planting by man has been a major factor in dispersing *Acacia cyclops*, *A. saligna*, *Hakea suaveolens* and *Pinus pinaster* in the region. On the other hand, man has played only a minor role in the spread of *Acacia longifolia*, *Albizia lophantha* and *Hakea sericea*. Man's role in regard to the other six species is considered to be intermediate between those two categories.

It is shown that on the Cape Flats control of drifting sand is not the only purpose for which acacias have been planted in the past (as is popularly believed). They were also planted on a large scale for the production of tannin and as shelter for plantations of pines. Areas where such planting occurred were not denuded sand drifts; in fact, the natural vegetation was removed to make way for the alien species. So-called "afforestation" of the eastern side of the Cape Flats with *Acacia cyclops* and *A. saligna* in the 20th century is shown to be a major cause of the present wide distribution of those species.

It is clear from this study that plantations of pines were formerly much more extensive on the mountains of the Cape Peninsula than now. Therefore stands of pines existent today in many cases represent abandoned plantations, not invasions from elsewhere.

A comparison of the present distribution of alien species on Table Mountain with that recorded in the chronology presented here suggests that only *Acacia longifolia*, *Albizia lophantha* and *Hakea sericea* are unequivocally invasive in that habitat. The distribution of other species is attributable more to the activities of man than to their invasiveness.

Evidence for multiple introductions of seven of the species is interpreted to mean that it is unlikely that only a single genetic strain of any of them was introduced. Therefore their apparent aggressiveness cannot be attributed to such a cause. On the other hand, for four species, *Albizia lophantha*, *Hakea suaveolens*, *Leptospermum laevigatum* and *Pinus halepensis*, no evidence for multiple introductions was found.

A comparison of the situation regarding alien plants in other regions of mediterranean climate is made. It is concluded that much of the apparent uniqueness of the situation at the Cape is due to the fact that Australian woody species were widely planted there in the 19th century. Such planting also occurred in New Zealand. The similarity of the alien floras of these two regions, inexplicable ecologically, is understandable in terms of their history.

The results of this study emphasise that wide distribution of alien plants does not necessarily imply that they are invasive. The role of man in creating their distribution must also be taken into account.

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## PREFACE

Because this study crosses the boundaries between the natural sciences and the humanities and those disciplines traditionally employ different systems for the citation of works consulted, it was necessary to choose a system for this report. That used by historians was adopted because it is suited to the archival material and official documents on which the core of the report (Chapters 4 to 6) is based.

The citation system employed here is based on that suggested in P.J. van der Merwe : *The Source List and Footnotes* (transl. by A.M. Davey), Tafelberg, Cape Town, 1972. It has been modified, mainly to accommodate the fact that articles in periodicals and books form a large part of the scientific citations. The nature of the major modifications is indicated later in this preface. The main features of the system used are as follows.

Whenever there is a reference to a statement or conclusion of another person, or a direct quotation, a numeral is inserted in the text at the end of the reference or quotation. Numerals are used consecutively throughout each Chapter and the sequence of numerals begins again in each Chapter. A given numeral accounts for all the text material that lies between it and the previous numeral, except where my own comments and interpretations are interpolated.

The final Section of each Chapter comprises numbered notes corresponding to the numerals in that Chapter. These notes indicate the sources of the references and quotations. Latin abbreviations such as *op. cit.* and *ibid.* are deliberately not used in the notes, for the convenience of the reader. Where the source is an authored article in a periodical or a book, only partial bibliographic information is given, namely, author,

title, date and relevant page number(s). This modification of Van der Merwe's method was adopted to obviate undue repetition of details. When the source is a book, the date of publication is always provided (contrary to the practice advocated by Van der Merwe). It is considered essential that the dates of all citations in the notes be identified. The Harvard system of citation, as generally employed in scientific works, emphasises the date of publication. This enables priority of ideas to be assessed.

All of the material cited in the numbered notes is consolidated into a list of sources which comprises Chapter 8. In order to interpret the citations in individual notes it may be necessary to consult this list, for example: (1) to ascertain the full details relating to an article from a periodical or book, and (2) to decipher the alphanumeric code employed for archival sources.

The list of sources is divided into categories arranged in order of increasing proximity to primary source material: literature, literary sources, periodicals and newspapers, official publications, maps and aerial photographs, historical manuscripts, archival sources, and herbarium specimens. Only the first two categories need any explanation. Literary sources comprise publications that rest principally on the author's personal observation, experience, knowledge or recollection. Literature, on the other hand, comprises works (published or unpublished) that do not rest mainly on personal observation, but on other sources. It includes both materials that are classed by historians as secondary sources and also scientific and general works. For a few items, classification as literature or literary source may appear arbitrary, but the essential test is the use to which the material is put in this report.

In general, a work is included in the list of sources only if it has been used in the compilation of this report (i.e. it has been cited in the notes). Nevertheless, where a publication that is issued in a series was examined systematically and some material from the series was

incorporated into the report, the complete series consulted is included in the list of sources, to signify that a systematic search was made.

Source material from periodicals receives varying treatment in the list of sources. If there is an identifiable author, the source is treated as either literature or literary source, as appropriate. On the other hand, if there is no identifiable author, the source is considered to be a news item and is placed in the periodicals and newspapers category.

Finally, it should be pointed out that the alphanumeric code employed for material from the Cape Archives Depot is that used by the Depot. The headings within this category in the list of sources are taken from the Depot's inventories.

## CHAPTER 1

### INTRODUCTION

"...man, by introducing an alien, invading flora, has struck the Achilles heel of fynbos, making the prospect of its total suppression not only possible, but likely."<sup>1</sup>

"If we are in earnest about defending our rich botanical heritage, these plant terrorists will need to be attacked on many separate fronts."<sup>2</sup>

"When the author arrived in Oahu in 1936, he soon became conscious of a strong antipathy among certain laymen towards the naturalized foreign plants. How such an antipathy can actually discolor one's interpretation of existing conditions was exemplified by a student who claimed that the alien flora apparently possessed a certain group spirit and cooperative action which permitted it to carry on a mass 'warfare' against the indigenous flora."<sup>3</sup>

## 1.1 The Problem

Several species of exotic plants have attracted attention in the Cape Province of South Africa because they have become widespread and it is believed that they threaten to invade, suppress and eventually replace natural vegetation. Known variously in the past as alien plants,<sup>4</sup> green cancers,<sup>5</sup> pest-plants,<sup>6</sup> weeds<sup>7</sup> and alien weeds,<sup>8</sup> they have more recently been called plant invaders<sup>9</sup> and invasive weeds.<sup>10</sup> These last names emphasise that it is their aggressiveness that causes the concern. Nevertheless, for convenience, the term pest plants is generally used in this report to connote those species referred to by other authors by the above names. Individual species are named later in this Section.

In the south-western and southern Cape, the threat from the pest plants is compounded by the fact that the natural plant communities of this comparatively small region of less than  $5 \times 10^6$  ha<sup>11</sup> are unique floristically and of a special kind structurally.

The region has been designated as a distinct floristic kingdom in two recent phytogeographical works. In both cases it was one of only six such kingdoms, each having its unique assemblage of plants, into which the entire flora of the earth was divided. Whereas R. Good applied the name South African kingdom to the region,<sup>12</sup> A. Takhtajan called it the Cape kingdom.<sup>13</sup> The latter name is generally used by South African botanists, presumably because it more accurately conveys the kingdom's geographical extent. In a recent book on the biogeography of southern Africa the name Capensis was applied to this distinctive floral area.<sup>14</sup> That term is also used in this report.

The area occupied by the six floristic kingdoms has been estimated by A.V. Hall. He showed that the Cape kingdom occupied only 0,04% of the total area of all the kingdoms combined. Thus, this tiny region is given equal status in terms of floristic uniqueness with kingdoms such as the Boreal (or Holarctic), which comprises 42% of the total area.<sup>15</sup>

Structurally, the plant communities of the region are allied with those

found in the world's other regions of mediterranean climate (cool, wet winters and hot, dry summers). While the Cape communities are considered to form four main vegetation types (mountain fynbos, coastal fynbos, coastal renosterveld and strandveld), collectively they comprise the plant component of the Fynbos Biome, and the term fynbos is often used to refer to the vegetation as a whole. The main physiognomic features of the vegetation are a prevalence of sclerophyllous shrubs, a scarcity of trees, and a relatively minor occurrence of grasses and evergreen succulent shrubs. These features distinguish the biome from adjoining South African biomes and emphasise its similarities to the macchia vegetation of the Mediterranean region, the chaparral of California, the matorral of Chile and the heath of Australia.<sup>16</sup> Comparative studies of those five strikingly similar vegetation types have the potential to provide new insights in ecology and evolutionary theory.<sup>17</sup> The conservation of fynbos for this purpose is therefore essential.

It should be noted at this point that within the boundaries of the Fynbos Biome there is another vegetation type, of much smaller extent. This is a broad-leaved, evergreen forest, which is largely confined to mountain ravines. It has been suggested that this forest may once have been far more extensive, possibly covering much of the moister mountain slopes. It is thought that climatic change, fire and the activities of humans have severely diminished its distribution.<sup>18</sup>

The floras of the regions of mediterranean climate have been singled out as needing special conservation action on a world scale.<sup>19</sup> Two of the major characteristics of the Cape floristic kingdom are its richness of species and high degree of endemism.<sup>20</sup> The evolutionary and ecological implications of these phenomena merit close scientific attention. This, as well as other ecological, economic and aesthetic reasons,<sup>21</sup> justifies the conservation of the flora. Yet some 20% of its constituents are believed to be in some danger of extinction.<sup>22</sup>

As Capensis is already threatened by the encroachment of urban areas,

agriculture and forestry, as well as by untimely fires,<sup>23</sup> to the extent that its original area has been reduced by about 60%,<sup>24</sup> the additional threat of invasion and replacement by exotic species poses a major problem. Some botanists believe that this is now the worst threat of all.<sup>25</sup> It has been stated that 24% of the remaining area of Capensis is infested to some degree by exotics and that, "without effective action, the fynbos might become so suppressed by the invaders as virtually to disappear in most areas within a hundred years".<sup>26</sup>

In a recent survey of the problem, Hall named 17 species as the "chief invasive weeds in fynbos". Two of them are aquatic plants and therefore cannot strictly be said to invade fynbos, a terrestrial vegetation type, although they qualify as weeds in the Fynbos Biome, where this term is taken to mean all ecosystems within the region encompassed by fynbos. In addition, Hall named 23 species (including three aquatic plants) that are "potential invasive weeds in fynbos, already established and showing indications of spreading".<sup>27</sup>

The 35 terrestrial species in Hall's two lists are indicated in Tables 1.8.1 and 1.8.2. They are the pest plants that are under consideration in the remainder of this Chapter. It is noteworthy that only three of them are herbaceous, the others being shrubs or trees. As fynbos is predominantly a shrubby vegetation, the woody exotics must compete on equal, or even superior, terms for resources such as light, water and nutrients. It should be pointed out that herbaceous, annual weeds also occur in the Fynbos Biome, but they are found on the fertile soil of the vegetation type known as coastal renosterveld, which is largely given over to agriculture. They are not a problem in areas of natural vegetation.<sup>28</sup>

In terms of their region of origin, it is noticeable from the tables that, if we exclude the cosmopolitan *Rubus* spp., the majority of the pest plants (53%) originate from Australia. Europe is the next most important source (21%) while most of the remainder derive from South

America. Only one species is solely of African origin.

It is known that many of the pest plants were deliberately planted in the nineteenth century for various practical purposes, including firewood, drift-sand control, timber and hedges, but now most of them "have outgrown any merits they may have had in the fynbos region and are almost entirely of nuisance value to the land manager".<sup>29</sup>

If the pest plants are to be brought under control it is essential that the reasons for their success in fynbos be understood. This present study is directed towards that aim, using the research methods of the historian and the interpretations of the biogeographer and the ecologist. The remainder of this Chapter comprises an examination of present understanding of both the pest plants specifically and invasive plants in general, and emphasises those aspects where historical research could increase that understanding.

## 1.2 Research on the Pest Plants

The pest plants have been the subjects of a number of research programs, particularly in the past twenty years. The topics of research may be considered to fall into five categories: spatial distribution, rates of spread, modes of spread, reasons for success and methods of control.

The distribution of various species in specified regions has been recorded in several studies.<sup>30</sup> In some cases an attempt was also made to explain the occurrence of the pest plants in terms of environmental factors with which their distribution appeared to be correlated. The treatment of negative data in this type of study needs care. The non-occurrence of the species under consideration at a given site does not necessarily mean that it is unable to exist there. Such a conclusion would assume that the distribution of the plants resulted from

an entirely stochastic process or, in other words, that there had been an equal probability of their reaching all sites. However, in view of the fact that nearly all the pest plants have been present in the Cape for fewer than 150 years,<sup>31</sup> there has probably been insufficient time for dispersal to all potential sites to have occurred.

Hall alluded to this aspect in his report on pest plants on Table Mountain. Many of the species in his study were found to be rare at high altitudes. He considered that their absence there could not be attributed to differences in climate, which were slight. He believed that it resulted from the "absence of local infection sources in such areas".<sup>32</sup> This implies that the distribution pattern of the pest plants should correlate, at least in part, with sites where they have been deliberately planted in the past.

This leads to the second category of research: analysis of rates of spread and the pattern of change with time. The method involves mapping pest plants at specified sites repeatedly at regular intervals. So far, repeat mapping has been carried out in only one area, the northern Cape Peninsula. There was an interval of 16 years between the original mapping and the repeat exercise.

The results of that study, which was conducted by McLachlan *et al.*, indicated "a small but definite increase in the areas infested" by the following five species: *Hakea gibbosa*, *H. sericea*, *Acacia saligna*, *Pinus canariensis* and *Eucalyptus* sp. The criterion for this conclusion appears to have been an increase in the number of sampling sites occupied by a given species between the first survey and the second. As those data were presented in Table 1 of the report, it is possible to check the conclusion. On that criterion, *A. longifolia* should have been included also, as the table shows an increase of one in the number of sites occupied by that species, an increase of the same value as that shown by *Eucalyptus* sp. Altogether, then, six species had spread in the 16-year period, in spite of the fact that the authorities controlling the area were conducting an active campaign to

eradicate alien species by means of mechanical clearing. The other seven species considered in the study showed either no change (one species) or a decrease in the number of sites occupied, according to the table.<sup>33</sup>

As the area is subject to clearing and to fires, a decrease was not unexpected. On the other hand, it is possible that other natural control mechanisms were operating, but that their effects were masked by the eradication campaign. This possibility applies to all thirteen species. If this is so, it may mean that some of the species have reached their maximum distribution range and are now in decline. Those species may therefore pose less of a threat to fynbos than has been thought. The difficulty of drawing conclusions in this regard from the study by McLachlan *et al.* emphasises the need for a comparable research program to be carried out in an area not subject to artificial eradication of alien species.

Another category of research concerns modes of dispersal. Some of the pest plants have very light seeds (e.g. *Leptospermum laevigatum*) or winged seeds (e.g. *Hakea* spp. and *Pinus pinaster*) and are therefore adapted to dispersal by wind. It has been observed that wind dispersal of seeds of *P. pinaster* is highly effective in the mountains of the south-western Cape. A "conservative" estimate of the range of dispersal by this means has been given as 1000m.<sup>34</sup> In the classic work on plant dispersal, H.N. Ridley provided measured distances travelled by wind-blown seeds of five species of *Pinus* (not including *P. pinaster*). They ranged from 66m to 810m.<sup>35</sup>

A study of the role of birds and small mammals in spreading *Acacia cyclops* at Rondevlei, near Cape Town, indicated that five bird species could be responsible for the dispersal of viable seeds away from existing stands of the shrub.<sup>36</sup> Three of those species are common throughout the Fynbos Biome: Cape turtle dove (*Streptopelia capicola*), laughing dove (*Stigmatopelia senegalensis*) and European starling (*Sturnus vulgaris*).<sup>37</sup> They may therefore play an important role in seed dispersal in the region.

The relationship between the European starling and *A. cyclops*, which is a form of symbiosis between two exotic species, may warrant further examination. It is known that the starling has dispersed from its point of introduction in Cape Town in 1899 to become common throughout the south-western and southern Cape.<sup>38</sup> It is possible that the spread of the two species has been linked. An historical study might shed light on this possibility.

A study of the role of chacma baboons (*Papio ursinus*) as dispersal agents for *A. cyclops* was carried out at a nature reserve near Cape Town. It was concluded that they were unlikely to play an important role.<sup>39</sup>

Thus, little evidence for dispersal mechanisms, other than wind for *P. pinaster* and birds for *A. cyclops*, has been accumulated. It is of course known that humans have acted as dispersal agents, for they are known to have introduced and planted many of the pest species, but the extent of their role has not been closely examined. E.R. Roux reported on some of man's planting activities in regard to Australian acacias on the Cape Flats, near Cape Town, but his conclusion is unacceptable. He stated that after 1886 spread of the acacias "must have been largely by natural means".<sup>40</sup> As he did not examine the historical record after 1892 he was not in a position to reach that conclusion.

Research has also focussed on ecological explanations for the success of the pest plants. Earlier work resulted in the postulate that these species were more tolerant of trace element deficiencies than indigenous species,<sup>41</sup> but this has not been verified. Other workers have shown that rhizobial nitrogen fixation occurs in *A. cyclops*.<sup>42</sup> How this relates to possible nitrogen fixation by indigenous leguminous species in fynbos has not been demonstrated. The capacity for allelopathic effects has been discovered in both *A. cyclops* and *A. saligna*,<sup>43</sup> but operation of such effects on fynbos species has not been conclusively proven.

The most significant result from research into the reasons for success has been the information on seed germination derived from R.M. Jones's work. He showed that intense heat aided the germination of the seeds of *A. cyclops* and thereby established that a fire through an area where the abundant seed of that species lay on the ground encouraged a flourishing crop of seedlings.<sup>44</sup>

Fire is also believed to be important in the success of the hakeas. It is generally accepted that the woody fruits open only after the death of the plants (although this does not appear to have been tested scientifically). The death of a large stand of the plants in a fire therefore results in a mass release of seeds.<sup>45</sup>

Even though fire aids the reproduction of certain of the pest plants, this still cannot entirely explain their success. Fynbos is noted for its adaptations to the occurrence of natural fires, for "the incidence of fire is a natural result of the characteristic features of the ecosystem"<sup>46</sup> and it has been called a "fire-type" vegetation.<sup>47</sup> Indigenous species as well as pest plants are therefore capable of quick recovery after fire. Perhaps part of the answer lies in the increased incidence of fires as a result of human activities. An analysis of records of past fires might reveal some association between the frequency of their occurrence and the spread of pest plants.

It should also be noted that the effects of fire described above require that the acacias or hakeas be in the vicinity. It does not explain how they got there.

There are several autecological projects currently in progress that should increase our understanding of the success of some of the pest plant species. They have as an additional aim the accumulation of data necessary for control programs. While biological control by means of insect predators has already been instigated for certain pest species, research towards that end for other species is still in progress.

Biological control normally involves the introduction of predators from the country of origin of the pest, but there is also the possibility that organisms indigenous to the Cape may be found to prey on some of the weeds or, in other words, that natural control mechanisms will begin to operate. This has in fact been observed. Indigenous bugs of the family Alydidae are known to prey on seeds of *A. cyclops* and *A. mearnsii*, and the indigenous field mouse *Rhabdomys pumilio* also feeds on acacia seeds.<sup>48</sup> It would be useful if other such biological relationships were discovered. It is possible that observations in this regard have been recorded in the past.

This discussion of biogeographical and ecological research that has been carried out on the pest plants has emphasised the gaps in our understanding of their behaviour. In particular, it has emphasised the need for closer examination of the role played by man in establishing their spatial distribution, dispersing their seeds, encouraging their spread with fires, and also in controlling their spread. This suggests that an historical analysis of man's association with the pest plants could increase our understanding of their success. Such an analysis might also locate information on control mechanisms as suggested in the last paragraph.

When discussing research priorities, both H.C. Taylor and A.V. Hall suggested that other topics as well as those dealt with above needed investigation. They were the long-term future of the pests, their effects on habitats, the possibility of finding useful products from them, and detailed taxonomic studies.<sup>49</sup> Historical research could provide information on all those topics.

In regard to the first topic, it might be possible to find information on the distribution of the pest plants in the past, which could then be compared with their present distribution. Likewise, an historical study might locate descriptions of habitats before they were occupied by pest plants. These could then be compared with the present situation. What is being suggested is the use of historical analogy

to predict future trends. While there are obviously pitfalls in this method, it could be useful in aiding the ordering of priorities.

As far as the possibility of finding useful products is concerned, it is known that many of the pest plants were deliberately planted in the past. If the reasons for this were examined it might be found that previous uses, long since forgotten, were revealed.

In regard to taxonomy, an historical study might locate the particular geographic region from which the seeds of a given pest species originated. This would facilitate the recognition of taxonomic varieties, information that is needed for the purposes of biological control.

From the discussion in Sections 1.1 and 1.2 it is obvious that a great deal has been written locally on the subject of the pest plants. What is remarkable about those writings is the scant attention paid to the accumulated knowledge about invasive plants elsewhere in the world. In the rest of this Chapter that knowledge is discussed and related to the situation in the Cape. Where appropriate, suggestions are made as to the relevance of historical studies.

### 1.3 The Pest Plants as Weeds

It was noted in Section 1.1 that the pest plants are sometimes categorised as weeds. Their acceptance as such is indicated by their inclusion for consideration in all three of the National Weeds Conferences held in South Africa.<sup>50</sup> Since weeds occur almost worldwide, our understanding of the pest plants might be increased by a consideration of what is known about them.

A broad definition of a weed is "a plant in the wrong place".<sup>51</sup> This acknowledges that the value placed on plants is highly dependent on the

perception of the observer at any given time or place. Many of the pest plants reflect such dependence, for when they were first planted they were undoubtedly considered to be in the right place. It is only subsequently, since the need for the plants has diminished, that they have come to be regarded as weeds. Likewise, some of the pest plants are highly valued crops in certain parts of South Africa today (e.g. *Acacia mearnsii*, which is grown for its bark in Natal)<sup>52</sup> while being considered weeds in the western Cape.

The definition of a weed given above does little to explain the behaviour of weeds in ecological terms, but it does emphasise that they are products of man-plant interactions. An historical study might reveal how the interactions between man and the pest plants have changed with time.

A somewhat more precise definition of a weed states that "a plant is a weed if, in any specified geographical area, its populations grow entirely or predominantly in situations markedly disturbed by man".<sup>53</sup> This definition obviously derives from the earliest concept of weeds as fast-growing herbaceous plants that invade arable land. Such plants are pioneers that colonise bare ground but that in the normal process of plant succession are eventually replaced by other species, usually with a more dominating life form. Because the crop farmer repeatedly clears his land, the pioneer species are repeatedly offered the opportunity to invade.

Only three of the pest plants listed in Tables 1.8.1 and 1.8.2 are herbaceous and even they are perennial. Therefore the pest plants cannot be weeds on land that is subject to annual cropping.<sup>54</sup>

Nevertheless, perennials, including woody plants, can still be classed as weeds according to the definition given above, if they flourish on abandoned crop land or in other areas disturbed by man, such as roadsides and firebreaks.

After providing this definition of a weed, H.G. Baker listed 12

characteristics of what he called the "ideal weed", such as tolerance of a broad range of environments for germination, discontinuous germination and great longevity of seeds, rapid growth to flowering stage, and continuous seed production. A combination of several of those characteristics in a plant species represented a pre-adaptation to weediness that explained its success in disturbed environments.<sup>55</sup>

The pest plants are frequently found in areas markedly disturbed by man and therefore they do behave as weeds in that sense. But, implicit in the concern expressed about these plants is the belief that they also invade and replace undisturbed natural vegetation. In this case they are not weeds by the definition given above. They exhibit powers of invasion beyond those of weeds. For this reason, it is insufficient to seek the reasons for their success solely in the characteristics of the hypothetical "ideal weed". It would appear that some other factor or factors must permit the pest plants to invade natural vegetation. Thus, instead of a consideration of what is known about weeds defined in this narrow sense, it would be more useful to examine the literature concerning invasive plants in general.

#### 1.4 The Invasion Process

##### 1.4.1 The ideas of Hooker and Darwin

The concept that certain plant species can invade, suppress and ultimately replace the natural vegetation of a region to which they have been transferred as aliens appears to have originated with J.D. Hooker and Charles Darwin in the mid-nineteenth century. The development of the concept has been discussed by several 20th century authors,<sup>56</sup> but as their accounts do not always agree, it is considered worthwhile to re-examine the original sources in this Section.

In 1860 Hooker expressed the belief that the world's flora consisted of a northern and a southern type. They were distinct and of great antiquity. He observed that many northern taxa (also referred to as European or Scandinavian) occurred in the southern hemisphere but that the reverse situation did not apply. Therefore, he argued, the northern flora was actively invading the southern.<sup>57</sup> He likened the process to that which occurs when an exotic weed establishes itself in a field that is already clothed in vegetation. The final outcome of this process must depend on "that power of appropriation in the strife for place [exhibited by weeds] which has not even a name in the language of biology".<sup>58</sup>

Hooker noted further that the spread of the northern plants was being aided by the activities of the northern races of man, but did not specify in what way. He predicted that many of the small local genera of Australia, New Zealand and South Africa would ultimately disappear as a result of the "usurping tendencies of the emigrant plants of the northern hemisphere".<sup>59</sup>

To that point, Hooker was discussing northern species that had spread southwards naturally. Later in the same publication he considered the success of exotic plants that had been introduced into Australia by man and were now well established there (naturalised plants). To those he applied a different argument. While observing that there were far more naturalised plants of English origin in Australia than the reverse, he did not attribute that to superiority resulting from a northern origin. He gave three other reasons instead: the far greater flow of seeds from England to Australia, the "better adaptation of Australia than England to support numerous forms of vegetable life", and the "abundance of unoccupied ground in Australia".<sup>60</sup> He doubted whether the "altered circumstances" in Australia that seemed to favour the exotics would do so permanently:

"...perhaps they over-stimulate, and will, by gradually effecting a change in the constitution of the naturalized plants, either render them eventually distinct forms, or bring on degeneracy and consequent extinction."<sup>61</sup>

Thus consciously or otherwise, Hooker was contradicting his earlier view on the superiority of the northern plants.

The concept of the northern flora invading and replacing the southern flora was also expressed by Darwin at about the same time. It fitted well with his theory of natural selection. He attributed the success of the northern plants to their having reached "a higher stage of perfection or dominating power". This resulted from the greater natural selection and competition to which they had been subjected in the larger land area of the northern hemisphere.<sup>62</sup>

Unlike Hooker, Darwin then related the case of naturalised plants to this concept. He cited as proof of the greater competitive ability of northern plants the fact that European plants introduced by man into New Zealand had spread and replaced indigenous species.<sup>63</sup> He also gave similar evidence from the La Plata region of South America and from Australia.<sup>64</sup>

Darwin then went on to make two suppositions, based on "the extraordinary manner in which European productions have recently spread over New Zealand, and have seized on places which must have been previously occupied by the indigenes". He surmised that if all the plants and animals of Great Britain were released in New Zealand, a large number of them would become naturalised and exterminate the indigenous species. He then stated, "from the fact that hardly a single inhabitant of the southern hemisphere has become wild in any part of Europe", that it was unlikely that "any considerable number" of organisms from New Zealand could become established in Great Britain if the situation were reversed. On the basis of those two suppositions (not facts) he concluded that "the productions of Great Britain stand much higher in the evolutionary scale than those of New Zealand".<sup>65</sup>

Presumably as a result of Darwin's ideas, Hooker also became convinced that introduced European weeds were displacing indigenous species in

New Zealand. In his first list of naturalised species found in that country, published in 1855, he had made no comment to this effect.<sup>66</sup> In his second, enlarged list of 1867, on the other hand, he suggested that some of the indigenous species might become extinct as a result of such displacement.<sup>67</sup>

That prediction was carried even further by a New Zealand naturalist, W.T.L. Travers, in 1869. He believed:

"...if every human being were at once removed from New Zealand for even a limited number of years, looking at the matter from a geological point of view, the introduced would succeed in displacing the indigenous fauna and flora."<sup>68</sup>

In this he was echoing Darwin's ideas, but adding the requirement that human agency be removed.

The naturalist Alfred Wallace took up the ideas of Hooker and Darwin in his discussion of the origin of the flora of New Zealand in 1880. He stressed the "aggressive and colonising" power of the northern flora and cited as evidence the success of European plants introduced by man to New Zealand, Australia and North America.<sup>69</sup>

#### 1.4.2 Resistance of the South African flora to invasion

The influence of the twin concepts of the aggressiveness of northern species and the replacement of indigenous species by introduced exotics, as developed by 19th century naturalists, can be traced in subsequent publications by other authors.

In two of his works on the flora of South Africa, H. Bolus revealed the influence of Hooker's ideas. It was made obvious both by direct references to the latter's writings and by the use of his method of analysing the flora by a consideration of the characteristic taxa and

of the affinities of the flora with those of other regions, a method used by Hooker in several publications. In applying this method, Bolus considered the question of European plants in South Africa. In the earlier work (1886) he concluded that the arrival of most of the "foreign" plants in South Africa was probably contemporaneous with the advent of civilised man.<sup>70</sup> In the later work (1904) he noted that relatively few European taxa occurred naturally in the flora of the Cape Peninsula and concluded that the "evidences of the connection of our Flora with that of Europe are but slight".<sup>71</sup> He did not elaborate on that, but in terms of Hooker's ideas, it would imply that the South African flora (or, at least, that of the Cape Peninsula) was highly resistant to invasion by the northern flora, and that South Africa was therefore an exception to Hooker's general rule about the relative superiority of northern and southern floras.

If one accepted the argument of Darwin and Wallace that the aggressiveness of introduced plants of European origin in New Zealand follows from the above-mentioned rule, then the converse argument could be applied to the South African situation, as follows. Since the South African flora is resistant to natural incursions by the northern flora (demonstrated by Bolus), then one predicts that northern species introduced to South Africa by man will not succeed there either. That is precisely what Bolus believed he had found.

In 1886 he estimated that there were about 200 introduced species, mostly of European origin, in South Africa. He noted at that time<sup>72</sup> and also in 1904<sup>73</sup> that few of them were found far from roadsides or human habitations. He considered it remarkable "how small, upon the whole, is the influence they exert upon the aspect of the vegetation, and how weak ... is their aggressive power as against the indigenous flora".<sup>74</sup>

It appears that Bolus linked together in his mind the paucity of naturally-occurring European taxa and the relative lack of success of introduced European plants, for he stated that one of the six distinguishing characteristics of the South African flora was "its power to

resist the aggression of foreign invaders".<sup>75</sup> In the light of the foregoing discussion this statement by Bolus can be interpreted to refer not only to foreign species introduced by man (as modern authors have thought<sup>76</sup>) but also to the northern flora as understood by Hooker.

The idea that the vegetation of South Africa was "resistant to invaders" was also expressed by another botanist, J.W. Bews, in 1916,<sup>77</sup> presumably on the basis of Bolus's opinion.

Obviously, that opinion is no longer widely held today and one of the purposes of this present study is to trace the reasons for the change in attitude. The aim of discussing the ideas of Bolus and Bews at this stage is to show how they were influenced by the writings of Hooker and Darwin.

#### 1.4.3 The invasion process in New Zealand

These writings have also stimulated a great deal of discussion on the eventual fate of the New Zealand flora. Writers who accepted their ideas included Travers and Wallace, as noted already. In 1895, T. Kirk appeared to accept them in part when he described the replacement of certain indigenous species by the proliferation of certain introduced plants.<sup>78</sup> In 1935, E. Rübél cited New Zealand as an example of an environment where the indigenous flora had been dispossessed by introduced invaders because of the superior competitive ability of the latter.<sup>79</sup>

On the other hand, a number of writers have severely questioned Darwin's prediction that introduced species would ultimately largely replace the New Zealand flora. Kirk noted that many of the naturalised exotics in New Zealand were capable of displacing indigenous species on a local scale, particularly in disturbed areas such as roadsides, landslips and patches of burnt vegetation.<sup>80</sup> On the other hand, he pointed out, the

exotics appeared unable to replace the indigenes altogether:

"Displacement rarely passes into absolute replacement; after it has reached a certain stage the invaders lose a portion of their vigour, and become less encroaching...."

He considered that the indigenous species in greatest danger of extinction as a result of the pressure from exotics were those whose natural distribution range was very small.<sup>81</sup>

In the 20th century several New Zealand botanists have re-examined this question. They have concluded, as did Kirk, that introduced exotics are successful only where man, or fauna introduced by man, has disturbed the original vegetation. This was expressed as follows by G.M. Thomson in 1922:

"... when the direct, or - to a large extent - the indirect influence of man is eliminated, the native vegetation can always hold its own against the introduced."<sup>82</sup>

Similarly, in 1936, H.H. Allan concluded:

"If all the introduced fauna [including man] were removed the evidence strongly favours the view that the aliens would be conquered by the indigenes, surviving only in greatly reduced numbers and as very subordinate members of the resulting ecosystem."<sup>83</sup>

Thus, in New Zealand at least, the theoretical question of the relative superiority of exotic and indigenous plants seems to have been resolved in favour of the latter.<sup>84</sup> In practical terms, since the introduced fauna cannot be removed, the problem of dealing with the exotic plants remains. As Allan expressed it:

"... it remains a major ecological feature that there has developed in New Zealand a new vegetation under the influence of the new conditions imposed by man. There have thus arisen extensive areas in which naturalised species are either dominant or present in very significant proportions."<sup>85</sup>

#### 1.4.4 The invasion process on islands

These studies have stimulated interest in the relative role of exotics and indigenes elsewhere. On the island of Oahu, Hawaii, F.E. Egler found that some 99% of the mass of the lowland vegetation in the arid part of the island consisted of alien species. He stressed that this condition could only be understood when the history of the island was taken into account. The history revealed that the various influences of humans had caused continuous and increasing degradation of the original vegetation cover, so that there was created "a large area practically devoid of a closed vegetation, an unsaturated region ready to absorb any of dozens of pioneer species, be they introduced or native".<sup>86</sup>

The indigenous vegetation had been composed predominantly of climax species unable to tolerate those conditions. Alien species able to colonise bare ground therefore spread. Gradually, in the process of plant succession, they were replaced by other alien species. Eventually, conditions were created that were tolerable to certain indigenous species and allowed them to succeed once more. Egler predicted that if further man-induced disturbance were prevented, eventually the indigenous climax species would resume their former dominance. He therefore agreed with Allan that the aliens would survive only as very subordinate members of the ecosystem.<sup>87</sup>

In a study carried out on the Leeward Islands, West Indies, D.R. Harris showed that the proportion of aliens differed among the various plant formations of the islands. By an historical analysis of the land-use

practices in each of the formations he showed that the varying proportion of aliens was related to different uses made of the land through time. It was concluded from the historical review of vegetation changes that "the extent of alien invasion depends less on natural conditions than on the relationship between the ecology of invading species and prevailing methods of land use".<sup>88</sup>

At the end of a similar study carried out on the island of Barbados, West Indies, D. Watts concluded:

"... the position of plant aliens in local vegetation associations is an artificial one, in that as soon as felling or grazing activities are reduced in scale, native species usually regain their pre-eminence."

He believed that his conclusion reinforced the views of others such as Egler and Harris that colonisation by alien plants tends to be ephemeral and that both individual indigenous species and indigenous plant associations on islands have great potential resilience and persistence.<sup>89</sup>

At the Tristan da Cunha islands, N.M. Wace concluded that of the 83 alien plant species there were 12 that could be categorised as "highly aggressive". They appeared to be capable of penetrating the natural vegetation on the smaller islands of the group, and those islands had suffered virtually no human disturbance nor been grazed by alien animals. Even in this case, it was pointed out that those plants all seemed to exploit habitats that had been disturbed through non-human agencies, such as coastal areas, bird-nesting sites and landslips. Wace's study therefore showed that the highly aggressive species owed their success to their ability to colonise disturbed ground, rather than to an origin in the northern hemisphere, or to some lack of resistance in the island's flora.<sup>90</sup>

The studies discussed in this Section were all prompted, partially at least, by the ideas of Hooker and Darwin. They also have in common the

fact that they relate to islands rather than to continents. Islands, particularly oceanic islands, are noted for certain biogeographical characteristics that distinguish them from continents. These include impoverished biotas that are disharmonic in relation to continental biotas, a high degree of endemism, and an absence of mammals.<sup>91</sup> Because of their uniqueness, island ecosystems may not be appropriate models for the development of general principles. Thus, D. Goodman has stressed that since island biotas may result from "accidents of distribution" and may, "for some reason", tend to accumulate species that are especially susceptible to competition, their usefulness as models from which generalisations about ecosystem stability can be derived is doubtful.<sup>92</sup>

#### 1.4.5 The invasion process on continents

As far as the situation at the Cape is concerned, comparisons with other continental areas might prove more relevant. A meeting sponsored by the International Union for Conservation of Nature and Natural Resources (IUCN) in 1966 considered the impact of introduced organisms on temperate ecosystems. As well as the paper by Wace discussed in the previous Section, there were reports on alien terrestrial plants in the United States, Poland, Europe as a whole, and Australia. Although South Africa was represented at the meeting, its problem with pest plants was not discussed in detail. One of the purposes of the meeting was to clarify the scientific basis on which to forecast the consequences of specific plant introductions. This attempt to derive general principles met with little success, for each case history appeared to be unique.

The one conclusion reached by all contributors was that closed natural ecosystems are strongly resistant to invasion by exotic terrestrial plants and, conversely, disturbance to the natural ecosystem is a necessary prerequisite for invasion to occur.

No definition of disturbance was agreed on at the meeting, but each of the following actions was referred to by at least one speaker as a form of disturbance: agriculture, pastoralism, burning, use of herbicides, logging, strip-mining, application of fertilisers, irrigation, construction and use of roads and footpaths, river erosion, mechanical and biological control of certain species and, finally, efforts to control natural components of the ecosystem such as insects, disease, wildlife, fire and drought.<sup>93</sup>

In Poland the evidence for the importance of disturbance as a prerequisite for invasion was believed to be so strong that a management policy for national parks could be based on it. This policy held that as long as the natural plant cover was protected against damage such as trampling, grazing, manuring, littering and burning, it would not be over-run by alien species.<sup>94</sup>

It was noted that in Australia the most successful aliens in a given region were those that derived originally from a region of similar climate. Nevertheless, many plants from temperate Europe had become naturalised in subtropical areas of Australia. This was attributed to the fact "that Australia is settled by Europeans and its communications are largely with the European continent". It was therefore inferred that "the naturalisation of exotic plants in Australia is influenced by history as well as by climate and other factors".<sup>95</sup>

#### 1.4.6 Disturbance as a key factor

The modern standard work on invasion is C.S. Elton's book published in 1958. He presented a large number of examples from many parts of the world of the consequences of invasions by organisms as varied as fish, fungi, birds, molluscs, insects, mammals, bacteria and viruses, as well as plants.

In attempting to draw generalisations from those examples, Elton reached

four main conclusions. He noted that "invasions most often come to cultivated land, or to land much modified by human practice". Secondly, he observed that there are some species "that penetrate further, into natural waters and woodlands, into communities that are at any rate rich and varied, even if they have also suffered the results of human occupation through fire, forest succession after lumbering, water control or channel drainage".<sup>96</sup> Thus, while he at first appeared to imply that some species could invade undisturbed ecosystems, he then modified that to ecosystems that are "rich and varied" despite having been disturbed. He was therefore not denying that disturbance in some form was a precursor of invasion.

From the discussion so far in Section 1.4 it is clear that there is overwhelming opinion in favour of the view that alien plants can spread and establish themselves only in disturbed ecosystems. J.L. Harper has gone further, and stated, on the basis of both empirical and experimental evidence:

"It is extremely questionable whether there is any single proven case of the extinction or even the decline in abundance of a native species which can be directly attributed to aggression by an alien. Almost inevitably an invading species becomes established in areas in which some other disturbance has occurred, and both the entry of the alien and any reduction in the abundance of a native can usually be associated with the disturbance of the habitat."<sup>97</sup>

The importance of disturbance was refuted by a South African observer at the IUCN meeting in 1966. He stated that in the Cape Province, alien plants, once established, "continue to invade even undisturbed veld". He pointed out:

"...the macchia vegetation [fynbos] of the mountains of the Western Cape has been invaded and sometimes completely dominated by hakea and cluster pine. This spread cannot be attributed to human agencies but is due to natural fires and the distribution of seeds in the droppings of birds.

This latter factor is particularly important in relation to the distribution of *Acacia cyclops* in the coastal area of South Africa."<sup>98</sup>

That statement cannot be accepted in its entirety since fire is itself a form of disturbance and the rate of its occurrence has been increased substantially by the activities of humans.<sup>99</sup> Nevertheless, other ecologists have also stated or implied that the pest plants invade undisturbed natural vegetation in the Cape.<sup>100</sup>

One is thus forced to ask whether the situation in the Cape is unique. If so, does this result from the characteristics of the indigenous vegetation or of the particular pest plants involved, or from some combination of the two? Alternatively, one may ask whether the situation in the Cape has been as carefully assessed as elsewhere. Is invasion really occurring in truly undisturbed vegetation? If so, are all the pest plants doing this, or only certain species? If the latter is actually the case, then rather than trying to control all the pest species, perhaps management efforts should be focussed on those, as they pose the most serious threat to fynbos.

A problem inherent to this discussion is how to define and measure disturbance. Nevertheless, an historical study of land-use practices in areas which pest plants are invading might reveal previously unsuspected disturbance to the original ecosystem. Relevant in this context is the recent proposal by B.M. Campbell and others that fynbos should support more natural tree vegetation. One of the lines of evidence was the fact that many of the pest plant species that invade undisturbed fynbos are themselves tall shrubs and trees. They asked whether the absence of indigenous trees was related to relatively recent activities of man or to climatic changes during the Pleistocene, and suggested that palaeoecological investigations might reveal the answer.<sup>101</sup> In other words, they were suggesting that lack of disturbance in fynbos may be more apparent than real and judged within too short a time span.

#### 1.4.7 Role of man as a dispersal agent

We now leave the discussion of disturbance and return to Elton's generalisations about invasions. His third point was expressed as follows:

"Whenever we know the history it starts with a very small nucleus of population, growing to an 'Autumn Rivulet' and then not infrequently to a flood. And when the population has got that far, its movement is seldom absolutely checked except by natural limits of the environment."<sup>102</sup>

That graphic description encapsulates what some authors appear to believe has happened with pest plants in fynbos: from a single introduction of a few plants, they have spread far and wide by natural dispersal. That was the assumption made by Roux about the acacias on the Cape Flats (Section 1.2). It has been extended by other authors:

"These two sand-binders [*A. cyclops* and *A. saligna*] have now spread by natural means, not only over most of the Flats, but also in favourable habitats along the west and east coasts as far as Olifants River and Port Elizabeth, respectively."<sup>103</sup>

"From the time of the earliest records in 1834, a number of introduced species... have spread, largely by natural means, over an area of some 430 000 ha in the South Western and Southern Cape."<sup>104</sup>

"Our earliest records show that Baron von Ludwig introduced stinkbean to his garden in 1833. These plants, as well as those sown by Sir John Herschel on his estate 'Feldhausen' near Claremont between 1834 and 1835, were probably the nuclei from which the species subsequently spread."<sup>105</sup>

That Elton's view of the invasion process is not always applicable is shown by the example of the European rabbit in Australia. The accepted account of its invasion until 1969 was Eltonian: the millions of rabbits that were over-running Australia by the year 1950 (when biological control was introduced) all derived from a few animals liberated on a farm near Geelong, Victoria, in 1859.<sup>106</sup> Their rate

of spread (e.g. 110km in a year in New South Wales) was described by a zoologist as "extraordinary" and "not easy to explain satisfactorily in biological terms".<sup>107</sup> This is particularly emphasised by the fact that in their natural habitat individual rabbits seldom move more than 0,5km from their place of birth.<sup>108</sup>

Now, however, after E.C. Rolls's exhaustive analysis of historical records, it is known that rabbits were released by people not just once, but many times and in many places.<sup>109</sup> The mystery of how the rabbits crossed the arid Nullarbor Plain and spread across Western Australia in only 16 years has been solved. Rolls found evidence that young rabbits had actually been taken there and released by travellers.<sup>110</sup> The absence of rabbits from most parts of Queensland was attributed by Rolls not to limiting conditions of the environment, but to the fact that rabbits had no economic value in those areas, there being no skin or carcass industry, nor any bounty system. He concluded:

"It was worth no one's while to turn out rabbits and they did not travel far without aid."<sup>111</sup>

As a result of Rolls's study it is now clear that the invasion of Australia by rabbits was achieved after multiple introductions by man at many localities. In other words, man was the agent of dispersal responsible for forming the framework of the rabbit's ultimate geographical distribution. Natural dispersal then filled in that framework.

To what extent has man performed a similar role with the pest plants in the Cape? If an historical study could answer that question, then a distinction could be made between the effects of dispersal by man and of that achieved naturally. This would then permit a clearer understanding of the latter process.

#### 1.4.8 Introductions that fail

The fourth conclusion reached by Elton was that for some taxonomic groups, particularly mammals and birds, very few of the many species that are introduced are actually successful. At least among birds, those that are successful in North America are the species that are best adapted to man-made habitats.<sup>112</sup> This leads one to ask whether the same phenomenon applies to alien plants in the Cape. Do the pest species represent a few successful invaders from among a large number of species originally introduced?

Thomson tackled this question in New Zealand. He observed:

"...the failure of a species to become established in a new country into which it has been introduced, under what appear to be most favourable conditions, is as important a biological problem as the success of another species...."<sup>113</sup>

An historical study of pest plants at the Cape might shed light on this question.

#### 1.4.9 Deliberate versus accidental introduction

A further point made by Elton was that one could distinguish between exotics introduced by mistake and those introduced deliberately. He observed that most insects belong in the former category, while "most mammals (other than rats and mice), birds, frogs, toads, and fish have been brought intentionally in the first instances, though many of them have become extremely harmful or unpopular afterwards".<sup>114</sup>

The distinction between deliberate and accidental introductions was also made by M. Bates in a discussion of man's role in dispersing organisms. He considered that plants introduced deliberately could be divided into four categories: major crops, minor crops, ornamentals and

landscape modifiers (i.e. plantings for reforestation, erosion prevention, etc.). He viewed the crop plants as "obligate cultigens" which, because of their dependence on man for survival, do not escape from cultivation to invade natural areas. There are, of course, exceptions to this generalisation. D.W. Gade noted a number of domesticated plants that have become naturalised away from their region of origin. His own study was of two species of orange that have become naturalised in Paraguay. They are now so common that they are widely regarded as part of the indigenous flora. The orange remains useful to man, "but has not (in the manner of many alien plants elsewhere) overwhelmed the land to become a noxious weed; it forms a component of the spontaneous vegetation rather than serving as a replacement of the natural vegetation".<sup>116</sup>

Bates considered that his third category of deliberately introduced plants (ornamentals) contained a large proportion of "facultative cultigens". Many of them readily escape to join other weeds or, in favourable conditions, the indigenous flora. He cited as examples *Lantana* and *Opuntia*. Both of those are pest plants in the Cape Province.

According to Bates, his final category (landscape modifiers) can scarcely be regarded as cultigens. Often they are indigenous species, but aliens are also frequently employed. He particularly noted the widespread use of Australian trees of such genera as *Eucalyptus*, *Casuarina* and *Melaleuca*. He did not discuss the invasiveness, or otherwise, of this category.<sup>117</sup>

Another author who distinguished between deliberate and accidental introduction of plants was J.P. Blaisdell. He pointed out that species that managed to become established and naturalised despite all the vicissitudes of accidental introduction, must be particularly "adaptable and aggressive". Consequently, he observed, "a high proportion of successful accidental introductions are, and will continue to be, pestiferous weeds".<sup>118</sup> This appears valid, although it does

not explain why they are successful. It suggests that a first step in the process of sorting out the relative aggressiveness of the pest plant species would be to know the circumstances of each one's introduction. This might be revealed by a study of historical records.

### 1.5 Comparisons with Other Mediterranean-Type Ecosystems

It was suggested in Section 1.4.6 that the process of invasion by pest plants in the south-western Cape may be linked with the characteristics of the natural vegetation. As already noted in Section 1.1, fynbos has structural analogues in the other regions of mediterranean climate of the world. It may be useful to compare the situations in those regions.

F. di Castri and H.A. Mooney noted that few areas of the earth's surface "have been more radically transformed by man" than the regions of mediterranean climate. This transformation has reached such proportions that it is difficult to recognise the "natural" ecosystem any more. They pointed out:

"A profound understanding of historical factors is therefore essential for explaining the structure and functioning of today's mediterranean ecosystems."<sup>119</sup>

An example of a consideration of historical factors is the investigation carried out by Mooney and his co-workers in California and Chile. They found that the vegetation in those two regions of mediterranean climate was not as similar structurally as would be expected on the basis of their similar climates. They concluded from an analysis of the history of land-use in the two regions that the dissimilarities resulted not from different evolutionary adaptations, but from dissimilar treatments by man through time. The more xerophytic character of the vegetation in Chile appeared to be a result of the

"very long history of intensive mistreatment which includes overgrazing, wood gathering and frequent burning" in that region.<sup>120</sup>

A comparison of the relative impact of man's activities on all five regions of mediterranean climate was made by H. Aschmann. He concluded that the Australian mediterranean regions "may well be the world's most disturbed". He attributed this chiefly to the relatively flat topography coupled with the large-scale commercial grazing and cropping carried out in those regions. By contrast, in the Cape region of South Africa the far steeper terrain had caused agriculture to be restricted mainly to the intervening lowlands. As a result, he claimed,

"...the chaparral-like forests on steep slopes in the mediterranean parts of South Africa are perhaps the least modified in the world."<sup>121</sup>

The term "chaparral-like forests", although somewhat ambiguous, must have referred to mountain fynbos.

The specific question of alien plants in the mediterranean-type regions has been examined by a number of authors. Di Castri pointed out that man has become the main factor influencing the distribution of such plants in those regions. This has been achieved in two main ways. Firstly, man has introduced, both deliberately and accidentally, exotic species having a large range of ecological tolerance. Secondly, man has so altered the natural environment that the invasion or spread of xerophilous species has been particularly facilitated.<sup>122</sup>

The impact of alien plants on the Australian mediterranean regions (which, as Aschmann pointed out, may be the most disturbed) was investigated by R.L. Specht. He noted first of all that the natural vegetation was not homogeneous, its structure being related to soil fertility. On fertile soil the understorey originally comprised perennial grasses and other herbs on which the indigenous grazing

fauna exerted little pressure. The introduction of mammals such as sheep, cattle and horses rapidly altered this ecosystem and allowed the understorey to be replaced by annual grasses and herbs that had been introduced from other mediterranean regions, especially Europe and the Cape. Specht found this replacement surprising, as he considered that the indigenous herbaceous flora showed a growth pattern more closely attuned to the climate, with growth occurring in spring rather than in summer.

On less fertile soils the original understorey comprised sclerophyllous shrubs. This vegetation had been subjected to very low stocking rates with introduced mammals, being used only for "scrub-grazing". It was found that very few alien plant species invaded this sclerophyllous understorey. When they did so, it was only along roadsides and in clearings, where soil fertility had been increased. The importance of increased fertility in allowing invasions to occur in this vegetation type was further evidenced by the fact that if phosphate fertilisers were applied in areas where the sclerophyllous understorey occurred, the spaces between the shrubs were invaded by introduced mediterranean-type annuals also.<sup>123</sup>

Specht thus implied that two important factors allowing the mediterranean ecosystems of Australia to be invaded by exotic plants are the introduction of exotic grazing mammals and the artificial increasing of soil fertility. Those are both examples of disturbance as discussed in Section 1.4.5.

There are two particularly noteworthy points from Specht's discussion. Firstly, the alien plants in question are annual grasses and herbs, unlike the pest plants of the Cape, which are predominantly woody perennials. Secondly, the alien plants he was considering originate from other regions of mediterranean climate. In regard to the second point, Di Castri and Mooney pointed out that a general feature of the mediterranean regions was "the massive interchange of cultivated and weed species of plants that has occurred between the

five areas ... with the Mediterranean basin region itself a major source".<sup>124</sup> Elaborating on that point, Cody and Mooney noted, however, that in general there have been few exchanges of woody species among those regions. The most notable transfer of this kind, they observed, was of woody Australian species to the Cape.<sup>125</sup> Once again, the situation in the Cape appears to be unique.

This discussion of the invasion process in mediterranean ecosystems has again stressed the importance of disturbance in allowing invasions to occur. It has also highlighted the impression that the Cape mediterranean region differs from the others in regard to both the degree of disturbance it has sustained and the growth habit of its invasive plants.

#### 1.6 Species Diversity in the Cape Flora

We turn now to a consideration of fynbos as a floristic unit rather than as a structural one. It has been noted already that one of the characteristics of the Cape flora is its high species diversity. Until recently, such diversity tended to be equated by ecologists with ecosystem complexity and this in turn was said to encourage ecosystem stability.<sup>126</sup> Stability is the tendency of the system to return to equilibrium after a disturbance.<sup>127</sup> On that reasoning, one would have expected that after a disturbance fynbos would re-establish itself. That it does so after fire has already been mentioned, and Taylor has commented that fynbos may well be more resistant than some other vegetation types to biotic pressures in general.<sup>128</sup> Its vulnerability to alien plants is therefore all the more surprising.

The development of the generalisation relating complexity and stability can be traced through the writings of several ecologists.<sup>129</sup> The evidence in its favour was set out by Elton in 1958. One of his lines of evidence was the fact that oceanic islands, which have low numbers of indigenous species, are particularly susceptible to invasion

by aliens.<sup>130</sup> Goodman has pointed out the weakness of that argument by noting that islands may be a special case (see Section 1.4.4).

Likewise, Goodman has questioned the validity of Elton's other evidence. On the basis of mathematical models, laboratory experimentation, empirical observation and abstract evolutionary reasoning, Goodman, as well as other ecologists, now seriously questions the complexity-stability generalisation. Goodman has gone further and "cautiously" suggested:

"...when a severe disturbance so scrambles a community as to nullify much of the evolutionary adjustment of its species-species interactions, then some measures of instability, such as the fraction of species subsequently lost, may well increase with diversity."<sup>131</sup>

Relating this statement to the Cape flora would result in the conclusion that a severe disturbance could cause increased instability, especially in terms of extinction of species.

While he did not specifically refer to the complexity-stability generalisation, F.R. Fosberg expressed a comparable view about the susceptibility of species-rich floras to disturbance. He argued that the occurrence of such floras was associated with habitat diversity, as follows:

"Since species differ in their means of tapping the resource pool, as well as in their requirements, an area of abundant and diverse resources usually supports a large flora."

Therefore, he reasoned, such an area "provides more favorable circumstances for new colonists to become established if there is any disturbance to give them a foothold".<sup>132</sup>

Thus, in terms of present-day thinking, it is not necessarily surprising that the Cape flora, with its high species richness, is unstable in the

sense of being vulnerable to invasion. Nevertheless, the key question of the role of disturbance remains. Fosberg obviously envisaged some form of physical disturbance allowing aliens to invade. Goodman, on the other hand, was less specific. In his statement quoted above, "severe disturbance" could be interpreted to refer to the actual process of invasion by aliens, however caused. The implication of the rest of his statement would then be that certain indigenous species in a rich flora such as that of Capensis could become extinct as a result of alien invasion. If this interpretation is valid and if the invasion by aliens does represent a severe disturbance, then there is cause for concern about the future of the Cape flora.

Another ecological concept that is often brought into discussions on species diversity is that of the niche. Fosberg employed the concept in his consideration of invasions. He stated that because island biotas are impoverished, there are unoccupied niches which are therefore available to invading species. Likewise, he stated, in areas of high species richness, physical disturbance creates new niches, which can then be occupied by aliens.<sup>133</sup> The idea of a vacant niche (although not expressed in those terms) has been related to fynbos in the suggestion that the success of the woody pest plants is evidence that trees should occur in fynbos.<sup>134</sup>

Discussions of invasions in relation to niches is fraught with difficulty because of the complexity of the concept. After making the statement referred to in the previous paragraph, Fosberg stated:

"...it is almost a truism that the niche occupied by an exotic is practically always one from which one or more native species have been potentially displaced."<sup>135</sup>

This is obviously a contradiction of his earlier postulate that aliens invade unoccupied or new niches.

On the basis of his statement quoted above and of the observation that

invasive plants tend to be "broadly tolerant" species, Fosberg further argued that the most important general effect of invasions is "the progressive impoverishment of the world's flora". He pointed out, in support of this, the monotonous cosmopolitan flora of the tropics that has resulted from the introduction of the same invasive species in various regions. He decried this development because such impoverishment was likely to lead to loss of ecosystem stability.<sup>136</sup> Likewise, L.L. Wester and H.B. Wood stated that the spread of the exotic plant *Clidemia hirta* in Hawaii was causing the "extensive replacement of diverse communities by a single species [which] may have serious ecological repercussions by reducing food-chain complexity".<sup>137</sup>

That type of reasoning is based on the complexity-diversity generalization, which, as discussed above, is no longer fully accepted. In any case, experience on islands, including those of Hawaii, has demonstrated that, rather than causing decreased diversity, the advent of alien organisms causes an increase in species richness because new species are added to the existing biota. The flora of Hawaii is believed to be three times larger now than before man arrived.<sup>138</sup> This does not mean that indigenous species of Hawaii have not become extinct, however. Recent data suggest that 12% of the Hawaiian flora have become extinct in modern times, as a result of changes such as those induced by agriculture and the introduction of goats.<sup>139</sup>

Why some regions are richer in species than others is a topic of debate among ecologists. As mentioned above, Fosberg related species diversity to habitat diversity. C.J. Krebs discussed six factors that have been proposed by various ecologists to explain variation in species diversity and suggested that all six interact to varying degrees in different communities.<sup>140</sup>

With regard to the high species diversity in the Cape flora, G.B. Cone suggested an explanation that simultaneously showed why Australian woody plants are successful invaders there. His explanation is not easy to follow, but he appears to propose that the high species

diversity results from recent climatic changes that have led to increased aridity. Because this aridity is so recent, the plants, although diverse, are "out of harmony" with their environment. In Australia, on the other hand, arid conditions have prevailed for a longer time and so "species have evolved much better adapted to the dearth of water [in summer] in the present Cape region than any of the indigenes".<sup>141</sup> His argument is not convincing, partly because it is not clearly expounded and partly because two of the Australian species he cited as examples, *Hakes gibbosa* and *H. sericea*, originate from a region that experiences a reasonably high rainfall that occurs throughout the year,<sup>142</sup> and therefore cannot be described as adapted to aridity.

This discussion of some ecological concepts related to species diversity has revealed the difficulty of extrapolating from them to explain invasions by aliens while the basic concepts themselves are not well understood. The role that historical studies could play in this context is therefore not well defined. Possibly the most fruitful activity would be an investigation of ecosystems as they were in the past to enable a comparison to be made with the present situation.

### 1.7 The Pest Plants as Aliens in Other Regions

In the previous two Sections the nature of the vegetation being invaded was considered. Now we turn to an examination of the pest plants themselves. For the sake of conciseness, the discussion here will be limited to the 15 major pest plants (Table 1.8.1).

In Section 1.5 it was noted that di Castri and Mooney made two generalisations about the alien plants that occur in the mediterranean-type ecosystems. One was that the Mediterranean basin itself is the major source of such plants for the other regions. This stresses the fact that the Mediterranean region, being close to the cradle of agriculture,

is the source of many of agriculture's products, both crop plants and the concomitant weeds.<sup>143</sup> The other generalisation was that second in importance as sources were the other mediterranean-type regions. This emphasises the commonly expressed observation that exotics are more likely to be successful in a region that is similar climatically to their original home.<sup>144</sup>

A consideration of Table 1.8.1 indicates that the first generalisation scarcely applies to the major pest plants, for only three of them originate from the Mediterranean basin, whereas most of them are from Australia.

Also indicated in Table 1.8.1 is the climatic classification of the region of origin of each species. It is clear that only six of the species come from regions that have a strictly mediterranean climate (Csa or Csb). Three of them emanate from climates of non-seasonal rainfall (Caf or Cbf). The other six come from regions where the climate ranges from the first type to the second. Thus there are 12 species for which success in a mediterranean climate is not unexpected in climatic terms and three for which such success is surprising: *Hakea gibbosa*, *H. sericea* and *Sesbania punicea*. Factors other than climate must be particularly favourable for the spread of those three species in the south-western Cape.

In Table 1.8.3 information on the pest plants as invaders in regions other than the Cape is set out. This information is derived from two types of source. One type is an attempt to list those parts of the world, other than the Cape, where the pest plants are naturalised or invasive. The other type comprises two publications that list the naturalised plants of New Zealand.<sup>145</sup> Comparison of the information from the two types of source indicates that the former is incomplete, at least in regard to New Zealand. Its reliability is therefore suspect, for it must represent an underestimate of both the number of species that are invasive elsewhere and also the range of countries in which the pest plants are invasive.

When the two sets of information are combined, it is revealed that of the 15 species at least 11 are known to be invasive in some other region of the world besides the Cape. It may therefore be surmised that the reasons for the success of those 11 species should be sought in either the innate characteristics of the species or their history at the hands of man, rather than in a putative susceptibility to invasion on the part of fynbos.

There remain four species for which these sources of information indicate no record of invasiveness elsewhere: *Acacia cyclops*, *A. saligna*, *Hakea gibbosa* and *Leptospermum laevigatum*. They may merit special attention in both ecological and historical studies.

A noteworthy observation from Table 1.8.3 is that, of the 15 pest species, nine are also naturalised in New Zealand, no region of which experiences a mediterranean climate. It has already been pointed out that the success of aliens in New Zealand is considered to be related to the effects of man-induced disturbances (Section 1.4.3).

When considering the alien flora of New Zealand, Allan noted that a strikingly large proportion of the Australian species were phanerophytes (trees and shrubs). This growth habit comprised 40% of the Australian species, whereas it formed only 10% of all naturalised exotics.<sup>146</sup> In other words, whereas invasive plants in general tend to be herbaceous, a relatively large proportion of invasive plants from Australia tends to be trees or shrubs. This concurs with the experience in the Cape that the woody pest plants are predominantly Australian.

Is this related to some special feature of the Australian flora? One way of answering that question would be to affirm that the Australian woody flora is innately more aggressive than the indigenous flora of the other southern lands. That explanation would be akin to the one conceived by Hooker and Darwin regarding the relative competitive ability of the northern and southern floras. Another way of answering the question would be to suggest that Australian trees and shrubs were more

extensively planted in both the Cape and New Zealand than such plants from other countries, and were therefore given greater opportunities to escape from cultivation. That hypothesis could be tested by historical methods.

Allan calculated in 1936 that there were 603 naturalised plant species in New Zealand. He eliminated 555 from consideration as aggressive invaders because they were either very rare or occurred mainly on waste land. This left 48 species classed as seriously invasive. He observed that of those 48 species the shrubs and trees tended to be the most imposing, in the sense of giving the appearance of totally over-running the landscape. He then showed that in each case their success could be related to disturbance of the habitat.

Several shrubs included in Allan's list of 48 are also pest plants in the Cape. He made the following observations on them: *Hakea sericea* had spread remarkably in heath country in North Island, but only in areas that had previously been burnt. *Acacia mearnsii*, *Albizia lophantha* and *H. suaveolens* tended to occur as thickets, or as components of the secondary succession, in modified heath, bush-burn pastures and various other induced communities, "without making any significant impression on unmodified vegetation". Again disturbance was seen as a necessary prerequisite for the establishment of these species.

Only one other of the Cape's 15 major pest species was discussed by Allan in his consideration of the 48 worst invaders. This was the herbaceous perennial *Hypericum perforatum*. He reported that it was locally prominent, but only in habitats strongly influenced by man, such as "bush-burn and other grassland".<sup>147</sup>

For information on the other four species that are indicated in Table 1.8.3 as occurring in both New Zealand and the Cape, we turn to Thomson's monumental work of 1922 in which he attempted to trace the history of all the alien flora and the fauna of New Zealand. As they were not included among Allan's 48 species, they may be assumed to be

less invasive and to occur mainly on waste land. The following observations are summarised from Thomson's book.

*Acacia longifolia*: recorded in 1896 as occurring in North Cape district.

*A. melanoxylon*: spreads to some extent by means of its seeds, as well as suckers, e.g. in Taranaki.

*A. pycnantha*: has been planted in wattle plantations; does not seem to spread to any great extent.

*Pinus pinaster*: spreads very freely and to a great distance; said to be dispersed by birds; evidence also for wind dispersal; recorded as occurring in "manuka scrub"; "hundreds of acres of scrub-covered land" near Auckland "are sprinkled with this tree"; so well established in some parts of the country that it was once thought to be native and it was named *Pinus nova-zealandica*; grows in a quite natural manner "in all sorts of unlikely places".<sup>148</sup>

From Thomson's remarks on *P. pinaster* one gains the impression that it was widespread and aggressive at the time that he was writing and yet Allan did not discuss it among the 48 worst invaders. The reasons for the discrepancy are not clear.

It is difficult to generalise about the discussion of the pest plants in this final Section, but several points should be emphasised. The pest plants are not all unique to the Cape. Their spread as invasives is not necessarily restricted to regions of mediterranean climate. In New Zealand, at least, their occurrence is related to human-induced disturbance. Furthermore, while the Cape may be unique among the regions of mediterranean climate in being invaded by Australian trees and shrubs (Section 1.5), this phenomenon also occurs in New Zealand. Finally, the fact that the south-western Cape and New Zealand have little in common ecologically suggests that historical factors may be important in explaining why they have a number of pest plants in common.

This Chapter has indicated the need for historical studies on the pest plants of the south-western Cape to augment other ecological and biogeographical research. In the following Chapter the question of historical research is discussed further.

## 1.8 Tables

TABLE 1.8.1 The major terrestrial pest plants in fynbos, as enumerated by A.V. Hall<sup>149</sup>

Species <sup>149</sup>	Growth habit <sup>149</sup>	Region of Origin	
		Location <sup>150</sup>	Climatic classification <sup>151</sup>
<i>Acacia cyclops</i> A.Cunn.ex G. Don	shrub or tree	SW Aust	Csb
<i>A. longifolia</i> (Andr.) Willd.	shrub or tree	Coastal areas of E Aust: NSW, Vic, SA	Cbf, Csb
<i>A. mearnsii</i> De Wild	tree	Aust: S Qld, S NSW, Vic, Tas, SE of SA	Caf, Cbf, Csb
<i>A. melanoxylon</i> R.Br.	tree	Aust: S Qld, NSW, Vic, Tas, SA	Caf, Cbf, Csb
<i>A. pycnantha</i> Benth.	shrub or tree	Aust: SE NSW, Vic, SA	Cbf, Csb
<i>A. saligna</i> (Labill.) Wendl.	shrub or tree	SW Aust	Csb
<i>Albizia lophantha</i> Benth.	tree	SW Aust	Csb
<i>Hakea gibbosa</i> (Sm.) Cav.	shrub	Aust: vicinity of Sydney (NSW)	Caf
<i>H. sericea</i> Schrad.	shrub	Aust: NSW, Vic	Cbf
<i>H. suaveolens</i> R.Br.	shrub	SW Aust	Csb
<i>Hypericum perforatum</i> L.	herbaceous perennial	Europe, inc. Mediterranean region	Cbf, Csa

(continued)

TABLE 1.8.1 (concluded)

Species <sup>149</sup>	Growth habit <sup>149</sup>	Region of Origin	
		Location <sup>150</sup>	Climatic classification <sup>151</sup>
<i>Leptospermum laevigatum</i> F.Muell.	shrub	Aust: Qld, NSW, Vic, Tas, SA	Caf, Cbf, Csa
<i>Nerium oleander</i> L.	shrub	S Europe: Mediterranean region	Csa
<i>Pinus pinaster</i> Ait.	tree	S Europe & N Africa: Mediterranean region	Csa
<i>Sesbania punicea</i> (Cav.) Benth.	shrub	S Amer: Argentina, Uruguay, S Brazil	Caf

TABLE 1.8.2 Terrestrial plants that are potential pests in fynbos, as enumerated by A.V. Hall<sup>152</sup>

Species <sup>152</sup>	Growth habit <sup>153</sup>	Continent of origin <sup>153</sup>
<i>Acacia baileyana</i> F. Muell.	shrub/tree	Aust
<i>A. dealbata</i> Link	shrub/tree	Aust
<i>A. decurrens</i> (Wendl.) Labill.	tree	Aust
<i>A. elata</i> A.Cunn. ex Benth.	tree	Aust
<i>Cytisus scoparius</i> Link	shrub	Europe
<i>Eucalyptus gomphocephala</i> A.DC.	tree	Aust
<i>E. lehmannii</i> (Preiss ex Schau.) Benth.	tree	Aust
<i>Homalanthus leschenaultianus</i> Juss. (= <i>H. populifolius</i> )	tree	SE Asia
<i>Lantana camara</i> L.	shrub/tree	S Amer
<i>Myoporum insulare</i> R.Br	shrub/tree	Aust
<i>Nicotiana glauca</i> Grah.	shrub/tree	S Amer
<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	grass	Africa

(continued)

TABLE 1.8.2 (concluded)

Species <sup>152</sup>	Growth habit <sup>153</sup>	Continent of origin <sup>153</sup>
<i>Pinus canariensis</i> C.Sm.	tree	Canary Islands
<i>P. halepensis</i> Mill.	tree	S Europe, W Asia, N Africa
<i>P. pinea</i> L.	tree	S Europe, N Africa
<i>Pittosporum undulatum</i> Vent.	shrub/tree	Aust
<i>Populus alba</i> L. (= <i>P. canescens</i> )	tree	Europe
<i>Rubus</i> spp.	shrub	cosmopolitan
<i>Solanum auriculatum</i> Ait (= <i>S. mauritianum</i> )	shrub	Madagascar, Mauritius
<i>Stipa trichotoma</i> Nees	tussock grass	S Amer

TABLE 1.8.3 Regions of the world, other than Cape Province, where the major pest plants are naturalised

Species	Regions where naturalised according to Stirton <sup>154</sup>	Reported as naturalised in New Zealand	
		by Thomson <sup>155</sup>	by Allan <sup>156</sup>
<i>Acacia cyclops</i>	-	-	-
<i>A. longifolia</i>	Uruguay, Argentina, California, Natal	X	-
<i>A. mearnsii</i>	Grown in India, Japan, Kenya, Tanzania, Uganda, Brazil, Uruguay, Argentina, Natal; has spread in some of those	X	X
<i>A. melanoxylon</i>	Argentina, California	X	-
<i>A. pycnantha</i>	-	X	-
<i>A. saligna</i>	-	-	-
<i>Albizia lophantha</i>	California, Canary Islands, Chile	X	X
<i>Hakea gibbosa</i>	-	-	-
<i>H. sericea</i>	-	X	X

(continued)

TABLE 1.8.3 (concluded)

Species	Regions where naturalised according to Stirton <sup>154</sup>	Reported as naturalised in New Zealand	
		by Thomson <sup>155</sup>	by Allan <sup>156</sup>
<i>H. suaveolens</i>	-	-	X
<i>Hypericum perforatum</i>	Australia, New Zealand, Chile, Canada, USA	X	X
<i>Leptospermum laevigatum</i>	-	-	-
<i>Nerium oleander</i>	India, USA, Mexico, Virgin Is., Australia	-	-
<i>Pinus pinaster</i>	-	X	-
<i>Sesbania punicea</i>	A number of countries, inc. USA	-	-

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28. H.C. Taylor, quoted by M.L. Cody & H.A. Mooney: Convergence versus nonconvergence in mediterranean-climate ecosystems (1978), p.310.
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## CHAPTER 2

## METHODS AND DOMAIN OF THIS STUDY

"The 'historical approach' is a somewhat grandiose term for a process of understanding which considers events in the past and the passage of time to be significant ecological factors. Its methodology consists essentially of discovering how a site came to be as it is from direct evidence, rather than from inference from the observed nature of the plant and animal communities on the site now."<sup>1</sup>

"We could have left man out, playing the ecological game of 'Let's pretend man doesn't exist'. But this seems as unfair as the corresponding game of the economists, 'Let's pretend nature doesn't exist'. The economy of nature and the ecology of man are inseparable and attempts to separate them are more than misleading, they are dangerous."<sup>2</sup>

## 2.1 General Approach

In the previous chapter it was stressed that the behaviour of invasive exotic species is intricately involved with human activities. In fact, human influences are so ubiquitous that they can scarcely be ignored in any ecological study. As Aschmann stated:

"Studies of ecosystems on this planet, except for those of very small areal extent, can be neither complete nor valid unless they take account of the pervasive and sometimes overwhelming role played by man's activities."

He then added:

"The salient difference between studying man's effects and those of other organisms is that in the former case historical rather than experimental data are central. We must try to learn what the resident society, or societies in sequence, did to their environment, when, and for how long in order to establish the framework in which other organisms might establish themselves and live."<sup>3</sup>

This concept, while relatively new to ecologists, is quite familiar to geographers as one of the approaches used in the subdiscipline of historical geography. C.T. Smith referred to it as the study of the evolution of the cultural landscape. The historical geographer who adopts this approach is primarily concerned with the transformation of natural landscapes by man. He uses historical data to document such activities of the past as the clearing of woodland, the draining of swamps, the imposition of the cadastral survey and the creation of towns, viewing them as the processes responsible for the pattern of the landscape that we see today.<sup>4</sup> The difference between the interpretation made by the historical geographer and that suggested by Aschmann is that the former tends to be interested in the resulting landscape as the home of man, whereas the ecologist is interested in the resulting ecosystem as the habitat for other organisms.

Biological disciplines other than ecology are also interested in historical studies. One of them is biogeography. Historical biogeography attempts to explain the present-day distribution patterns of organisms by an examination of the past. It is involved with time-scales of the order of tens of thousands or even millions of years. Therefore its method of analysis involves inference based on present patterns, phylogenetic relationships, fossils and geophysical mechanisms.

Biogeography is also a subdivision of geography, in which discipline it is seen by some of its practitioners as the bridge between the two, rather discrete, major branches of physical and human geography. This view of biogeography led N.M. Wace to the opinion that the impact of man on the rest of the biosphere was an important and essential part of its studies. That impact includes man's role as a disseminator of plants and animals around the world. If a biogeographer wishes to understand the distribution range of such organisms his research will inevitably consider cultural records. Wace suggested:

"It may therefore be possible to make reconstructions of the historical biogeography of the recent past that are much less speculative than those provided by the meagre fossil evidence through most of geological time...."

Modern historical biogeography of this kind, based primarily on written documents, was referred to by Wace (following Bennett<sup>5</sup>) as cultural biogeography.<sup>6</sup> Several of the studies on invasions that were discussed in Chapter 1 were carried out by biogeographers from university departments of geography and were of this type.<sup>7</sup>

Another discipline with an interest in history is the relatively new one of sociobiology. It has been suggested that, as the concepts of sociobiology become more generally entrenched, disciplines such as history, and others that are traditionally the preserve of the humanities, will in time be reduced to specialised branches of biology.<sup>8</sup>

Whether or not one wholly accepts this extreme view, it is obvious that there is a place for historical studies within the broader bounds of biology, as well as geography.

In Chapter 1 several studies were suggested as being relevant to the pest plant problem and susceptible to historical analysis. In practical terms, not all of them are feasible, because of the nature of the available historical records. While one might happen to chance upon some relevant information, an historical study needs to be more than a serendipitous rummaging through old documents. The boundaries of the problem under consideration need to be defined at the outset, in order to avoid time-consuming side-tracks.

Ideally, one would hope to erect an hypothesis that could be tested by the use of the historian's methods. One such hypothesis would be that a particular area of land on which pest plants were found had undergone disturbance from human activities in the past. In order to reject the null hypothesis (and so accept the hypothesis) one would need to locate evidence that disturbance had occurred. However, if no such evidence were found, this could not be interpreted as meaning that disturbance definitely had not taken place. It could mean nothing more than that records of such an event had not been located. Thus one may never be in a position to reject the null hypothesis absolutely.

It follows that all events of the past may be considered to belong to one or other of two categories: those that have been recorded and those that have not. Only the first category of events is potentially available to the historian as raw data with which an hypothesis of the kind suggested above could be tested. The second category can only be inferred on the basis of information from the first.

The first category (events that have been recorded) can also be divided into two classes: those for which the historian locates the records and those whose records elude him. Part of the historian's task is to increase the size of the former class. The hypotheses that he erects

relate therefore to the probability of finding information relevant to his topic. Instead of working his way through all the records in an archives depot, he makes an hypothesis that a particular document (or set of documents) will contain information relating to the subject. He tests the hypothesis either by reading the document completely or by some form of sampling, such as looking up key words in the index or focussing on statements by particular persons who he knows were involved in the events under consideration. As is normally the case in scientific research, such hypotheses are based on previous knowledge and consideration of the topic.

As far as the pest plants are concerned, even basic information on their history in the Cape is not known. The published information on the date and manner of their arrival is tentative.<sup>9</sup> The role played by man in their spread has not been documented, except partially in regard to acacias.<sup>10</sup> Thus, base-line temporal and spatial data on these species are almost entirely lacking. Without them it is impossible to proceed to more detailed studies such as rates of spread. It was therefore decided that this present study should attempt to document the introduction and deliberate spread by man of the pest plants. It was felt that spread other than by man (that is, by natural dispersal) was unlikely to have been recorded, except by chance, and therefore its documentation was not considered to be a major objective.

In general scope, then, the aim of the study is to reconstruct the chronology of events involving the pest species and man from the time of the plants' arrival to the present day. By carrying the survey through to the present one hopes to avoid the criticism that was made of Roux's study in Section 1.2.

It was also decided that the chronological account should concentrate on a particular region, rather than the whole of the Cape Province, in order to avoid diffuseness of effort.

The study envisaged at the outset was analogous to that reported in

1974 by P. Rixon on the woodland known as Bedford Purlieus in England. This was not specifically a study of alien plants. It chronicled the documentary evidence for both active planting and also selective encouragement and removal of particular shrub and tree species in the woodland over several centuries. The study showed that the present-day composition of the woodland reflects the effects of those human activities as much as the effects of other ecological factors.<sup>11</sup>

Rixon's study has been criticised by J. Barkham for its failure to resist the temptation "to give a near verbatim account in chronological order of as much of the documentary evidence as possible". He pointed out that it is preferable to attempt the (admittedly more difficult) task of "discerning the principal features and trends and considering them in terms of present-day attributes of the site - in other words, to answer specific questions, however fascinating the peripheral detail".<sup>12</sup>

While the validity of that criticism is accepted, it appears that Rixon's contribution should be viewed in context. It was one of 16 papers presented at a meeting of the Historical Ecology Discussion Group.<sup>13</sup> The purpose of the meeting was both "to present the facts about a rich, interesting and well-known site" and also "to consider the value or otherwise of the historical or developmental approach to woodland ecology and management through the example of Bedford Purlieus".<sup>14</sup> Topics covered by the papers ranged from archaeology, history and earthworks, to geology, botany and zoology, and then to management. Rixon's paper was thus one of those that presented the facts about the site. It was left to the authors of the papers on management to take those facts into account in their overall assessment.

Nevertheless, in view of Barkham's criticism discussed above, it was decided that in this present study the chronological account should be presented in a manner that emphasised those processes that appeared to be most important in explaining the present-day distribution of the pest plants. Moreover, after the presentation of the chronology there

would be a discussion that attempted to use data from the chronology to answer specific questions about the region under consideration. The approach used in this study therefore conforms generally with that of the relatively new discipline of historical ecology, as espoused in the report on Bedford Purlieus and also in other works by G.F. Peterken and O. Rackham.<sup>15</sup>

Inasmuch as this study is concerned with alien plants and man's role in their spread, it may also be considered to belong in the category of modern historical biogeography, or cultural biogeography, as discussed earlier in this Section.

## 2.2 The Cape Town Region

As the available information suggested that most of the pest plants were first introduced to South Africa at or near Cape Town,<sup>16</sup> the environs of that city appeared to be the most appropriate region for this study. Those environs include two remarkably contrasting terrain types.

Only four kilometres south of the city's Central Business District, which is virtually at sea-level, the steep northern face of Table Mountain rises abruptly to an altitude of 1087m. From there southwards for 45km the Cape Peninsula forms a continuous mountain range whose summit rarely dips below 300m altitude. Eastwards of the city and the northern half of the Peninsula are the sandy, low-lying Cape Flats. They have an area of some 500km<sup>2</sup> and rise only 76m above sea-level at most.<sup>17</sup> These two terrain types support distinctive vegetation types: mountain fynbos and coastal fynbos, respectively.<sup>18</sup> Thus, there are examples of two of the four vegetation types of the Fynbos Biome close to Cape Town.

For the purposes of this study, it was decided to define the region of

interest as the northern Cape Peninsula and the Cape Flats (see Map 1). The southern boundary on the Peninsula was considered to be the Fish Hoek Gap, a line from Kommetjie to Fish Hoek. The northern Peninsula as defined in this study is therefore virtually identical with that considered in the repeat mapping study of alien plants carried out by McLachlan *et al.* and described in Section 1.2. In that study, however, only sites above 150m altitude were included.

The northern Peninsula includes the following mountains: Signal Hill, Lion's Head, Devil's Peak, Table Mountain, Karbonkelberg, Constantia-berg, Chapman's Peak, Noordhoek Peak, Muizenberg and Kalk Bay Mountain. Occasionally, the name Table Mountain is used in a broad sense to refer collectively to all of the first four mountains named above. When the name Table Mountain is used in the narrow sense, it includes two plateaux. The higher, more northerly plateau consists of the Western and Eastern Tables, the summit of the mountain being near the eastern end of the latter. The lower, more southerly plateau is often referred to as Back Table. Drainage from the plateaux is approximately southwards via Disa Gorge and Disa Stream which deeply dissect the lower plateau and join together in the valley known as Orange Kloof. Five water supply reservoirs are situated on the headwaters of those streams, on Back Table.

Rainfall varies considerably over the Peninsula. On Table Mountain, for example, the highest annual rainfall occurs on the lower plateau (1780mm), with similarly high values on the eastern cliffs and slopes. The western and northern slopes and Signal Hill, on the other hand, receive less than 890mm per year. While precipitation occurs predominantly in the winter, there is also moisture input from mists in summer on the summit and eastern and southern cliffs.<sup>19</sup>

Geologically, the Cape Peninsula is dominated by the horizontal strata of sandstone and shale of the Table Mountain Series. These form the spectacular cliffs of the upper levels of the mountains. At the northern end of the Lion's Head - Signal Hill ridge and on the lower

slopes of Devil's Peak, the underlying Malmesbury shale is exposed. Otherwise, granite forms the lower slopes of most of the mountains of the northern Peninsula.<sup>20</sup> No correlation between geology and vegetation type appears to have been described.

As noted above, the vegetation of the Peninsula is broadly classified as mountain fynbos. The plant communities of Table Mountain were described by R.S. Adamson in the 1920s and 1930s.<sup>21</sup> More recently, E.J. Moll and B.M. Campbell reconsidered the vegetation. They described two main types: forest and fynbos. The forests, consisting of broad-leaved, evergreen species 12 to 25m in height, are largely confined to the sheltered south-facing slopes and the ravines.<sup>22</sup> They are believed to be the remnants of a far more extensive forest cover that once extended along the eastern slopes and throughout Orange Kloof, but was largely destroyed by the European settlers at Cape Town within 50 years of the town's establishment in 1652.<sup>23</sup>

Fynbos is the more extensive vegetation type. It is a shrub community rarely exceeding 2,5m in height. Moll and Campbell divided the fynbos into two subtypes: that of the lower slopes and that of the plateaux and moist upper slopes. Further division of those subtypes resulted in a total of seven facies of the fynbos vegetation.<sup>24</sup>

Moll and Campbell pointed out that very little remained of the natural vegetation as it existed in 1652. This was particularly true of the lower slopes, "which at present are covered by plantations and stands of introduced plant species, or, if covered by indigenous vegetation, they are essentially fire-maintained pioneer communities".<sup>25</sup>

Eastwards of the escarpment of the northern Peninsula, the mountains slope gently away to merge with the Flats. The transition zone between mountain and plain was the site of the first farms established after the initial agricultural settlement at Cape Town.<sup>26</sup> Subsequently this zone formed the core of the city's suburbs.

The Cape Flats form a sand-covered plain, with an average elevation of 34m, separating the Cape Peninsula from the rest of the south-western Cape Province. The Flats are bounded on the north by the Tygerberg and Boffelary Hills, on the east by the Eerste River, and on the south by the coast of False Bay.

The surface sand of the Flats, which varies in depth to a maximum of about 30m, forms a series of parallel dunes running south-east to north-west, in line with the prevailing winds, with a belt of foredunes along the coast. In general, the sand is quartzitic, but there are also areas of calcareous sand and occasional interlayered clay bands. Because the annual rainfall of 360 to 435mm occurs almost entirely in winter, the low-lying interdune areas tend to become waterlogged in that season. Even in summer, the water table is relatively high in those areas. The poor drainage is partly attributable to the presence of calcrete and ferricrete pans. On the dunes, on the other hand, the freely-draining sand provides a relatively arid environment throughout the year.<sup>27</sup> For plants to succeed on the Flats, they must be able to cope with these edaphic conditions as well as with the persistent and strong winds.

As noted above, the vegetation of the Flats is classified broadly as coastal fynbos. Despite the proximity of the area to Cape Town, the vegetation was not described in detail until 1972. By that time it was severely altered by human activities: suburban and industrial development in the north and west and farming over much of the rest. In many places, the aliens *Acacia cyclops* and *A. saligna* replaced whatever indigenous vegetation originally occurred. Nevertheless, H.C. Taylor described nine natural plant communities. They were all low and scrubby, the tallest woody components being only two to three metres high.<sup>28</sup> Those remnant communities give some indication of the diverse flora that must have occupied the Flats before large-scale disruption by humans occurred. Confirmation that such a flora existed is provided by the writings of a much earlier botanist, F. Masson, who in 1776 described the Flats as "overgrown with an

infinite variety of plants". Likewise, W.J. Burchell in 1811 found a "great variety" of bushes covering most parts of the Flats.<sup>29</sup>

### 2.3 Thirteen Pest Plant Species

It would be a very complex task to document planting activities involving all of the 35 species listed in Tables 1.8.1 and 1.8.2. It was therefore decided to concentrate on a smaller group of species and to provide less extensive information about the others.

The thirteen pest plant species on which this study focusses are listed in Table 2.5.1. They are all shrubs or trees. They comprise 11 Australian species in four genera: *Acacia* (six species), *Albizia* (1), *Hakea* (3) and *Leptospermum* (1) and two species of *Pinus* from the Mediterranean region. While *Pinus pinaster* is a pest throughout the southwestern Cape, *P. halepensis* is not generally considered such a serious problem. On Table Mountain the latter is far less widespread than *P. pinaster*. Nevertheless, it was classed as a pest plant there by Moll and Campbell.<sup>30</sup>

When one is dealing with historical records it is necessary to be aware of old names for the species under consideration, as well as the current names. For various reasons, it frequently happens that one plant species acquires more than one Latin name. When this is eventually discovered during the course of a taxonomic revision, one named is decreed to take precedence. That name replaces all the others thereafter and the redundant names are referred to as synonyms. In Table 2.5.1 the important synonyms for each species are given. This reduces the necessity for explanatory notes in the presentation of the chronology in Chapters 3 to 6. For example: in the text of those chapters the name *Leptospermum laevigatum* can be used throughout, even though some of the sources actually used the synonym *Fabricia laevigata*.

in the presentation of the chronology, species other than the thirteen pest plants are inevitably referred to. If the presently-accepted name is different from that which was used in the source material, the following example shows the procedure that is followed. *Pinus radiata* was formerly also known as *Pinus insignis* and 19th century botanists commonly used the latter name. Thus, *P. insignis* is a synonym of *P. radiata*. In the text this is indicated as: *P. radiata* (= *P. insignis*).

All of the species in Table 2.5.1 (except *P. halepensis*) were described and illustrated in Stirton's handbook on the pest plants.<sup>31</sup> Their growth habit is indicated in Table 1.8.1 or 1.8.2. It is necessary at this point to discuss some morphological similarities among certain species, for they have led to confusion in the past. The species to be discussed are the six species of *Acacia* and the three of *Hakea*. The major similarities and differences are summarised in Tables 2.5.2 and 2.5.3.

Table 2.5.2 indicates that only *A. mearnsii* of the six Australian acacias has the feathery compound leaves that are so characteristic of indigenous African species of the genus. The other five species, when mature, bear phyllodes (swollen leaf stalks) instead of true leaves. The phyllodes resemble simple leaves. The young seedlings bear compound leaves, but those are soon replaced by phyllodes as the plants grow.

The table suggests that among the five phyllodinous species there are two pairs in which confusion is likely to occur. Thus, *A. pycnantha* and *A. saligna* are very similar to each other, and likewise, *A. cyclops* and *A. melanoxylon*. Both *A. pycnantha* and *A. saligna* were placed in the sub-generic group *Falcatae* in the pioneering classification of the *Acaciae* by G. Bentham in 1842 because of their falcate or slightly curved phyllodes.<sup>32</sup> In practice, however, it is nearly always possible to distinguish between them because the phyllodes of *A. pycnantha* are far more noticeably falcate. It is also relatively

easy to differentiate *A. cyclops* from *A. melanoxydon* because the former is a bushy shrub whereas the latter is a tall, slender tree.

More confusion actually occurs between young plants of *A. cyclops* and *A. longifolia*, because their phyllodes are very similar. Once they are in bud, or in flower, however, they are easily distinguished.<sup>33</sup>

As Table 2.5.3 indicates, *Hakea suaveolens* is readily distinguished from the other two species of *Hakea*. *H. gibbosa* and *H. sericea*, on the other hand, tend to be confused with each other, unless attention is paid to their leaves. Other differences, as well as those shown in the table, are that *H. gibbosa* has larger fruits and that the flowers are a deeper cream in colour.<sup>34</sup>

#### 2.4 Source Material

There is no collection of documents in the Cape Archives Depot labelled "Pest Plants". To conduct historical research on their introduction and planting, therefore, one is obliged to approach the topic indirectly through a series of hypotheses as described in Section 2.1. The list of sources at the end of this report shows the full range of material from which information was obtained. Here the general method of approach to the sources is outlined.

The starting point for this study was Roux's paper of 1961 on the history of Australian acacias on the Cape Flats.<sup>35</sup> This led to an appreciation of the need to examine the records of the authorities responsible for forestry in the Cape both before and after the period 1875-1892, which had been considered by Roux. That period also had to be reconsidered.

The governmental authority charged with responsibility for forestry has had various names over the years, but there is a complete series of

published annual reports from 1876 onwards, as the list of sources indicates. Throughout the text of Chapters 3 to 6, the term "forestry department" is used to refer to the appropriate authority in the period under consideration. This convention has been adopted to obviate the confusing use of complicated departmental titles.

Roux's paper also led to an appraisal of the information contained in E.E. Mossop's history of the roads of the Cape,<sup>36</sup> on which Roux based his statements about planting that was carried out in the late 1840s. Mossop's material was derived from W.A. Newman's biography of John Montagu.<sup>37</sup> From the latter book it became evident that the operations of the Central Board of Commissioners of Public Roads were pivotal to this study. Its annual reports, covering the years 1845 to 1858, were also located. This left the period 1859-1875 to be accounted for. The authorities who took over from the last-named body were the Chief Commissioner of Roads and, later, the Chief Inspector of Public Works. They also published annual reports regularly. Thus, a continuous series of reports from 1845 to 1875 was available to provide the basic framework of the chronology for Chapters 4 to 6.

Manuscript materials from most of the authorities mentioned above were also located, as is indicated in the list of sources. The Cape Archives Depot gave me access to the inventory of the records of the Public Works Department, which was still being compiled at the time of my research. Manuscript records of the forestry department after 1910 are stored in the Pretoria Archives Depot. I was informed that they were inaccessible as they were unsorted and there was as yet no inventory.

From this basic material the research was extended to other archival documents such as the records of the Colonial Office and of the various municipalities in the Cape Town region, and also maps. Consideration was also given to appropriate published materials such as the various magazines published in Cape Town in the 19th century, the annual reports of such entities as municipalities, the Colonial Botanist, the

Cape Town Botanic Garden and the Railways Department, and the annual journal of the Mountain Club of South Africa. No systematic search of newspapers was conducted, but clues to newspaper references from other sources were investigated.

It soon became obvious that a number of the Australian pest plants were in Cape Town before the date of 1847 suggested by Roux as their date of introduction. This realisation led to an exploration of the history of the city's early botanical gardens. For this, F.R. Bradlow's biography of Baron von Ludwig<sup>38</sup> provided useful sources.

The attempt to document the introduction of the pines to Cape Town, which forms the earlier part of Chapter 3, began with M.C. Karsten's history of the Cape Town gardens<sup>39</sup> and M. Grut's history of forestry.<sup>40</sup> From there a widely-ranging trail of clues was investigated, as is described in that Chapter.

The chronology as presented still has many gaps. There are also many inferences and surmises, but every effort has been made to explain the reasoning behind them. It is hoped that this presentation of a detailed, fully-documented account of 13 pest plants in the Cape Town region will provide a basis for new ecological studies. As other documentary materials become available, it should provide the impetus for more extensive historical studies in the future.

## 2.5 Tables

TABLE 2.5.1 The thirteen woody alien plant species of major interest to this study

Latin name	Important synonyms <sup>41</sup>	Vernacular name <sup>42</sup>
<i>Acacia cyclops</i> A. Cunn. ex G. Don	<i>A. cyclops</i>	rooikrans
<i>A. longifolia</i> (Andr.) Willd.	-	long-leaved wattle
<i>A. mearnsii</i> De Wild	<i>A. decurrens</i> <i>A. mollissima</i>	black wattle
<i>A. melanoxylon</i> R. Br.	<i>A. latifolia</i>	blackwood
<i>A. pycnantha</i> Benth.	<i>A. falcinella</i>	golden wattle
<i>A. saligna</i> (Labill.) Wendl.	<i>A. cyanophylla</i> <i>A. leiophylla</i>	Port Jackson willow
<i>Albizia lophantha</i> Benth.	<i>Acacia lophantha</i> <i>Albizzia lophantha</i> <i>Albizia distachya</i>	stinkbean
<i>Hakea gibbosa</i> (Sm.) Cav.	-	rock hakea
<i>H. sericea</i> Schrad.	<i>H. acicularis</i> <i>H. tenuifolia</i>	silky hakea
<i>H. suaveolens</i> R. Br.	-	sweet hakea
<i>Leptospermum laevigatum</i> F. Muell	<i>Fabricia laevigata</i>	Australian myrtle
<i>Pinus halepensis</i> Mill.	<i>P. maritima</i> <i>P. sylvestris</i>	Aleppo pine
<i>P. pinaster</i> Ait.	<i>P. maritima</i>	cluster pine

TABLE 2.5.2 Morphological comparison of six Australian species of *Acacia*<sup>43</sup>

Morphological character	Species
Compound leaves	<i>A. mearnsii</i>
Phyllodes resembling simple leaves	
With one longitudinal vein	
Globular flower heads	<ul style="list-style-type: none"> <li>  <i>A. pycnantha</i></li> <li>  <i>A. saligna</i></li> </ul>
With more than one longitudinal vein	
Globular flower heads	<ul style="list-style-type: none"> <li>  <i>A. cyclops</i></li> <li>  <i>A. melanoxylon</i></li> </ul>
Flowers in spikes	<i>A. longifolia</i>

TABLE 2.5.3 Morphological comparison of three species of *Hakea*<sup>44</sup>

Morphological character	Species
Simple, greyish-green leaves	
Leaves 40-80mm in length, hairy	<i>H. gibbosa</i>
Leaves less than 40mm in length, smooth	<i>H. sericea</i>
Compound, bright green leaves	<i>H. suaveolens</i>

## 2.6 Notes

1. G.F. Peterken: Historical approach to woodland ecology and management (1975), p.3.
2. M. Bates: The Forest and the Sea (1960), p.226.
3. H. Aschmann: Human activities affecting mediterranean ecosystems (1973), p.361.
4. C.T. Smith: Historical geography: current trends and prospects (1965), pp. 121,125.
5. C.F. Bennett: Cultural zoogeography... (1960).
6. N.M. Wace: The units and uses of biogeography (1967), p.24.
7. D.R. Harris: The invasion of oceanic islands by alien plants... (1962); D. Watts: Persistence and change in the vegetation of oceanic islands... (1970); N.M. Wace: Alien plants in the Tristan da Cunha islands (1967).
8. E.O. Wilson: Sociobiology (1975), p.547; G.N. Louw: The biological sciences in South Africa... (1978), p.261.
9. C.H. Stirton (ed.): Plant Invaders (1978).
10. E.R. Roux: History of the introduction of Australian acacias on the Cape Flats (1961).
11. P. Rixon: History and former woodland management (1975).
12. J. Barkham: [Review of] Bedford Purlieus... (1976).
13. G.F. Peterken & R.C. Welch (eds): Bedford Purlieus (1975).
14. G.F. Peterken & R.C. Welch (eds): Bedford Purlieus (1975), p.1.
15. O. Rackham: Historical studies and woodland conservation (1971); G.F. Peterken & J.C.E. Hubbard: The shingle vegetation of southern England... (1972); O. Rackham: Hayley Wood (1975); O. Rackham: Trees and Woodland in the British Landscape (1976).
16. C.H. Stirton (ed.): Plant Invaders (1978).

17. Trigonometrical Survey Office: South Africa, 1:50 000 sheets, 3318CD, 3318DC, 3418AB&AD, 3418BA (1970).
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The names of the veld types are as modified by J. Day *et al.*:  
(eds): Fynbos Ecology (1979), p.vi.
19. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.9.
20. J.A. Mabbutt (ed.): The Cape Peninsula (1952), p.3.
21. R.S. Adamson: The plant communities of Table Mountain, preliminary account (1927), part 2 (1931), part 3 (1935).
22. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.10.
23. B.M. Campbell & E.J. Moll: The forest communities of Table Mountain, South Africa (1976), p.2.
24. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), pp.12-16.
25. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.10.
26. G.M. Theal: History of South Africa, Vol. 3 (1922), pp.55-64.
27. H.C. Taylor: Notes on the vegetation of the Cape Flats (1972), p.637; UG18-1943 Report of a Committee of Enquiry into Conditions Existing on the Cape Flats.
28. H.C. Taylor: Notes on the vegetation of the Cape Flats (1972).
29. F. Masson: An account of three journeys... (1776), p.269;  
W.J. Burchell: Travels in the Interior of Southern Africa, Vol. 1, (1822), p.43.
30. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), pp.20-21.
31. C.H. Stirton (ed.): Plant Invaders (1978).
32. G. Bentham: Notes on *Mimoseae*... (1842), pp.351-353.

33. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.25.
34. S. Naser: Rock hakea (1978), p.72.
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37. W.A. Newman: Biographical Memoir of John Montagu (1855).
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42. As used by C.H. Stirton (ed.): Plant Invaders (1978).
43. Information extracted from J.H. Ross: The naturalized and cultivated exotic *Acacia* species in South Africa (1975).
44. Information extracted from C.H. Stirton (ed.): Plant Invaders (1978), pp.72-83.

## CHAPTER 3

## THE INTRODUCTION OF EXOTIC TREES AND SHRUBS

TO THE CAPE, 1652-1848, WITH

SPECIAL REFERENCE TO THE PEST PLANTS

"Le *Protea argenta* ou arbre d'argent est le seul arbre naturel du pays, et le seul que la nature ait placé jusqu'à cent lieux dans les terres: toutes ces allées de chênes, de peupliers, de maronniers, et de noyers que nous admirons, sont venus des climats européens, et y ont dégénéré."<sup>1</sup>

"We know nothing equal for security against cattle equal to a hedge-fence now growing on the premises of the late Mr Merckel at the Half Way House. Independently of its protecting qualities, it is most remarkable for the distribution of its seed. When the fruit is ripe it opens, and borne on the breeze, two beautiful seedlings, in perfect appearance with the transparent wings of an insect, take their flight and become their own planters. Mr Bowie has favoured us with the following scientific description of this plant. It is well worth the attention of all landholders.... *Hakea gibbosa*, gibbous-fruited hakea...."<sup>2</sup>

### 3.1 Introduction

The introduction of exotic plants was a *sine qua non* of the original European settlement at the Cape. This was established by the Dutch East India Company in 1652 as a victualling station on the sailing route to the East Indies with Jan van Riebeeck as commander. Although the indigenous Cape flora is remarkably diverse, there is a paucity of plants useful for food, fuel, timber and shelter and thus it was inevitable that a variety of exotics, proven useful by experience elsewhere, would be grown. The earliest attempts to establish exotics took place in the Company's Garden, situated in what is now the heart of Cape Town. M.C. Karsten has described those attempts in her history of the Garden.<sup>3</sup>

While it is generally known that the common oak (*Quercus robur*) was introduced to the Cape in the 17th century,<sup>4</sup> less is known of the history of other tree species. The cluster pine (*Pinus pinaster*) and stone pine (*P. pinea*) form such a conspicuous component of the Cape Town landscape today, together with the oak, that one feels intuitively that they must also have been introduced very early. A number of 20th century authors have considered the question of when they were introduced, but it has not yet been satisfactorily answered.

In this Chapter the conclusions reached by some of those authors are considered before a re-examination of the question is made. Because its history is closely tied with that of *P. pinaster*, *P. pinea* is also included in this re-examination, even though it is not one of the 13 species of major interest to this study. It is one of the potential pests (Table 1.8.2). After this discussion there is an attempt to pinpoint the time of arrival of Aleppo pine (*P. halepensis*), the other northern hemisphere species among the 13 pest plants.

The other eleven pest plants owe their introduction to the intense interest in Australian plants that developed at the Cape in the

middle of the 19th century. Evidence relating to their introduction concludes the chapter.

### 3.2 Twentieth Century Authors on the Introduction of Conifers

#### 3.2.1 Godée-Molsbergen

Although he did not specifically examine the question of when pines were introduced, E.C. Godée-Molsbergen listed the cultivated plants that were introduced by Van Riebeeck in his history of the Cape in the 17th century. The source of his information was not indicated, but Karsten, having stated that it was not derived from Van Riebeeck's journal, suggested that it was possibly obtained from the instructions of the Company's Commissioners to Van Riebeeck.<sup>5</sup>

In Godée-Molsbergen's list (which was in Dutch) the only trees other than fruit or spice trees were *eiken* [oaks], *elzen* [alders] and *mastbomen*.<sup>6</sup> The identity of the last-named trees is considered later in this chapter.

#### 3.2.2 Legat and Zahn & Neethling

At the meeting of the British and South African Associations for the Advancement of Science held in Cape Town in 1929, three speakers addressed themselves to the question of the introduction of pines to South Africa. They were all members of the South African forestry department.

One of these speakers was C.E. Legat, who was head of the department. He stated that in G.M. Theal's History of South Africa he had found

evidence of oaks and firs being obtained from Holland in 1655 by Van Riebeeck. By 1659 the firs were still unsuccessful, but the oaks, and also ash and alder trees, were doing well.<sup>7</sup>

In an attempt to corroborate this information, I have examined Theal's publication for the period 1655 to 1661, but have found only the following relevant statement, on a page headed 1656: "Young oaks and firs were sent growing in boxes from Europe".<sup>8</sup> Evidently, Legat had mistakenly written 1655 instead of 1656, while his information relating to 1659 must have been from another, unidentified, source.

Legat then surmised, with no supporting evidence, that "the firs exported from Holland [in 1656] were *Pinus sylvestris* and possibly even some spruce (*Picea excelsa*)".<sup>9</sup> He was thus suggesting that the earliest conifers brought to Cape Town were Scots pine (*P. sylvestris*) and Norway spruce (*Picea abies* = *P. excelsa*).<sup>10</sup> How he arrived at that conclusion was not made clear. He added that it was not surprising that they were unsuccessful, as both species had subsequently been shown unsuited to conditions anywhere in South Africa in controlled forestry trials.

Legat described some very old specimens of stone pine that suggested that this species was "one of the first conifers successfully introduced into the country". He added that there was "some reason to suppose that the cluster pine (*P. pinaster*) also might have been introduced at the Cape 150 or more years ago", and thought it likely that the French Huguenots might have brought this species and *P. pinea* (both of which are indigenous to France) with them. He also suggested that, as cluster pine was known to have been introduced to the Atlantic Ocean island of St Helena in 1787, and was very likely to have been taken there on a ship en route from India via Cape Town to Europe (as many indigenous Cape plants had been), then the species must have been in Cape Town before that date.<sup>11</sup> The alternative possibility, that the transfer of cluster pine might have been in the opposite direction, was not mentioned.

The other speakers were G.A. Zahn and E.J. Neethling, who were Forest Officers at Tokai, near Cape Town. They examined archival material, Van Riebeeck's journal, and Theal's History of South Africa, and found references to the planting of oak, ash, chestnut and alder trees in the 17th century, but no mention of conifers.<sup>12</sup>

They then referred to the published accounts of P. Kolb and F. Valentijn, who both visited the Cape in the early part of the 18th century.<sup>13</sup>

From Kolb's work they obtained a list of seven tree species that were established in the Company's Garden at the time of his visit in 1705. One of them was reportedly named by Kolb as "'*Abies*: known in Germany as the Fir'". Zahn and Neethling suggested that this "may have been one of the Pines".

From Valentijn's description of the Company's Garden Zahn and Neethling extracted a list of trees that allegedly grew there in 1714. They also provided a list of trees that Valentijn "found growing in the various gardens". This list included *Abies* and *Pinus sylvestris*, but the two authors made no comment on this reference to coniferous species.<sup>14</sup>

If Legat's account is compared with that of Zahn and Neethling, it appears that the reference by the latter two to *P. sylvestris* and *Abies* must have been the source of Legat's unexplained statement that the fir trees mentioned in early records may have been *P. sylvestris* and possibly *Picea excelsa*. (It must be appreciated that the species known as *Picea excelsa* in Legat's time was originally named *Pinus abies* and is now called *Picea abies*.<sup>15</sup>) Legat's grounds for connecting the two sets of information were exceedingly flimsy, however, when one considers the time difference (1656 for the introduction of "firs" as against 1714 for Kolb's list of trees), the fact that the "firs" were reported to be unsuccessful and finally, Legat's emphasis of the unlikelihood that *P. sylvestris* and *Picea abies* could have succeeded.

After referring to Kolb and Valentijn, Zahn and Neethling then stated

that "although no specific reference to the introduction of the two principal pines, *P. pinaster* and *P. pinea*, has been found, it is probable that these became established at the Cape fairly early in its history". They suggested that some very old living specimens of stone pines indicated that this species must have been planted in the 18th century.<sup>16</sup>

In another paper presented two days later at the same meeting, Zahn and Neethling again briefly referred to the history of *P. pinaster*, this time stating that, although "the exact manner and date" of its introduction were not known, "there can be no doubt that the species came to the Cape before 1800". They thought it probable that it was brought by the French Huguenots, who arrived in Cape Town in the late 17th century.<sup>17</sup>

If Zahn and Neethling's two papers are compared with each other and with Legat's, it is clear that the idea that cluster pine was brought to the Cape by the Huguenots in the late 17th century originated with Legat and was adopted by the other two authors subsequently at the conference. The tendency among some recent authors to attribute the idea to the latter two, on the basis of their second paper,<sup>18</sup> thus ignores Legat's contribution. The tendency is understandable because, firstly, Zahn and Neethling's paper was published before Legat's and, secondly, the periodical in which the former paper appeared (South African Journal of Science) is better known in South Africa than that in which Legat's paper was published (Empire Forestry Journal).

In any case, the connection between cluster pine and the Huguenots was merely a suggestion, prompted by the fact that both originated from France. In an effort to test this hypothesis, I have examined C.G. Botha's history of the arrival of the Huguenots at the Cape, which was based on archival material. I have been unable to locate any references to the planting of conifers by these people, even though there is specific mention of the cultivation of other plants, including vines and olives, in the book.<sup>19</sup>

### 3.2.3 Karsten

Another author who mentioned the introduction of pines to the Cape was Karsten, in her history of the Company's Garden, published in 1951. The major source for her study was Van Riebeeck's journal. This was supplemented by a few other archival references, but there does not appear to have been a systematic examination of that type of material. In addition, she referred to various published accounts.

Karsten presented a list of the plants that, "according to the *Journal*", were "introduced and tried at the Cape" by Van Riebeeck. Included in the list were alders, ash trees, oaks and spruce-firs, and Karsten suggested that "the so-called 'spruce-firs' were probably pines, which are now found all over the Cape".<sup>20</sup>

At another stage Karsten attempted to evaluate the success of the various plant introductions made in Van Riebeeck's time and stated, without documentation:

"From the fatherland Van Riebeeck obtained most of the trees which in our time are found in gardens and farmyards. Of these trees the oak, the olives, the white and French poplar, the pines and the bay-tree, some of these trees being from Mediterranean regions, have adapted themselves best to the Cape climate."<sup>21</sup>

The inclusion of pines in this list was presumably based on her earlier reference to spruce-firs.

Karsten did not state precisely where in the journal she located the reference to spruce-firs, but elsewhere in her book a translated quotation from the journal of August 1656 implies that trees of this kind arrived from Holland shortly before:

"... the Commander, walking about in search of any trees which would be fit for transplanting around the gardens to serve as shelter from the heavy winds, etc., has found among other things a kind of spruce-fir, about 6 feet high and almost similar to what we received from home in the *Parl*...."<sup>22</sup>

Examination of Van Riebeeck's journal (published version) for this period shows that in the original Dutch the word that Karsten translated as spruce-fir was *sparreboom*.<sup>23</sup> Trees of this kind had evidently arrived shortly before on the ship *Parl*. These must have been the trees that Theal referred to as firs and that Legat guessed were *P. sylvestris* and possibly also *Picea abies*. In the published English version of the journal, *sparreboom* was translated as pine.<sup>24</sup>

There is an earlier reference to *sparreboom* in archival documents. In a letter to Van Riebeeck in March 1656 the Directors of the Company advised him that they were sending some *sparreboomtjes* to the Cape.<sup>25</sup> (The suffix indicates that the trees were small.) They were presumably those that arrived on the *Parl*. H.C.V. Leibbrandt, who was responsible for this letter appearing in published form, was evidently not sure what tree was meant by this term, for he merely translated it as "spar trees".<sup>26</sup>

This letter was also mentioned in the published versions of Van Riebeeck's journal, in footnotes to the entry of August 1656 discussed above. This time, the English translation referred to "fir trees", even though the word *sparreboom* had just previously been translated as "pines".<sup>27</sup>

In the letter of March 1656, after stating that some *sparreboomtjes* were being sent, the Company advised Van Riebeeck that an attempt would also be made to obtain seeds of "*sparre off Mastbomen*" to send to him. Leibbrandt translated this as "spars or mast trees (?fir)".<sup>28</sup>

This letter may have been the source of Godée-Molsbergen's statement that *mastbomen* were introduced to the Cape in Van Riebeeck's time (see Section 3.2.1). It appears from Leibbrandt's tentative translation that this term may also have referred to some kind of

conifer.

It is apparent from this discussion that there has been a great deal of confusion over the meaning of the words *mastboom* and *sparreboom*. To facilitate comparison, the various interpretations made by the modern authors discussed here are set out in Table 3.6.1.

Karsten also examined the publications of Kolb and Valentijn that were referred to by Zahn and Neethling. She gave a partial account of the list of exotic plants that, according to Kolb, grew at the Cape. Her list differed from Zahn and Neethling's but, like theirs, included "Abies (*sic*) (fir)".<sup>29</sup> With reference to Valentijn, Karsten merely stated that he "also published a list of Oldenland's plants".<sup>30</sup> H.B. Oldenland was Superintendent of the Company's Garden from 1692 to 1697.<sup>31</sup> She did not indicate the contents of the list.

Karsten then mentioned another source of information, namely J.S. Stavorinus's account of his journeys to the East Indies, published in 1798.<sup>32</sup> As an appendix to this publication, she stated, there was "an 'Abstract of the *Herbarius Vivus*, or Herbal, of Henry Bernard Oldeland [Oldenland], Superintendent of the Company's garden at the *Cape of Good Hope*, in the year 1695'". This catalogue, she continued, was followed by "a list of numerous exotics, which have been introduced to the country from Europe, Asia, and America". From this list she mentioned, *inter alia*, "Abies (*sic*) (fir)" and "*Pinus sylvestris* (pine)".<sup>33</sup>

None of this information from Karsten answers the question of when and how cluster and stone pine were introduced, but it does suggest sources that should be re-examined.

#### 3.2.4 Appel

A much more detailed analysis of archival sources was carried out by

A. Appel in 1966. He systematically examined not only Van Riebeeck's journal, but also the Resolutions, Memorials, Instructions, Letters Received and Despatched, Journals, etc. pertaining to the Dutch East India Company's presence at the Cape from 1652 to 1795, seeking *inter alia* all references to tree-planting. The material he located regarding conifers was small. It related to five different occasions: August and November 1656, March 1657 and the years 1700 and 1793.

The information from August 1656 was identical with that already discussed, but with some additional detail. Appel (writing in Afrikaans) stated that a few *sparboompies* (his translation of the Dutch *sparreboomtjes*) were received in that month and that they were one to two years old.

Appel further discovered that in November 1656 a barrel of *masboom* seed was received at the Cape.<sup>34</sup> Examination of Appel's source shows that the original Dutch word was *mastboomen*.<sup>35</sup> This shipment must have been the fulfilment of the Company's promise of March 1656 to send seeds of *sparre off Mastbomen* (referred to in Section 3.2.3). The reference to *mastboomen* in November 1656 may have been the source of Godée-Molsbergen's statement (see Sections 3.2.1 and 3.2.2).

Appel went on to add that by March 1657 some of the *sparboompies* had died and Van Riebeeck, in another attempt to grow the trees, asked for more seed to be sent from Holland.<sup>36</sup>

Appel summarised the information for these three occasions by stating that attempts were made to grow *spar- en masbome* [literally, *spar* and *mast* trees] at the Cape in Van Riebeeck's time. He explained in a footnote, citing as his authority the *Houtvademecum* of the *Stichting Houtvoorlichtingsinstituut* in Amsterdam, that the Dutch name *fijnspar* or *gewone spar* means *Picea abies* and that this species does not grow in Holland, coming mainly from North and Central Europe. The Dutch name *mastboom* he continued, means *Pinus sylvestris*, *Pinus sp. div.*, all of which he evidently interpreted to mean one species, but which surely

must mean "*Pinus sylvestris* and various other species of *Pinus*". He added that it (*P. sylvestris*) is indigenous to North, East and Central Europe and Siberia, but is also planted in Holland.<sup>37</sup>

Thus, Appel implied that Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*) were introduced to the Cape in 1656 (the former as young trees, the latter as seed), that some of the former had died by 1657 and that more seed of both species was then requested.

Appel found another record of these trees from the year 1700 when Governor W.A. van der Stel requested seed of *spar- en masboom* from Holland.

The final record of conifers discovered by Appel was from the year 1793. The Company's Commissars-General found that Hendrik Niemann, who was overseer of the *Wittebomepos* [literally, White Tree Station, or Post] which included the indigenous forests at Paradise, Kirstenbosch and Hout Bay, on the slopes of Table Mountain, had been spending his time beautifying his plantations of "*Witteboomen*". The Governor was instructed to see that Niemann sowed seeds of *witte- of dennebome* [literally, white- or *denne* trees] and, according to Appel, good results followed.<sup>38</sup>

Examination of Appel's sources for this information has shown that in the original Dutch Niemann was directed to sow *witte of denneboomen*.<sup>39</sup> The name *witteboomen* undoubtedly referred to the indigenous silver trees (*Leucadendron argenteum*).<sup>40</sup> Surprisingly, Appel did not comment on the reference to *denneboomen*, yet "denneboom" is today used in South Africa as a general term for a pine tree (*Pinus* spp.) in Afrikaans and also occasionally in English.<sup>41</sup> Which species was meant in 1793 is not clear, but one would tend to assume that it was different from the *sparreboom* and *mastboom* of earlier years.

When concluding the section of his thesis that related to tree-planting, Appel stated that the period 1652 to 1795 had resulted in the oak

becoming the characteristic tree of the Cape Peninsula, while a number of other tree species had been introduced and established, including alder, ash and a species of *Pinus*.<sup>42</sup> The evidence that the last-named was actually established is fairly slim, however, when one considers Appel's findings. The question of which species was involved remained unanswered.

### 3.2.5 Grut

M. Grut's recent account of the history of afforestation in the western Cape was based on secondary sources, but it is of some importance because it was the means of bringing Appel's work to a wider audience. Grut stated, on the basis of Appel's thesis, that Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*) were introduced in 1656 but that neither did well. He further stated that W.A. van der Stel experimented with these species shortly after his arrival in 1699.<sup>43</sup>

Two points to be noted from Grut's paper are, firstly, that he specifically stated that it was Scots pine that was introduced, rather than, as Appel had actually said, *Pinus sylvestris*, *Pinus sp. div.*, and secondly, that Grut missed Appel's reference to *denneboom*.

Grut added:

"What appears to have been the first actual softwood timber plantation in South Africa - the early plantings of pine and spruce in the 17th century had been mere trials - was established in 1825 at Genadendal near Caledon. The species used was *Pinus pinaster*...."<sup>44</sup>

The source of this information was given as R.J. Poynton. Where Poynton learned of the plantation at Genadendal was not made clear. That plantation is referred to again later in this report.

### 3.3 Conifers in the 17th Century

#### 3.3.1 Introduction

Appel thoroughly examined the archival records of the Dutch East India Company for the 17th century and his conclusions were considered in Section 3.2.4. From his research it is clear that two tree species known in Dutch at that time as *mastboom* and *sparreboom* were introduced in 1656, but whether they survived is not clear. While it is certain that the trees were conifers, it is difficult to be more precise about their identity, as various 19th and 20th century authors have given different interpretations (see Table 3.6.1).

Although Appel appeared confident of his identifications, this confidence may have been misplaced. While the modern authority consulted by Appel gave *fijnspar* and *gewone spar* (along with *vuren*) as Dutch vernacular names for *Picea abies*, and *mastboom* (along with *grenen*, *pijnboom* and *grove den*) as a name for *Pinus sylvestris*,<sup>46</sup> this does not necessarily mean that these names were so used three centuries ago. Furthermore, just as in English the names "fir" and "pine" tend to be used interchangeably and indiscriminately by laymen, so there is no guarantee that Van Riebeeck or the Company's directors were using the Dutch names with any precision. In the case of *mastboom* there is the added complication that the authority consulted by Appel actually stated that it could refer to a number of species of *Pinus*. Thus, from the sources consulted so far, the identity and fate of these species remain unknown.

The other main sources of information available for this period are the contemporary accounts of visitors to the Cape. The recently-published compilation by R. Raven-Hart of descriptions of the Cape written by travellers in the period 1652 to 1702 has been consulted and the results are considered in this section. In addition, the information on trees in the works of Kolb, Valentijn and Stavorinus (already mentioned in Section 3.2) is considered. Although these works were

published in the 18th century, the information they contain relating to trees in Cape Town actually pertains to the 17th century. Therefore, it is appropriate to consider it here.

### 3.3.2 Information from travellers' descriptions, 1652-1702

The index of Raven-Hart's work has no entries under "*Abies*", "fir", "pine", "*Pinus*", "spruce", "tree" or "timber". The only appropriate entry is "Garden, the Company's".

The 46 items under this entry have been examined. While many of them contain lists of fruit and spice trees, shrubs, vegetables and flowers, none of them refers to firs, pines or spruces growing in the Garden.<sup>47</sup> While this does not conclusively prove that these conifers were not growing in Cape Town during this period, it does suggest that, if present in the Garden, or elsewhere, they were a very minor feature. One is forced to conclude that the *mastboom* and *sparreboom* introduced in 1656 probably failed totally. Their identity remains obscure.

### 3.3.3 Information from the works of Kolb, Valentijn and Stavorinus

The published accounts of Kolb, Valentijn and Stavorinus all contain lists of plants that were found at the Cape,<sup>48</sup> as Karsten observed. The most remarkable aspect of these lists is that they are all identical, and yet this fact was noted neither by Zahn and Neethling, nor by Karsten. One of the editors of a recently-published version of Valentijn's work, P. Serton, noticed the similarity between the lists of exotic plants in the works of Valentijn and Kolb. He concluded that Valentijn's list was copied from Kolb's.<sup>49</sup> Kolb's list was embellished with descriptive notes after each plant name, but the basic enumeration of species was nevertheless the same in all three works.

Another point, not made clear by Karsten, is that each of the three author's lists is divided into two parts. The first part is restricted to indigenous species, while the second covers exotics.

A further point to be noted is that in Stavorinus's work the list of plants appears only in the English translation and not in the original Dutch, nor in the French or German version.<sup>50</sup> Its inclusion in the publication should therefore be attributed to the translator of the English version, S.H. Wilcocke, rather than to Stavorinus.

As all three lists are identical, they were undoubtedly taken from the same source. In order to establish their origin, information concerning the lists is set out in Table 3.6.2. Examination of this table strongly suggests, firstly, that Wilcocke copied his information from Valentijn's book (because their wording is so similar). Secondly, it suggests that Valentijn and Kolb obtained their lists separately (their wording is quite different) but from the same source, namely a *Herbarius Vivus* [collection of plants] compiled by Oldenland, Superintendent of the Company's Garden (both stated this). Finally, as it is known that Oldenland died in 1697,<sup>51</sup> the collection of plants must have been made before that date and likewise the exotics listed as growing at the Cape must have been introduced before 1697.

Now that the status of these lists of plants has been clarified, the list of exotics can be examined for information relating to conifers. Only two relevant species were included. They were named (in Latin) as *Abies* and *Pinus sylvestris*. Thus, this re-examination has so far added nothing new to what was already known from Zahn and Neethling and from Karsten, except that it is now clear that these plants occurred in Cape Town by 1697.

Further consideration of Kolb's list is warranted because of his annotations. Karsten's suggestion that the "short and rather naïve description in German" after each species' name might have been written by Kolb himself, rather than by Oldenland,<sup>52</sup> is supported by

the fact that these notes appear in neither Valentijn's nor Wilcocke's list. As Kolb admitted that he was not a qualified botanist,<sup>53</sup> undue reliance should not be placed on his notes. Furthermore, since the published English translation of Kolb's work is not always accurate, it is necessary to refer to the original German and to use the Dutch and English translations only as supplementary information.

With regard to *Abies*, Kolb referred to it as *Tannen* (translated into Dutch as *Denneboom* and English as fir-tree<sup>54</sup>) and described it as being very common, almost over-abundant, in Germany. He stated that it was introduced into the Company's Garden twenty years before and that only two specimens survived. The species grew better at the Cape than in Germany, the two trees having grown to almost twelve metres in that time from an original height of one metre. The intention when the trees were planted was that they should act as a source of seeds for extensive plantations, but so far the trees had produced no fruit.<sup>55</sup>

As far as *Pinus sylvestris* is concerned, Kolb called this *wilder Fichten-baum* (translated into Dutch as *wilde Pynboom* and English as wild pine<sup>56</sup>). There was one specimen growing in the Garden, also planted twenty years before, and it had reached between seven and nine metres in height. Like the other species, it had not yet borne fruit.<sup>57</sup>

If these notes were indeed Kolb's own work, then the twenty years referred to must have meant twenty years before his visit, that is, sometime in the period 1685 to 1693.<sup>58</sup> (He could not have meant twenty years before the publication of his book, for that would place the date of planting two years after Oldenland's death.) The translator of the English version of Kolb's work, G. Medley, actually stated that the specimens of *Abies* were taken to the Cape 'about the year 1690', instead of merely translating Kolb's reference to twenty years,<sup>59</sup> presumably on the basis of a calculation similar to the one made above.

We turn now to a consideration of the identity of the two species that Oldenland called *Abies* and *Pinus sylvestris*. The obvious question is

whether they were the *sparreboomen* and *mastboomen* that were brought to the Cape in 1656. This seems unlikely for three reasons, none of which would be convincing on its own, but which, taken in conjunction with each other, are fairly conclusive. Firstly, it has already been concluded that those trees almost certainly did not survive. Secondly, Kolb's notes imply that the three trees he saw were introduced in about the year 1690. Finally, the names given in the Dutch translation of Kolb's book were different from those used in 1656, namely, *Denneboom* and *wilde Pynboom*.

In considering the Latin names one must appreciate that this was more than half a century before the publication of C. Linnaeus's *Species Plantarum*, the starting point for modern botanical nomenclature,<sup>60</sup> and that therefore the names used by Oldenland do not necessarily have their modern connotations.

Let us consider the name *Pinus sylvestris*. It is facile to assume that this necessarily meant the Scots pine (*P. sylvestris*) of today, particularly as this species has been shown unable to survive in South Africa, as Legat pointed out. All three versions of Kolb's work gave the vernacular name for this species as the equivalent of "wild pine". If we consult the 1733 edition of P. Miller's *Gardener's Dictionary*, we find that the binomial *Pinus sylvestris* was at that time applied to the tree known in English as the pinaster or wild pine. The Scots pine did not have a simple binomial at that time, but was given a phrase name by Miller, viz. *Pinus sylvestris foliis brevibus glaucis conis parvis albentibus*.<sup>61</sup> It was not until Linnaeus's publication of 1753 that the Scots pine was given the binomial *P. sylvestris*. Linnaeus then considered the pinaster to be a subspecies of *P. sylvestris*.<sup>62</sup> It received full specific rank, as *P. pinaster*, only in 1789, in W. Aiton's revision of Linnaeus's nomenclature.<sup>63</sup>

From this information it appears highly likely that the *P. sylvestris* that, according to Kolb, was introduced to the Company's Garden in about 1690 was actually *P. pinaster*. The fact that a specimen survived for

20 years accords with its being the latter, which is known to be suited to conditions at the Cape, in contrast to *P. sylvestris*. According to Aiton, *P. pinaster* had been introduced into England by 1596.<sup>64</sup> Therefore, it is quite likely to have been grown in Holland also by the 17th century. Its introduction to the Cape could therefore have been from Holland and one does not need to invoke the French Huguenots as the means of its arrival.

It is difficult to determine what species Oldenland and Kolb meant by *Abies*. In England in 1548 this Latin name was evidently applied to what is now called European silver fir (*Abies alba*), for, according to W. Turner:

"*Abies* is called in greke *Elate*, in english a firre tree, in duch *Ein dannen*, in french *Sapin*, it groweth in the alpes naturally and in certeyne gardines planted and set by mannes hande boeth in Englande and in Germanie."<sup>65</sup>

This information accords well with part of Linnaeus's description of the species that he called *Pinus picea*, but that is now *Abies alba*.<sup>66</sup>

In the synonymy Linnaeus included *Abies femina s. Elate teleja* and, in describing its distribution, stated, "*Habitat in Alpibus Helvetiae, Sueviae, Bavariae, Scotiae*".<sup>67</sup>

On the other hand, Miller stated in 1731 that *Abies* meant "the Common Firr, or Pitch Tree, sometimes called, the Norway or Spruce Firr".<sup>68</sup> This description seems to fit the Norway spruce (*Picea abies*).

The very fact that there was some confusion over the use of the name *Abies* suggests that Oldenland may not have been altogether sure of its identity either. On the basis of Legat's statement (referred to earlier) it is unlikely that the trees in the Garden were *P. abies*, because this species has been shown unable to survive in South Africa. It appears to me unlikely that *Abies alba*, an alpine species, would survive in Cape Town either.

Could it have been a totally different conifer? In particular, could it have been stone pine (*Pinus pinea*)? There are two pieces of circumstantial evidence that lend some credibility to this possibility.

The first is the fact that in Afrikaans today the general term for a pine (*Pinus* spp.) is *denneboom*, whereas in Dutch the name *dennen* refers to *Abies alba*, while *Pinus* spp. are usually called *grenen* or *pijnboom*.<sup>69</sup> If the species in the Garden in the late 17th century was mistakenly thought to be *Abies alba* it would have been referred to in Dutch as *dennen* or *denneboom* (as witness the Dutch translation of Kolb's work). If the trees were actually *Pinus pinea*, then the name *denneboom* would gradually have acquired this particular connotation at the Cape, being subsequently extended to other species of *Pinus*, as the Afrikaans language evolved.

The second piece of evidence comes from an article published in 1830 by the English botanist J. Bowie, a few years after he took up residence in Cape Town. He discussed various exotic plants that grew in Cape Town at that time and for several of them stated that they had been introduced before 1695. For one species he was more precise, stating that "it must have been introduced very early, being recorded in the Garden List of 1695". It is highly probable that this "Garden List" was Oldenland's list, that is, the one also used by Kolb, Valentijn and Wilcocke. Bowie had probably seen it in Wilcocke's publication, to judge by his reference to the year 1695 (see Table 3.6.2).

Bowie stated that two species of *Pinus* had been introduced before 1695, *P. sylvestris* and *P. pinea*, but he made no mention of *Abies*.<sup>70</sup> From this it may be deduced that Bowie believed the *Abies* on the list to have meant *P. pinea*. His reasons for believing this were not stated, however.

*Pinus pinea* was known to Miller in 1733 as *Pinus sativa*<sup>71</sup> (which translates as "cultivated pine") and Turner reported one growing in England as early as 1548.<sup>72</sup> Therefore, it could have been cultivated in

Holland by the 17th century. As with *P. pinaster*, it is not necessary to assume that this species was brought to the Cape by the French Huguenots, merely because its original home was southern Europe.

The conclusions reached here, therefore, are that *P. pinaster* was almost certainly introduced to Cape Town at some time in the period 1685 to 1693, under the name *P. sylvestris*, and that another conifer, which was referred to as *Abies*, but which may have been *P. pinea*, was also introduced at that time. No evidence has been found in support of the suggestion that the two species were introduced by the Huguenots from France, whereas it has been shown that they could have been brought from Holland. On the other hand, as the first Huguenots arrived in Cape Town in 1688,<sup>73</sup> the former suggestion cannot be ruled out completely.

Whether these were the progenitors of the trees that now occur at the Cape cannot be stated, but it seems unlikely, in view of the fact that only three specimens survived after twenty years and none of them had borne fruit. Perhaps Governor van der Stel's request for seed of *mastboom* and *sparreboom* in the year 1700 (see Section 3.2.4) was an attempt to rectify this deficiency. Whether it was fulfilled is not known.

It is noteworthy that none of the travellers' accounts in Raven-Hart's collection referred to the presence of the two species of conifers, even after 1690 (see Section 3.3.2). This casts some doubt on the reliability of their reports.

### 3.4 Conifers in the 18th and 19th Centuries

#### 3.4.1 *Pinus pinaster* and *P. pinea*

The resources of the University of Cape Town's Jagger Library, supplemented by the South African Library's collection, have been exhaustively

searched for descriptions of the exotic plants that occurred at the Cape in the 18th century and first half of the 19th century. All references to conifers that have been located are set out in Table 3.6.3. Kolb's observations are included here, as well as in the previous section, because he actually saw the trees during his visit of 1705 to 1713. The following remarks relate to Table 3.6.3.

J.D. Buttner arrived in Cape Town in 1712 and therefore undoubtedly made the acquaintance of his fellow-countryman, Kolb. His account of the plants in the Company's Garden, which is believed to have been written in about 1716,<sup>74</sup> may have been influenced by Kolb, but it was certainly not a duplication of the Oldenland catalogue discussed in the previous section. The plants were listed in a different order and were given only German names, not Latin. As Table 3.6.3 shows, his list included *Dannenbäum* and *fichtenbäum*, but he did not indicate how many of these trees were present. These names were translated as "fir trees" and "pine trees" in the 1970 version of Buttner's account.<sup>75</sup>

In view of the time overlap, there is little doubt that Buttner was referring to the same trees as Kolb. By *fichtenbäum* Buttner must have meant the tree that Kolb called *P. sylvestris* or *wilder Fichten-baum* and which it was decided in the previous section was almost certainly *P. pinaster*. Therefore, his name *Dannenbäum* must have meant the *Abies* or *Tannen* of Kolb. Buttner's use of the word *Dannen* rather than *Tannen* appears to signify that he recognised that the tree was not the same as the species to which the latter name would be applied in Germany, nor was it any other species familiar to him, and therefore he was giving his version of the local Dutch name for it. This conclusion supports those reached in Section 3.3.3, namely that the *Abies* on Oldenland's list was not *Abies alba* or *Picea abies*, secondly, that it was known in Cape Town as *denneboom* (or *dannenboom?*), and thirdly, that it may possibly have been *P. pinea*.

From 1716 there is a gap until O.F. Mentzel's observations. Mentzel visited the Cape between 1733 and 1741.<sup>76</sup> His description of the

Company's Garden began (in the English translation of 1921):

"Upon entering the garden from the hospital side four large pine trees come into view. These had been planted for decorative purposes, as it was intended to trim them to pyramid-shape in the same way as yew-trees. However, the pines, as it were, trim themselves, for the lower branches constantly dry up and drop off, hence the effect obtained is not so remarkable as it was intended."<sup>77</sup>

In the original German "four large pine trees" was expressed as "*vier grosse Riesern oder Dannenbäume*" [literally, four large *Riesern* or *Dannen* trees], while the second reference to pines was written as "*der Dannenbaum*".<sup>78</sup> It appears that he was referring to four individuals of one species, but, being unsure of its identity, was giving two alternative names. This suggests immediately that new planting had occurred since Kolb's visit, when there were only three coniferous trees, of two species, in the Garden.

The word *Riesernbaum* appears to be fairly unusual in German, not being included in several dictionaries consulted, but it has been located in one dictionary with the meaning of "pine tree".<sup>79</sup> Mentzel's alternative name (*Dannenbaum*) is identical with that used by Buttner and therefore the same inferences that were made above about Buttner's observations apply also to Mentzel's *Riesernbaum* or *Dannenbaum*.

Mentzel's description of the lower branches falling off fits both *P. pinaster* and *P. pinea*, but if it were the former species one would expect him to have called it *Fichtenbaum*, as Kolb and Buttner did. Thus, there is a strong possibility that the four trees near the entrance of the Garden in 1733 were *P. pinea*.

It may be noted here that, if the name *denneboom* signified *P. pinea* in Cape Town in the 18th century, as has been surmised above, then the instructions given to the overseer of the *Wittebomepos* in 1793 to sow seeds of *denneboomen* (see Section 3.2.4) must have meant this species.

From Table 3.6.3 it is obvious that by the time the botanist C.P. Thunberg visited the Cape in 1772, *P. pinaster* (identified by him as *P. sylvestris*, the correct name at that time) had been widely planted.<sup>80</sup> Subsequent references in the table to *P. sylvestris* or Scotch fir must also refer to *P. pinaster*.

It was thought that Thunberg's herbarium might possibly be an additional source of information on conifers in the late 18th century. He is known to have amassed a large collection of plant specimens during his sojourn at the Cape from 1772 to 1775. As plant collectors generally concentrate on the indigenous species of a region, however, it was expected that the likelihood of meaningful information being located was very small.

Examination of the microfilm records of Thunberg's herbarium indicated that three specimens of conifers were allegedly collected at the Cape of Good Hope. Two of them were named by Thunberg as *Pinus strobus* and *P. sylvestris*. On the herbarium sheets another botanist has subsequently re-identified them as *P. koraiensis* and *P. thunbergii*, respectively.<sup>81</sup> Those two species occur naturally in Japan<sup>82</sup> and Thunberg visited that country after his stay at the Cape.<sup>83</sup> It would therefore appear likely that his two specimens were collected there and that he had inadvertently labelled them as being from the Cape.

The third specimen was named by Thunberg as *Thuja cupressoides*.<sup>84</sup> The specific epithet *cupressoides* is not an accepted name or synonym for any species of *Thuja*.<sup>85</sup> There is no revised name on the herbarium sheet. As the six species of *Thuja* are indigenous to China, Japan, Formosa and North America,<sup>86</sup> it seems highly likely that Thunberg also collected this specimen in Japan. Thus, this examination of Thunberg's herbarium has not added to our knowledge of conifers at the Cape.

Consideration of Table 3.6.3 shows that it was not until 1810 that there was an unequivocal statement that both *P. pinaster* and *P. pinea* were present at the Cape, the author being the naturalist W.J. Burchell. The

trees that he described as growing around the Parade<sup>87</sup> were evidently quite young at the time, for in a painting of Cape Town reproduced in a book published in 1812, there is a row of trees surrounding the Parade, and they are only the height of a man.<sup>88</sup>

After 1810 both species appear to have become widespread in the Cape Colony. The English botanist C.J.F. Bunbury seems to have distinguished the two species as pine (*P. pinea*) and fir (*P. pinaster*),<sup>89</sup> but it is not clear which species J.D. Hooker meant by "pudding-headed pines"<sup>90</sup> (a surprisingly loose description for a famous botanist to use!)

In summary, four major conclusions have been reached regarding cluster pine and stone pine in the 18th and 19th centuries. Firstly, in the Company's Garden in 1713 there was one specimen of *P. pinaster* and there were two specimens of a tree that was referred to as *Abies* but that may have been *P. pinea*. All three were about 20 years old. Secondly, at some later time, but before 1733, four coniferous trees, possibly *P. pinea*, were planted in the Company's Garden. Thirdly, in 1772 *P. pinaster* was quite widespread in the Cape Town region. Finally, by 1810 both *P. pinea* and *P. pinaster* were conspicuous features of the Cape Town landscape.

### 3.4.2 *Pinus halepensis*

The earliest reference to Aleppo pine (*P. halepensis*) that has been located occurred in an article published in Cape Town in 1857. The author, R. Smith, had been the gardener at "The Oaks" a farm about 110km east of Cape Town and 25km north-east of Caledon. This farm had become famous for its plantations of trees, especially conifers.<sup>91</sup> Smith stated that at Elsejes Kloof on the River Sonderend there was a row of trees comprising *P. pinaster*, *P. pinea* and *P. halepensis*. He judged from their size that they had been planted 30 years before.<sup>92</sup> This means that *P. halepensis* must have been introduced some years before 1830.

I have been unable to locate Elsejes Kloof on a modern map, but the farm immediately west of "The Oaks" is "Elsen Kloof" and the original southern boundary of both farms was the River Sonderend.<sup>93</sup> It was presumably at this farm that Smith observed *P. halepensis*.

It appears that the valley of the River Sonderend must have been the site of a great deal of early experimentation with conifers. As well as Smith's report, there are the observations of the missionary, C.I. Latrobe, who recorded pines or firs at three localities in that region in 1816 (Table 3.6.3). In addition, there is the indirect report that cluster pines were planted at Genadendal in 1825 (Section 3.2.5).

### 3.5 Australian Plants

#### 3.5.1 Earliest introductions

In Burchell's account of his travels he listed from memory the exotic plants that he had seen growing in Cape Town during his visit in 1810. In the list there was only one Australian species, *Casuarina stricta* (not one of the pest plants).<sup>94</sup> Other early evidence of Australian plants growing in Cape Town comes from Latrobe. In 1816 he described the garden of the country-seat of the Deputy-Governor as containing "some curious plants, from Botany Bay and China". He also referred to the garden of the minister of the Lutheran church. In it was "a great variety of singular plants, trees, and shrubs, the produce both of this, and other southern regions".<sup>95</sup> Botany Bay is in Australia and the term "other southern regions" could well include that continent.

The next record of Australian species comes from the writings of Bowie. In 1832 he described his efforts to grow "seeds of various species of the Australian Acaciae" that he had brought with him from England and sown immediately on arriving in Cape Town. Most of them had failed, but after three years several of them germinated.

Bowie also reported that he had sown seeds of *Acacia longifolia* that had been "saved at the Cape".<sup>96</sup> It appears from this statement that a seed-bearing bush of *A. longifolia* was growing in Cape Town at that time. Whether it was brought by Bowie, or was already in Cape Town when he arrived, is not clear from his account, but Bowie had published

in 1830 a list of exotic trees and shrubs that were growing in Cape Town, and *A. longifolia* was not included.<sup>97</sup> Therefore, it may be inferred that his seeds of *A. longifolia* were collected from a plant that he had brought from England.

It is known that Bowie arrived to settle in Cape Town in April 1827.<sup>98</sup> Therefore, this date marks what appears to have been the first introduction of Australian acacias to South Africa. It is obvious from Bowie's report that several species were involved, but the identity of only one of them, *A. longifolia* was stated. Actual establishment of these species could not have occurred until several years later, because of the difficulty he experienced in growing the plants from seed.

It is not surprising that the first introduction of Australian acacias was made from England rather than directly from Australia, for many Australian plants were known as horticultural specimens in Britain by that time. In fact, all but one of the Australian species being considered in this study are reported to have been introduced into Britain before 1825 (the exception being *A. pycnantha*).<sup>99</sup>

### 3.5.2 Botanical gardens

Bowie's purpose in introducing the acacias was evidently to form the nucleus of a botanical garden. In 1830 he applied to Sir G. Lowry Cole, Governor of the Cape Colony, for permission to take over a portion of the government garden in Cape Town (formerly the Company's Garden) and turn it into a botanical garden. Marginal annotations on his letter of application indicate that his plan was considered too ambitious by those in authority and he was given no encouragement.<sup>100</sup> Cole was not against the idea of introducing exotic plants, *per se*, for he was credited by Bowie with having introduced a species of *Eucalyptus* to the government garden.<sup>101</sup>

In any case, just six months before Bowie's application, Cole had received a request from Baron C.F.H. von Ludwig, a Cape Town merchant, for the title to a piece of land adjacent to his property in Kloof Street so that he could establish a botanical garden there.<sup>102</sup> This had been granted, and so Bowie's plan to establish a public garden had been pre-empted by a privately-owned concern.

F.R. Bradlow has described in his biography of Von Ludwig the development of the "Ludwig's-burg Garden", as it was called, into the botanical showpiece of Cape Town between 1830 and 1847. Some 1660 species of plants from all over the world were introduced by him.<sup>103</sup> Von Ludwig appears to have collected plant species as avidly as a philatelist collects stamps.

With no prospect of his original plan being carried out, Bowie had to be content with employment as Von Ludwig's gardener. Bradlow has established that Bowie was thus employed between 1838 and 1842,<sup>104</sup> but two lines of evidence suggest that he actually commenced working for Von Ludwig several years earlier than 1838. Firstly, a report about the garden was transmitted from Von Ludwig "by Mr Bowie" to the South African Literary and Scientific Institution in 1835.<sup>105</sup> This suggests that he was already working for Von Ludwig at that time. Secondly, in the preface to his botanical treatise, published in 1838, William Harvey acknowledged the assistance of "Mr Bowie, the Curator of the Ludwig's-burg garden" in its preparation.<sup>106</sup> Since the book had taken three years to prepare,<sup>107</sup> this suggests that Bowie was working for Von Ludwig before 1838.

No doubt Bowie, as a botanist, was a useful ally to Von Ludwig in his quest for plants for the garden. Bowie had worked for Kew Gardens (England) and had collected plant specimens for Kew in both South America (with A. Cunningham) and South Africa.<sup>108</sup> Cunningham worked as a botanist in Australia from 1816 until his death in 1839.<sup>109</sup> Bowie may have used him as a source of Australian plants for Von Ludwig's garden.

Although a full list of the 1660 species that were grown in the garden is not available, there are several partial lists. In those, the earliest mention of Australian genera was in January 1834, when *Eucalyptus*, *Casuarina* and *Mimosa* were included by Von Ludwig.<sup>110</sup> No names of species were given. That reference to *Mimosa* could well have meant *Acacia* for a number of Australian species that were originally placed in the former genus were reclassified as *Acacia* spp. in the early part of the nineteenth century.<sup>111</sup> It is noteworthy that Bowie, when commenting on Von Ludwig's list a few months later, referred to the taxon that Von Ludwig had called *Mimosa* as *Acacia*.<sup>112</sup> Furthermore, there is evidence that in February 1835 Von Ludwig wrote a letter in which he stated that there were a number of Australian acacias growing in his garden at that time.<sup>113</sup>

In July 1835 Bowie reported that since the previous September some 124 trees and shrubs had been introduced to the garden from several countries, including Australia. In addition, in the previous three months 300 packets of seeds had been received from Australia.<sup>114</sup>

Another list of plants in the garden was published in 1843. It included several Australian genera: *Eucalyptus*, *Melaleuca*, *Hakea*, *Banksia* and *Casuarina*.

One further list, issued in 1848, mentioned the Australian genera *Eucalyptus*, *Callitris*, *Melaleuca* and *Callistemon*, and the species *Acacia melanoxylon*, the only one of the pest plants that was specifically named in these records.<sup>115</sup>

From these lists it is obvious that Von Ludwig (possibly aided by Bowie) was responsible for the importation of many Australian species, although there is definite evidence for only one of the pest plants among them (*A. melanoxylon*). In addition, there is circumstantial evidence that these men may have played a role in the introduction of some of the other pest species.

Firstly, the astronomer Herschel, during his stay in Cape Town, recorded

in his diary in December 1834 that he had planted 27 seeds of an "acacia from New South Wales" in the garden of his house at Claremont, an area that is now a suburb of Cape Town. Subsequently, in April 1835, he planted 70 seeds of "*Acacia lophantha*", that is, *Albizia lophantha*.<sup>116</sup> It is clear from his diary that he and Von Ludwig were friends<sup>117</sup> and therefore it seems likely that he obtained the seeds from Von Ludwig. It is quite probable that they came from the batches of seeds reported as received in 1834 and 1835 by Bowie (see above). In any case, the date of April 1835 is the earliest known reference to the presence of *A. lophantha*, another of the pest plants, in Cape Town.

A second item of information relates to *Hakea gibbosa*. Bowie was called upon in 1835 to identify a plant that was reported to be growing "on the premises of the late Mr Merckel at the Half Way House". The plant was described as being particularly suitable for use as a hedge to provide security against cattle. Bowie identified it as *H. gibbosa*, "introduced to this colony some years since as a species of *Banksia*, from which genus it is now very properly separated".<sup>118</sup> He did not state that it was one of Von Ludwig's introductions, but this appears likely from his comments. From this report the introduction of another pest plant, *H. gibbosa*, can be stated to have occurred in the early 1830s.

One more pest plant is recorded from this period. In early 1848 an advertisement for the sale of the farm "Blumenthal", between Claremont and Wynberg and 11km from Cape Town, and owned by L.H. Beil, stated:

"Owing to the labours of the well-known German botanist to this colony, Mr Carl Zeyher, joined to the botanical labours of Mr Beil himself, a great number of valuable exotics will be discovered amongst the plantations, among which two beautiful and thriving specimens of the Port Jackson Willowtree (an acacia making the best shrub or tree for impenetrable hedges even in spite of wind or drifting sand) is none of the least."<sup>119</sup>

It could be inferred that Zeyher or Beil was responsible for the introduction of these exotics, but this is not necessarily so. It is quite possible that Beil had acquired them from Von Ludwig, as the latter two are known to have been friends.<sup>120</sup> In any case, this appears to be the earliest recorded mention of Port Jackson willow in Cape Town. If it is assumed that this vernacular name referred to *Acacia saligna* at that time, as it does now, then this is the earliest record of the species in Cape Town, and it is obvious from the quotation above that it must have been introduced before 1848.

After Von Ludwig's death in late 1847 his property was subdivided and sold. Once more Cape Town lacked a botanical garden.<sup>121</sup> By this time there was great enthusiasm for such gardens in Britain and its colonies<sup>122</sup> and Sir Harry Smith, the Cape Governor, was keen for his colony to have one also. Bradlow has described the establishment of the Cape Town Botanic Garden and shown that this was a direct consequence of Von Ludwig's death, as it was feared that otherwise his remarkable collection of plants would be lost.

In 1848 the Botanic Garden was opened on the site of the government garden (formerly the Company's Garden).<sup>123</sup> Thus, Bowie's proposal of 1830 had eventually come to fruition. The intention was that plants from Von Ludwig's garden should be transferred to the new site,<sup>124</sup> but it is not certain that this was done. In any event, new introductions of plants continued to be made, under the supervision of James McGibbon, who was appointed director of the garden in 1850.<sup>125</sup> More details are given in the next Chapter.

### 3.6 Tables

TABLE 3.6.1 Interpretations made by various modern authors as to which trees were meant by the Dutch words *mastboom* and *sparreboom*, as used in Van Riebeeck's time

Dutch word	Interpretation	Author	Year
<i>mastboom</i>	mast tree (? fir)	H.C.V. Leibbrandt <sup>126</sup>	1898
	<i>Pinus sylvestris</i> , <i>Pinus sp. div.</i>	A. Appel <sup>127</sup>	1966
<i>sparreboom</i>	spar tree	H.C.V. Leibbrandt <sup>126</sup>	1898
	fir	G.M. Theal <sup>128</sup>	1922
	spruce-fir; pine	M.C. Karsten <sup>129</sup>	1951
	pine; fir	H.B. Thom <sup>130</sup>	1954
	<i>Picea abies</i>	A. Appel <sup>127</sup>	1966

TABLE 3.6.2 A comparison of the lists of plants reported to be growing in the Cape Town region by the authors P. Kolb,<sup>131</sup> F. Valentijn<sup>132</sup> and S.H. Wilcocke<sup>133</sup>

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Date of Publication

Kolb: 1719

Valentijn: 1726

Wilcocke: 1798

Title given to list of indigenous species

Kolb: "Alphabetical Description and Account of the Flowers, Trees, Roots, and other African Plants which are found at the Cape of Good Hope"

Valentijn: "... a short abstract of this [Oldenland's] Herbal"

Wilcocke: "Abstract of the *Herbarius Vivus*, or Herbal of Henry Bernard Oldeland (*sic*), superintendent of the Company's garden at the Cape of Good Hope, in the year 1695"

Title given to list of exotic species

Kolb: "Alphabetical Description of the Exotic Flowers, Trees, Roots, Herbs, which grow at the Cape of Good Hope just as well as in their Fatherland"

Valentijn: "... a list of exotic plants found here"

Wilcocke: "... numerous exotics, which have been introduced into the country from Europe, Asia, and America"

(continued)

TABLE 3.6.2 (concluded)

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Where exotics stated to be growing

Kolb: not specified

Valentijn: "All these trees, plants, crops and flowers are found in the Honourable Company's garden or at Vergelegen, Constantia and at other fine country-houses and estates here"

Wilcocke: "... all these trees, plants, herbs and flowers were to be found in the garden of the Company"

Other relevant statements

Kolb: "All that I let you know about it [botany] I owe to my pleasant garden-dwelling, ....to the daily intercourse with Joh. Hartog, Gardener in this world-famous garden of the above-mentioned Company, and finally to the *Herbaria viva* of the late Mr N. *Olderland* (*sic*) which were shown to me repeatedly by his stepsons"

Valentijn: "I saw a *Herbarius Vivus*, of the plants, which Mr Henrik Bernard Oldeland (*sic*), a fine Botanist, whom I knew as a superintendent of the Company's garden in the year 1695, had collected and which consisted of 13 or 14 volumes in folio, with a nice description in Latin of each plant. I found this work, left by him, in the year 1714, and which I occasionally perused with great delight"

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TABLE 3.6.3 Contemporary observations of conifers growing at the Cape in the 18th century and first half of the 19th century

Date of observation	Author	Trees as named by author	Where growing	Comments
1705-1713	P. Kolb	<i>Abies</i> , i.e. <i>Tannen</i>	the Garden	two specimens survive of those planted 20 years ago <sup>134</sup>
1705-1713	P. Kolb	<i>Pinus sylvestris</i> , i.e. <i>wilder Fichten-Baum</i>	the Garden	one specimen survives of those planted 20 years ago <sup>135</sup>
1716	J.D. Buttner	<i>Dannenbäum;</i> <i>fichtenbäum</i>	the Garden	planted by the Company <sup>136</sup>
1733-1741	O.F. Mentzel	4 <i>grosse Riesern</i> oder <i>Dannenbäume</i>	the Garden	lower branches constantly drop off <sup>137</sup>
1772	C.P. Thunberg	the pine <i>Pinus sylvestris</i>	Rondebosch	"conspicuous by its elegant crown" <sup>138</sup>
1773	C.P. Thunberg	the pine	farms and villas near Cape Town	"frequently planted for ornament and shade" <sup>139</sup>
1797	A. Barnard	Scotch fir	Cape Town	"growing to perfection" <sup>140</sup>
1797	A. Barnard	firs	Paradise	"a clump of firs" grows near the house <sup>141</sup>

(continued)

TABLE 3.6.3 (continued)

Date of observation	Author	Trees as named by author	Where growing	Comments
1810	W.J. Burchell	<i>Pinus pinaster</i> ; <i>Pinus pinea</i>	the Garden	in a list of exotic plants growing in the Garden, recalled from memory <sup>142</sup>
1810	W.J. Burchell	<i>Pinus pinea</i>	the Garden	"the noblest ornaments of the garden" <sup>143</sup>
1810	W.J. Burchell	the pine trees	the Garden	"present a remarkable feature" <sup>144</sup>
1810	W.J. Burchell	pinaster	streets of Cape Town	"oak and pinaster planted here and there" <sup>145</sup>
1810	W.J. Burchell	pinasters; stone pines	the Parade, Cape Town	Parade surrounded by a walk shaded by these trees <sup>146</sup>
1811	M. Graham	the fir; the firs of Scotland and Norway	the colony	used for small spars for ships <sup>147</sup>
1816	C.I. Latrobe	firs	farm of Mrs Gie-beler near Genaden-dal	orchards and gardens surrounded by "avenues of firs" <sup>148</sup>
1816	C.I. Latrobe	pinus	"Gaense-Kraal" farm on R. Sonderend	"groves of lofty oaks and pines" <sup>149</sup>

(continued)

TABLE 3.6.3 (continued)

Date of observation	Author	Trees as named by author	Where growing	Comments
1816	C.I. Latrobe	firs	Genadendal	nursery of young trees, including firs <sup>150</sup>
1816	C.I. Latrobe	firs	Stellenbosch	"groves, avenues, and plantations of fir and other trees" <sup>151</sup>
1816	C.I. Latrobe	firs	house of Mr Hoetz, 5 km from Cape Town	extensive plantations of oak and firs between house and mountain <sup>152</sup>
1830	J. Bowie	<i>Pinus sylvestris</i> , Scotch pine or fir	the colony	introduced before 1695 <sup>153</sup>
1830	J. Bowie	<i>Pinus pinea</i> , stone pine	the colony	well known; introduced before 1695 <sup>154</sup>
1838	J. Backhouse	stone pine	between Rondebosch and Wynberg	country is "ornamented by planted woods of Oak, Stone Pine, and Poplar" <sup>155</sup>
1838	C.J.F. Bunbury	stone pine	Cape Town	this sp. and the oak most commonly cultivated; "both thriving very well" <sup>156</sup>
1838	C.J.F. Bunbury	fir trees	Rondebosch	the road is "shaded by oak or fir trees" <sup>157</sup>

(continued)

TABLE 3.6.3. (concluded)

Date of observation	Author	Trees as named by author	Where growing	Comments
1838	C.J.F. Bunbury	pine trees	Wynberg	groves surround country houses <sup>158</sup>
1838	C.J.F. Bunbury	pine	Paarl	"rows of pine and oak trees" amongst the houses <sup>159</sup>
1843	J.D. Hooker	pudding-headed pines	along the road outside Cape Town.	lean at an angle of 45° because of the wind <sup>160</sup>
1848	anonymous	fir trees (both crown and spars)	farm "Blumenthal", 11km from Cape Town	a large park of these beautiful trees <sup>161</sup>

## 3.7 Notes

1. P. Sonnerat: *Voyage aux Indes Orientales et à la Chine*, Vol. 2 (1782), p.92.
2. Cape of Good Hope Literary Gazette, Vol. 5, 1835, p.54. The Half Way House referred to in this quotation was undoubtedly the inn once known as Merckell's Traveller's Joy and subsequently as Rathfelder's Halfway House. It was situated near the present-day Steurhof railway station at Diep River, about halfway between Cape Town and Simonstown (L.A.D. Gordon: *Letters from the Cape* (1927), pp.43-44; I.A. Goncharov: *A Russian view of the Cape in 1853* (1960), p.57; H.W.J. Picard: *Grand Parade* (1969), p.103.
3. M.C. Karsten: *The Old Company's Garden at the Cape...* (1951).
4. E.J. Moll & B.M. Campbell: *The Ecological Status of Table Mountain* (1976), p.7.
5. M.C. Karsten: *The Old Company's Garden at the Cape...* (1951), p.58.
6. E.C. Godée-Molsbergen: *De Stichter van Hollands Zuid-Afrika, Jan van Riebeeck, 1618-1677* (1912), pp.146-147.
7. C.E. Legat: *The cultivation of exotic conifers in South Africa* (1930), p.33.
8. G.M. Theal: *History of South Africa*, Vol. 3 (1922), p.55.
9. C.E. Legat: *The cultivation of exotic conifers in South Africa* (1930), p.33.
10. Nomenclature updated from W. Dallimore & A.B. Jackson: *A Handbook of Coniferae* (1948), p.389.
11. C.E. Legat: *The cultivation of exotic conifers in South Africa* (1930), pp.33-34.
12. G.A. Zahn & E.J. Neethling: *Notes on the exotic trees in the Cape Peninsula* (1929), pp.211-213.

13. P. Kolb: *Caput Bonae Spei Hodiernum* (1719); F. Valentijn: *Beschryvinge van de Kaap der Goede Hoop* (1726).
14. G.A. Zahn & E.J. Neethling: Notes on the exotic trees in the Cape Peninsula (1929), p.214.
15. W. Dallimore & A.B. Jackson: *A Handbook of Coniferae* (1948), p.389.
16. G.A. Zahn & E.J. Neethling: Notes on the exotic trees in the Cape Peninsula (1929), p.215.
17. G.A. Zahn & E.J. Neethling: The cluster pine (*Pinus pinaster*) at the Cape (1929), p.195.
18. R.M. Cowling *et al.*: The ecological status of the understory communities of pine forests on Table Mountain (1976), p.13.  
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 F.R. Bradlow: Baron van Ludwig and the Ludwig's-burg Garden (1965), p.15, surmised that the correspondent in the above citation (who signed himself "B") was Bowie. This appears highly probable from the text of the letter. There is some confusion over the identity of the species involved in what appears to have been the first introduction of the Australian genus *Eucalyptus*, now so widespread, to South Africa. Bowie stated that it was *E. robusta*, but gave no vernacular name. P. MacOwan (G3-1885 Report on the Botanic Gardens, p.4) stated that Cole had brought nine blue gum trees with him from Mauritius in 1828 and that four of them had been planted in the government garden. He did not use a Latin name. In the following year, A.W. Heywood: Cape woods and forests (1886), pp. 151-152, stated that all nine of the blue gums had been planted in the garden and that two still survived. He gave the Latin name as *E. globulus*.
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121. F.R. Bradlow: Baron von Ludwig and the Ludwig's-burg Garden (1965), pp.70-82.
122. In 1841 Kew Gardens became a government-owned botanical garden under the directorship of Sir William Hooker and within five years it had been enlarged from fewer than eight hectares to more than 100 ha (W.B. Turrill: The Royal Botanic Gardens, Kew (1959)). In Australia, the Melbourne Botanic Garden was established in 1846 and its counterpart in Adelaide in 1855 (C. Morrison: Melbourne's Garden (1957), p.21; Anonymous: The Botanic Garden, Adelaide, South Australia... (1955), p.24).
123. F.R. Bradlow: Baron von Ludwig and the Ludwig's-burg Garden (1965), pp.82-90. The garden was known variously as the "Botanical Garden", "Botanical Gardens", "Botanic Gardens" and "Botanic Garden". For convenience, the last name is used throughout the text of this report.

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## CHAPTER 4

## THE USE OF EXOTIC TREES AND SHRUBS

## IN THE CAPE TOWN REGION, 1845-1883

"... private enterprise has done much which goes to establish the fact that districts of white sand once in a state of drift may be utilized by the growth of forest trees. Large plantations of pine, poplar, and other trees may be seen like oases in the desert surrounding the residences of Colonel Eustace, Mr Ansdell, and others on the Cape Flats, if the whole of the plantations around Claremont, and extending on towards Rathfelder's, be not considered satisfactory evidence of the same fact."<sup>1</sup>

"It will be seen from our advertising columns that some light fingered gentry have been at work at Wynberg and stolen from Mr Fleming's ground, near the Plumstead Road, a number of young hakea trees just planted. It is to be hoped that the £5 reward will be quickly claimed, and the offender or offenders brought to book - when, should the birch be brought into use, it will be richly deserved."<sup>2</sup>

#### 4.1 Early Attempts to Control Drift Sand on the Cape Flats

The existence of the Cape Town Botanic Garden proved to be important when a scheme to stabilise drift sand on the Cape Flats was instituted in the mid-nineteenth century. The problem with drift sand was not new, as it resulted from disturbance of the original cover of vegetation and such disturbance must have occurred even before the arrival of Europeans, but it was intensified after the establishment of a permanent settlement at Cape Town in the 17th century. There were several sources of disturbance, but it appears from the following information that one of the most important was the collection of firewood.

A series of official proclamations prohibiting the collection of wood from the Cape Flats was issued in the years 1743, 1744, 1757, 1787, 1791, 1794 and 1803.<sup>3</sup> The fact that it was repeatedly considered necessary to renew the ban suggests that it was not achieving its desired aim. This impression is reinforced by the remarks of an observer of the local scene in 1804. Commenting on the scarcity of fuel, he referred to the constant and ever-increasing denudation of the country around Cape Town, "which presents in most places but a waste of sand almost totally deprived of its thin clothing".<sup>4</sup> Similarly, in 1811 Burchell noted that the exploitation of the woody plants of the Flats for fuel was likely to reduce the area to "a sand-desert, still more difficult for waggons to travel over than at present".<sup>5</sup>

Destruction of the vegetation must also have resulted from the collection of thatching material for the houses of Cape Town. The reed-like plants of the family Restionaceae, which were abundant in the damp interdune areas, were used for this purpose.<sup>6</sup> The passage of waggons drawn by oxen was undoubtedly another major source of disturbance. To reach any other region of the Cape by land from Cape Town required crossing the Flats. With no constructed road to follow, each traveller tended to choose his own route.<sup>7</sup> The trampling of hooves and wheels must have

rapidly caused the denudation of large tracts of sand. Domestic animals set loose to forage on the Flats added to this denudation. Evidence for these statements emerges in the following pages. Fire may well have been another factor, but no particular evidence to this effect has been found.

It has also been suggested that the destruction of the vegetation may be partly attributable to the production of lime (used for plastering houses), as the vegetation was torn up to provide fuel for the kilns.<sup>8</sup> On the other hand, the vegetation may have been cleared during the excavation of the calcareous deposits for the production of the lime. This was considered to have been an important factor by the Superintendent of Plantations when he inspected the Flats in 1857.<sup>9</sup>

The bare sand exposed by all these activities was readily set in motion by the strong and persistent winds and drifting sand became a serious problem. Travel across the Flats became increasingly difficult and by the 1840s it was claimed that as many as 18 oxen were required to pull one waggon even a very short distance over the sand,<sup>10</sup> while another report stated that the heavy sand so impeded the passage of ox waggons that they took seven hours to cover 24km.<sup>11</sup>

A very early, but unsuccessful, attempt to bind the sand by establishing vegetation is reported to have occurred in 1724. According to one author, grasses and trees were used, according to another, knot grass and wild olive, and according to yet another, grass and various types of bushes.<sup>12</sup>

Burchell suggested in 1822 that the Flats should be planted with shrubs, trees, sedges and grasses. The trees would shelter the sand from the wind, while the sedges would not only fix the loose sand, but also provide more suitable food for cattle than the existing plant cover. He reasoned that this scheme would benefit Cape Town both by making travel across the Flats easier and by converting the area to more productive use.<sup>13</sup>

A later proposal for solving the inter-related problems of the drifting sand and the lack of a good road was made by Bowie in 1833. He suggested that a roadway across the Flats be established with a central carriageway flanked on either side by a plantation. In each plantation there should be three belts of trees. Poplars in the first belt would provide a firm foundation for the road with their spreading roots. In the second belt would be oaks to provide "a grateful shade to the traveller". Finally, there would be a belt of cluster and stone pines to shelter the oaks while they were young and to "arrest the moving sand and prevent it encroaching upon the inner plantation and the road". Within seven years the plantations would be a profitable source of firewood, and later, of timber. This firewood could then be sold to bakers who, according to Bowie, were the chief culprits in the destruction of the vegetation in their search for firewood.<sup>14</sup>

Bowie's proposal was not implemented, but three years later there was another official attempt to halt the destruction of the plant cover of the Flats. Ordinance No. 5 of 1836 prohibited damage to vegetation on Crown land on the Cape Flats and required that permits be obtained before thatching reeds could be cut or animals allowed to graze.<sup>15</sup>

Nothing further was done about the condition of the Flats until the arrival of John Montagu as Colonial Secretary in 1843. He immediately saw the need for improved roads in the Cape Colony and also for suitable employment to be found for the colony's convicts. As a result, he established the Central Board of Commissioners of Public Roads, or Central Roads Board, as it was commonly called. The Board was made responsible for building and maintaining main roads and mountain passes throughout the colony, using convicts as its labour force. One of the first projects initiated by the Board was the building of a hard road across the Cape Flats.<sup>16</sup>

The new road across the Flats linked Cape Town with the crossing over the Eerste River at Faure, south-east of Cape Town. Instead of taking the most direct route, it went approximately east for 19km, as far as

the locality now known as Bellville, and then turned south-south-east for another 19km to reach the Eerste River.<sup>17</sup> This route crossed the sandy Flats where they are narrowest and allowed the road to follow the higher ground east of the swampy course of the Kuils River for about half of its length. It is apparent from Buttner's account of 1716 that this had long been the standard route to follow across the Flats to the Hottentots-Holland mountains.<sup>18</sup>

The road was marked with milestones and a maintenance station was established at every fourth milestone. When it was opened to traffic in December 1845 it was known as the Hard Road.<sup>19</sup> Later it was called Maitland Road,<sup>20</sup> while today it is Voortrekker Road as far as Bellville, and Strand Road or Van Riebeeck Road thereafter.<sup>21</sup>

In spite of the poor agricultural potential of the region, there were many private properties on the Cape Flats by the time the road was built. The remaining parts of the Flats had the status either of unused Crown lands or of public outspans. The latter were areas set aside as common grazing land and were intended primarily to be used by farmers moving animals between outlying districts and Cape Town. The largest outspan extended along the southern side of the Hard Road almost continuously from the 6th to the 15th milestone<sup>22</sup> (see Map 2).

While the Hard Road was being constructed, the need to protect it from drifting sand in certain places became obvious. Accordingly the Roads Board appointed H. Dempers for one year from January 1845<sup>23</sup> to "protect the Cape Flats and Downs and assist in endeavouring to fix the drift sand".<sup>24</sup>

In mid-June 1845, Baron von Ludwig sent to the Roads Board "a packet of seeds of various plants with suggestions to sow them in the vicinity of the Hard Road across the Downs as calculated to arrest the progress of the drifting sands".<sup>25</sup> The Board acknowledged Von Ludwig's interest in promoting its objects,<sup>26</sup> but it is not clear whether the seeds he provided were actually used.

Nevertheless, it is recorded that in early July 1845 planting was being carried out over an area commencing between the farm Vygekraal and the property of a Mrs Baum and extending northward across the Hard Road at about the 5th milestone.<sup>27</sup> The location of the latter property is not known, but the farm Vygekraal is shown on both a contemporary map and a modern one.<sup>28</sup> It may be deduced that the planting was carried out in the area that now forms the eastern part of Pinelands from near Athlone power station to Voortrekker Road near Woltemade railway station. It is not surprising that the worst drift sand occurred in that area, the section of the Flats closest to Cape Town. This vacant Crown land was doubtless heavily exploited for wood and thatching material. Here, also, the routes to various parts of the Flats were still close together after the crossing of the Salt River.<sup>29</sup>

This planting carried out in July 1845 marks the beginning of systematic efforts to establish vegetation on the Flats. There appears to be no record of the plant species used on this occasion.

In the following year the Central Roads Board agreed with a suggestion by Montagu that seeds of pines should be sown along the Hard Road, but Colonel Michell, the Surveyor-General, felt that renewed efforts should be made both to arrest the sand and to stop the increasing disregard of the Ordinance of 1836.<sup>30</sup> A new Ordinance, No. 28 of 1846, was issued. It imposed heavier penalties for damaging vegetation on Crown land, required persons removing plants from private property to have written permission to do so and, furthermore, prevented owners of land on the western side of the Flats from disposing of any plants growing on their property.<sup>31</sup> These measures were evidently aimed chiefly at persons collecting firewood and thatching reeds.

#### 4.2 Drift Sand Brought Under Control

In 1847 a renewed effort to stabilise the sand that threatened the road

between the 5th and 6th milestones began. It was planned to fix the sand over an area of about 400 ha with "various kinds of shrubs and plants" and it was expected that the work would require three years to complete.<sup>32</sup> By mid-June 1848, 26 ha had been planted: 14 ha with "the Hottentot figs" on the flanks of the dunes and 12 ha with "rye, acacia, and rush seeds" in rows on the flat interdune areas. All the plants were healthy except for a few in waterlogged areas.<sup>33</sup>

This is the first report of acacias being planted at this site, but the identity of the species used does not seem to have been recorded. In view of the fact that Port Jackson willow was known to be adapted to sandy, windy conditions by this time, and was known to be an acacia (see quotation in Section 3.5.2), there is a strong possibility that it was this species that was planted.

The Hottentot fig was almost certainly the indigenous succulent creeper *Carpobrotus edulis*, which grows naturally in sandy areas. The rye was presumably the cereal *Secale cereale*. It is not clear which plants were meant by the name rush. It may have referred to one or more of the species of the indigenous family Restionaceae.

Another attempt to solve the problem of sand drifting across the road involved elevating a section of the road on an embankment. This was also done in 1847. In places the road was raised as high as 5.2m above the surroundings, "so as to present a more effectual barrier to the sand".<sup>34</sup> A circuit magistrate provided a vivid picture of the journey across the Flats at that time:

"At the very outset of the fatiguing journey, misery commences. Thus, when, sad and anxious at leaving town, we hurry the unwilling steeds along the 'Hard Road', swept with a hurricane's force by the south-east wind, the white sand sending like mist across the elevated road, its hot grains sting the face, equal to the smart of nettles. Scarcely we saw the horses stem the gusts of wind, and 'hold fast by their feet'. Wagons of forage may be upset on either side the steep embankment, and the circuit wagons, but for their heavy load, would soon incur a similar fate".

From this description it may be gathered that elevating the road did not solve the problem. As the writer pointed out, "nothing but binding the sand by vegetation" could be expected to do so.<sup>35</sup>

The planting scheme continued in 1848 under the direction of a new overseer, C. Feeney. He used seeds of Hottentot fig, which he found to be the most suitable plant, and also rye and rush, but not acacia.<sup>36</sup> Manure was brought from Cape Town to be spread with the seeds<sup>37</sup> and poison was laid in an attempt to destroy the marauding crows.<sup>38</sup> By April 1850 the planting was complete and the Roads Board was able to report that "an arid desert" of 800 ha had been converted to "a perfect garden".<sup>39</sup>

A witness to the planting was J.S. Hemming, who was storekeeper to the Roads Board. From his description we learn that the area planted in the period 1847 to 1850 extended three kilometres along the road and four kilometres southwards from it, becoming narrower at the southern end near a small stream that ran westward and discharged in winter into the Salt River.<sup>40</sup> This must have been the Vyekraal River. The area planted was therefore what is today the Maitland Cemetery, the eastern part of Pinelands and the western parts of Thornton, Epping Industria and Langa.<sup>41</sup>

Hemming named the plants used as mainly "Hottentot figs, rye-grass and reeds". He described the planting as beginning at the point furthest from the road and being gradually extended northward.<sup>42</sup> This means that the planting of acacias in 1847, the first year of operations, must have been at the southern end, in the vicinity of Vyekraal River, that is, near the site of the present-day Athlone Power station.

To protect the road until the planting scheme reached it, a fence was built alongside. It was 270m long and constructed of poles 3,4m high with brushwood placed between the poles. It was intended to form a barrier to the sand that would gradually accumulate on the windward side. It was expected that it would take three years for the sand to overtop the fence, but instead the fence was completely covered after only "a

few south-east winds" and a mound of sand 3,7m high and 21m wide at the base was formed. This mound was then also planted as part of the scheme.<sup>43</sup> It must have been a conspicuous landmark along the road for many years afterwards and may well have been the source of the following description of the Cape Flats made in 1862:

"These sand-dunes are at least twelve to thirteen feet high, and are most extraordinary freaks of nature. For years it puzzled everybody how to fix them, until the late Colonial Secretary hit upon the device of planting them with Hottentot fig - a wild succulent plant, like a lot of fingers moulded in green jelly, and which will grow anywhere; and now many of these hills have retained their old shapes, and are quite covered with this hardy creeper".<sup>44</sup>

While the Roads Board was engaged in planting the sand near the Hard Road, concern developed regarding sand drifts on the road to Simons-town, between the 10th and 11th milestones.<sup>45</sup> That road is now called Main Road and the area is known as Heathfield.<sup>46</sup> The Magistrate of Wynberg reported that the sand drift at the road was almost a kilometre long and was moving rapidly, being derived from a field of sand several kilometres in length and breadth. He attributed the movement of the sand to the cutting of bushes by "bakers and others" and also to the large numbers of sheep, cattle and goats wandering over the area. He suggested that Hottentot fig should be planted south-east of the 11th milestone and, further, that the road should be raised on a viaduct three metres high to allow the sand to pass underneath.<sup>47</sup>

This area of drift sand was dealt with in 1849 and 1850. Firstly, two screens, almost parallel and about 422m apart, were constructed east of the road. One was 322m long and the other 239m, and both were 3,7m high. Their intended purpose was to prevent any further accumulation of sand on the road. Then Hottentot fig was planted between the screens and also between the road and the screens.<sup>48</sup> After the planting was completed in June 1850 a fence of poplar cuttings was constructed along the road. These cuttings took root and grew to form a hedge which was still being maintained in 1857 when young poplar trees were planted to fill gaps in it.<sup>49</sup>

The Central Road Board's description of the screens that were erected near the Simonstown Road was quoted verbatim by W.A. Newman in his biography of the former Colonial Secretary, John Montagu, published in 1855. Several other statements from the Board's reports were also quoted with this description.<sup>50</sup> The juxtaposition of these quotations in Newman's book gave the impression that the screens were erected near the Hard Road, whereas, as has just been described, they were built adjacent to the main road to Simonstown, near the 11th milestone. Several 20th century historians have misinterpreted this information and stated incorrectly that the screens were built along the Hard Road.<sup>51</sup>

#### 4.3 Trees and Shrubs on the Drift Sand

As we have seen, by mid-1850 two plantations to control drifting sand had been established, one on the southern side of the Hard Road, in the vicinity of the 5th and 6th milestones (known as the White Sands plantation) and the other at the 11th milestone on the Simonstown Road. In both, the chief species used was Hottentot fig. At the White Sands some acacias had been planted in 1847, but apparently with little success. At the Simonstown Road plantation, poplars had been planted as well.

In June 1850 the Central Roads Board decided that trees should be established at the White Sands. Application was made to the Director of the Cape Town Botanic Garden for "as many forest tree plants as can be spared from the Botanical Gardens, especially of the South Australian kind". Of particular value, the Board considered, would be plants "which cattle are not likely to be attracted by or browse at".<sup>52</sup> McGibbon, the director, promptly provided plants that he considered suitable from his existing nursery stocks and also arranged for a large number of seeds to be sown in his nursery to provide young trees to be planted in the following year.<sup>53</sup> When thanking the director

for the first batch of plants, the Roads Board requested that about 50 000 plants be made available the following year, particularly "the gumtree and Port Jackson willow", which were considered to be "the plants most likely to answer the object in view".<sup>54</sup>

But, for some reason, the Board lost its enthusiasm for tree-planting. When the next planting season arrived, it was only after some difficulty that Feeney, the overseer, managed to persuade the Board to allow him to proceed with the planting of the 14 000 "gum and other plants" that the Botanic Garden had managed to provide. He also had to beg permission to obtain manure for the plantation.<sup>55</sup> The Roads Board's program of afforestation of the White Sands then ceased, having lasted only two seasons, 1850 and 1851.

Further details of this tree-planting phase can be gleaned from two published accounts and from statements made by R. Smith, who later became superintendent of the plantation. One of the published accounts is the article by Hemming that has been referred to already. Hemming reported that the planting that occurred in 1850 and 1851 included Port Jackson willow and green hakea on high ground and papkuil and stick reeds in low swampy areas. In addition, oak, gum, pine and poplar were planted as timber trees. Of the trees only the pines thrived and then only where there was sufficient depth of soil. The New Holland cypress (that is, presumably, *Callitris* sp.<sup>56</sup>) had also been planted and was growing well but slowly. The mound that had been created adjacent to the road in 1847 from the accumulation of sand against the fence was soon covered with a luxuriant growth of pypgras and Port Jackson willow "sufficiently high to hide a man on horseback".

Most of the species named above are exotics, the exceptions being pypgras (*Ehrharta villosa*) and, possibly, bulrush and stick reeds. By the last two names Hemming presumably meant *Typha* sp. and one or more species of the Restionaceae, respectively. Hemming reported that various other indigenous plants had been tried. Of those, the sugar bush (which he also called *Protea myrtales*, but by which he presumably

meant *P. repens*<sup>57</sup>) was most successful. He added that Hottentot fig was used to provide shelter for young plants of other species. By the time it died, in its third year, the other plants were strong.<sup>58</sup>

The other published account is that of Newman, who credited Montagu with being the driving force behind the planting of the sands. According to Newman, the most successful trees and shrubs used were *Acacia longifolia*, *A. latifolia*, *Leptospermum* sp., *Callitris* sp. and pale and green hakea. The gum tree (*Eucalyptus* sp.) was found to be less successful, being damaged by the strong winds. A hedge of Port Jackson willow and hakea was planted between the 5th and 6th milestones.<sup>59</sup>

Although these two accounts differ in some respects, it is possible to gain from them an idea of the species that were used. Both accounts agree that Port Jackson willow, green hakea, *Callitris* sp., and *Eucalyptus* sp. were planted, and that the last species was a failure. Which species was meant by "green hakea" was not indicated, but it may be surmised that it was *Hakea suaveolens* from the following information.

In 1857 Smith, when in charge of the plantation, sent some seeds of *H. suaveolens* to the Central Roads Board, recommending their distribution to the public. From his accompanying letter it appears that these seeds were collected from the White Sands<sup>60</sup> and thus that mature specimens of this species were growing there then. As the leaves of *H. suaveolens* are a relatively bright green compared with the rather greyish-green of other species such as *H. gibbosa* and *H. sericea* (Table 2.5.3), "green hakea" would appear to be an appropriate vernacular name for it, and therefore it seems reasonable to infer that both Hemming and Newman were referring to the planting of *H. suaveolens*.

Newman's report that *Leptospermum* sp. had been used was confirmed by Smith, who in 1857 found *L. laevigatum* growing luxuriantly at the White Sands.<sup>61</sup>

Smith also confirmed Hemming's report of pines, for in 1858 he stated

that at the White Sands there were about 40 specimens of *P. pinea* that had been planted seven or eight years before.<sup>62</sup>

As for the acacias reported by Newman: *A. longifolia* had been known in Cape Town for more than twenty years, as we have already seen (Section 3.5.1), and was an obvious candidate for trials on the sand; *A. latifolia*, on the other hand, poses a problem. It is doubtful that this name was being used correctly. This species is endemic to the tropical coast of northern Australia and was first described only in 1842.<sup>63</sup> It is unlikely to have been planted in temperate Cape Town only eight years later. A more reasonable explanation ensues from the fact that the name *A. latifolia* is a synonym of *A. melanoxydon* (Table 2.5.1). This suggests that Newman may have meant that *A. melanoxydon* was planted at the White Sands. As has already been shown, this species was known in Cape Town by 1848, having been reported in Von Ludwig's garden at that time (Section 3.5.2).

Further information on the acacias planted in 1850 and 1851 comes from Smith. In 1857 he reported that the plantation contained several plants of a "New South Wales shrub" which in March were "loaded with seed", and which he considered well adapted to growing on bare sand.<sup>64</sup> This may well have been *A. cyclops* for it is typically covered with open pods exposing large numbers of seeds in March, whereas the other Australian shrubs that are common today in the vicinity of Cape Town all shed their seed by the end of January. *A. cyclops* originates from Western Australia, not New South Wales, but Smith may have been using the latter term in the broad sense to mean Australian, or he may simply have been guessing at its place of origin.

In a list of seeds that Smith sent to the Roads Board in late 1857 were three species of acacia that he specifically stated were growing on the Cape Flats (or the Downs, as the area was also called). They were:

"*Acacia falciiformis* - tree from the Downs, Port Jackson willow

*A. cunninghamii?* - shrub from the Downs

*A. saligna?* - shrub from the Downs".<sup>65</sup>

This confirms the report of the other two authors that Port Jackson willow had been planted there and also appears to be the first attempt to assign a Latin name to this species in Cape Town.

The name *A. falciiformis* is no longer valid, being a synonym of *A. penninervis*,<sup>66</sup> but the classification of the botanist G. Bentham, published in 1842, included this species with seven others: *pycnantha*, *leiophylla*, *cyonophylla*, *saligna*, *falcata*, *microbotrya* and *penninervis*, in the series *Falcatae* of the genus *Acacia*.<sup>67</sup> The close relationship of all these species to one another suggests that the species Smith was trying to identify could well have been *A. saligna*. He had probably opted for the name *falciiformis* because he had observed strongly falcate phyllodes on the plants. Since *A. saligna* also frequently bears phyllodes of that shape, it could have been the latter species.

If Smith actually meant *A. saligna* by *A. falciiformis*, there is another problem, because he listed *A. saligna* simultaneously as another species growing on the Flats. As he signified by the use of a question mark that he was unsure of his identification, there is room for speculation about it. *A. saligna* is a variable species. Its range of variation includes characters that have been considered by some botanists in the past to distinguish a separate species, *A. cyanophylla*.<sup>68</sup> Therefore, the plants that Smith thought belonged to separate species, *A. falciiformis* and *A. saligna*, could well have been different forms of the one species, *A. saligna*.

Another possibility is that what Smith called "*A. saligna?*" was a closely related species in the *Falcatae* - perhaps *A. pycnantha*. As there is no supporting evidence for this latter suggestion, it is not entertained further in this report.

As for "*A. cunninghamii*?": again it is not clear which species was meant. Smith was obviously doubtful about his identification but there is no evidence that it was wrong except that this species is not known in South Africa today.<sup>69</sup> As *A. cunninghamii* has phyllodes with several longitudinal veins and flowers arranged in spikes,<sup>70</sup> it bears a resemblance to *A. longifolia* (see Table 2.5.2). This suggests that the plant Smith was trying to identify may have been *A. longifolia*. This would then be a confirmation of the report by Newman that *A. longifolia* was planted.

To summarise then, it is not possible, on the basis of this evidence, to state precisely which species were planted at the White Sands in 1850 and 1851, but the following list of species that were established can be accepted fairly confidently: *A. saligna*, *A. longifolia*, *H. suaveolens*, *L. laevigatum*, *P. pinea*, *Callitris* sp. and *Protea repens*. Other species, for which there is weaker evidence, include: *A. cyclops*, *A. melanoxydon* and "pale hakea". There is no information on which to base an identification of the last species. It could have been *H. gibbosa*, as that species is known to have been in the Cape Town region by this time (Section 3.5.2).

If these lists are accepted it can now be stated that 1850 is the earliest year in which the pest plants *H. suaveolens* and *L. laevigatum* are known to have been present in Cape Town and that the pest plant *A. cyclops* was probably also present at that time, in which case this is also the earliest known date for this species.

The important role played by the Botanic Garden in providing plants for the White Sands plantation is obvious. There is no evidence that Montagu "imported Port Jackson trees and Australian myrtle" specifically for this purpose, as Mossop stated.<sup>71</sup> These species, along with the others, were obtained from the Cape Town Botanic Garden. Likewise, claims that *A. saligna* was first introduced and used for sand control and wind breaks only in the 1880s<sup>72</sup> are patently incorrect.

The garden also played an important role in disseminating exotic plants to the public at this time. To raise money for its operating costs (including part of the director's salary) members of the public were invited to become subscribers to the garden in return for special visiting privileges and the right to select plants to the value of their subscription for their own use.<sup>73</sup> In addition direct sales of plants were made. By 1855 a good stock of "young plants of timber trees, shrubs, climbers, and ornamental plants of all kinds" was available in the nursery and that year sales to the value of 109 pounds were made.<sup>74</sup>

After the Roads Board lost interest in afforestation in 1851, work at the plantations consisted of maintenance of the established vegetation<sup>75</sup> and experimental planting of various indigenous herbaceous and shrubby species, particularly wax berry and pypgras.<sup>76</sup>

At this time, there was considerable interest in Cape Town in exploiting wax berry (*Myrica cordifolia*) as a commercial crop, as the wax could be used for making candles,<sup>77</sup> and the Agricultural Society conducted a competition for an essay on this subject in 1853. The two winners were Feeney, the overseer of the White Sands plantation, and Bowie.<sup>78</sup> Cultivation of pypgras at the White Sands began in 1851 and two years later some seed was sent to T.B. Bayley at "The Oaks", near Caledon, for his gardener to experiment with.<sup>79</sup>

In 1853 further planting was carried out on the sands at Heathfield. Nine hectares of sand at the source of the drift, just north of the shallow interdune lake known as Sandvlei, were ploughed, manured, and sown with rye and wax berry. Additional sowings were made near the screens next to the road. In 1854 pine seed was sown in this area.<sup>80</sup>

#### 4.4 Another Attempt to Establish Trees

The first attempt at afforestation at the White Sands in 1850 and 1851

evidently succeeded in establishing two tree species, *P. pinea* and *Callitris* sp., the other successful species being shrubs. After describing this planting activity, Hemming pointed out in 1857 the need for an active policy of establishing trees. He believed that simply converting the sand to pasturage (with herbaceous plants) or nurseries for firewood (with shrubs) would serve to "convert it merely into commonage, in which state it would be to no one's peculiar interest to preserve it".<sup>81</sup> This remark is of interest for its early appreciation of the concept of "the tragedy of the commons" which has been brought to the attention of modern conservationists by Garrett Hardin.<sup>82</sup>

Hemming suggested that if the plantation were converted to a forest various benefits would result, including increased rainfall, improved soil fertility and profit to the community from the sale of timber. Foreseeing a demand for vast amounts of timber for railway sleepers, he proposed that efforts be concentrated on the species of *Pinus* that had proved so successful on the sands of Landes in France, *P. pinaster* and *P. maritimus*, of which the former was already well known in Cape Town while the latter seemed scarcely known. It is not clear which species he meant by the latter name, as it is not an accepted one. Both *P. halepensis* and *P. pinaster* have been called *P. maritima* (Table 2.5.1). Hemming also suggested that farmers should be encouraged to grow trees and that prizes should be awarded annually for tree-growing.<sup>83</sup>

In July 1857 Hemming drew the attention of the Central Roads Board to his article,<sup>84</sup> presumably hoping to influence its plans, but by that time the Board had already embarked on a new afforestation scheme of its own. Its report for 1856 had set out a plan for extending the White Sands plantation, not only for more effective protection of the road, but also with the aim of deriving a financial return from the sale of timber and wax berries.<sup>85</sup>

The plan was implemented by R. Smith, who was appointed Superintendent of Plantations early in 1857. He had previously been a gardener at the property known as "The Oaks", near Caledon, owned by T.B. Bayley.<sup>86</sup>

The farm was famous for its conifers.<sup>87</sup> Smith's observations on *Pinus halepensis* growing on the adjoining farm were discussed in Section 3.4.2.

When Bayley had sold his farm and moved to Cape Town, Smith had obtained employment as a road overseer at the 8th mile station on Maitland Road (the former Hard Road). He expressed interest in growing trees along the road and Bayley asked the Roads Board (of which he himself had been a member until 1853<sup>88</sup>) to place Smith in charge of the plantations. In the meantime Bayley agreed to locate for Smith a supply of seeds of trees "such as Australian gums and acacias, pines of various sorts, etc."<sup>89</sup> The Botanic Garden then supplied seeds to Smith, at Bayley's request.<sup>90</sup>

By September 1856 Smith reportedly had a thriving nursery of Australian, South American and Cape trees, and had sown a triple row of *P. pinea* for 3,2km along the southern side of the road (presumably in the vicinity of the 8th milestone, where he was stationed). He had also planted 200 basket willows (*Salix triandra*) in a low damp spot.<sup>91</sup>

Smith's observations on the species that he found growing at the White Sands at the time of his appointment as superintendent in 1857 have been referred to already (Section 4.3). For the new afforestation program the Botanic Garden was again called on as a source of seeds. McGibbon, the director, sent to Smith in February 1857 a large quantity of seeds which he considered "sufficient for very extended operations". Among these were seeds of Port Jackson willow (no Latin name mentioned), *Acacia longifolia*, *A. melanoxyton*, *A. glaucophylla*, and a species referred to as *A. dolabriformis*.<sup>92</sup> It is shown in the next Chapter that *A. glaucophylla* was actually *A. cyclops*. Therefore this is the first definite report of that species being planted on the Cape Flats, although it has already been inferred that it was used in 1850.

Other Australian species supplied by McGibbon were named by him as *Callitris cupressiformis*, *Casuarina muricata*, *Callistemon viridiflora*, *Eucalyptus diversifolia* and another *Eucalyptus* species. Other exotics

included *Prunus spinosa*, *Cassia carymbosa*, common cypress, Judas tree, camphor tree and sycamore. There were also some indigenous trees: silver tree, kaffirboom, Cape chestnut and *Acacia horrida*.<sup>93</sup> The last-named may have been *A. karroo*, for many 19th century botanists confused those two species.<sup>94</sup>

Smith also obtained large quantities of seed from trees on private estates.<sup>95</sup> From Bayley he acquired one plant of *Pinus radiata* (= *P. insignis*), which he knew to be well suited to conditions in the Cape Colony as a result of his experience with it on Bayley's farm, where several specimens, grafted on stocks of *P. pinaster*, were flourishing.<sup>96</sup> This evidence that *P. radiata* was growing at "The Oaks" before 1857, and was therefore present in the colony more than a quarter of a century earlier than foresters of this century have generally thought,<sup>97</sup> substantiates the undocumented statements of M.H. Lister and R.J. Poynton to this effect.<sup>98</sup> In late 1858 Smith reported that young trees of *P. radiata* (as well as other pines) were growing "in full vigor" at the White Sands.<sup>99</sup>

As has already been mentioned, McGibbon sent to Smith in February 1857 seeds of a species that he called *A. dolabriiformis*. As this name is no longer in use, an attempt is made here to deduce what species McGibbon was referring to. The name has been applied by botanists to three species in the past, but in each case is now considered to be a synonym.<sup>100</sup> None of those species is known in South Africa today.<sup>101</sup>

In May 1857 Smith reported to the Roads Board that he had procured, on the recommendation of the Governor, Sir George Grey, some seeds of a plant from Kangaroo Island, "a species of *Acacia*, perhaps 'Dalubriiformis' (*sic*)". At the end of the year he reported that several hundred young plants of the "Kangaroo Island thorn", recommended by Grey and raised in the nursery, were being used to form a hedge alongside Maitland Road near the 6th milestone.<sup>102</sup>

From these facts it may be deduced that the species that McGibbon

referred to as *A. dolabriiformis* was actually *A. armata*, which in Australia is known as kangaroo thorn after Kangaroo Island, where it is abundant.<sup>103</sup> Grey must have become familiar with this species during his term as Governor of South Australia.<sup>104</sup>

This conclusion tends to be negated by the fact that in his catalogue of plants in the Botanic Garden in 1858 McGibbon listed both *A. dolabriiformis* and *A. armata*,<sup>105</sup> thus implying that these were distinct species. This may be explained by assuming that two batches of seed of *A. armata* had been received from Australia, one correctly labelled, the other without a name, or with the wrong one. If no direct comparison had been made between the plants grown from the two consignments of seeds, it would not have been realised that they were identical.

If the inference that has been made here, that the plants used by Smith to form a hedge at the 6th milestone in 1857 were *Acacia armata*, is correct, then this appears to be the first record of the planting of this species in the vicinity of Cape Town. This is one of the species that Taylor warned in 1975 was a potential pest plant of the future.<sup>106</sup>

Smith spent his first two years as Superintendent of the White Sands, 1857 and 1858, experimenting with a large number of species in a variety of sites. He was impressed by the "extraordinary growth" of what he called *A. falciiformis*, but which, it was suggested earlier, was probably *A. saligna*. Some specimens had grown more than 3,3m in two years.<sup>107</sup> As he hoped to resolve the question of how to convert all of the White Sands reserve to forest, however, he was more interested in trees than in shrubs such as acacias.

The total area planted by Smith in these two years was 60 ha, but not all of this was successful. The eucalypts and deciduous trees nearly all died in the summer. Smith's conclusion from this experimentation was that pines were the most promising trees. He particularly favoured *P. pinea* and *P. pinaster*, but considered that *P. radiata* and *P. halepensis* should also do well.<sup>108</sup>

#### 4.5 Public Interest in Growing Exotic Trees and Shrubs

Smith attempted to communicate to the public his interest in the growing of trees. He published a series of articles directed at "all who wish to convert barren spots into valuable forest land" in which he advised the use of Australian plants, "as they are well adapted to the climate of South Africa". Among his recommendations were *A. melanoxyton* and *L. laevigatum*, as well as various species of *Eucalyptus*.<sup>109</sup> He also sent 74 packets of seeds of trees and shrubs, including Port Jackson willow, *L. laevigatum* and *H. suaveolens*, to the Roads Board in 1857 for distribution to the public.<sup>110</sup>

Subsequently, in 1861, Smith established a nursery at the White Sands from which he began selling "blue gums, conifers, and tree-acacias" to the public, in the hope of encouraging farmers to plant trees on their properties.<sup>111</sup>

As we have seen, the Botanic Garden was also distributing plants and seeds to the public at this time. Plant materials were sent as far afield as Grahamstown and Durban for use in the public gardens there.<sup>112</sup> The Garden's supply of seeds was augmented by "large quantities of Indian, Tasmanian, Australian and English seeds" presented by Governor Grey from time to time, by parcels of seeds from the botanical gardens at Harvard, Melbourne and Sydney and "living plants in glazed cases" from England, Melbourne, Sydney and Mauritius, all received in 1855, and also by a large collection of seeds sent in 1861 by Baron F.J.H. von Mueller, Government Botanist in the Australian colony of Victoria.<sup>113</sup>

A catalogue of the plants growing in the Garden, issued in 1858, indicated in its 36 pages how large the scale of importation of Australian species had become, listing *inter alia* 25 Australian species of *Acacia* and six of *Hakea*. It showed that *A. mearnsii* and *H. sericea*

had been introduced by then, this being the earliest record of those two pest species. Of the thirteen pest plants, only three were not included in the catalogue: *A. pycnantha*, *H. suaveolens* and *P. halepensis*.<sup>114</sup> As has already been stated, the latter two species are known to have been present in the Cape Colony by this date. Therefore, it appears that only one of the thirteen species, *A. pycnantha*, had not been introduced by 1858.

The importance of the Garden's influence on public interest in exotic species at this time was said by one local observer to be proven by "the green tresses of the casuarina floating over our gardens, and the lofty plumes of the eucalyptus waving over everything else".<sup>115</sup>

According to the director, the Garden's policy had been so successful that it had brought into existence a class of business establishment previously unknown in Cape Town: plant nurseries. By 1859 there were "so many private growers who raise and sell such easily produced things as gum-trees, hakeas, etc.", which only a few years earlier could be obtained only at the Botanic Garden, that the Garden's own nursery business began to suffer.<sup>116</sup>

Another outcome of the intense interest in botanical matters in the Cape Colony at this time was the creation of the post of Colonial Botanist. According to the second incumbent of this post, J.C. Brown, the intention was that the Colonial Botanist should ascertain and make known the value of indigenous plants as economic resources, investigate the suitability of the Cape for useful exotic trees and other plants, and further the advance of botanical science by studying the flora of South Africa.<sup>117</sup> The first botanist appointed to the post was L. Pappe, in 1858.<sup>118</sup>

#### 4.6 New Areas of Drift Sand

Meanwhile, drift sand on the Cape Flats was still causing concern. While the problem at the White Sands had been solved and Superintendent Smith's efforts there were now directed at establishing trees, other areas of the Flats were becoming increasingly denuded.

In September 1857, after the Roads Board had advised the Colonial Secretary that far stronger control measures were needed to deal with the problem,<sup>119</sup> the latter requested a detailed report on the state of the sands and the best method of dealing with them.<sup>120</sup> Smith made an extensive tour of the Flats and marked on a map the major areas of drift sand. The map and his report were submitted to the Colonial Secretary accompanied by a summary of the Board's recommendations. The main points made were the need for more extensive planting, more rangers to protect the vegetation, and an accurate survey of the Flats to locate precisely the position and extent of the tracts of sand that required planting.<sup>121</sup>

These documents were sent to the Surveyor-General who eventually, in April 1859, agreed to carry out a trial survey of part of the Flats, but doubted that a planting scheme on a large scale could be successful, mainly because it would be difficult to obtain sufficient manure.<sup>122</sup>

No further action at official level in regard to Smith's report was taken for twelve years, except for the issuance of a Government Notice in 1860 to the effect that a fine of five pounds would be imposed on any person destroying any tree, shrub or bush growing on the Cape Flats. The stated intention was to prevent the recurrence of the drifts "which, at great expense and labour, have of late been so happily overcome and arrested".<sup>123</sup>

The reorganisation of public administration that followed the establishment of Representative Government in the Cape Colony in 1854<sup>124</sup>

resulted in the disbanding of the Central Roads Board in 1858. Its functions were taken over by the Chief Commissioner of Roads,<sup>125</sup> who thus assumed responsibility for the plantations on the Flats. Smith continued his work as Superintendent of Plantations but found that he had little opportunity to continue with his afforestation scheme. His time was occupied with planting new areas of drift sand and policing the various plantations to prevent people and animals from damaging them. He had only one ranger to assist him in this task.<sup>126</sup>

The completion of the railway line between Cape Town and Stellenbosch, via Eerste River, in 1862<sup>127</sup> created more problems for Smith. As it followed almost the same route as Maitland Road (formerly the Hard Road), generally being about 0,5km south of it,<sup>128</sup> the line disrupted the White Sands plantation by dividing it into two at the northern end. Furthermore, the railway also had to be protected from drift sand.

Three areas of sand engaged Smith's attention in the period 1858 to 1865. At the 8th milestone on Maitland Road (in the vicinity of the present-day Vasco railway station) an area of about 80 ha just south of the road was dealt with in 1858. It was first enclosed with poplars on all four sides, the southern side being the bank of a river (which must have been the Elsieskraal River). Inside this poplar hedge was sown a broad row of Port Jackson willow (again identified by Smith as *A. falciiformis*). Across the enclosure rows of branches cut from indigenous shrubs were placed in the sand to form a series of screens about 0,5m high and from 1,8 to 5,5m apart. The whole area was then sown with *Protea repens* (= *P. mellifera*), wax berry and other seeds, together with a sprinkling of *Pinus pinaster* and lupins.<sup>129</sup>

This appears to be the first report of the use on the Cape Flats of low screens made from branches thrust into the sand. This method of sheltering young seedlings is still used by the market gardeners of the Flats. Ironically, today the branches are obtained from the

ubiquitous pest plants *A. cyclops* and *A. saligna*. Perhaps the custom of using indigenous shrubs for this purpose in Smith's time contributed to the demise of the latter and assisted the establishment of the aliens.

Another new area of drift sand on which Smith began work in 1858 was at Duikersvlei, on the south-eastern side of the new road that was being constructed between Cape Town and Malmesbury, north-east of Cape Town. According to Smith, this area would never have been a problem if the road had been built as surveyed. Instead, the Road Inspector, J.S. Lister senior, had decided that the road should follow the original waggon route, and that was exposed to drifting sand.<sup>130</sup> The area known as Duikersvlei in Smith's time is just south of the present-day oil refinery on Koeberg Road.<sup>131</sup>

Across the drift Smith planted two rows of the indigenous shrub *Chrysanthemoides monilifera* (= *Osteospermum moniliferum*), which was found to grow readily from cuttings and to resist the encroachment of sand even better than the "far-famed wax berry". The barrier created by these plants was "strengthened with 1 000 young Dutch willow trees".<sup>132</sup>

The use of *C. monilifera* is of interest because this South African species is today considered a pest plant in Victoria, Australia. It was first introduced to the Botanic Garden in Melbourne, Victoria in 1858 (the same year that Smith was demonstrating its value as a sand-binding plant near Cape Town) and subsequently it was widely planted.<sup>133</sup>

Smith's work at Duikersvlei was continued in the following year at the source of the drift, 1,6km from the road. Screens were erected to form two squares and inside the squares were sown seeds of grass, sugar bush, stone pine and bulrush.<sup>134</sup> In 1863 Smith reported that all the sand had been stabilised but that the plantation must be guarded from trespassers until the plants grew sufficiently robust

to make the ground firm.<sup>135</sup>

The third area of drift sand was just south of the 12th milestone, in the area now known as Bellville. It was about 1,6km long and 0,8km wide. In 1858 Smith employed the same technique there as at the 8th milestone, using *C. monilifera* as one of the species forming the low screens. Among the seeds scattered over the sand, Smith planned to use lupins, these plants having demonstrated their suitability by the fact that they had "so completely taken possession of the sands at the Diocesan College and other places on the Campground". By July 1858, 40ha had been treated.<sup>136</sup>

Work continued for several years at this drift, which threatened both the road and the railway. In 1860 an average of 6ha of sand was being treated per month,<sup>137</sup> while in 1863 the average was 2,8ha per month. No record has been found of the type of seed sown, except for a reference to the use of "grass seeds" in 1863.<sup>138</sup>

In 1864, 5 000 "trees of various kinds" were transplanted from the White Sands to the banks of the Elsieskraal River in the vicinity of the 12th milestone.<sup>139</sup> It seems reasonable to assume that they included species of *Acacia*, *Hakea*, *Leptospermum* and *Pinus*, since these are known to have been established at the White Sands by that time.

At the White Sands Smith continued as well as he could with his afforestation scheme, using pines. Five hundred seeds of *P. radiata* were sown in 1862,<sup>140</sup> while in the period 1859 to 1863 large quantities of *P. pinea* were sown each year.<sup>141</sup> The latter species was sown mainly in a strip from Uitvlugt to the 4th milestone.<sup>142</sup> Uitvlugt was a farmhouse near the southern end of the plantation that was used as the superintendent's residence.<sup>143</sup> It was situated adjacent to where Homestead Avenue now runs in Pinelands.<sup>144</sup> The 4th milestone was adjacent to the Maitland railway station.<sup>145</sup> Therefore this plantation of *P. pinea* passed through the area that is today western Pinelands and Ndabeni.

#### 4.7 Experimentation With Exotics

When Pappe died in 1863, Rev. John C. Brown was appointed to replace him as Colonial Botanist. Brown believed that one of his most important functions was to encourage people throughout the colony to plant trees and he travelled widely on this mission. While he preferred that indigenous species be used, he nevertheless advised people to plant "any kind of tree which will grow: oak, fir, poplar, blue gum, beefwood, blackwood - anything".<sup>146</sup>

He considered that the most important justification for planting trees was that it would cause the rainfall to increase. He realised also that wood was needed for fuel both for household use and for steam-operated railway locomotives and agricultural machinery.<sup>147</sup> To promote widespread planting, he recommended in 1866 that "seeds of Australian and European trees such as blue gums, Port Jackson willows, blackwoods, oaks, pines, etc.," be given to civil commissioners, municipalities, agricultural societies and the general public.<sup>148</sup>

Another of Brown's functions was to answer queries regarding the most suitable plant species for particular localities. Among his recommendations to enquirers were Port Jackson willow, *Albizia lophantha* and "the hakea".<sup>149</sup>

Brown was also actively involved in importing and distributing seeds. In 1866 he imported seeds of 700 species from Europe, California, Victoria and New South Wales for distribution throughout the Colony.<sup>150</sup>

Brown's annual reports provide ample evidence that exotic trees and shrubs were widespread in the Cape Colony by the mid-1860s. In 1866 he noted that the soil and climate of the region appeared particularly suitable for Australian acacias and that *A. mearnsii* and *A. melanoxylon* were being cultivated extensively. The latter species was used as an ornamental and self-sown seedlings were often seen.

One introduced species with which he was less happy was *Albizia lophantha*, another of today's pest plants. It was "becoming a nuisance by taking possession of land adapted for better things".<sup>151</sup>

Brown reported that hakeas were frequently grown to form hedges and were occasionally interplanted with cypress trees to form stately avenues in cemeteries. He recommended that the outer boundary of a cemetery should comprise a dense hedge of hakeas, with willows, casuarinas and eucalypts spaced at regular intervals, while lining the walks within the cemetery should be avenues comprising mixtures of the three last-named trees with hakeas and cypresses. Such avenues "would meet an ungratified craving which is felt at times on visiting the resting place of the dead".<sup>152</sup>

From one of Brown's reports we learn that at Diep River a farmer called Holding was successfully growing many exotics, including *A. longifolia*, *A. mearnsii*, *A. melanoxylon* and *A. pycnantha*, as well as eleven other species of acacia. This is the earliest report that has yet come to light of the presence of *A. pycnantha* in the colony. Its date of arrival can thus be set at 1865, at the latest. In addition to the acacias, Holding was said to be growing two species each of *Leptospermum* and *Hakea* ("*H. brachyrrhyncha* and another unknown species").<sup>153</sup>

Brown mentioned in 1865 "the plantations of fir trees belonging to Mr Breda on the skirts of Table Mountain, only a few years old".<sup>154</sup> Those plantations were also described by a local resident in 1861 as "the extensive pine forests hugging the base of Lion's Head and Table Mountain" and abutting on to Plattekliip Stream.<sup>155</sup> A dense forest of pines is clearly depicted in a painting of the upper Kloof Road, on the northern slopes of Table Mountain, made in about the year 1860.<sup>156</sup> These trees must have been on the property "Oranjezicht", which had long been in the hands of the Van Breda family.<sup>157</sup> In 1822 M. van Breda had been described as "the most experimental horticulturalist of the Cape" and was said to collect and distribute rare plants.<sup>158</sup>

Like Smith, Brown was interested in the problem of establishing trees on the Cape Flats. He observed that at various farms on the western edge of the Flats, near Claremont, there were "large plantations of pine, poplar, and other trees", having the appearance of "oases in the desert". He considered them to be ample proof that forest trees could be grown in sand.<sup>159</sup>

By the mid-1860s the Cape Colony was in the grip of a severe economic depression which had begun several years before, in conjunction with drought conditions which persisted throughout the decade.<sup>160</sup> Both Smith and Brown were frustrated by the severe financial stringencies forced on them by the government. Smith is even reported to have shed tears when the government refused to allow him to spend a shilling on nails for a fence to keep animals out of a plantation.<sup>161</sup> As an economy measure, the post of Colonial Botanist was abolished in 1866 and Brown returned to Scotland.<sup>162</sup>

Smith was replaced as superintendent in late 1864 by A. Mathieson.<sup>163</sup> He was expected merely to maintain the existing plantations and not to incur any unnecessary expenditure.<sup>164</sup> He was keen to continue the tree-planting program at the White Sands, but observed:

"... with the exception of two belts of trees, the one ranging from the 5th to the 6th milestone along the Maitland Road, and the other (for the most part in sickly condition) ranging along the rising ground near Uitvlugt, the forest trees existing in the remaining portion of the so-called plantation are, in relation to the great area, all but mythical".<sup>165</sup>

He continued with the planting of *P. pinea* that Smith had instituted and he also transplanted acacias and hakeas, both from the nursery and from sites in the plantation where they had grown too thickly. He reported that 20 000 "young acacia trees" were transplanted in 1866, 3 500 "golden and Port Jackson willow trees" and 1 500 "blackwood trees" in 1867, 6 000 "Australian willow trees" on both sides of the railway line in 1868, several thousand "young hakeas, Port Jackson

and golden willows, etc." in 1869, and 4 000 "young Australian willow and blackwood trees" in 1872. In addition, hakea seed and various kinds of trees were sent from the plantation to Robben Island, in Table Bay.<sup>166</sup>

As some of the vernacular names referred to above are unfamiliar, the information has been set out in tabular form (Table 4.9.1) to help clarify which species were involved. It is clear from the table that blackwood (presumably *Acacia melanoxyton*) was involved and also at least one species of *Hakea*. It appears from the table that the term Australian willow, used in 1868 and 1872, meant either or both of the two species referred to as golden willow and Port Jackson willow in 1867 and 1869. If we assume that the latter was *A. saligna*, then only golden willow remains to be identified.

As McGibbon in 1858 had applied the name golden willow to *A. longifolia*<sup>167</sup> one is obliged to accept this as the most likely identification of the species. If this is correct, then one wonders about the fate of *A. cyclops*, which is known to have been planted at the White Sands at an earlier stage. One would expect it to flourish there also. As there is a certain similarity in appearance between these two acacias, to the extent that it is often difficult to distinguish between them when they are young (see Section 2.3), it is possible that Mathieson had confused the two and was actually transplanting *A. cyclops* as well as, or instead of, *A. longifolia*, under the name golden willow. In later sources it is quite clearly stated that the name golden willow is applied by some people to *A. cyclops*.<sup>168</sup> Thus, this may well have been so in Mathieson's case also.

It may be concluded from the above discussion of Mathieson's information that by the late 1860s *A. melanoxyton*, *A. saligna*, *A. longifolia* and/or *A. cyclops*, and *Hakea* (one or more species) were thriving at the White Sands.

After the opening of the railway line, fires started by sparks from

Locomotives had increased the difficulties involved in establishing trees. M.R. Robinson, who was the Chief Inspector of Public Works (under whose jurisdiction the plantations fell from 1866) did not consider these fires to be a problem, for he believed that all that was needed to achieve the "real object in view, viz. the suppression of sand drift" was simply to replant with shrubs after each fire. He saw little point in persisting with forestry, as "on such a soil these trees could never reach maturity".<sup>169</sup> After Mathieson died in 1871, Robinson wrote:

"I have never seen the advantages of tree-planting. Very few of the many hundreds of thousands that have been planted ever live more than the second year, except where the drift sand happens to be deep; and the principal object should now, in my opinion, be their preservation from trespass, fire, and uprooting of bushes, with occasional renewal of such creeping plants that hold the sand".<sup>170</sup>

He recommended that Mathieson's post should not be filled, but that a second ranger should be appointed instead to help protect the existing plantations.<sup>171</sup>

By 1871 concern had again arisen over drift sand on the Flats, particularly near the 12th milestone. In the Legislative Council, W. de Smidt drew the attention of the Governor to this problem, pointing out that the report on drift sand prepared by the Roads Board in 1857 had been ignored.<sup>172</sup> De Smidt had been secretary to the Board at that time.<sup>173</sup>

Although the government acted, it was only with half-hearted enthusiasm. A new Superintendent of Plantations, J.H. Versfeld, was appointed in 1873,<sup>174</sup> but his method of controlling drift sand did not meet with official approval. By late 1874 he had been dismissed for incurring the unauthorised expenditure of a very large amount of public money by erecting fences to arrest the drift sands in the plantation near the 12th milestone.<sup>175</sup>

#### 4.8 Role of J.S. Lister

In the early 1870s the long drought had ended and the financial condition of the colony had begun to improve. A wave of prosperity followed, allowing large public works to be taken in hand.<sup>176</sup> The effects of this prosperity were not immediately apparent in the plantations on the Cape Flats, as the dismissal of Versfeld shows, but in 1876 the government indicated a renewed interest in tree-planting by passing an Act to "encourage the planting and cultivation of trees", which provided that the government would pay half the cost of tree-planting programs carried out by municipalities and other local government authorities.<sup>177</sup>

The appointment of J. Storr Lister junior as Superintendent of Plantations at the beginning of 1875<sup>178</sup> also indicated a renewed official interest in tree-planting. Lister's father, who was a road inspector with the Central Roads Board, had been impressed by Smith's efforts to grow trees<sup>179</sup> and is reported to have carried out several tree-planting programs of his own in the Rondebosch area. Lister himself had just returned from India after five years of training as a forester.<sup>180</sup> As superintendent he would obviously be interested in planting trees rather than merely being a caretaker.

At first Lister felt that his enthusiasm for trees was not shared by the public. He complained that he was regarded condescendingly as "a stranger zealous in arboriculture" who was "full of verdant ideas", but who had a great deal to learn about the problems of growing trees at the Cape. People to whom he spoke seemed unconvinced by his argument that trees were valuable "as a means to temper the climate and increase or equalize the rainfall", for their main concern was that plantations of trees, even if they could be grown, were undesirable because they might in time "form a shelter for thieves and vagabonds"<sup>181</sup>

(an accurate prophecy, as residents of the Flats today can testify).

Despite this apparent resistance, it is obvious from what has already been said that there was a great deal of interest in the cultivation of exotic trees and shrubs even before Lister's arrival. In any case, Lister remained undeterred and proceeded to establish a plantation of eucalypt trees at Worcester, 120km inland from Cape Town, to provide fuel for the railway.<sup>182</sup>

During Lister's first year as superintendent, some of the vacant Crown land on the Flats was let by auction. A condition of the leases was that "trees, shrubs, or other vegetation calculated to prevent or arrest sand drift" must be planted. The government would provide free seeds and would offer prizes for the best plantations.<sup>183</sup>

More land on the Flats passed into private hands a few years later when agricultural allotments were granted to the first of the German immigrants to arrive under the government's sponsorship scheme initiated in 1876.<sup>184</sup> In 1878, 52 lots were surveyed at Wynberg Flats, the area that became known as Philippi, and 69 lots were laid out at Claremont Flats, the area today known as Rylands.<sup>185</sup> The small size of these lots (almost all of them were 8,5 ha) indicates that it was intended that they should be cultivated and not merely used for rough grazing. Through Lister, the government distributed to the settlers, free of charge, seeds and young trees.<sup>186</sup>

In addition to his duties as Superintendent of Plantations, Lister was made responsible for the supervision of the Zulu Chief, Langalibalele.<sup>187</sup> After being exiled from Natal, Langalibalele was first sent to Robben Island, near Cape Town, and then transferred to the mainland in 1875.<sup>188</sup> The area set aside for his detention comprised a large section of the Crown land on the Cape Flats, bounded in the north by the railway line, from midway between the 4th and 5th milestones to the 8th milestone, and extending south almost to the Vyekraal River.<sup>189</sup> This incorporated most of the White Sands plantation as well as the

small plantation at the 8th milestone and, by including a large area to the east and south of these plantations, respectively, increased substantially the area under Lister's immediate jurisdiction. The scope for his planting activities was therefore greatly increased.

Being responsible not only for the existing plantations, but also for the condition of the vegetation of all of the Flats, Lister set about organising a team of "forest rangers". By 1882 there were five rangers, each in charge of a section of the Flats.<sup>190</sup> From the size of this team it is obvious that at last the government was taking the condition of the Cape Flats seriously.

The large area of drift sand south of the 12th milestone and west of the Kuils River, which had been causing concern and on which sporadic planting activity had occurred since 1858, drew Lister's attention immediately after his appointment. This area was known by then as Durban Road, being named after the branch road that led northward from the 12th milestone to the village of Durban (later called Durbanville). Today the locality then known as Durban Road is called Bellville.

In 1875 and 1876 Lister continued the work at Durban Road by following the established method, devised by Smith, of fixing branches in the sand in rows to form screens and then sowing between the screens.<sup>191</sup> As we have seen, this technique had been used successfully at the 8th milestone and had also been carried out for some years at Durban Road. Lister did not report at the time that this technique was a failure, but in 1877 he devised a new method, which he described as exceeding "the most sanguine expectation".<sup>192</sup>

When describing Lister's new method some ten years later, A.W. Heywood stated that the old way had been "totally unsuccessful".<sup>193</sup> Even though Heywood worked with Lister for several years in the 1880s and was related to him by marriage<sup>194</sup> it is hard to believe that such a completely negative judgment could have reflected Lister's opinion at the time. The Superintendent of Woods and Forests stated in 1881, in

regard to the old method, that "in many places the success arrived at leaves much to be desired",<sup>195</sup> while Lister's daughter subsequently described the method as "slow, expensive, uncertain and on the whole unsuccessful".<sup>196</sup> An engineer, writing in 1902, described the reclamation conducted before 1877 as achieving "much valuable work".<sup>197</sup> These comments imply that some success was achieved and appear to be a more realistic assessment of Lister's attitude.

Reliance on Heywood's account has led at least one author to infer that sand drift control on the Flats began only in 1877,<sup>198</sup> whereas, as this present study has shown, it had been carried on with reasonably good results in various parts of the Flats since 1845.

One of the principal features of Lister's new technique was the application of fertiliser to the sand. The advantages of doing this had been appreciated by some of Lister's predecessors, who had used manure brought from Cape Town, but they had had limited amounts at their disposal (see Sections 4.3 and 4.6). For Lister, use of fertiliser was facilitated by the existence of the railway. For several years before his appointment, Cape Town's household and street refuse had been disposed of by being transported to the Flats by rail and dumped, or it had been sold to farmers as fertiliser.<sup>199</sup> Lister soon realised that this rubbish would be useful in the drift sand control work.<sup>200</sup> It must be appreciated that street sweepings in those days consisted mainly of horse manure.

A railway siding was constructed in 1877 from the main line at Durban Road station (adjacent to the 12th milestone on Maitland Road) southwards towards the sand. It was 1,2<sup>km</sup> long initially and was doubled in length in 1879. Rubbish was brought from Cape Town by train, deposited alongside the siding and carted from there to the areas of bare sand. The procedure followed was to scatter seeds over the sand and then spread a layer of rubbish over the top. This new technique of sand reclamation thus incorporated both the stabilising effect of the rubbish on the sand and its capacity to act as a fertiliser.<sup>201</sup>

In his choice of plant species to use on the drift sand, Lister was able to take advantage of the experimentation that had been carried out over the previous 30 years. He was particularly impressed by Port Jackson willow, which he at first identified as *A. foliata*.<sup>202</sup>

At this point it is desirable to summarise the various names applied to Port Jackson willow in Cape Town. It took many years for the correct identification to be worked out. As already noted (Section 4.3), Smith identified it as *A. falciformis* in 1857 and considered it to be distinct from another plant that he tentatively identified as *A. saligna*. In 1858 McGibbon referred to Port Jackson willow as *A. falcata* and also mentioned *A. saligna* separately.<sup>203</sup> Now, in 1878, Lister was using yet another name, *A. foliata*. As this name is not listed in *Index Kewensis* as a published epithet,<sup>204</sup> it is not clear where Lister obtained it. A few years later the Superintendent of Woods and Forests referred to the wattle that Lister was planting as *A. falcata*,<sup>205</sup> thereby reverting to the name used by McGibbon. It would appear then that the accepted identification of Port Jackson willow in Cape Town at the end of the 1870s was *A. falcata* and that in calling it *A. foliata* Lister had merely misread the name. Roux also arrived at this conclusion, although by different means, in 1961.<sup>206</sup>

The question of the correct identification of this species is considered again in the next Chapter, but in the meantime in this discussion it is referred to as *A. saligna*, even though, in the time period under consideration, those planting it were not yet using this name.

In appraising Port Jackson willow, Lister noted that it flourished on the sand of the Flats and that its wood was useful for the construction of waggons and for fencing posts; while as firewood it was "unequaled".<sup>207</sup> After receiving favourable reports from local tanners on the suitability of its bark as a tanning agent in 1879, he promoted this species even more enthusiastically, and urged farmers on the Flats to consider it as a possible crop.<sup>208</sup>

A further advantage of Port Jackson willow, Lister observed, was that it was not attacked by the insect *Icerya purchasi*, known locally as Australian bug.<sup>209</sup> This insect was inadvertently introduced to Cape Town in the early 1870s (being at first identified as *Dortheisia* sp.). It spread rapidly among the Australian acacias that were by then common in streets and gardens and by 1877 it occurred in localities as far away as Namaqualand in the north and East London in the east. *Acacia melanoxylon* was particularly prone to attack.<sup>210</sup> According to Theal all trees of that species were destroyed.<sup>211</sup>

Because the insect also attacked citrus trees, a governmental commission was appointed in 1877 to investigate the problem. It concluded that the only totally effective control measure would be to ban cultivation of all Australian acacias and destroy all those already growing in the colony, but pointed out that achievement of this aim would be impossible, so widespread had the acacias become.<sup>212</sup>

As Lister's arrival coincided with the height of the plague of *I. purchasi* and Port Jackson willow was resistant to this pest, it was inevitable that he should favour using this species in his work on the Flats, particularly as it had already been shown to be very suitable for planting in sand.

Thus, from 1877 onwards, the sand at Durban Road was stabilised by being sown with seeds of *A. saligna*, together with rye and pyggras,<sup>213</sup> which were then covered with a layer of town refuse. Smaller quantities of other tree and shrub species were used as well, including *P. halepensis*, *Widdringtonia cupressoides*, *L. laevigatum* and *Hakea* sp., but none of these was very successful.<sup>214</sup> It is interesting to note that neither *A. longifolia* nor *A. cyclops* was used, even though, as already observed, "golden willow" was flourishing at the White Sands in the 1860s. It might be surmised that this was because these species had also been affected by the Australian bug, but this cannot have been the case for *A. cyclops*, because by 1880 seed of this species, collected on the Flats, was being distributed to the public.<sup>215</sup>

Lister's new technique proved effective and work continued steadily each year. By the end of the planting season in 1883 a total of 243 ha at Durban Road had been treated in this manner.<sup>216</sup> In that year the first crops of wood and tanning bark, from the Port Jackson willow sown in 1877, were sold.<sup>217</sup>

At the other plantations on the Cape Flats there was little planting activity during Lister's first nine years as superintendent. The White Sands plantation was now treated as two separate units: the 6th Mile plantation (between the railway line and Maitland Road) and Uitvlugt (the larger part of the former White Sands, south of the railway). At the 6th Mile, fires caused by railway engines continued to create problems by destroying many of the pines. Lister reported in 1883:

"Fortunately, the Australian Acacias, *Hakias* (*sic*), and *Fabricias* [*L. laevigatum*] with which the plantation is thickly interspersed, grow again more densely and rapidly after a fire. This is not the case with the Pines, and it is lamentable to see them swept away."<sup>218</sup>

Eight metric tons of bark were harvested from Port Jackson willows in this plantation in 1880 and sold for use by the tanning industry, thereby establishing the commercial possibilities of this product.<sup>219</sup>

At Uitvlugt the ranger was kept busy collecting seeds and raising young trees for use at Durban Road and for distribution to the public. The plantations of stone pines established by Lister's predecessors were maintained. Ironically, this one tree species that had proved an unequivocal success on the Flats was found to have no commercial prospects because its timber rotted very quickly in use.<sup>220</sup>

As we have seen, the distribution of plants and seeds to the public was one of Lister's responsibilities. Not only was he required to provide them free to the lessees of certain land on the Flats and to the immigrant farmers, but he also sold them to the general public,<sup>221</sup>

thus continuing the practice instituted by Smith. The use made of the seeds by the immigrant farmers was described by Lister in 1881 as follows:

"On receiving an allotment, their first labour is to construct along its boundary a ditch and bank, on the bank they dibble in wattle or fir seed. There are now probably some miles of such banks, with trees from a few inches to several feet in height growing upon them. Thus the aspect of the country must, in a short time, be much changed, and the shelter given by the trees should in some degree tend to ameliorate the climate."<sup>222</sup>

That the distribution of plant materials was on a large scale is indicated by the fact that as early as 1878, 42 185 young trees and shrubs were supplied in one year from Uitvlugt nursery.<sup>223</sup> By 1880 eight woody species were being offered for sale: *A. cyclops*, *A. saligna*, *Casuarina* sp., *Cupressus* sp., *Eucalyptus* sp., *H. suaveolens*, *P. pinaster* and *P. pinea*, as well as pyggras and wax berry.<sup>224</sup> These plants were not supplied only to the local market. Records for 1880 show that they were sent as far afield as Wellington, Malmesbury, Worcester, Beaufort West, Port Elizabeth and Durban.<sup>225</sup>

At this point it is necessary to digress briefly to a discussion of the identify of *H. suaveolens*. As mentioned earlier in this Chapter, two species of hakea were planted at the White Sands in 1850-1851, one of which, "green hakea", was deduced to have been *H. suaveolens*. It would appear that this was the more successful because Smith specifically recommended it to the Central Roads Board as a fast-growing fence shrub.<sup>226</sup>

Subsequent references to hakeas in the sources consulted in this study are sometimes ambiguous as to whether several species were involved, or only one, for example, when transplanting of "young hakeas" at the White Sands was mentioned in 1869.<sup>227</sup> In 1866, on the other hand, Brown specifically referred to "the hakea",<sup>228</sup> a term which implies

that there was only one species. Likewise, in the advertisement of 1880 offering trees and shrubs for sale (referred to above) and in Lister's reports for 1882 and 1883,<sup>229</sup> which all refer to hakea (*sic*) being sold, it is quite clear that only one species was involved. By 1884 Lister had evidently managed to identify this species, because he referred to *Hakea suaveolens*, giving it the vernacular name hakea.<sup>230</sup> Thereafter in his reports, and those of his successors, the name *H. suaveolens* was used consistently. Large quantities of its seeds and seedlings were collected and distributed.<sup>231</sup>

From this information it seems fairly certain that from the 1860s, at least, one species of hakea, *H. suaveolens*, was grown and distributed by the various Superintendents of Plantations, and so that name is used here, even during the discussion of time periods when the superintendent himself was unsure of its identity.

Lister's records indicate a big demand for *H. suaveolens* in the Cape Town region. In 1880, for example, eleven customers living in the area were supplied with a total of 10 050 transplants of this species (Table 4.9.2).

Likewise, *A. saligna* was supplied in large amounts. A consignment of 36,4 litres (one bushel) of seed of this species was sent to a customer for collection at Eerste River railway station.<sup>232</sup> In order to gauge the magnitude of such consignments, it is necessary to convert the volume (or mass) to numbers of seeds. To facilitate this, a table of conversion factors for those pest plant species for which such information is readily available has been compiled (Table 4.9.3). From the table it can be calculated that the above-mentioned customer on the eastern edge of the Cape Flats received in one purchase about 1,5 million seeds of Port Jackson willow. Even if only a small fraction of them survived to maturity, this still indicates a massive influx of the species. From Table 4.9.4 it is apparent that many other individuals were also purchasing large amounts of seed in the same period.

Lister announced that seeds of all species offered for sale would be supplied in minimum lots of 0,45kg (one pound) by mass or 36,4 litres (one bushel) by volume. Exceptions to this rule were *H. suaveolens*, *Casuarina* sp. and *Cupressus* sp., which would be sold in amounts of 29g (one ounce). Transplants of *H. suaveolens* were to be sold in minimum lots of 1 000.<sup>233</sup>

From 1882 statistics on the distribution of seeds and transplants to the public by the forestry department were published annually. Four of the thirteen pest plant species were sold in significant quantities in the last two years under consideration in this Chapter, 1882 and 1883. They were *A. cyclops*, *A. saligna*, *H. suaveolens* and *P. pinaster* (Table 4.9.4).

The Botanic Garden continued to distribute plants to the public in this period, despite the damage caused by the Australian bug. The maximum income from sales occurred in 1881.<sup>234</sup> In general, the species distributed were not recorded, but for 1881 it is known that *Eucalyptus* spp., *Pinus* spp. and *Cupressus macrocarpa* were in demand, as well as "hedge plants".<sup>235</sup> The latter term undoubtedly included *H. suaveolens*. In 1882 reference was made to the raising of "eucalypts and other Australian trees and shrubs" continuing "as usual".<sup>236</sup>

James McGibbon retired in 1880 from the post of Director of the Garden,<sup>237</sup> which he had held almost since its inception. In the following year Peter MacOwan, a botanist who had been a teacher in the eastern Cape Colony, was appointed in his place. MacOwan was also made Curator of the Government Herbarium and Professor of Botany at the South African College.<sup>238</sup>

MacOwan attributed a large drop in the sales of plants that occurred in 1882 partly to severe local competition, particularly from gardeners who were quitting his employ and setting themselves up as nursery-men.<sup>239</sup> Earlier, Lister had also been obliged to acknowledge the

existence of these nurserymen when they claimed that his forestry department nursery had an unfair advantage over them. As a result he had decided that his department would fill only bulk orders, leaving smaller orders to the nurserymen.<sup>240</sup> This decision probably caused many more of the pest plants to be distributed than would otherwise have been the case, since his bulk rates were not inordinately expensive (for example, 30 shillings per thousand plants for *H. suaveolens* and twenty shillings per bushel of seeds for *A. saligna*).<sup>241</sup>

As a further incentive to the farmers on the Flats to grow trees and shrubs, a scheme for the award of prizes was introduced. This idea had been put forward as early as 1857 by Hemming,<sup>242</sup> but had not been acted upon. Now, twenty years later, the Commissioner of Crown Lands and Public Works offered three prizes to the holders of leasehold land on the Flats for the successful cultivation of trees, shrubs and other vegetation on their property. For the first prize of 100 pounds, at least 20 ha had to be cultivated. For the other prizes of 50 and 20 pounds the minimum area was ten and five hectares, respectively. The purpose of the competition was to encourage the establishment on private property of "a barrier against the encroachment of drift sand".<sup>243</sup>

Because there had not yet been any entries for the competition, Lister proposed in 1879 that it be opened to all proprietors of land on the Flats, including the German immigrants, who were showing "praiseworthy eagerness to improve their holdings by planting trees along the boundaries".<sup>244</sup> In 1883 the requirements of the competition were changed, since there had still been no entries. Plantations covering smaller areas were now allowed and prizes were reduced proportionately.<sup>245</sup>

It is not clear whether the absence of entries in the competition reflected a lack of interest in competing or in growing trees. Neither explanation seems likely, the former in view of the cash prizes offered, the latter since we know that seeds and transplants were being

supplied to the farmers. It seems more probable that there had been insufficient time to learn the techniques needed to establish the plants on the scale required by the competition. This interpretation is supported by the change in the rules that occurred in 1883.

A real incentive to grow Port Jackson willow was the discovery that its bark was rich in the tannin needed for tanning leather. Up to this time the bark of indigenous species, including kreupelhout (*Leucospermum conocarpodendron*),<sup>246</sup> waboom (*Protea nitida* = *P. arborea*) and other *Protea* species,<sup>247</sup> had been used for this purpose. No doubt the exploitation of these plants had contributed to a reduction in their numbers in the Cape Town region.

Lister read the report of an official enquiry into the exploitation of black wattle for tannin in Victoria, Australia.<sup>248</sup> This enquiry was held in 1878 because exportation from Victoria of the bark of black wattle (known then as *Acacia decurrens* but now as *A. mearnsii*), which had begun to accelerate in 1864, had increased to such an extent that some form of control of the industry was deemed necessary.<sup>249</sup> It appears that Lister changed his mind about the identity of Port Jackson willow after reading this report, for in 1879 he stated:

"The Australian wattle, or what is here called the Port Jackson willow, thrives well on the sandy soil of the Downs.... The bark, which is valuable for tanning, and gum which exudes from the tree, are largely exported from Australia."<sup>250</sup>

He apparently now believed that Port Jackson willow was *A. mearnsii* and not *A. falcata* or *A. foliata*. He submitted the bark of two ten-year-old bushes of Port Jackson willow to local tanners who were favourably impressed by its quality.<sup>251</sup> In 1880, as has been noted, eight metric tons of bark were sold from the 6th Mile plantation, thus confirming the commercial possibilities of this product.<sup>252</sup>

In 1882 Lister reinforced his mistaken belief. He obtained some seeds

of the black wattle from Von Mueller, the Government Botanist in Victoria. He reported on their progress a year later, when they were a metre high, and made the surprising statement that, as far as it was possible to judge by the leaves and general appearance, *Acacia mearnsii* was "identical with the wattle that is cultivated on the drift sands".<sup>253</sup>

It is impossible to confuse the black wattle with Port Jackson willow when they are a metre high, because the former species has compound leaves while in the latter the leaves are reduced to phyllodes (Table 2.5.2). Therefore one is forced to conclude that either the plant then called Port Jackson willow in Cape Town was, in fact *A. mearnsii* or the plants Lister had grown from seed received from Victoria were actually Port Jackson willow (*A. saligna*) and not black wattle at all. The first possibility is highly unlikely, in view of the fact that it had previously been identified as *A. falciiformis* and *A. falcata* both of which have phyllodes, not compound leaves. The second possibility is the more likely explanation and we must conclude that some mistake occurred in the handling of the seeds from Victoria.

One can only conjecture as to the cause of this mistake. Perhaps Von Mueller sent the wrong seeds. On the other hand, perhaps the right seeds were sent but others were accidentally planted. Alternatively, perhaps none of the black wattle seed germinated and Port Jackson willow seed, being present already in the soil in the nursery, germinated instead. Whatever the cause, it was an important mistake, for Lister was misled into believing that the species known locally as Port Jackson willow was the same as that known in eastern Australia as black wattle and therefore that it was the best acacia for the production of tanning bark.

That Lister still believed this in 1883 is evident from his report that he distributed to the public in that year 790kg of seed of black wattle. He did not mention Port Jackson willow at all,<sup>254</sup> whereas in the

previous year he had reported distributing 361kg of seed of Port Jackson willow and none of black wattle.<sup>255</sup>

As local tanneries had confirmed that Port Jackson willow was rich in tannin, Lister had no cause to suspect his mistake. The successful sale of bark from Durban Road plantation in 1883 maintained his faith in this species and, believing that there would be a market overseas for vast quantities of its bark, he began planning an extensive plantation of Port Jackson willow at Uitvlugt, as well as urging the farmers of the Flats to concentrate on this species.<sup>256</sup>

#### 4.9 Tables

TABLE 4.9.1 Species reported to have been transplanted at the White Sands, 1866-1869 and 1872<sup>257</sup>

Species	1866	1867	1868	1869	1872
acacia trees	X				
Australian willow			X		X
blackwood trees		X			X
golden willow		X		X	
Port Jackson willow		X		X	
hakeas				X	

TABLE 4.9.2 Consignments of *Hakea suaveolens* transplants from Uityvlugt forestry nursery to addresses in the Cape Town region, 1880<sup>258</sup>

Date	Consignee	Address	Number
12 July	M.R. Lewis	Claremont Station	1 000
	H.M. Manes	Cape Town	500
	L. Philips	Mowbray	1 000
26 July	Cape Town Harbour Board	Cape Town	1 000
29 July	C. Bennett	Mowbray	1 000
	C. Molteno	Claremont	500
10 August	C. Molteno	Claremont	1 000
24 August	Astronomer Royal	Observatory	1 000
	Glass Manufactory	Observatory	1 000
30 August	N. Bolus	Kloof Street, Cape Town	1 000
	N. Rawbone	Burg Street, Cape Town	1 000
	Capt. Smith	Wynberg Station	500
Total			<u>10 500</u>

TABLE 4.9.3 Numbers of seeds per unit volume and unit mass of certain pest plant species<sup>259</sup>

Species	No. of seeds per litre	No. of seeds per kg
<i>Acacia cyclops</i>	6 160	14 112
<i>A. mearnsii</i>	-	71 680
<i>A. pycnantha</i>	-	48 400
<i>A. saligna</i>	41 110	50 715
<i>Leptospermum laevigatum</i>	-	1 050 000
<i>Pinus halepensis</i>	-	45 961
<i>P. pinaster</i>	-	18 357

TABLE 4.9.4 Quantities of seeds and transplants of four pest plant species distributed to the public from Uitvlugt forestry nursery, 1882 and 1883<sup>260</sup>

Species	1882		1883	
	seeds (kg)	trans-plants	seeds (kg)	trans-plants
<i>Acacia cyclops</i>	181	0	106	0
<i>A. saligna</i>	361	0	790	0
<i>Hakea suaveolens</i>	6	0	8	8 800
<i>Pinus pinaster</i>	145	0	435	0

## 4.10 Notes

1. G1-1866 Report of the Colonial Botanist, p.91. Rathfelder's was probably Rathfelder's Halfway House at Diep River (see Section 3.7, Note 2).
2. Cape Times, 16.8.1878 (as cited in Cape Times, 16.8.1978, p.12).
3. UG18-1943 Report of a Committee of Enquiry into Conditions Existing on the Cape Flats.
4. R. Percival: Account of the Cape of Good Hope (1804), p.147.
5. W.J. Burchell: Travels in the Interior of Southern Africa, Vol.1 (1822), p.43.
6. M.R. Levyns: A Guide to the Flora of the Cape Peninsula (1966), p.57.
7. W.J. Burchell: Travels in the Interior of Southern Africa, Vol. 1 (1822), p.62.
8. L.G. Green: Tavern of the Seas [1947], p.195.
9. CO 4427 Arrears Correspondence, 1871: No. 146, De Smidt - Rawson, 31.10.1857.
10. A.C.W. ———: Cape circuits (1848), p.422.
11. J. Barrow: An Auto-biographical Memoir (1847), p.144.
12. P.W. Laidler: A Tavern of the Ocean [1926], pp.164-165;  
E.E. Mossop: Old Cape Highways [1927], pp.35-36; J.R. Shorten: Cape Town (1963), p.54.
13. W.J. Burchell: Travels in the Interior of Southern Africa. Vol. 1 (1822), p.42.
14. Cape of Good Hope Literary Gazette, Vol. 3, 1833, pp.83-84, 116,164.
15. Government Gazette, 10.6.1836 (Ordinance No. 5, 1836).
16. J.J. Breitenbach: The development of the secretaryship to the government at the Cape of Good Hope ... (1959), pp.234-239.

17. CO 4427 Arrears Correspondence, 1871: No. 146, De Smidt - Rawson, 31.10.1857 (Herewith: Sketch Plan of the Cape Flats and Downs); Trigonometrical Survey Office: South Africa, 1:50 000 sheets 3318CD, 3318DC, 3418BA (1970).
18. J.D. Buttner: Account of the Cape ... (1970), p.70.
19. Government Gazette, 12.2.1846 (Central Roads Board Annual Report, 1845).
20. CO 4427 Arrears Correspondence, 1871: No. 146, De Smidt - Rawson, 31.10.1857 (Herewith: Sketch Plan of the Cape Flats and Downs).
21. Map Studio: Cape Town and Environs, pp.12-18.
22. CO 4427 Arrears Correspondence, 1871: No. 146, De Smidt - Rawson, 31.10.1857 (Herewith: Sketch Plan of the Cape Flats and Downs).
23. CRB 77 Letters Received: Dempers - Central Roads Board, 11.2.1845.
24. CO 4923 Letter Book, Civil, Vol. 26: Montagu - Central Roads Board, 13.5.1845, p.265.
25. CRB 2 Minutes, 10.7.1845, p.99.
26. CRB 85 Letters Despatched: Central Roads Board - Von Ludwig, 11.7.1845, p.380.
27. Government Gazette, 25.7.1845 (Government Notice).
28. CO 4427 Arrears Correspondence, 1871: No. 146, De Smidt - Rawson, 31.10.1857 (Herewith: Sketch Plan of the Cape Flats and Downs); Trigonometrical Survey Office: South Africa, 1:50 000 sheet 3318DC (1970).
29. CO 4427 Arrears Correspondence, 1871: No. 146, De Smidt - Rawson, 31.10.1857 (Herewith: Sketch Plan of the Cape Flats and Downs).
30. CRB 2 Minutes, 2.4.1846, p.402; 11.6.1846, p.462.
31. Government Gazette, 22.10.1846 (Ordinance No. 28, 1846).

32. Government Gazette, 27.4.1848 (Central Roads Board Annual Report, 1847).
33. CRB 38 Letters Received: No. 496, O'Farrell - Central Roads Board, 15.6.1847.
34. Government Gazette, 27.4.1848 (Central Roads Board Annual Report, 1847).
35. A.C.W————: Cape circuits (1848), p.422.
36. Government Gazette, 3.5.1849 (Central Roads Board Annual Report, 1848).
37. CRB 43 Letters Received: Feeney - Central Roads Board, 20.2.1849, 27.2.1849, 30.4.1849.
38. CRB 3 Minutes, 6.9.1848, p.268.
39. Government Gazette, 11.4.1850 (Central Roads Board Annual Report, 1849).
40. J.S.H[emming]: The Cape Flats and how they may be improved (1857), p.266. That Hemming was the author of this article is confirmed by G1-1866 Report of the Colonial Botanist, p.83, and that he was the storekeeper, by CRB 13 Minutes, 29.7.1857, p.526.
41. Trigonometrical Survey Office: South Africa, 1:50 000 sheets 3318CD, 3318DC (1970).
42. J.S.H[emming] : The Cape Flats and how they may be improved (1857), p.266. See also Note 40.
43. J.S.H[emming]: The Cape Flats and how they may be improved (1857), pp.266-268. See also Note 40.
44. Cape Monthly Magazine New Series, Vol. 2, 1871, p.136.
45. CRB 89 Letters Despatched: Central Roads Board - Wolfe, 26.3.1849, p.420.
46. MAP REGISTER 1/69 North West Section of the Cape Peninsula, ca. 1900; Trigonometrical Survey Office: South Africa 1:50 000 sheet 3418AB&AD (1970).

47. CRB 44 Letters Received: Wolfe - Central Roads Board, 29.3.1849.
48. Government Gazette, 11.4.1850 (Central Roads Board Annual Report, 1849).
49. CRB 46 Letters Received: Feeney - Central Roads Board, 10.6.1850;  
CRB 71 Letters Received: Smith - Central Roads Board, 31.12.1857.
50. W.A. Newman: Biographical Memoir of John Montagu (1855), pp.166-167.
51. P.W. Laidler: A Tavern of the Ocean [1926], pp.167-168, stated that the screens were built in 1810 alongside the rough track that preceded the Hard Road and this idea was repeated by M. Marshall: The Growth and Development of Cape Town (1940), p.62. C.D.H. Braine: Reclamation of drift-sands in Cape Colony (1902), pp.3-5, described the screens as having been built alongside the Hard Road in the mid-nineteenth century, as also did E.E. Mossop: Old Cape Highways [1927], p.39, for which Newman's book was the source. In more recent years, E.R. Roux: History of the introduction of Australian acacias on the Cape Flats (1961), p.100 and J.J. Smit: *Die Paaie, Passe en Rivieroor gange in Suid-Kaapland, 1806-1858* (1974), p.258, have perpetuated Mossop's error.
52. CRB 90 Letters Despatched: Central Roads Board - Director of the Botanical Gardens, 14.6.1850, p.445.
53. CRB 47 Letters Received: Commissioners for the Botanic Garden - Central Roads Board, 15.6.1850.
54. CRB 90 Letters Despatched: Central Roads Board - Director of the Botanical Gardens, 3.8.1850, p.509.
55. CRB 48 Letters Received: Feeney - Central Roads Board, 1.4.1851.
56. Several of the species of *Callitris* (a genus endemic to Australia and New Caledonia) are known as cypress pines (W. Dallimore & A.B. Jackson: A Handbook of Coniferae (1948), pp.207-217).
57. The name sugar bush is today generally applied to *P. repens*; *P. myrtales* is not an accepted name, or synonym, for any species (J.P. Rourke: personal communication).

58. J.S. H[emming]: The Cape Flats and how they may be improved (1857) pp.266-268. See also Note 40.
59. W.A. Newman: Biographical Memoir of John Montagu (1855), pp.168-169.
60. CRB 71 Letters Received: Smith - Central Roads Board, 28.12.1857.
61. CRB 71 Letters Received: Smith - Central Roads Board, 26.10.1857.
62. R.S[mith]: The Cape Flats (1858), p.306. That the author of this article was Smith is confirmed by G1-1866 Report of the Colonial Botanist, pp.91-92.
63. G. Bentham: Notes on *Mimoseae*... (1842), p.382.
64. CRB 71 Letters Received: Smith - Central Roads Board, 17.3.1857.
65. CRB 71 Letters Received: Smith - Central Roads Board, 28.12.1857.
66. B.D. Jackson: *Index Kewensis*, Vol.1 (1893), p.8.
67. G. Bentham: Notes on *Mimoseae*... (1842), pp.351-353.
68. B.R. Maslin: Studies in the genus *Acacia*, 3. The taxonomy of *A. saligna*... (1974).
69. J.H. Ross: The naturalized and cultivated exotic *Acacia* species in South Africa (1975).
70. W.J. Hooker: *Icones Plantarum*, Vol.1 (1837), plate 165.
71. E.E. Mossop: Old Cape Highways [1927], p.39.
72. W. Logan: Reflections on Pinelands, Croxford Papers, as cited by G.C. Cuthbertson: A New Town at Uitvlugt (1974), p.22.
73. Cape of Good Hope Almanac and Annual Register, 1858, p.103; G46-1878 Report of the Botanic Gardens.
74. G13-1856 Report of the Botanic Garden, Cape Town, pp.1-3.
75. Government Gazette, 28.4.1853 (Central Roads Board Annual Report, 1852).
76. CRB 52 Letters Received: Feeny - Central Roads Board, 3.8.1852, 5.10.1852; CRB 56 Letters Received: Feeny - Central Roads Board, 7.4.1853, 25.7.1853.

77. CRB 56 Letters Received: Feeney - Central Roads Board, 28.9.1853.
78. South African Commercial Advertiser, 10.11.1853 (The berry wax plant).
79. CRB 52 Letters Received: Feeney - Central Roads Board, 5.10.1852;  
CRB 56 Letters Received: Feeney - Central Roads Board, 7.3.1853.
80. CRB 56 Letters Received: Feeney - Central Roads Board, 7.5.1853,  
25.7.1853, 12.12.1853; CRB 10 Minutes, 19.5.1854, p.32.
81. J.S. H[emming]: The Cape Flats and how they may be improved (1857),  
p.268. See also Note 40.
82. G. Hardin: The tragedy of the commons (1968).
83. J.S. H[emming]: The Cape Flats and how they may be improved (1857),  
pp.268-269, 355. See also Note 40.
84. CRB 13 Minutes, 29.7.1857, p.176.
85. G22-1857 Report of the Central Board of Commissioners of Public  
Roads.
86. CRB 12 Minutes, 27.2.1857, pp.482-485.
87. Cape Monthly Magazine, Vol. 11, 1862, pp.378-383.
88. Cape Monthly Magazine, Vol. 11, 1862, pp.378-383.
89. CRB 67 Letters Received: Bayley - Central Roads Board, 10.7.1856.
90. CRB 67 Letters Received: McGibbon - Central Roads Board, 15.7.1856.
91. CRB 67 Letters Received: Lister - Central Roads Board, 17.9.1856.
92. CRB 67 Letters Received: McGibbon - Central Roads Board, 6.2.1857.
93. CRB 67 Letters Received: McGibbon - Central Roads Board, 6.2.1857.
94. J.H. Ross (ed.): Flora of Southern Africa, Vol. 16 Part I (1975),  
pp.69-70.
95. CRB 71 Letters Received: Smith - Central Roads Board, 5.3.1857,  
20.3.1857, 9.4.1857; CRB 74 Letters Received: Smith - Central  
Roads Board, 19.4.1858; R. S[mith]: The Cape Flats (1858),  
p.303. See also Note 62.

96. CRB 71 Letters Received: Smith - Central Roads Board, 29.5.1857; R.S[mith]: Notes on planting (1857), p.332. Confirmation that Smith was the author of this article is provided in G1-1866 Report of the Colonial Botanist, pp.91-92.
97. G.A. Zahn & E.J. Neethling: Notes on the exotic trees in the Cape Peninsula (1929), p.221; N.L. King: Historical sketch of the development of forestry in South Africa (1938), p.6; M. Grut: Forestry and Forest Industry in South Africa (1965), p.6. It is of interest to note that C.E. Legat: The cultivation of exotic conifers in South Africa (1930), p.34, documented the presence of *P. radiata* in the colony in 1865. That this record has passed unnoticed is another instance of the lack of awareness of Legat's contribution, as discussed in Section 3.2.2.
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120. CRB 68 Letters Received: No. 2235, Colonial Secretary - Central Roads Board, 23.9.1857.
121. CO 4427 Arrears Correspondence, 1871: No. 146, De Smidt - Rawson. 31.10.1857.

122. SG 1/1/3/22 Letters Received from Colonial Secretary: No. 243, Colonial Secretary - Surveyor-General, 8.12.1857.
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125. G57-1859 Report on the Operations of the Late Central Board of Commissioners for Public Roads.
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135. G34-1863 Report of the Chief Commissioner of Roads.
136. CRB 74 Letters Received: Smith - Central Roads Board, 12.4.1858, 24.5.1858, 23.7.1858.
137. PWD 222 Letters Received: Smith - Chief Commissioner of Roads, 9.10.1860.
138. G39-1864 Report of the Chief Commissioner of Roads.
139. PWD 261 Letters Received: Smith - Chief Commissioner of Roads, 10.8.1864.

140. G37-1862 Report of the Chief Commissioner of Roads, p.47.
141. PWD 222, 246, 250 Letters Received: Smith - Chief Commissioner of Roads, 31.3.1860, 29.3.1861, 14.3.1862, respectively; G37-1862, G39-1864 Report of the Chief Commissioner of Roads.
142. PWD 246 Letters Received: Smith - Chief Commissioner of Roads, 29.3.1861.
143. CRB 74 Letters Received: Smith - Central Roads Board, 5.4.1858.
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147. G24-1865 Report of the Colonial Botanist.
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174. G42-1874 Report of the Chief Inspector of Public Works, p.9 (enclosure No. 3).
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253. G105-1883 Report of the Superintendent of Woods and Forests, p.15.
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259. Information extracted from Food and Agricultural Organization: Forest Tree Seed Directory (1975). Where more than one value is given in this source, the mean has been calculated and is presented in this table.
260. G105-1883, G34-1884 Report of the Superintendent of Woods and Forests. The figure of 790kg for *Acacia saligna* in 1883 in this table represents an interpretation on my part, for Lister actually reported that figure for black wattle (*Acacia mearnsii*) (see Section 4.8). In Chapter 5 it is demonstrated that the species in question was in fact *A. saligna* and therefore, to avoid confusion in the presentation of this table, and to retain consistency *vis-à-vis* Table 5.5.1, that name is used here.

## CHAPTER 5

## THE PEST PLANTS IN THE CAPE TOWN

## REGION, 1884-1917

"The larger portion of the lower plateau of Table Mountain is now afforested and the benefit derived from the upgrowth of the trees will soon begin to be felt in the deep-seated springs all over the mountain area."<sup>1</sup>

"It is useless to plant any trees until the scrub and indigenous vegetation have been eradicated. The simplest way to do this is of course to burn, plow, and cross-plow."<sup>2</sup>

"*Hakea suaveolens*: the Common Hakea: Completely naturalized and the commonest of all hedge plants in the Cape Peninsula.... *Hakea gibbosa*: the Prickly Hakea: Indigenous or naturalized, this species is common on the slopes of Table Mountain. It makes a less dense but more prickly hedge than the common Australian Hakea."<sup>3</sup>

## 5.1 The Period 1884 to 1888

### 5.1.1 Afforestation

In 1881 the new official policy of promoting forestry, which had first been hinted at in the appointment of a trained forester as Superintendent of Plantations in Cape Town in 1875, had been taken a step further by the appointment of Count de Vasselot de Regné, an experienced forester from France, as Superintendent of Woods and Forests for the whole Cape Colony.<sup>4</sup> By late 1883, after an extensive tour of the colony, De Vasselot had begun to implement a coordinated, tripartite approach to forestry that involved protection and rational exploitation of indigenous forests, a program of afforestation, and orderly processing and marketing of forest products.<sup>5</sup>

Lister remained Superintendent of Plantations in Cape Town, in which post he was subordinate to De Vasselot, and continued his campaign to educate the public about trees. In 1884 he published a booklet of hints on tree-growing in which he recommended the use of *A. cyclops*, *A. saligna*, *H. suaveolens* and *P. pinaster*, among other species.<sup>6</sup> He also continued to distribute seeds and transplants to the public, not only from Uitvlugt nursery, but also from Tokai, where a nursery had been established in late 1883.<sup>7</sup> As Table 5.5.1 shows, from 1885 not only the four species mentioned above were distributed, but also *A. mearnsii*, *A. pycnantha*, *L. laevigatum* and *P. halepensis*.

Because there were no exploitable indigenous forests in the vicinity of Cape Town and there was a large market there for timber, it was inevitable that the area should have high priority in De Vasselot's afforestation program. There was ample land available on the Cape Flats but, even though trees had been established there, it was obvious that the area was not ideal for forestry. The most suitable area, the gently-sloping, fertile and well-watered land at the base of the eastern

escarpment of Table Mountain and the Cape Peninsula chain of mountains, was by now entirely in private hands.

That much of this land was already planted with trees is evident from several sources. An album of photographs taken in 1884 shows tall cluster pines and stone pines in the upper sections of Rondebosch, Newlands and Claremont.<sup>8</sup> A.W. Heywood, who was an assistant to De Vasselot, reported in 1886 that the woods of *P. pinaster* and *P. pinea* stretching along the south-eastern slopes of Table Mountain constituted "a remarkable feature in the landscape".<sup>9</sup> This description was confirmed four years later by a visiting forester who stated that the eastern side of the mountain was "well-wooded", the chief species being cluster and stone pines.<sup>10</sup> There is also a record for this period for the section of the slopes that is today occupied by the Newlands Forest (owned by the Municipality of Cape Town). This was already covered with *P. pinaster*, oaks and poplars when it was acquired by the Cape Town District Waterworks Company in 1889.<sup>11</sup>

Heywood also reported that Cape Town and its suburbs obtained firewood from the stands of pines along the mountain slopes, but that the wood was rarely used for other purposes.<sup>12</sup> As we have seen, Lister realised by 1883 that *P. pinea* was not a useful species for timber. It would appear from Heywood's account that *P. pinaster* was not highly regarded for this purpose either. Thus it was inevitable that other timber species would be tried.

The problem of finding suitable land for the government's afforestation program was solved initially in three ways: by the purchase of the farm Tokai<sup>13</sup> on the eastern slopes of Constantiaberg, south of Table Mountain; by the allocation of Crown land on the plateau of Table Mountain; and by the use of a new technique for growing trees at Uitvlugt. The location of these sites, as well as of all of the other reserves owned by the forestry department, is shown on Map 3.

While production of timber was the primary motivation for the afforestation program that began in 1884, Lister also justified his pro-

posal to grow trees on the plateau of Table Mountain, whose "bleak and naked appearance" was "a subject of daily comment", by stating that trees would intercept moisture from summer clouds and thus secure "a bountiful supply of water".<sup>14</sup> It will be remembered that earlier proponents of tree-planting, such as Hemming and Brown, had believed that the presence of trees would lead to increased rainfall.

Afforestation began at Tokai in 1884.<sup>15</sup> Transplanting of young trees, mainly *P. radiata* and *P. pinaster*, various other species of pine, and *Eucalyptus* spp., began at the base of the cliffs and was gradually extended down the lower slopes. By 1888 there were some 917 000 established trees<sup>16</sup> covering 416 ha (Table 5.5.2).

On Table Mountain, afforestation began in 1885 on the lower plateau or Back Table, in the area where the Woodhead and Hely-Hutchinson reservoirs are now situated. They had not yet been built when the plantation was commenced. The Bridle Path was constructed from the pass known as Constantia Nek to the site, and seeds of *P. pinea* and *A. saligna* were sown alongside it. At the plantation site, initially, 16 ha were sown with cluster pine, stone pine and "wattles", and a nursery was established. Subsequently, transplants from the nursery, comprising mainly *P. pinaster* and *P. halepensis*, were set out.<sup>17</sup> These early plantings evidently achieved only limited success, for by 1888 the area reported to be afforested was only 4 ha (Table 5.5.3).

The use of the name *P. halepensis* in the preceding paragraph represents an interpretation on my part which must now be explained. In the forestry department reports relating to the Table Mountain plantation from 1885 to 1901, there was no record that Aleppo pine (*P. halepensis*) was planted. In almost every year of that period, on the other hand, there were references to the planting of Scotch pine on Back Table and in the ravines on the eastern escarpment. On three occasions the Scotch pine was also referred to as *P. sylvestris*.<sup>18</sup> Since the name was used so consistently, it would appear that no doubts were experienced at that time in regard to the identity of the species. Subsequent

information, however, strongly suggests that the identification was wrong.

The first piece of evidence is that *P. sylvestris* does not occur on Table Mountain today.<sup>19</sup> This is not necessarily significant because it could have died out since it was planted, but taken with other information this becomes an important clue.

The next line of evidence is the fact that in 1903 trees that had been referred to as *P. sylvestris* when they were planted two years before were now referred to as Canary pine.<sup>20</sup> This suggests that doubts had arisen and a new identification of the species as *P. canariensis* had been made. This would further imply that all the earlier references to Scotch pine on Table Mountain should have been to Canary pine.

A confounding piece of evidence here is that the locality where this planting was made was the area of Table Mountain now known as Fir Tree.<sup>21</sup> This area today supports two species of pine, *P. pinaster* and *P. halepensis*, but not *P. canariensis*.<sup>22</sup> Likewise, the Back Table and the ravines on the eastern escarpment today support the first two species, but not *P. canariensis*.<sup>23</sup> This leads to the suspicion that the species originally planted as *P. sylvestris* must have been *P. halepensis* rather than *P. canariensis*.

This suspicion is confirmed by the statement of the botanists R.S. Adamson and T.M. Salter in 1950 that records of *P. sylvestris* (sic) from Table Mountain actually refer to *P. halepensis*.<sup>24</sup>

All these lines of evidence are taken to mean that the species that was considered to be Scotch pine (*P. sylvestris*) when planted was in fact Aleppo pine (*P. halepensis*). Since the synonymy of *P. halepensis* Mill. includes *P. sylvestris* Gouan (see Table 2.5.1) the initial confusion is understandable. In the present study the name *P. halepensis* is used whenever the sources record *P. sylvestris*, in regard to the Table Mountain plantation only. Further details of the planting

alluded to above are given in the rest of this Chapter.

At Uitvlugt the new method of afforestation that began in 1884 involved sowing alternate rows of *P. pinaster* and *A. saligna* on ground that had first been ploughed. It was intended that the ploughing would eliminate competition from indigenous plants, while the fast-growing acacias would shelter the pines for the first few years, enabling them to become well established. After eight years the acacias were to be harvested for tanning bark while the pines would be left to grow to maturity as timber trees.<sup>25</sup> This mixed sowing was carried out at the southern end of the Uitvlugt reserve,<sup>26</sup> the area that is today occupied by the suburb of Bokmakierie, the Athlone sewage ponds and the southern half of Langa township.<sup>27</sup> By 1888 there were reportedly 960 000 cluster pines and 1 920 000 Port Jackson willows established on 249 ha.<sup>28</sup>

#### 5.1.2 Tanning bark

At the time when the new planting scheme for Uitvlugt was devised (1883) Lister still believed that Port Jackson willow was *A. mearnsii*. By 1885, he apparently had doubts about this identification, for he now referred to the collection and distribution of "Port Jackson wattle, *Acacia* sp." and did not mention black wattle.<sup>29</sup> Nevertheless, he could still feel justified in planting it at Uitvlugt because local tanners thought highly of its bark.

Operations to control drift sand at Durban Road, using Cape Town's rubbish and seeds of *A. saligna*, continued until 1887. The work now had a financial justification from the sale of bark, but even so, only small quantities of seed were used there, as it was felt more important to concentrate on the Uitvlugt plantation. Tree-planting operations were much less costly at Uitvlugt, "being conducted on a different principle".<sup>30</sup> When work ceased at Durban Road, 283 ha had been covered with vegetation comprising mainly *A. saligna*.<sup>31</sup>

Another attempt to grow the elusive black wattle was made in 1885 when seeds were obtained from Australia of the five species of acacia that were there considered to be most valuable for the production of tanning bark. They were named by Lister as *A. pycnantha*, *A. decurrens*, *A. saligna*, *A. cyanophylla* and *A. implexa*.<sup>32</sup> The second species is today known as *A. mearnsii*, while the third and fourth are now considered to be one species *A. saligna* (see Table 2.5.1).

The seeds were sown at Tokai nursery and subsequently some of the seedlings were transplanted at Tokai, some were sold to the public and some were transplanted at Uitvlugt.<sup>33</sup> Of those grown at Uitvlugt, Lister reported in 1886 that "*A. saligna*, the black wattle of South Western Australia, but commonly known in this colony as Port Jackson wattle, has made the most progress".<sup>34</sup> Thus, we may conclude that Lister had finally realised the correct identity of Port Jackson willow. Confirmation of this occurred in the following year when he stated that, even though it had not yet flowered, the *A. saligna* being grown from the seeds sent from Australia "would appear to be synonymous with the 'Port Jackson wattle' so largely grown throughout the Cape Division".<sup>35</sup>

From Lister's statement of 1886 (quoted above) we know that in its source region *A. saligna* was called black wattle. This suggests a cause of the earlier confusion in regard to the seeds sent by Von Mueller. If Von Mueller reserved the name black wattle for *A. saligna* and referred to *A. mearnsii* as simply wattle, then naturally, when asked for seeds of black wattle, he would have sent *A. saligna*.

Lister's temporary confusion of *A. mearnsii* with *A. saligna* has caused some problems to modern researchers. Both Roux and Sherry were forced to assume that when Lister referred to black wattle in 1883 he must have meant *A. saligna*.<sup>36</sup> That assumption has now been vindicated by the evidence presented here.

To Lister's disappointment, *A. mearnsii* showed itself unsuited to the conditions at Uitvlugt, as did *A. implexa*. He observed that

*A. cyanophylla* and *A. pycnantha*, on the other hand, did show some signs of success there.<sup>37</sup>

At Tokai many seedlings of *A. pycnantha* and *A. saligna* were subsequently transplanted on the slopes and flats in an effort to produce tanning bark, the actual numbers being 14 760 and 18 000, respectively, by the year 1888. A few seedlings of *A. mearnsii* were also planted, but that species proved to be prone to attack by the Australian bug.<sup>38</sup>

### 5.1.3 *Acacia cyclops*

The drift sand problem at Durban Road was considered to be solved by 1887 and Lister turned his attention to areas of sand in the south-eastern part of the Flats. As a first step towards its control, he had seeds sown at several localities in this area, including the mouth of the Eerste River, in 1885 and 1886. Among the species used was *Acacia cyclops*.<sup>39</sup> This is Lister's first reported sowing of this species, although, as we know, it had been used much earlier by his predecessors at the White Sands plantation and he had been distributing it to the public since 1880, if not earlier. Since *A. cyclops* does not yield bark suitable for the tanning process, this species must have been employed solely because of its ease of establishment and the availability of seeds. It is worth speculating about the source of these seeds, since they were obviously available in large quantities (Table 5.5.1).

The most likely source was the 6th Mile plantation, where (when it was part of the White Sands) *A. cyclops* was planted in the early 1850s. It may be surmised that this was one of the acacias reported from time to time to be flourishing there in spite of fires, and so it was a ready source of seeds. If this is so, then the question of the identity of the "golden willow", discussed earlier (Section 4.7), appears to have been resolved in favour of *A. cyclops*.

*A. cyclops* was also used at the Rogge Bay plantation, which was established by Lister in the mid-1880s close to the heart of Cape Town, on Dock Road between Burg and Bree Streets.<sup>40</sup> By using *A. cyclops* as a screen against the wind and *H. suaveolens* as a hedge to keep out trespassers,<sup>41</sup> Lister was able to demonstrate the potential of these two species to the townspeople.

#### 5.1.4 The Municipality of Cape Town

The establishment of the Rogge Bay plantation (which was comprised principally of *Cupressus macrocarpa*, *Eucalyptus cornuta* and *Casuarina quadrivalvis*<sup>42</sup>) coincided with a brief renewal of interest in tree-planting shown by the Municipality of Cape Town. The Act of 1876 stating that the government would pay half the cost of tree-planting carried out by municipalities had so far achieved only small results in Cape Town. In 1877 a triple row of *Eucalyptus* sp. and firs had been planted along Somerset Road and its extension, Main Road, north-westwards from Cape Town towards Green Point.<sup>43</sup> At least one resident had disapproved of this, complaining that the the trees were obstructing his view.<sup>44</sup> Municipal interest in tree-planting had then waned, partly because this plantation was not particularly successful, as it was attacked by the Australian bug.<sup>45</sup>

In 1885 municipal interest revived and trees were planted in the squares and other open spaces in the town.<sup>46</sup> In 1887 more than 500 young trees of 19 species, together with 4,5kg of seed of *P. pinea*, were planted on land immediately north of the new Molteno reservoir above the town.<sup>47</sup> This plantation was later developed as a public garden known as De Waal Park.<sup>48</sup>

Charles Ayres, who had been appointed the municipality's Supervisor of Tree Planting in 1886, resigned in 1888 after Lister had criticised his method of pruning trees.<sup>49</sup> Although another supervisor was appointed,<sup>50</sup>

there appears to have been little tree-planting activity for several years.

#### 5.1.5 Private growers

Interest in growing exotic trees and shrubs among private individuals continued, as the figures on the distribution of seeds and transplants indicate (Table 5.5.1). The forestry department's success in this regard was not welcomed by MacOwan, Director of the Botanic Garden, who was still trying to support the Garden financially by sales to the public. He complained bitterly of the unfair competition from the department's nurseries, from local private nurserymen (some of whom had learnt their trade from him before setting up in opposition) and from seed merchants in Europe (whose trade was "brought to every man's door by the Postal Parcel System"). Sales did not return to their peak value of 1881 and in 1889 he decided that he "must capitulate" and he ceased selling plants to the public.<sup>51</sup>

The annual reports of the Botanic Garden do not indicate which species were sold to the public, but we can infer that some of the species were the same as those sold by the forestry nurseries, from the fact that they were in competition. MacOwan did report that in 1886 he harvested 25kg of seed of Australian willow in the upper section of the garden (where the museum was later built).<sup>52</sup> This seed was presumably distributed to the public.

The farmers on the Cape Flats had evidently succeeded in establishing plantations, for in 1886 a number of them competed for the prizes that had been offered. Five prizes were awarded, the largest being of 25 pounds.<sup>53</sup> Another award was made in 1889. This time there were ten prizes, of which the largest was 55 pounds.<sup>54</sup> There appears to be no record of which species these prize-winners were growing, but it is highly likely that *A. saligna* was the main one, as Lister had so consistently urged its use.

### 5.1.6 Demise of the 6th Mile plantation

Whereas a general feature of the period under consideration was the great expansion of the area of land used for plantations, there was nevertheless a reduction in area in 1887 when the 6th Mile plantation was ceded for use as a cemetery,<sup>55</sup> at Lister's suggestion.<sup>56</sup> This land extending between the railway line and Maitland Road from between the 4th and 5th milestones to the 6th milestone was, of course, part of the original White Sands. It was in this area that acacias, hakeas, pines and myrtles had been planted in 1850 and subsequently. Thus the Maitland Cemetery occupies the site where the value of these species for planting on sand was first conclusively demonstrated.

### 5.1.7 Consolidation of the forestry department

By 1888 De Vasselot and Lister could contemplate with pride their successes in the vicinity of Cape Town. Their plans for afforestation were being achieved at Tokai, Table Mountain and Uitvlugt, they had established the basis of a tanning bark industry which was already producing income (Table 5.5.4), the worst drift sands were under control, and the public was eagerly supporting their tree-planting campaign by purchasing the products of their nurseries (Table 5.5.1).

While Lister had been responsible for these schemes locally, De Vasselot had been organising similar programs in other parts of the colony. In 1886 he had divided the colony into three divisions with a Conservator of Forests in charge of each. Lister had been named Conservator of the Western Division and was responsible for other plantations in the region besides those close to Cape Town.<sup>57</sup>

In 1888 Lister was transferred to the Eastern Division where his experience in controlling drift sand was put to good use near Port Elizabeth.<sup>58</sup> Captain C. Harison, who had previously been in charge of

the Knysna Division, took over Lister's post in Cape Town.<sup>59</sup>

The policies gradually formulated by De Vasselot were given legal standing in 1888 by the passing of the Forest Act. This allowed for two types of Crown Forest: demarcated and undemarcated. The former was land proclaimed as such by a Government Notice and could include land intended to be used for a plantation as well as land already under forest. Undemarcated land included commonages, Native locations, or any other land on which the Crown retained the right to the timber, together with all vacant land on which trees were growing or had grown.

The definition of "trees" in the Act was very broad, as it included not only timber trees, but also "trees, shrubs and bushes of all kinds, seedlings, saplings, and re-shoots of all ages". The Act provided special protection to "reserved trees", which were defined to include not only a large number of indigenous species, but also "oak, gum, pine and all planted trees".<sup>60</sup> In effect, this Act extended protection to plants that ultimately came to be regarded as pests.

## 5.2 The Period 1888 to 1892

### 5.2.1 Further planting on the Cape Flats

After Harison became Conservator of Forests in 1888 two new plantations were commenced on the Cape Flats. At the privately-owned Kuils River rifle range, just west of the Blackheath railway station, an area of 370 ha was sown with *A. cyclops* and *A. saligna* and also some *P. pinaster*. There is no indication that drift sand was a particular problem there at the time, but the intention was obviously to forestall such an eventuality. Although work at this plantation was carried out for only three years, 1889 through 1891, there was a good chance of the acacias becoming established because the ground was

ploughed and ridged up prior to being sown and this must have destroyed the existing vegetation cover.<sup>61</sup>

Drift sand in the south-eastern corner of the Flats, originating at the shore of False Bay, had caused Lister concern. In 1889 marker posts put in by Forest Officer Heywood, who was working for Harison, indicated that the sand had moved about 70m in only eight months.<sup>62</sup> Heywood then drew up a plan for reclaiming this sand, which he estimated to cover nearly 7 000 ha. The same technique as that employed by Lister at Durban Road was to be used. This became possible only after the completion of a new railway line that branched from the Stellenbosch line at Eerste River station and continued to Sir Lowry's Pass. From this new line, midway between Eerste River and Faure railway stations, a siding for transporting town rubbish was constructed towards the sand.<sup>63</sup> Planting in this area, which was known as the Eerste River forest reserve, began in 1891. It is obvious that the choice of species to be used was guided by past experience and availability of seeds, for *A. cyclops*, *A. saligna*, *L. laevigatum*, *P. pinaster* and *Widdringtonia* sp. were employed, along with rye and pypgras.<sup>64</sup>

At Durban Road there was no planting of *A. saligna* after Cape Town's rubbish ceased to be railed there in 1887, but an experimental plantation of eucalypts was established. Felling of mature acacias for their bark and wood continued. It was reported at this time that natural regeneration of the Port Jackson willow was disappointing, few young plants being found under twelve-year-old trees, even though there was abundant seed in the soil.<sup>65</sup>

In 1889 areas of this plantation that had not yet been vegetated were sown broadcast with large quantities of seed of, reportedly, cluster pine and Port Jackson willow.<sup>66</sup> It would appear from two later reports that the latter species was wrongly identified. The first of these reports was to the effect that in 1895 a fire had burnt a portion of the stand of *A. cyclopes* (*sic*) near the Durban Road station.<sup>67</sup> The second stated that in 1899 the supply of tanning bark

was running low because of "the mistake of planting *A. cyclopis* (*sic*) in the early days" at Durban Road.<sup>65</sup> Both these reports are puzzling, since there is no record of *A. cyclops* being planted there. In the second report, the expression "in the early days" presumably referred to a time eight to ten years previously, since that was the period required for *A. saligna* to reach maturity in terms of bark production.

The most feasible explanation of this puzzle is that the seed sown in 1889 was in fact *A. cyclops* and not *A. saligna* and that there had been confusion over the use of the name Port Jackson willow. At that time, and often still today, in the eastern areas of the Cape Colony, that vernacular name was applied to *A. cyclops* not *A. saligna*.<sup>69</sup> As Harison had arrived from Knysna to replace Lister in 1888, he may well have brought this terminology with him. There had also been a change of forest rangers at Durban Road in 1887,<sup>70</sup> and it is feasible that the new ranger was unfamiliar with the Cape Town usage of the vernacular name and that when instructed to sow Port Jackson willow, had used *A. cyclops*. If this interpretation is correct, the introduction of *A. cyclops* at Durban Road was accidental and occurred in 1889.

### 5.2.2 Abandoned plantations

Two further reductions in the area occupied by government-owned plantations occurred in 1890. The eastern part of the Durban Road plantation passed into private ownership when this area, known as Bellville South, was subdivided into agricultural allotments.<sup>71</sup> The farmers who then occupied this land must have automatically acquired stands of *A. saligna*.

At Tokai, in the same year, some of the level land was transferred to the Porter Reformatory.<sup>72</sup> This institution thereby acquired a stand of *A. saligna*, and possibly *A. pycnantha* as well, from the wattle bark plantation.

### 5.2.3 Tanning bark

The hopes of establishing *A. pycnantha* as a major source of tanning bark at Tokai faded, as this species did not flourish there. From 1892 onwards, *P. pinaster* was planted within the *A. pycnantha* plantation as a replacement.<sup>73</sup>

As *A. pycnantha* was considered in Australia to be a better source of tanning bark than *A. saligna*, another effort to establish the former species was made, this time at Uitvlugt. The practice of sowing *P. pinaster* and *A. saligna* in alternate rows had continued there steadily since 1884. Now, in 1890, seed of *A. pycnantha* was mixed with that of *A. saligna* and in the following two years *A. pycnantha* was substituted entirely for *A. saligna*.<sup>74</sup>

In spite of the lower esteem in which *A. saligna* was held in Australia, it had proved highly satisfactory as a source of tannin to Cape Town tanneries. As Table 5.5.4 shows, local sales of bark from Uitvlugt and Durban Road had shown a steady increase since 1883. By 1891 the German immigrants and other farmers on the Flats were also producing large quantities of bark.<sup>75</sup>

Figures for the harvest of wattle bark are available for two seasons: 1890-91 and 1891-92 (Table 5.5.5). This bark must have been derived entirely from *A. saligna* as it was still too early for any plantings of *A. pycnantha* to produce a crop. At Uitvlugt a distinction was made between the old and the new plantation. The former was presumably that remaining from the old White Sands and would therefore have been adjacent to the Maitland cemetery, while the latter was that established since 1884, comprising alternate rows of *P. pinaster* and *A. saligna*. The wattles in the new plantation would only just have begun to reach maturity in 1890.

Table 5.5.5 shows that, of the two government plantations, Durban Road was far more important than Uitvlugt in these two seasons in terms of

bark production. It is not possible to make a direct correlation between mass of bark and area covered by *A. saligna*, because of the mixing of this species with *P. pinaster* at Uitvlugt. Nevertheless, it does appear that mature plants of *A. saligna* were more numerous at Durban Road than at Uitvlugt at this time.

The mass of bark sold from privately-owned plantations in 1890-91 and 1891-92 was 2,6 and 3,8 times greater, respectively, than the total amount produced by the forestry department's plantations (Table 5.5.5). These figures indicate that *A. saligna* was by this time being grown on a large scale by farmers and therefore that the spread of this species on the Cape Flats in this period can be attributed as much to planting by private individuals as to the forestry department's activities, if not more.

This view is reinforced by Heywood's description of the Flats in 1890:

"Eight years ago the country was a dreary monotonous stretch of useless bush; it is now dotted over with comfortable homesteads, each surrounded by its belts of Pines or Port Jackson Wattles, and attached to many are valuable plantations."<sup>76</sup>

A further point to be noted from this quotation is that the farmers were not planting bare sand dunes. They were replacing the natural vegetation ("useless bush") with exotics.

Lister's aim after reading about the Victorian wattle bark industry in 1878 had been to create a comparable export industry at the Cape. The first export consignment of wattle bark from Cape Town was made in 1892. The bark was from *Acacia saligna*.<sup>77</sup> This was inevitable as a result of the early success of that species, the confusion over the identity of black wattle, the later discovery that *A. mearnsii* was unsuited to the sandy conditions of the Flats as well as being inhibited by the Australian bug, and the tardiness with which *A. pycnantha* was tried.

In the meantime, however, the black wattle (*A. mearnsii*) had been flourishing in Natal for more than twenty years. In 1886 a small trial shipment of bark to London had been sufficiently successful that an export trade was soon established.<sup>78</sup> By the time the consignment of *A. saligna* from Cape Town reached London, the competition from *A. mearnsii* from Natal, as well as from Australia, was too great and it proved unsaleable. In 1893 it was decided in Cape Town that the plan to export the bark of *A. saligna* was a failure.

By this time *A. pycnantha* was proving to be unsuccessful at Uityvlugt as well as at Tokai and it offered no hope as an export item either.<sup>79</sup> The dream of an export industry based on acacia bark grown near Cape Town had been abruptly destroyed. With only the small local market to be supplied, there was no demand for the large quantities of bark for which plantings had already been made.

There is some irony in the fact that in the very year that the export of bark was declared a failure, the Australian bug (*Icerya purchasi*), which had been partly responsible for the failure of *A. mearnsii* was finally brought under control. This was achieved by the introduction of a predator in the form of the ladybird beetle (*Vedalia cardinalis*). This form of biological control had been pioneered in California where *I. purchasi* was also a pest to the citrus industry. An American entomologist who was sent to South Australia in 1888 discovered the ladybird preying on *I. purchasi* and initiated its introduction to California.<sup>80</sup> Its success there was so great that it was introduced into the Cape Colony in 1891. There, it rapidly reduced the population of the Australian bug and by the end of 1892 the insect pest had virtually disappeared from the vicinity of Cape Town.<sup>81</sup>

Although this success was welcomed at the time,<sup>82</sup> it meant that one of the factors that might have kept some of the Australian acacias in check and prevented them from becoming pests had now been eliminated.

While the tanning bark operations had not been as successful as had

been hoped, the other activities of the forestry department had proved worthwhile. De Vasselot brought to fruition the work that his foresters had been carrying out over the years by issuing to the public comprehensive lists of trees and shrubs that experience had shown were suited to various purposes and soil types.

Of the 13 species that are of particular interest to this study, eight were included in the lists: *A. cyclops*, *A. saligna*, *A. pycnantha*, *H. gibbosa*, *H. suaveolens*, *L. laevigatum*, *P. halepensis* and *P. pinaster*.<sup>83</sup> This report has shown that all eight were familiar from their use in the plantations near Cape Town, except *H. gibbosa*. It may be concluded that the last species must have been tried successfully elsewhere in the colony by De Vasselot's foresters.

Despite the fact that *H. gibbosa* was not grown or distributed by the forestry department in the Cape Town region at this time, it obviously occurred in the region, for in 1893 the new conservator, D.E. Hutchins, observed that it was common on the slopes of Table Mountain. Indeed, it was so well-established that Hutchins evidently thought it was indigenous, for he referred to it as "the Cape species", in contrast to *H. suaveolens*, which he called "the common Australian hakea".<sup>84</sup> By 1899 he had some doubts about this and described *H. gibbosa*, somewhat ambiguously, as "indigenous or naturalized".<sup>85</sup>

As *H. gibbosa* was growing in a hedge in Cape Town as early as 1835 and was in the Botanic Garden in 1858 (see Sections 3.5.1 and 4.5) it is not surprising that it became established elsewhere. It may be surmised that seeds from the Garden were the source of the plants that Hutchins saw.

Hutchins further observed that *H. suaveolens* was the commonest of all hedge plants in the Cape Peninsula and that in comparison *H. gibbosa* made a less dense, but more prickly, hedge.<sup>86</sup>

In 1891 De Vasselot retired from his post as Superintendent of Woods and

Forests. No replacement was appointed. Instead, each of the regional conservators became answerable to the Department of Crown Lands and Public Works and, later, to the Department of Agriculture.<sup>87</sup>

### 5.3 The Period 1892 to 1906

#### 5.3.1 Assets and problems

In 1892 David E. Hutchins replaced Harison as conservator. Hutchins had served as a forester in India before being brought to the Cape in 1882 to assist De Vasselot in the establishment of the forestry department. He had been in charge of the eastern region until 1888 and the southern region until 1892.<sup>88</sup>

In the Cape Town region Hutchins inherited several problems as well as assets. Among the former were the surplus stocks of *A. saligna* on the Flats, and the drift sand near the Eerste River mouth. Among the assets was, firstly, the renewed possibility of growing *A. mearnsii* and *A. melanoxylon* now that the Australian bug was under control. That both of them were widely planted in subsequent years becomes evident in the rest of this Chapter. This negates the statement made by Theal in 1919 that "the ornamental blackwood tree has not yet been reintroduced".<sup>89</sup>

Other major assets were the three forest plantations at Tokai, Table Mountain and Uitsvlugt. At Tokai by this time, 525 ha had been stocked with pines and also eucalypts and acacias.<sup>90</sup> Other species that had been planted there included *Hakea suaveolens* and *Leptospermum laevigatum*.<sup>91</sup>

At the plantation on the Back Table of Table Mountain 29 ha had been stocked by 1892 with *P. pinaster* and *P. halepensis*, together with

various other species,<sup>92</sup> including the "wattles" sown in 1885.

The other forest plantation, at Uitvlugt, by this time covered 443 ha, of which 40 ha were considered to be well established.<sup>93</sup> Included were the mixed sowings of *P. pinaster*, *A. saligna* and *A. pycnantha*, together with a stand of trees that had been planted near Uitvlugt house. Among the latter were *Eucalyptus* spp., *P. radiata* and *P. halepensis*.<sup>94</sup>

The year 1892 was a turning point for another reason besides Hutchins' appointment, for the Cape Town Botanic Garden was then handed over to the Municipality of Cape Town.<sup>95</sup> Its function as a scientific establishment was relinquished and it became instead an ornamental pleasure garden. MacOwan felt that it had never really fulfilled the first function properly because he had been obliged to devote most of his time to being a nurseryman.<sup>96</sup> Free from that burden, he was now able to concentrate on his roles as Government Botanist and Curator of the Government Herbarium.<sup>97</sup>

### 5.3.2 *Acacia saligna* and *A. cyclops*

*Acacia saligna* and *A. cyclops* continued to be planted after Hutchins' arrival, but before this aspect is considered, it is appropriate to examine further their nomenclature.

We have seen already (Section 5.1.2) that in 1885 Lister decided that Port Jackson willow was *A. saligna*. Thereafter, that name was used consistently in Cape Town until 1950 when Adamson and Salter stated that Port Jackson willow had been wrongly identified as *A. saligna* and was actually *A. cyanophylla*.<sup>98</sup> The latter epithet was then generally used until 1974 when the Australian botanist B.R. Maslin decided that *A. saligna* was a polymorphic species whose range of variation included the form previously known as *A. cyanophylla*. The latter name was

therefore a synonym.<sup>99</sup> As there is interest in taxonomic studies of the pest plants (Section 1.2), it may be worthwhile at this point to consider the variability of the specimens of *A. saligna* that were brought to Cape Town.

There is evidence that there were two forms of *A. saligna* at the White Sands and in the Botanic Garden in the 1850s (Sections 4.3 and 4.8). We also know that in 1885 stocks of two forms were introduced from Australia under the names *A. saligna* and *A. cyanophylla* (Section 5.1.2). As it was concluded at that time that Port Jackson willow was *A. saligna*, seeds derived from old stocks of Port Jackson willow, which had been present since the 1840s, were not distinguished from seeds of the new stock of *A. saligna* after that date. On the other hand, the form that was called *A. cyanophylla* was for a time treated separately under that name, as the following discussion indicates.

The plants known as *A. cyanophylla* at Tokai in 1885 evidently remained in the nursery there for four years, for in 1889 it was reported that for the first time 500 plants of this taxon had been transplanted from the nursery into the plantation. Seeds of this taxon were also distributed to the public from the Uitvlugt nursery in that year.<sup>100</sup> In 1893 there were nearly 700 transplants of *A. cyanophylla* in the Tokai nursery, presumably raised from seed collected from the earlier transplants. In 1894, 100 transplants of *A. cyanophylla* were sold at Kluitjes Kraal forest reserve, near Wolseley, and there were 20 transplants of that taxon in the Devil's Peak nursery in that year. In 1895, 220 transplants of *A. cyanophylla* were sold to the public from Tokai nursery.<sup>101</sup> These were probably all derived from the original stock of seeds from Australia grown at Tokai in 1885. Because they were actually labelled as *A. cyanophylla*, they retained an identity distinct from Port Jackson willow.

There were no further reports of *A. cyanophylla* being sold or planted after 1895, even though seed of this taxon was imported from France in that year (Table 5.5.6). We must assume that as the years passed it

was forgotten that the plants grown under the name *A. cyanophylla* had been thought to be a distinct species, and that they were also considered to be Port Jackson willow (*A. saligna*).

In summary, then, it appears that different forms of *A. saligna* were introduced to the Cape Town region and that those responsible treated them as different species. Subsequently, the differences between the forms were not as readily recognised and no distinction was made between them. Because of this later confusion of identity, it is not possible to say that only one particular form was planted in a certain locality. Therefore, any attempt to locate areas where a particular genotype of *Acacia saligna* was introduced is unlikely to be successful.

It should be noted that in 1919 the Australian botanist D.A. Herbert commented that there was confusion in South Africa between *A. cyanophylla* and *A. saligna*. He attempted to describe the differences between them, but Maslin later showed that those differences were illusory.<sup>102</sup>

With regard to *Acacia cyclops*, it was stated in the previous Chapter that the name *A. glaucophylla* used by McGibbon actually referred to that species. In the presentation of this history to this point, the former name has been used whenever the sources used the latter. The evidence for synonymy is now presented.

Among the seeds that McGibbon sent to Smith for planting at the White Sands in 1857 were some that he referred to as *A. glaucophylla*. No vernacular name was given. In McGibbon's list of species growing in the Botanic Garden, published in the following year, there was no mention of *A. glaucophylla*, but *A. cyclops* was included, also with no vernacular name.<sup>103</sup>

The next record of either name that has been located is from the year 1880 when seeds of *A. glaucophylla* were distributed to the public from the Uitvlugt seed store.<sup>104</sup> This name was mentioned regularly in the

forestry department's annual reports from 1882 onwards and in 1888 it was also referred to as "small-leaved wattle".<sup>105</sup>

A list of seeds offered for sale by the forestry department in 1882 included "*A. glaucophylla*, rooi cranz".<sup>106</sup> As the modern vernacular name for *A. cyclops* is rooikrans, this suggests synonymity. A report in 1893 that "*A. glaucophylla* (? *cyclops*)" had been sown at Eerste River<sup>107</sup> signified that there was some debate as to the correct identity of the species by that time. Finally, in 1893 *A. cyclops* was reported to be growing at Eerste River and to have been planted at Uitsvlugt. It was also stated that two wattles grew freely on the Cape Flats: *A. saligna* and *A. cyclops*.<sup>108</sup> Thereafter, there was no further mention of *A. glaucophylla* in the forestry reports, whereas *A. cyclops* was frequently mentioned.

It seems reasonable to infer from this evidence that the species referred to in the early reports as *A. glaucophylla* was in fact *A. cyclops*. Lister clearly stated in 1895 that this was the case, and attributed the original error to a misidentification by McGibbon.<sup>109</sup> This conclusion on the synonymity of *A. glaucophylla* and *A. cyclops* confirms that reached by other means by Roux in 1961.<sup>110</sup>

From this consideration of the nomenclature of *A. saligna* and *A. cyclops* we now move to an examination of their use in the 1890s. As we have seen, Hutchins's arrival coincided with a surplus of Port Jackson willow near Cape Town. While the information in Table 5.5.5, combined with the discussion in Section 5.2.3, indicates that this species was being grown both at government plantations on the Flats (Uitsvlugt and Durban Road) and at private farms, it does not reveal the actual location of those farms. After Hutchins's arrival there were two more awards of prizes for private plantations and the records kept of these enable us to deduce their location.

The awards were made in 1892 and 1894. The records show the subdivision name and allotment number of each prize-winning farm, together with the

area covered by the plantation and the names of the species grown. The information is summarised in Table 5.5.7. All of the plantations consisted entirely of *A. saligna*, except one that also included a small patch of *A. pycnantha*. In addition, some of the farmers had grown *P. pinaster* and *Eucalyptus* spp. In 1894 a note was made of eleven other entrants whose plantations were disqualified because they were smaller than the required two hectares. The note indicated that the disqualified farms were all located at Claremont Flats, Wynberg Flats and Durban Road.<sup>111</sup>

In Table 5.5.7 the modern name for the area in which each of the prize-winning plantations was situated is indicated. We may deduce that in the 1880s and early 1890s *A. saligna* was widely grown in the areas that now form the suburbs of Cape Town that extend southwards from Kewtown, Belgravia and Rylands through Wetton and Hanover Park to Philippi, on the western side of the Cape Flats, as well as in Bellville South in the north-eastern corner of the Flats.

It may also be deduced that *A. saligna* was being grown on the land west of Wetton now occupied by the Youngsfield military base and the Royal Cape golf course, for in 1893 this land was known as the "Tannery Estate".<sup>112</sup>

Because of the surplus of *A. saligna* Hutchins decided that the only economic prospect for the government plantations of this species was to harvest them for firewood. He instructed that the plantations should be first burnt and then felled. He reasoned that a fire of low intensity would improve the quality of the bushes for firewood and, more importantly, it would ensure the germination of the plentiful seeds lying on the ground, thus producing another crop with very little effort.<sup>113</sup> It had long been known that heat assisted the germination of the seeds of acacias (Bowie had published his discovery of this fact in 1832<sup>114</sup>) and they were normally boiled before being sown on the Flats.<sup>115</sup> As we have seen, the fact that *A. saligna* would readily germinate after a fire had been demonstrated at the 6th Mile plantation

where fires were frequently started by sparks from trains.

With this plan Hutchins appears to have introduced deliberate burning of Port Jackson willow as a management practice on the Cape Flats, although it is not known how often this was carried out. This may have assisted the species' survival in some areas long after the main justification for cultivating it had disappeared.

Despite its decreased economic value, *A. saligna* continued to be planted for various purposes, including drift sand control. At Eerste River plantation the railway siding was extended by 0,8km in 1892<sup>116</sup> and stabilisation of the sand by the spreading of rubbish and sowing of seeds continued steadily until 1897.<sup>117</sup> The main species used were *A. cyclops* and *A. saligna*, for it was soon found that *A. pycnantha* and *P. pinaster* would not readily grow there.<sup>118</sup>

That farmers were also growing acacias for drift sand control at this time is evidenced by a report that wattles, especially *A. cyclops*, had been used for this purpose on the farms Duinefontein and Kalksteenfontein,<sup>119</sup> in the area today occupied by the suburbs of Guguletu and Nyanga.<sup>120</sup> Both *A. cyclops* and *A. saligna* were sown at Uitvlugt in 1893, in separate plots, in addition to *P. pinaster*,<sup>121</sup>

Another purpose for which acacias continued to be used was as nurse plants to shelter other species. This technique had been pioneered at Uitvlugt but, as Hutchins had dismissed it as "fanciful" and caused acacias and pines to be grown separately there from 1892,<sup>122</sup> it is rather surprising that he encouraged its use elsewhere. Even when acacia seedlings were found to be a nuisance in the pine plantations at Uitvlugt in 1895,<sup>123</sup> the use of acacias as nurse plants at other plantations did not cease altogether.

At Tokai, *A. saligna* was used for this purpose in 1893. It was sown alongside the road that led from the plantation to Retreat railway station, in order to shelter an avenue of pines that was later planted there.<sup>124</sup>

*A. cyclops* and *A. saligna* were used as nurse plants at the new East End plantation on the site now occupied by Trafalgar Park in Woodstock, 2km east of the centre of Cape Town. This land, originally occupied by a line of redoubts as part of Cape Town's defences, was a neglected and derelict strip between the boundaries of the municipalities of Cape Town and Woodstock when it was taken over by the forestry department in 1895. It was ploughed and sown in rows with "wattles"<sup>125</sup> (a term apparently used by Hutchins to connote both *A. cyclops* and *A. saligna*<sup>126</sup>). Later, a hedge of "wild hakea" and kei apple was planted and *P. pinaster*, *P. canariensis*, *Cupressus sempervirens* and *Eucalyptus* spp. were grown.<sup>127</sup> In 1904 the wattles were removed because they were thought to be damaging the other trees and it was considered that they had fulfilled their purpose as nurse plants.<sup>128</sup>

Another area where *A. cyclops* and *A. saligna* (as well as other acacias) were used in the 1890s was the new Devil's Peak plantation. The establishment of this plantation resulted from a proposal made by Forest Officer Heywood to convert the entire slopes of Table Mountain and Devil's Peak to dense forest. Both Heywood and Hutchins believed that such a forest would be less inflammable than the existing vegetation and would thus reduce the risk of another serious fire such as the one that had swept Devil's Peak at the end of 1891.

Their plan required the owners of private estates to increase the density of their existing forests by planting additional trees, while the forestry department would establish plantations on land as yet unafforested.<sup>129</sup> By acquiring land from the Woodstock municipality,<sup>130</sup> the government obtained 105 ha<sup>131</sup> of such land on Devil's Peak. This land occupied most of the north-eastern, or Woodstock, slopes and face of the mountain, together with the upper cliffs and First Waterfall Ravine on the eastern, or Rondebosch, side.<sup>132</sup> The plan to afforest Devil's Peak was seen by Hutchins as an opportunity to cover the "bare and stony slopes above Woodstock and Salt River" which had for so long been "a reproach and eyesore to Cape Town".<sup>133</sup>

In 1893 *A. cyclops* and *A. saligna* were sown in rows at this plantation together with *A. mearnsii*, *A. pycnantha* and *P. pinaster*. In the following year more seeds of the last three species were sown, as well as of *A. melanoxylon*, *P. pinea* and cork oak (*Quercus suber*). A shelter belt of *A. cyclops* and *A. saligna* was sown in 1895 and 1896 alongside the road that had been built from the end of Roeland Street, Cape Town, to the King's Blockhouse at an altitude of 430m on Devil's Peak.<sup>134</sup> The forester's house had been built adjacent to the blockhouse and the forestry nursery was established just below it. The purpose of the belt of acacias was to conceal the scar across the mountainside caused by the construction of the road. Hutchins had received severe criticism from his superiors about this, "the most conspicuous road in Africa".<sup>135</sup> *A. saligna* was also used for shade in the nursery and there were 12 000 "thorny hakea" seedlings in the nursery in 1896.<sup>136</sup> It appears that *P. pinaster* was found to grow sufficiently readily on the slopes of Devil's Peak that the use of nurse plants became redundant. From 1896 to 1900 the afforestation program in this reserve was based almost entirely on that species.<sup>137</sup>

Acacias were also sown at the short-lived Springfield plantation, which was situated in the area now known as Philippi, on the Cape Flats.<sup>138</sup> At this plantation 2,8 ha were sown in 1893 with *A. pycnantha*, *A. saligna* and *P. pinaster*, each in a separate plot.<sup>139</sup> No further planting was carried out there and this forestry reserve was transferred to other owners in 1907.<sup>140</sup>

By sowing *A. cyclops*, *A. saligna* and other acacias in such far-flung localities as Eerste River, Retreat, Woodstock, Devil's Peak and Philippi, the forestry department was contributing to the extension of their range beyond that already achieved both by the department and by private individuals. This extension was thus achieved by deliberate planting by man and not merely by natural dispersal.

### 5.3.3 Direct sowing of *Pinus pinaster*

When the forestry department began its new afforestation program in 1884, two methods of establishing trees were used, as we have seen. At Uitvlugt, seed of *P. pinaster* was sown in rows (alternating with *A. saligna*) directly on to the ground to be stocked, whereas at Tokai young plants were first established in the nursery and then transplanted to the open ground. The latter method was employed subsequently at other plantations. In the first few years the transplants were placed in pits, but from 1887 the entire area to be planted was ploughed and the transplants were then set out in rows, or, if the ground was too stony to be ploughed, it was dug up and piled into ridges about a metre wide and the trees were then planted on the ridges.<sup>141</sup> The transplant method proved expensive and, before his retirement, De Vasselot urged that pines should be established by direct or *in situ* sowing wherever possible.<sup>142</sup>

In the case of Uitvlugt, direct sowing was already being used. Hutchins put an end to the "fanciful" mixed sowings in 1892 and cluster pine and acacias were then sown separately.<sup>143</sup> From 1895 this plantation was devoted almost entirely to *P. pinaster*, established by *in situ* sowing. Hutchins announced that the success of this species on the Cape Flats was now assured and he believed that the period of experimentation thus successfully concluded was an "important epoch in the history of forestry", since it had demonstrated the true worth of this species. It could be grown in dense stands from direct sowings and the rough timber thus produced would find a ready market as railway sleepers.<sup>144</sup>

The success of cluster pine at Uitvlugt, as evidenced both by Hutchins's writings and by the presence today of many fine specimens in Pinelands, contradicts the claim by Braine in 1902 that repeated efforts to introduce this species on the sand of the Flats had failed. On the other hand, Braine's comment that its lack of success at Eerste River and Durban Road was probably due to the presence of Lime<sup>145</sup> may have

had some validity. It has already been noted (Section 5.2.1) that seeds of *P. pinaster* were sown at those two reserves, but there is no indication in the forestry department's reports that they flourished. Moreover, Hutchins actually stated that this species was a failure at both places.<sup>146</sup>

At Tokai, direct sowing of *P. pinaster* was first tried in 1890.<sup>147</sup> This technique was soon in regular use to augment the transplant method, even though the seed was subject to losses from scavenging baboons.<sup>148</sup>

At Table Mountain, the plantation had been initiated in 1885 by dibbling in seed of cluster and stone pine and wattles, but thereafter the transplant method had been used (Section 5.1.1). In 1891 experimental sowing of *P. pinaster* and *P. halepensis* on one hectare of ground that had been dug up and formed into ridges was carried out.<sup>149</sup> It was concluded that *P. pinaster* was particularly well suited to this method of establishment and from 1893 to 1896 this species, sometimes in mixtures with *P. halepensis*, *A. mearnsii* or *A. melanoxylon*, was sown over an area of 38 ha. Transplanting also continued in these years and it was then reported that the "larger portion" of the lower plateau had been afforested.<sup>150</sup>

Sowing of seed of *P. pinaster* in the forestry reserves was carried out at extraordinary densities, a value of 50kg per hectare being quite common,<sup>151</sup> while in one year at Tokai as many as 137kg/ha were sown.<sup>152</sup> Such values contrast strongly with the 6kg/ha that has been considered sufficient in more recent years.<sup>153</sup> These rates of seed application must have resulted in high densities of young trees in areas where conditions for germination were advantageous, thus obviating any possibility of exploiting the trees for timber, unless very intensive thinning were carried out.

The lavish use of seed would appear to suggest that it was available in abundance. While seed was collected from mature trees in the plant-

ations as well as being purchased locally,<sup>154</sup> it was also being imported. In 1893 more than five metric tons of seed of cluster pine were imported and in each of the following two years about four metric tons.<sup>155</sup> Importation of seeds of *P. pinaster* continued regularly thereafter. An analysis of import records from this period was carried out in 1928 by C.E. Duff, a Forest Officer. He showed that the seeds came from a variety of sources in France, Italy and Austria.<sup>156</sup>

Concerned about the cost of importing seeds, Hutchins suggested a means of increasing the local supply. He had observed that the yield of seed appeared to increase with altitude. He suggested:

"It may possibly be found advantageous to lay down special plantations of seed-bearing cluster pines on Table Mountain, planting the trees sparse and lopping them in order to keep them dwarfed and in heavy bearing."<sup>157</sup>

In the event, he was unable to implement this plan, for the Table Mountain plantation did not remain under his jurisdiction.

The method of direct sowing of pines was adopted from the outset by the Municipality of Cape Town when it also began to establish plantations on the mountains near Cape Town. Once the government had commenced work on the Devil's Peak plantation, the Commissioner of Crown Lands, John X. Merriman, urged the municipality to begin an afforestation program on the mountain land under its jurisdiction and offered one thousand pounds as a subsidy for this work, over and above money provided under the Tree-Planting Act of 1876.<sup>158</sup> This proposal was implemented at four localities, at two of which pines were established by *in situ* sowing.

One plantation was formed on the northern slopes of Table Mountain near Platteklip Gorge. There, in 1894, seeds of *P. pinaster* were sown and young oaks were transplanted.<sup>159</sup>

Another municipal plantation was established on the eastern side of Signal Hill during 1894 and 1895. In the first year both *P. pinaster* and *P. halepensis* were sown over 8,5 ha.<sup>160</sup> In the second year only the former species was used, some 251kg of seed obtained from the forestry department being sown over 14,2 ha.<sup>161</sup> Although Hutchins was critical of the methods used,<sup>162</sup> many of the trees survived and were well established four years later.<sup>163</sup>

Of the other municipal plantations established at this time, one was on the eastern slopes of Lion's Head, above Kloof Nek Road, where 10 000 young eucalypts were transplanted in 1895.<sup>164</sup> The other plantation comprised stone pines that were planted along the path that followed the water pipeline along the western side of Table Mountain from Slangolie Ravine to Kloof Nek (the Pipe Track).<sup>165</sup>

In conjunction with this tree-planting activity, the municipality had a path constructed across the northern slopes of Table Mountain from Kloof Nek to Platteklip Stream to provide access for fire-fighting. (This path was eventually transformed into Tafelberg Road.<sup>166</sup>) In order to do this, it was necessary to expropriate land from two privately-owned estates which had formerly comprised the property "Oranjezicht".<sup>167</sup> This area had been covered with pines since the early 1860s, at least, as we have seen (Section 4.7). That the forests remained more or less intact is obvious from statements made after the municipality acquired the land. In 1902 it was said to be "already fairly well wooded"<sup>168</sup> and in 1908 the mayor referred to "all Council's plantations between the Kloof Road and Platteklip and beyond Platteklip in the direction of the Old Deer Park".<sup>169</sup> As there is no record of the municipality establishing such plantations they must have been the old ones remaining from "Oranjezicht".

With regard to the idea of sowing *P. pinaster* directly on to the ground to be stocked, Hutchins was undoubtedly influenced to adopt this method by a visit he made to the village of Genadendal, about 100km east of Cape Town (and quite close to "The Oaks" and "Elsen

Kloof": see Section 3.4.2). There he observed that this species had apparently spread self-sown from a plantation at the village into the natural vegetation on the mountainside.<sup>170</sup> The fact that *P. pinaster* could become established from seed on unprepared ground made the forester's method of raising seedlings and then transplanting them to carefully prepared sites appear unnecessarily tedious. It appears that Hutchins was unaware that broadcast sowing of pine seed was a common practice at the Cape until Smith had demonstrated in the 1850s that they could be successfully grown from transplants. Smith had preferred the latter method on the Cape Flats because scattered seed was subject to heavy losses from birds and mice.<sup>171</sup>

Hutchins concluded from his observations at Genadendal, as well as on the slopes of Table Mountain, that pines became established when seed fell among rocks where there was little natural vegetation. When a fire swept through the area, the lack of inflammable shrubs in the rocky areas to feed the fire meant that the pines escaped burning and were thus able to grow to maturity.<sup>172</sup> Having reached this conclusion, Hutchins realised that man could emulate this strategy by scattering seeds in appropriate rocky situations.

In his account of his visit to Genadendal, Hutchins stated that the original plantation there had been established near the churchyard between 1825 and 1830, but did not say how he knew this.<sup>173</sup>

Hutchins's account must have been the source of Poynton's statement in 1959<sup>174</sup> (referred to by Grut in 1977<sup>175</sup>) that the first plantation of *P. pinaster* in the Cape was commenced in 1825 at Genadendal (see Section 3.2.5). It is possible that the young firs that were seen in a nursery "beyond the burial-ground" at Genadendal in 1816 by Latrobe<sup>176</sup> (see Table 3.6.3) formed the basis of this plantation. If this is so, then the trees were older than Hutchins thought.

Members of the Mountain Club of South Africa approached Hutchins in 1896 for advice on how they could best achieve what they believed was a useful purpose: sowing tree seeds in suitable localities on the

mountains. They cited the example of one of their members who had sown hundreds of acorns during his many visits to the mountains near Franschoek. In response, Hutchins recommended that they use *P. pinaster* and advised that the best places to sow the seeds were "small patches of soil, or crevices in the rocks with a little soil in them". He warned them that a large proportion of the seeds would not survive.<sup>177</sup> A search through the Mountain Club's annual journals has not revealed any definite evidence that the club followed Hutchins's advice, but at least one member has stated that mountaineers did subsequently distribute pine seeds on the eastern face of Table Mountain.<sup>178</sup>

#### 5.3.4 Fire belts

Another innovation made in this period was the use of eucalypts to form fire belts within pine plantations. The choice of eucalypts for this purpose is rather surprising in view of the fact that they are generally considered in Australia, their original home, to be highly inflammable because of the volatile oils in their leaves. Hutchins chose them because firebreaks needed "strong rapid-growing trees.... that are not destroyed by burning".<sup>179</sup> That description fits eucalypts well for, although they are very inflammable, they also regenerate rapidly after being burnt. He also claimed at one point that eucalypts would inhibit the growth of bushy vegetation in firebreaks, thereby obviating the necessity for annual clearing, as well as breaking the force of the wind and arresting sparks when a fire did start.<sup>180</sup> On the other hand, he also described the fire belts of eucalypts as "dense, quick-growing [and] uninflammable".<sup>181</sup>

Firebreaks were planted at both Tokai and Devil's Peak in 1895, in the form of broad belts running up the mountain slope to the base of the cliffs, through the centre of the pine plantations. Both karri (*E. diversicolor*) and blue gum (*E. globulus*) were used at Tokai,

while only the latter species was planted at Devil's Peak.<sup>182</sup> This use of eucalypts in firebreaks soon became standard practice and later, as we shall see, *Acacia mearnsii* and *A. melanoxylon* were also used for this purpose.

When one considers that a stated justification for establishing dense pine plantations along the mountains had been that this would prevent fires (Section 5.3.2), it is ironical that Hutchins now found it necessary to plant these fire belts. It must be remembered that this was a time of experimentation in forestry practices and that the characteristics of various species were not yet well understood. Even as late as 1931, in a different and broader context, it was stated that "no really good fire resisters" had been discovered amongst the species most suitable for afforestation purposes in the temperate lands of the Southern Hemisphere, and eucalypts were still being recommended for planting in belts around plantations of inflammable species such as pines. It was stressed that the ground surface beneath the eucalypts must be kept clear.<sup>183</sup>

### 5.3.5 Private planting

Private individuals continued to plant exotics in large numbers, encouraged by government officials. MacOwan, in his capacity as Government Botanist in the Department of Agriculture, frequently advised farmers on their choice of trees and shrubs.<sup>184</sup> He recommended *H. suaveolens* as a hedge plant,<sup>185</sup> particularly to "keep out the prying eyes of passengers up the road".<sup>186</sup>

Hutchins was also a proponent of tree-planting by the masses and in 1893 he issued a descriptive catalogue of trees suitable for the Cape Colony. He advised that it was useless to attempt to plant trees until the indigenous vegetation was eradicated by burning, ploughing and cross-ploughing. For *in situ* sowing he advised densities of 100kg of seed

per hectare for cluster pine on sand drifts and 5kg/ha "for good wattle seed on good soil". Nearly all of the thirteen pest plants were recommended in his catalogue, only *H. sericea* and *P. halepensis* not being mentioned. Both *A. longifolia* and *Albizia lophantha* were highly recommended for bee-keeping, although otherwise Hutchins condemned them as "shrubby weeds in the Cape Peninsula, very hardy but of no use for bark".<sup>187</sup> It would appear from this comment that *A. longifolia* had not been affected by the Australian bug (see Section 4.8).

The forestry department remained a major source of plants. As Table 5.5.1 shows, distribution of *A. cyclops* and *A. saligna* diminished after 1893, but *A. mearnsii* and *A. melanoxylon* were then supplied in larger quantities. The 1890s were also notable for an upsurge of interest in *H. suaveolens* and, beginning in 1895, of *H. gibbosa*. *L. laevigatum* also became important during this period, while *P. pinaster* and *P. halepensis* continued to be distributed. It is also noticeable in Table 5.5.1 that in 1893 distribution of seeds to the public ceased, only transplants being supplied thereafter.

The massive trade in seeds that had been conducted by the forestry department up to that time is emphasised in Table 5.5.1 by the total numbers of seeds (calculated on the basis of the conversion factors in Table 4.9.3). Thus, some 14 million seeds of *A. cyclops*, 3 million of *A. mearnsii*, 1,5 million of *A. pycnantha*, 300 million of *A. saligna*, 16 million of *L. laevigatum*, 1 million of *P. halepensis* and 34 million of *P. pinaster* were distributed in the period 1882-1893.

In general, records do not indicate where all these plants were eventually grown, but an example of their use is that in 1893 and 1894, 1 150 transplants of *H. suaveolens* and 1 050 of *P. pinaster* were supplied to the St George's Home in Upper Kloof Street, that is, on the lower northern slopes of Table Mountain.<sup>188</sup>

While the fact that the forestry department was supplying large amounts of plant materials to the public, as well as using copious quantities in

its own plantations, implies that there was a plentiful supply of seed, it must not be concluded that this was all obtained locally. It has already been noted (Section 5.3.3) that seeds of *P. pinaster* were being imported. In addition, seeds of *A. cyclops*, *A. longifolia*, *A. melanoxydon* and *A. saligna* were received from a seed merchant in Paris by the Department of Agriculture in 1895 (Table 5.5.6). These were presumably for the use of the forestry department, which fell under the aegis of the former department. They were not necessarily used in the Cape Town region, however. An order was also placed for seeds of *H. gibbosa* and *H. sericea*<sup>189</sup> but it is not known whether they were received. Hutchins reported that in 1896 the amount of money spent on purchasing seeds through the Agent-General in London and from Australia was 691 pounds as against 529 pounds spent on local purchases.<sup>190</sup>

It appears that an important source of seeds since the 1860s had been Von Mueller in Victoria. According to one of his contemporaries, writing after his death in 1896, it was to him that South Africa and several other countries were "greatly indebted for the groves of eucalypti, acacias and other trees that have done so much to adorn their hills and plains and even to improve their climates".<sup>191</sup> MacOwan judged Von Mueller's contribution a little less enthusiastically, referring to the "somewhat too ubiquitous Eucalypts and Acaciae which meet us at every turn", as a result of Von Mueller's actions,<sup>192</sup> although on another occasion he stated that Von Mueller prided himself, "not unworthily", on his contribution.<sup>193</sup>

In his turn, Von Mueller was able to use the results of the experimentation with Australian plants that was being conducted at the Cape to assess their potential for other areas. He incorporated the results into a published catalogue of temperate-zone plants suitable for naturalisation and economic exploitation.<sup>194</sup>

### 5.3.6 New techniques

The year 1897 saw the application of several new techniques in forestry. At both Tokai and Devil's Peak plantations, afforestation on the slopes below the cliffs was by then virtually complete. The methods that had gradually been formulated through trial and error at those plantations were put into immediate effect at a new plantation begun that year at Ottery, on the site of the former Wynberg rifle range, just east of the "Tannery Estate".<sup>195</sup> There, *P. pinaster* was established by *in situ* sowing and fire belts of eucalypts were planted to divide the pines into compartments of 1,6 ha.<sup>196</sup> By 1904 the entire area of 88 ha had been successfully afforested in this way.<sup>197</sup>

At Table Mountain plantation, direct sowing of *P. pinaster* on ground that had first been cleared and ridged had also proved successful, but a conflict had developed between the forestry department and the municipality over the use of land on the plateaux of Table Mountain for this purpose. The town councillors were not convinced of the validity of Hutchins's argument that a cover of trees would increase the water-retaining capacity of the soil, thereby ensuring a steady flow of water into Disa Stream (from which Cape Town obtained much of its water supply via the Woodhead tunnel). Moreover, they were concerned that disturbance of the soil during afforestation would cause siltation of the Woodhead reservoir which was then being built on Disa Stream.<sup>198</sup>

Already, as a result of the municipality's protests, the forestry nursery had been moved in 1893 from its site close to Disa Stream to eliminate the possibility that fertiliser used there would pollute the stream. The nursery had been relocated on the eastern edge of the lower plateau, outside the drainage basin of Disa Stream, at the head of the valley now known as Nursery Ravine.<sup>199</sup> Between 1893 and 1900 a large variety of exotic tree species, both evergreen and deciduous, were sown or transplanted at this new nursery. They included *A. mearnsii* and *A. melanoxylon* as well as species of pine, cedar, eucalypt, oak, elm, plane, walnut, chestnut and alder.<sup>200</sup>

Many of those species were still growing there in 1957 when the nursery, then long-abandoned, was reserved as an arboretum and named the "Lister Nursery".<sup>201</sup> This name is misleading because it is now clear that the nursery was founded under Hutchins's direction in 1893, not Lister's, as those who named it thought. The original Table Mountain nursery that had been founded in 1885 when Lister was Superintendent of Plantations was close to Disa Stream, within the area now occupied by the Hely-Hutchinson reservoir.<sup>202</sup>

The conflict between the municipality and the forestry department came to a head in 1897 when the Woodhead reservoir was completed<sup>203</sup> and work began on the Hely-Hutchinson reservoir immediately upstream. Because of the municipality's complaints, afforestation on the plateau ceased and the entire plantation was ceded to the municipality.<sup>204</sup> Hutchins mourned the loss of the "flourishing young woods of pine, blackwood, oak, and other trees" which were being cut down in 1900 to make way for the new reservoir,<sup>205</sup> but trees above the water level must have been left standing, as several photographs taken a few years later clearly show tall pines adjacent to the reservoir.

One of those photographs, taken when the reservoir was nearing completion in 1904, shows pines on the north-eastern shore. Another, of the municipal luncheon after the official opening ceremony for the reservoir in 1904, shows guests seated at a table set in a dense stand of pines at least seven metres tall.<sup>206</sup> The Mayor stated that this pine forest adjoined the reservoir.<sup>207</sup> A third photograph, taken shortly after the completion of the Hely-Hutchinson reservoir, shows pines on both the southern and northern upper shores of Woodhead reservoir and on the slopes above the southern edge of Hely-Hutchinson reservoir.<sup>208</sup>

J. Burman, writing in 1969, stated that all the pines then growing around the two reservoirs must have been planted after the construction work was completed.<sup>209</sup> If this were correct then, firstly, all of the trees of the original Table Mountain plantation must have been removed and, secondly, a new plantation must have been established later.

Photographic evidence cited in the previous paragraph indicates that the first event did not take place. The second event is not registered in the records of the Municipality of Cape Town, and this possibility must also be dismissed.

In fact, municipal records show that the Superintendent of Public Gardens and Tree Planting thinned and cleaned "all the pine plantations on top of Kasteel's Mountain" in 1905.<sup>210</sup> Kasteel's Mountain was the name given at that time to the buttress just south of the pass known as Kasteel's Poort on the western side of Table Mountain. The summit of Kasteel's Mountain merges with Back Table.<sup>211</sup> It would therefore appear that the superintendent was referring to the plantations on Back Table established by the forestry department. Thus, we may conclude that in 1905 the municipality was actively maintaining those plantations that it had acquired along with the title to the land occupied by the reservoirs.

Burman's statement was based on his observation that "in this particular spot, old pictures show that the mountains were completely bare 60 years ago".<sup>212</sup> It is not clear which pictures Burman consulted but, as has just been indicated, there is abundant photographic evidence of pine trees around the reservoirs in 1904. Certainly, two photographs of Woodhead reservoir taken in 1898 do not show any trees, but their range of view is very restricted.<sup>213</sup> Likewise, photographs of the vicinity of the Mountain Club hut, taken in 1908, do not show any trees,<sup>214</sup> but the hut is 0,5km distant from the nearer of the two reservoirs (Woodhead).<sup>215</sup>

The conflict between the municipality and the forestry department over the desirability of carrying out afforestation work in the catchment area of the reservoirs was resolved in 1897. Tree-planting activities were then transferred to the headwaters of some of the ravines on the eastern side of the mountain, which drain into the Liesbeek River, namely Skeleton Gorge, Nursery Ravine and Ash Valley. Planting was also extended to the south-eastern end of the lower plateau, above

Rooikat Kloof (at the top of the Trolley Track). At these sites *P. pinaster* and *P. halepensis* were sown at various times from 1897 to 1901. Other trees planted in the general vicinity in this period included *A. melanoxyton* and species of ash, oak, pine, and eucalypt.<sup>216</sup>

Hutchins stated at this time that his aim was to achieve a vertical zonation on the mountain with Scotch pine on the higher slopes and cluster pine below, to simulate the situation that existed in Corsica.<sup>217</sup> As explained earlier (Section 5.1.1), it has been assumed here that the species that was being grown as Scotch pine had been misidentified and was actually Aleppo pine (*P. halepensis*). Fire belts were planted through these stands of pines, the species used being *A. melanoxyton*, on the wet, higher ground, and *Eucalyptus* spp. lower down.<sup>218</sup>

The year 1897 was significant for other reasons besides the establishment of Ottery plantation and the change of tactics at Table Mountain. In that year the publication of statistics relating to sales of wattle bark from government plantations on the Cape Flats ceased after fourteen years (Table 5.5.4). Evidently this activity had become a very minor part of the forestry department's functions. That collection of wattle bark did continue, nevertheless, is evidenced by a report that sales of bark to the value of 127 pounds from *A. saligna* and *A. pycnantha* at Tokai were made in 1899.<sup>219</sup>

Another important event of 1897 was the cessation of the use of Cape Town's rubbish for reclaiming drift sand at Eerste River, because of high railage charges. By then 441 ha had been reclaimed with rubbish and sown with *A. saligna* and *A. cyclops*, as well as other species.<sup>220</sup> An attempt was made between 1897 and 1903 to make this plantation an economic proposition by growing trees, including *A. melanoxyton*, *P. halepensis*, *P. canariensis*, *Callitris* sp., *Casuarina* sp., *Cupressus* spp., and *Eucalyptus* spp. One of the last-named was *E. gomphocephala*, introduced especially from Western Australia.<sup>221</sup> This lime-tolerant species<sup>222</sup> has since been widely planted as a windbreak and in avenues on the Flats. It has reportedly shown a tendency to spread

in places<sup>223</sup> and it is listed as a potential pest plant in Table 1.8.2. The planting of *Callitris* sp. at Eerste River in this period was probably the source of the stand of *Callitris robusta* found in this area in 1972.<sup>224</sup>

Whereas *A. cyclops* had been considered desirable when the Eerste River plantation was started, because it grew readily in sand, now Hutchins decided to replace it with more valuable species. Tenders for its removal were called, but there was little interest in it, even for firewood.<sup>225</sup> *Acacia saligna* continued to be grown in this period, as many as 10 000 transplants being set out in one year (1901). Sales of its bark did not live up to expectations, however.<sup>226</sup>

There was no more planting at this original part of the Eerste River forest reserve after 1903. It was considered that the drift sand had been permanently fixed by the planting carried out since 1891. When planting ceased, the plantation covered 405 ha and was comprised predominantly of *A. saligna*.<sup>227</sup>

When reclamation of sand with refuse near the railway siding ceased in 1897, attention shifted to the coast where the drifting sand originated.<sup>228</sup> A strip of land extending 22km along the shore of False Bay from Strandfontein to the Eerste River, with an average width of about 2km and a total area of about 4 280 ha, was declared a Demarcated Forest in that year.<sup>229</sup> The eastern section of the strip was treated as part of the Eerste River forest reserve, while the western section became the Strandfontein forest reserve.<sup>230</sup>

Hutchins had decided to try using marram grass (*Ammophila arenaria* = *Psamma arenaria*) to stabilise the sand. Earlier trials to establish this exotic grass by direct sowing at Eerste River had proved unsuccessful.<sup>231</sup> Subsequently, it had been shown that the grass could be raised from seed in a nursery and then transplanted on to the dunes.<sup>232</sup> This method appeared to be far less expensive than that involving the spreading of refuse and sowing of seeds of trees and shrubs, as the marram grass did not require fertiliser. He proposed

to plant marram in such a way that sand would accumulate against it to form an artificial littoral dune, as had been achieved in Gascony, France.<sup>233</sup>

After the proclamation of Strandfontein forest reserve, which covered 1793 ha and extended for 11km along the coast at the southern edge of the Cape Flats,<sup>234</sup> planting of marram began, and by 1901 a dune 5,3km long had been created, effectively preventing the influx of sand to the "great central drift" at the property known as "Mitchell's Plain".<sup>235</sup> Both *A. cyclops* and *A. saligna* were subsequently established on this dune from transplants<sup>236</sup> and thus the ranges of these two species were further extended.

#### 5.3.7 Extended use of *Pinus pinaster*

By the late 1890s, the original Table Mountain plantation in the water catchment area of Back Table had been abandoned by the forestry department. At both Tokai and Devil's Peak forest reserves the lower slopes below the steep cliffs were virtually totally afforested. Thus, at all three reserves new areas for planting were needed. At Table Mountain, as has already been noted, this need was at first met by the extension of afforestation along the eastern edge of the lower plateau, outside the catchment area of the reservoirs (Section 5.3.6), but the site above Rooikat Kloof also had to be abandoned in 1901 because it was within the catchment of the Alexandra and Victoria reservoirs.<sup>237</sup> These two reservoirs had been built by the Municipality of Wynberg in the 1890s,<sup>238</sup> ownership of the land on which they were situated having been transferred to that municipality in 1891.<sup>239</sup> When this plantation was abandoned, the forester's cottage that had been built at the site of the original Table Mountain nursery in 1885<sup>240</sup> and had then been dismantled and rebuilt above Rooikat Kloof in 1899,<sup>241</sup> was sold to the municipality by the forestry department.<sup>242</sup>

The transfer of the plantation near the reservoirs to the Wynberg municipality occurred during a detailed survey of property boundaries on the mountain that was carried out in 1901. In that survey a large tract of land, 735 ha in extent, was demarcated as the Table Mountain forest reserve. This reserve extended from the summit of Devil's Peak, where it was contiguous with the Devil's Peak reserve, south-westwards along the mountain escarpment to Constantia Nek. It was bounded on the south-eastern(lower) side by private estates and on the north-western (upper) side by (approximately) the watershed between the Liesbeek River and Disa Stream.<sup>243</sup> It thus included the areas already afforested along the top of the eastern escarpment but excluded the afforested areas on land around the reservoirs that now belonged to either the Cape Town or Wynberg municipality.

For some reason, although the surveyed area of this reserve was 735 ha, its area was given in the forestry department's report for 1901 as 1569 ha.<sup>244</sup> This must have been a last-ditch attempt on Hutchins's part to lay claim to those afforested areas that now belonged to the municipalities, for examination of a map<sup>245</sup> shows that if the two catchment areas were added to the proclaimed reserve, the total area would be approximately twice the area of the reserve. In any case, the attempt must have failed, because in 1905 the area of the reserve was given by Hutchins as only 735 ha.<sup>246</sup>

If this explanation for the enlarged area in 1901 is correct, then it would seem that the area given as afforested at that time (74 ha)<sup>247</sup> must have included areas within the catchments of the reservoirs. This figure falls far short of the total that is obtained by adding the annual planting figures for Table Mountain plantation, which is at least 259 ha (Table 5.5.3). It was noted earlier (Section 5.1.1) that afforestation on the lower plateau did not meet with immediate success. This probably explains part of the discrepancy. In addition, at least part of the difference can be attributed to the replacement of parts of the original plantation by the reservoirs.

Two new sites for afforestation were taken over by the forestry department after the loss of the land to Wynberg Municipality. One of these was at the southern end of the Table Mountain forest reserve, on the eastern slopes below the bridle path. Planting had actually begun there in a small way in 1899, when the site was referred to as the Lower Slopes. Thereafter it was gradually extended, under the name Cecilia plantation, and by 1905 it covered 49 ha (Table 5.5.8). Species used up to that time included *P. pinaster*, *P. canariensis*, *P. halepensis*, *A. saligna* and *A. mearnsii*. The last two were not very successful.<sup>248</sup>

The other new site on Table Mountain was at an altitude of approximately 1 000 m. It was north of the summit, in the area known today as Fir Tree.<sup>249</sup> This area lay outside the demarcated Table Mountain reserve, being on a small tract of Crown land between the reserves surveyed in 1901.<sup>250</sup> Seeds of *P. pinaster* and *P. halepensis* were sown at this site in 1901.<sup>251</sup> The plantation was not very successful, but no further planting was carried out.<sup>252</sup>

At Tokai the broad open valley at the head of Prinskasteel River, forming a plateau south of the summit of Constantiaberg, was an obvious site for the extension of the plantation. Experimental planting of young trees of various species was carried out there in 1895<sup>253</sup> and in the following year 6 ha were ploughed and sown directly with *P. pinaster*.<sup>254</sup> Thereafter, much of the afforestation at Tokai, both by sowing and transplanting, was carried out on these upper levels of Constantiaberg.<sup>255</sup>

By 1901 it appeared that cluster pine would be as successful there as on Table Mountain and steps were taken to incorporate this mountain area into the forest reserve.<sup>256</sup> A formal survey and proclamation of Tokai forest reserve had been carried out in 1898. This showed that the area of the reserve was 990 ha and that, although the summit of Constantiaberg formed one of the corners of the reserve, most of the plateau, where planting was already taking place, lay outside the

boundaries.<sup>257</sup> In 1902 two extensions to the Tokai reserve were surveyed and proclaimed. These were the Hout Bay reserve, comprising 1 189 ha and incorporating the remainder of the Constantiaberg ridge westwards and southwards to the sea, and the Silvermine reserve of 472 ha, which incorporated the upper catchment area of the Silvermine River.<sup>258</sup> Included within the boundaries of the latter reserve was the Silvermine Reservoir, which was built by the Municipality of Kalk Bay in 1900.<sup>259</sup> Both new forest reserves were administered as extensions to the Tokai forest reserve.

Hutchins considered that all this new land should be afforested, even close to the sea where the rainfall was lower:

"The area appears to be one which should be planted where it is sufficiently favourable to do so, and from whence pines may be hoped to extend naturally over the less favourable ground."<sup>260</sup>

Planting, mainly of *P. pinaster* but also of *P. canariensis*, continued and in 1905 dividing belts of *A. mearnsii* were established on top of the mountain.<sup>261</sup> At the end of that year the area of Tokai reserve stocked with trees by transplanting or sowing was 1 229 ha (Table 5.5.2). As the total area of the main Tokai reserve was only 990 ha, this means that at least 239 ha of this afforestation must have occurred in the other two reserves (Hout Bay and Silvermine), including the plateau of Constantiaberg.

At Devil's Peak, planting had continued, various paths being constructed to provide access to the higher parts of the mountain.<sup>262</sup> By 1899, "nearly the whole area" of the proclaimed reserve was afforested. In the following year six hectares "on the upper cliffs" were sown with more than 400 kg of seed of *P. pinaster* after the area had been cleared and burnt.<sup>263</sup> The whole of the reserve of 105 ha was then adjudged to have been successfully afforested and Hutchins reported that "in some localities, the growth on the almost bare rock of the

mountain is astonishing".<sup>264</sup> Thus, the Woodstock or north-eastern face of Devil's Peak, right to the summit at 1000 m, was deliberately planted, predominantly with cluster pine, by the forestry department.

Because of the success of this work, Hutchins was determined to extend it further. He was particularly keen to use *P. canariensis* in preference to the less valuable *P. pinaster*. His department took over from the Cape Town Municipality 215 ha of land incorporating the north-western side of Devil's Peak, the area below the Saddle, and the northern face of Table Mountain as far as Silverstream. This land was treated as an extension to the existing Devil's Peak reserve.<sup>265</sup>

Afforestation, both by sowing and transplanting, was carried on steadily in this extension, beginning in 1902. There was an emphasis on *P. canariensis* and *Eucalyptus* spp., but *A. mearnsii*, *A. melanoxylon*, *H. gibbosa* and various other trees species, including silver tree, were also used. *P. pinaster* was sown "on the very high slopes of the Peak" in 1902 and this species was also sown in 1905 over 32 ha of land where other species had failed.

By the end of 1905 there were reported to be 113 ha of afforested land at Devil's Peak.<sup>266</sup> If we assume that all of the 105 ha of the original reserve were included in this figure, then it appears that only eight hectares had been afforested in the extension between 1902 and 1905, which does not accord with the figures for each year given in the annual reports. In 1906, however, the figure for the area afforested to the end of 1905 was reported to be 138 ha.<sup>267</sup> A revised estimate must have been made. On the basis of this figure, we can say that about 33 ha of the extension were successfully afforested in the period 1902 to 1905.

The success of the afforestation program on Devil's Peak up to this time was attested to by the wording on the memorial plaque erected in honour of Forester F. Jarman who, until his death in 1905, had been responsible for the plantation under Hutchins's direction:<sup>268</sup>

"He found these barren stony slopes treeless and left them covered with forest."<sup>269</sup>

The Municipality of Cape Town also extended its planting activities to higher altitudes at this time. A path to the summit of Lion's Head was constructed<sup>270</sup> and on this mountain, above the previously-established eucalypt plantation and right to the summit (669m), a large area of indigenous vegetation was cleared in 1905. Seeds of pines and the indigenous silver tree (*Leucadendron argenteum*) were sown in that year and the next.<sup>271</sup> The species of pine involved were not recorded, but it may be surmised that the stone pines that grow within 120m of the summit of Lion's Head today are the remnants of this afforestation episode.

Also in 1905, all of the plantations belonging to the municipality and the forestry department along the northern and eastern sides of Table Mountain and around Devil's Peak were linked together when a continuous path at about 350m altitude from Kloof Nek to Constantia Nek was completed.<sup>272</sup> This represented the fulfilment of one of Hutchins's proposals for combatting fires, made when the Devil's Peak plantation was still in the planning stages.<sup>273</sup> This path, which is now known as the Contour Path, except where it is a full-sized road called Tafelberg Road, has become a major access route for walkers and climbers on the mountain.

#### 5.3.8 Abandonment of certain plantations

Governmental forestry activities were reorganised again in 1905 when the forestry department was formally established as a section of the Department of Agriculture. At the head of the new department was the post of Chief Conservator of Forests. Lister returned to Cape Town as the first incumbent.<sup>274</sup> At first, Hutchins remained conservator in charge of the Western Forest Conservancy, but he retired in 1906.<sup>275</sup>

Hutchins left his mark in many ways, but perhaps most significant was his role in extending the plantations of *P. pinaster*. He justified the use of this species at Uitvlugt as a future source of railway sleepers,<sup>276</sup> while on the mountains its main value was that its presence increased ground water storage, thus retaining "in our midst the water that would otherwise rush off to the sea".<sup>277</sup>

The following description of Uitvlugt plantation, written in 1898, is an example of Hutchins's great enthusiasm, as a forester, for the exotic trees that he and his predecessors had worked hard to establish:

"...it is easy to imagine oneself in Germany as one walks for half a day over acre upon acre of young pines, stretching over the rolling flats as far as the eye can reach and bounding the horizon on every side. And we have here what they have not got in Germany. Long stretches of the estate covered with *Acacia saligna*,... at this moment bursting into blossom. The wind blows loaded with the sweet scent, the colouring is most vivid, and with the backing of Table Mountain and the hum of the city in the distance, the shadows and sunshine on the mountain and the soft spring air, I know of no prospect more enchanting in this beautiful Cape Peninsula!"<sup>278</sup>

In contrast to this attitude, the botanist Bolus was far less enthusiastic. Shortly before Hutchins's retirement he described the effects of the years of tree-planting activity near Cape Town:

"On the mountain-sides, chiefly on the eastern slopes, large plantations have been made of the common Oak, of Pines, chiefly *Pinus pinea* and *P. pinaster* (the stone and Cluster Pines) and some Australian *Eucalypti*; and on the Flats, of Australian *Acaciae* or Wattles.... All over the suburbs eastward of Cape Town these trees have also been planted largely, and give to the country a forestal aspect which it certainly did not possess before the advent of Europeans or even until comparatively recent years."<sup>279</sup>

Bolus then went on to observe that cluster pine and acacias appeared to

be totally naturalised and to speculate that, if man's interference were to be withdrawn from the region for a few hundred years, there would undoubtedly be competition between the exotics and the indigenous flora. He predicted that the outcome of this competition would be an impoverishment of species, resulting in a vegetation of "monotonous and mournful character".<sup>280</sup> He thus envisaged that certain of the indigenous species would become extinct, but did not state that the exotics would necessarily replace the indigenous species entirely. How Bolus related this view to his belief that the South African flora was resistant to invasion (Section 1.4.2) is not clear.

With Hutchins's retirement and the appointment of J.S. Henkel as his replacement,<sup>281</sup> a rationalisation of forestry activities near Cape Town occurred. Two minor plantations were disposed of. They were Springfield<sup>282</sup> and East End, the latter being taken over by the Municipality of Cape Town and subsequently transformed into a public recreation area known as Trafalgar Park.<sup>283</sup>

A far more important change also occurred in 1906. An examination of Table 5.5.2 reveals a marked discrepancy between the values for 1905 and 1906 for the area afforested at Tokai. At the end of the earlier year the area was 1229 ha, whereas the figure for the beginning of the following year (which should have been identical) was given as only 648 ha. No comment on this discrepancy was made in the annual reports and therefore we can only surmise its cause. It certainly did not result from an excision of part of the reserve, for the total area of the Tokai forest reserve (including its extensions) was the same in both years (2648 ha).<sup>284</sup> The most likely explanation is that it had been decided to rationalise the afforestation program at Tokai and concentrate only on those areas where trees had shown a certain degree of success. Areas that had been planted but where only a scanty cover of trees had been achieved must have been considered to be failures and therefore abandoned.

We cannot know for certain where these failed areas were, but it seems

reasonable to suppose that the most successful areas were those on the slopes and flats on the eastern side of Constantiaberg, where the Tokai plantation still flourishes today. (In fact, there is a remarkable similarity between the area of Tokai forest in 1906 and 1975: 648 ha in both years, despite fluctuations in between.<sup>285</sup>) If this supposition is correct, then the 581 ha that were abandoned in 1906 must have been on the upper slopes, the cliffs and the plateau of Constantiaberg.

Although these areas had apparently been judged unsuccessful as forests, they nevertheless must have been stocked with a certain number of *P. pinaster*, *P. canariensis* and *A. mearnsii* by that time and these were presumably left to grow to maturity after being abandoned. The high densities at which seed of the first-named species had been sown must also have left a reservoir of seed in the soil, but as nothing is known of the longevity of the seed of this species,<sup>286</sup> it is not possible to say whether this might have been the source of more trees at a later time.

Abandonment of afforested areas also occurred at the Table Mountain forest reserve at this time. This is evident from an examination of Tables 5.5.3 and 5.5.8. At Cecilia plantation, which was within the boundaries of the Table Mountain reserve, afforestation began in 1899. By 1901, 13 ha had been planted there (Table 5.5.8). In the same year, the total area afforested in the Table Mountain reserve was given as 74 ha (Table 5.5.3). Even if it is assumed that that figure included the 13 ha at Cecilia, then this still left 61 ha on the plateaux and the eastern escarpment (planted in the period 1885-1901).

After 1901, the name Table Mountain forest reserve was no longer used; instead, the name Cecilia was employed. The planting figures for Cecilia (Table 5.5.8) must have referred only to the Cecilia plantation itself and not to the Table Mountain reserve as a whole, because by the beginning of 1905 the total area planted was still only 35 ha. Thus, it may be inferred that by 1905 the 61 ha of afforested land on the

plateaux and eastern escarpment had been abandoned by the forestry department. Some of that area, around the reservoirs, was by now the property of the municipalities of Cape Town and Wynberg. The rest, in Skeleton Gorge, Nursery Ravine and Ash Valley, and at Fir Tree, was now totally abandoned. That many of the trees in these abandoned areas persisted there is proven by the presence today of an array of exotic trees at the so-called Lister Nursery in Nursery Ravine.

Parts of the Uitvlugt reserve were also abandoned at about this time, much against the wishes of the forestry department. Because of its level terrain and proximity to major communication routes, this land attracted other uses. Between 1899 and 1909 parts of the reserve were set aside for a rifle range, a quarantine camp, a gravel quarry, a rubbish dump and a resettlement area for Africans.<sup>287</sup>

In 1902 the entire eastern section of Uitvlugt, comprising 811 ha, was transferred to the Railways Department to be used for a plantation for the production of railway sleepers.<sup>288</sup> This plantation, known as Epping Forest, was nevertheless established and maintained by the forestry department. Afforestation at Epping and in the remainder of Uitvlugt continued and by the end of 1906 there were 1351 ha of planted land.<sup>289</sup>

## 5.4 The Period 1907 to 1917

### 5.4.1 New orientations

By 1907 new orientations were evident in the forestry department's approach to its reserves near Cape Town. Areas where afforestation had shown only limited success had been disposed of and it was now

possible to concentrate on proven areas at Tokai, Cecilia and Devil's Peak. Marram grass had proven its worth for drift sand control and it came to be relied on more heavily in this period.

In 1910 the Cape Colony was incorporated into the Union of South Africa. A national forestry department was established with J.S. Lister at its head as Chief Conservator of Forests.<sup>290</sup> The organisation of the new department was modelled on that of the former Cape Colony's forestry department. In 1913 the Forest Act, similar in concept to the legislation that had operated in the Cape, was passed.<sup>291</sup> In that year, also, Lister retired and was replaced by C.E. Legat.<sup>292</sup>

The formation of the Union meant that afforestation could now be carried out in those areas where climate, topography and soils were most suitable, on large tracts of land away from the pressures of encroaching urbanisation. In particular, the mountain escarpment of the eastern Transvaal became an important forestry area once it had been determined which tree species were suitable for this region of summer rainfall.<sup>293</sup> The importance of forestry near Cape Town declined as other regions flourished.

Another stage in the story of Cape Town's botanical gardens was reached in 1913 with the founding of the Kirstenbosch National Botanic Gardens. This was situated adjacent to Cecilia Forest, on the lower slopes of the eastern escarpment of Table Mountain.<sup>294</sup> The land had formed part of the original *Wittebomepos* of the Dutch East India Company. Subsequently, it had been a privately-owned farm and eventually it had been incorporated into Cecil Rhodes's estate, which extended by the time of his death in 1902 along the eastern slopes of Table Mountain from Devil's Peak to Constantia Nek.<sup>295</sup>

According to the first director, by the time Kirstenbosch was acquired for the botanical garden, *P. pinaster* and *Albizia lophantha* grew in profusion there, while large areas were occupied by "the pestilent Hakea". The presence of the last-named was attributed to the fact

that "a gentleman actuated no doubt by the best of benevolent intentions, formerly made his daily constitutional more interesting by distributing generous quantities of the seed... over the Kirstenbosch slopes".<sup>296</sup>

As it was intended that the new botanical garden should comprise indigenous species,<sup>297</sup> unlike the earlier gardens, which had emphasised exotics, the presence of pines, stinkbeans and hakeas was particularly unwelcome.

#### 5.4.2 Afforestation

The rationalisation of afforestation at Tokai in 1906 was followed by the establishment of a new plantation, known as Tokai Extension or Hout Bay plantation, on the western slopes of Constantiaberg above Hout Bay.<sup>298</sup> By 1910 an area of 299 ha had been afforested there (Table 5.5.9). The trees used were pines, eucalypts and poplars.<sup>299</sup> No further planting was carried out in the main Tokai plantation in this period (Table 5.5.2).

After 1910 data for afforestation in these two plantations were no longer issued separately and it is not possible to state with absolute certainty where planting reported as occurring at Tokai (Table 5.5.2) actually took place. As none had been carried out for four years in the main plantation, there seems to be no particular reason why it should suddenly have recommenced there in 1911, and therefore it is assumed here that all planting between 1911 and 1914 occurred at Tokai Extension. If the area afforested at the main location remained at 680 ha, then 699 ha must have been afforested in the extension to give the total of 1379 ha by the year 1914 (Table 5.5.2).

Although the annual reports of the forestry department did not state which species were being planted in the extension, it may be deduced

that *P. pinaster* was an important component from the caption to a photograph published in 1930,<sup>300</sup> and also from a reference to "stands of the inferior type of *P. pinaster* as found at Hout Bay Plantation" made by two Forest Officers at about that time.<sup>301</sup>

In 1916 it was decided to cease planting at Hout Bay, "as so many objections were raised locally that planting operations were leading to the destruction of the natural flora and spoiling the landscape".<sup>302</sup> This decision was followed two years later by a "resurvey" at Hout Bay which resulted in the subtraction of 189 ha of land previously classified as afforested.<sup>303</sup> This must mean that the afforestation carried out there was considered to be unsuccessful. As at areas abandoned earlier at Tokai, there must have been a certain number of trees established on this abandoned land, nevertheless.

At Cecilia, afforestation continued steadily (Table 5.5.8). The owners of land below Cecilia complained in 1907 about the denudation of the mountain during its preparation for afforestation. They were assured by the forestry department that, once the slopes were planted with pines and the ravines with poplars, this forest cover would increase the water supply to their springs, as had happened in a similar situation in California. Although they were unhappy about the replacement of the natural bush by forests, as they believed the former was more fire-resistant, the land-owners were somewhat consoled that pines and poplars were to be established rather than "the hungry and selfish Australian trees, which fit in so badly in the character of our mountain scenery". Lister's reaction to this was to comment that the maligned Australian trees produced excellent timber. He regretted that they were "generally thoughtlessly condemned".<sup>304</sup>

By 1915 there were 166 ha of afforested land at Cecilia. In the following year a "corrected" figure of 64 ha was reported, the correction being attributed to a new survey.<sup>305</sup> This reduction in area must have represented an abandonment of 102 ha of the plantation. Where this abandoned land was situated is not clear, but as the forestry

department owned all of the eastern escarpment of Table Mountain from Constantia Nek to Devil's Peak, all of which was referred to as Cecilia forest reserve from 1907 onwards,<sup>306</sup> it could have been anywhere in that area. The land in question must still have remained the property of the forestry department, as there were no excisions from the reserve at that time (and in fact there was an addition of 57 ha on the lower side, near Constantia Nek<sup>307</sup>).

It would appear that the abandoned forest was not located immediately above Kirstenbosch for, according to a later director of the garden, R.H. Compion, this land was covered with indigenous vegetation when Kirstenbosch was acquired in 1913. Nevertheless, the trustees of the garden had believed that the forestry department's "vigorous policy of planting exotic trees, which was taking place in other parts of the Cape Peninsula and elsewhere" threatened this area of indigenous vegetation. Accordingly, they had agitated for control of the land "to safeguard it from exploitation and to administer it as a Nature Reserve". Their wishes were acceded to in 1922 when they were granted control of the land, although actual ownership remained with the forestry department.<sup>308</sup>

It is possible that the 102 ha of abandoned plantation were on the forestry department's land north of Kirstenbosch. This includes Window, Fernwood, Protea and Ascension Buttresses of Table Mountain and the Rondebosch face of Devil's Peak, as well as all the ravines between those cliffs. A fire occurred in this area in 1915<sup>309</sup> and it may have been concluded that the forest trees there would be worthless after the fire. Cluster pine certainly occurs in most of this area today (or did so until the clearing program of recent years was instituted), but its presence has generally been attributed to natural spread from plantations on the lower slopes, such as Newlands Forest, north of Kirstenbosch,<sup>310</sup> or to the seed-scattering activities of mountaineers.<sup>311</sup> The tantalising suspicion now exists that these pines were first established as part of Cecilia plantation and then subsequently abandoned. Conclusive evidence in regard to this suspicion may still await discovery

in the forestry department's archives.

At Devil's Peak Extension, afforestation with pines continued. Two tracts of land 17 ha in extent were added to the reserve on its northern boundary,<sup>312</sup> bringing the total area of the reserve to 337 ha, and they too were planted. By the end of the season in 1913, when planting ceased, 326 ha (97 percent) had been afforested.<sup>313</sup> This means that the planted area must have extended right to the top of the mountain on the Cape Town or north-western face, as well as on the Woodstock face. The network of paths constructed to provide access to all parts of the plantation was 35km long by 1909 and was "much used by the citizens of Cape Town".<sup>314</sup>

Planting of cluster pine continued at both Uitvlugt and Epping until the year 1917, by which time the total afforested area at the two reserves was 1579 ha.<sup>315</sup> This consisted predominantly of cluster pine, but at Uitvlugt there were still stands of other species planted at earlier times, including 53 ha of *A. pycnantha*, which had been grown to supply bark to the local tanning trade.<sup>316</sup>

The Municipality of Cape Town also continued with its forestry program in this period, although on a limited scale. A new tract of land was acquired at Newlands Forest. This land had been bought by the Cape Town District Waterworks Company in 1889 for the purpose of building a water-supply reservoir for the suburbs on the eastern side of Table Mountain.<sup>317</sup> As has been noted (Section 5.1.1) cluster pines, oaks and poplars were already present on the property at that time. The company had sold its assets in 1900 to the Suburban Municipal Waterworks Committee, which represented the municipalities of Woodstock, Mowbray, Rondebosch and Claremont.<sup>318</sup>

The committee decided to institute a system for harvesting timber on the land.<sup>319</sup> The department of forestry was asked for advice and subsequently, in 1911, a report on the condition of the property was issued. The report stated that it was "mainly covered with cluster pine (*Pinus*

*pinaster*) of all ages growing in full vigour".<sup>320</sup> The department then prepared a forestry working plan for the committee. This involved gradual harvesting of the cluster pine and its replacement with *P. radiata*.<sup>321</sup>

When the four municipalities amalgamated with the Municipality of Cape Town in 1913<sup>322</sup> this forest then came under the latter's jurisdiction. Implementation of the working plan for the area, by now known as Newlands Forest, appears to have begun in 1915.<sup>323</sup>

Meanwhile, the municipality was still involved in tree-planting on Lion's Head and Signal Hill. The pine plantation established in the 1890s had grown so dense by 1910 that one member of the Council suggested that it should be thinned to produce "pretty and attractive" scattered clumps of trees in place of the existing "dense thicket of spindly trees". He believed this would create a more natural environment in which heather could grow, game would be encouraged and "the music of the partridge's call" could be heard once more.<sup>324</sup> This reaction against the use of exotic trees apparently spurred the use of indigenous species, for in 1912 silver tree and black and pink sugar bush were sown in openings in the plantation on Signal Hill,<sup>325</sup> while in the following year those species were sown on the western and northern slopes of Lion's Head.<sup>326</sup>

While the name silver tree undoubtedly meant *Leucadendron argenteum*, it is not clear which species was meant by the second name. The term sugar bush implies a species of *Protea*. The combination of colours suggests *P. longifolia*, *P. neriifolia*, *P. laurifolia* or *P. lepidocarpodendron*. Of these four species, only the last-named occurs naturally in the Cape Peninsula.<sup>327</sup> As seed of that species was therefore the most likely to have been available, we may infer that it was probably the one planted.

There was a partial reversion to the use of exotics thereafter. In 1915 *P. radiata* and *P. canariensis* were sown on the western side of

Lion's Head.<sup>328</sup> In 1916 the western side of the ridge between Lion's Head and Signal Hill was planted with stone pine, Aleppo pine and silver tree. The trees were planted in groups of five about three metres apart, with a distance of 45m between the groups.<sup>329</sup> This method was adopted "with a view to preserving the native flora which forms such a delightful feature of the hillside".<sup>330</sup> The sowing of silver tree was not very successful. That species was tried again on the southern slopes of Lion's Head in 1917.

#### 5.4.3 Reserves for the control of drift sand

Durban Road plantation became known as Bellville in 1907.<sup>332</sup> Since the sand stabilisation program initiated by Lister had ended in 1887, there had been little planting activity at this reserve. As noted in Section 5.2.1, cluster pine and rooikrans had been sown in 1889. Between 1887 and 1890 various tree species, together with *A. pycnantha*, had been planted over 4,9 ha,<sup>333</sup> while in 1904 a stand of *Eucalyptus redunca* had been established.<sup>334</sup> In 1898 the boundaries of the reserve had been proclaimed. They extended southwards almost halfway to the shore of False Bay.<sup>335</sup> This vast reserve covered 3 440 ha and the existing plantation occupied only a very small fraction of that area.<sup>336</sup>

Transportation of Cape Town's rubbish to this reserve had recommenced in 1901, but it was merely dumped at the end of the railway siding, without being used for sand stabilisation, as the area that could have been treated was too far away from the siding.<sup>337</sup> Instead, marram was planted from 1904, this being considered the only effective method of sand reclamation where no fertiliser was available.<sup>338</sup>

Extension of the siding 1 150 m southwards was carried out between 1909 and 1911 and Cape Town's rubbish was once again used, in conjunction with seeds of *A. cyclops* and *A. saligna* as well as marram, to stabilise

the sand. Various species of pine and eucalypt were also tried and *E. gomphocephala* was successfully established.<sup>339</sup> Use of town refuse ceased again in 1916, but planting continued.<sup>340</sup> By 1918 some 732 ha at Bellville were considered to have been afforested with acacias, pines and eucalypts.<sup>341</sup>

Marram also became important at Eerste River reserve in this period. Attention was directed at the coastal section, as this was the ultimate source of the drift sand.<sup>342</sup> By 1918 there were 193 ha of marram.<sup>343</sup> Woody species were also planted in this reserve, an experimental plot of *A. mearnsii* being started in 1908, for example.<sup>344</sup> Afforestation with pines, eucalypts and acacias also continued in reclaimed areas, so that by 1918 the area classified as afforested was 505 ha,<sup>345</sup> despite the effect of a fire that in 1913 burnt 243 ha of acacias.<sup>346</sup>

After the coastal dune had been established at Strandfontein, only a very small amount of planting was carried out in this period. By 1918 there were 95 ha of marram in the Strandfontein reserve.<sup>347</sup>

Another area of drift sand came under the forestry department's jurisdiction in 1908, at Blaauwberg<sup>348</sup> on the coast about 15km north of Cape Town, an area that may be considered to be the north-western corner of the Cape Flats.<sup>349</sup> Only small-scale reclamation work was carried out there up to 1918. By that year there were 19 ha of marram.<sup>350</sup>

#### 5.4.4 Changed attitudes to exotics

The period under consideration is noteworthy for the change in attitudes towards the use of exotic species that gradually became evident.

One example of this was the establishment of Kirstenbosch as a garden specialising in indigenous species, thus representing a reversal of

the traditional concept of a botanical garden. Other examples were the protests of land-owners over the replacement of the natural vegetation at Cecilia and Hout Bay, and the plea that heather should be allowed to flourish on Signal Hill. The term "heather" presumably referred to indigenous *Erica* spp.

The increasing trend away from exotics after 1917 is considered in the next chapter.

## 5.5 Tables

TABLE 5.5.1 Quantities of seeds and transplants of 13 pest plant species distributed to the public from Uitvlugt and Tokai forestry nurseries, 1882-1900<sup>351</sup>

	<i>A. cyclops</i>		<i>A. longifolia</i>		<i>A. mearnsii</i>		<i>A. melanoxylon</i>		<i>A. pycnantha</i>	
	seeds (kg)	trans-plants	seeds (kg)	trans-plants	seeds (kg)	trans-plants	seeds (kg)	trans-plants	seeds (kg)	trans-plants
1882	181	-	-	-	-	-	-	-	-	-
1883	106	-	-	-	-	-	-	-	-	-
1884	138	-	-	-	-	-	-	-	-	-
1885	90	-	-	-	-	50	-	-	-	100
1886	67	-	-	-	0,1	-	-	-	-	-
1887	139	-	-	-	0,3	-	-	-	0,5	-
1888	49	-	-	-	1	-	-	-	1	-
1889	78	-	-	-	1	-	-	-	0,2	-
1890	49	-	-	-	-	-	-	-	1	1 570
1891	28	-	-	-	9	-	-	-	7	207
1892	33	-	-	-	10	-	-	-	7	200
1893	25	-	-	-	24	-	-	-	14	-
1894	-	-	-	-	-	1 047	-	285	-	150
1895	-	-	-	-	-	510	-	4	-	800
1896	-	-	-	450	-	274	-	195	-	1 100
1897	-	-	-	350	-	-	-	525	-	-

(continued)

TABLE 5.5.1 (continued)

	<i>A. cyclops</i>		<i>A. longifolia</i>		<i>A. mearnsii</i>		<i>A. melanoxyton</i>		<i>A. pycnantha</i>	
	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants
1898	-	-	-	-	-	-	-	100	-	-
1899	-	100	-	-	-	2	-	476	-	150
1900	-	431	-	-	-	310	-	45	-	25
Total	983	531	-	800	45	2 193	-	1 630	31	4 302
Total no. of seeds (x 10 <sup>6</sup> )	13,9		-		3,2		-		1,5	

(continued)

TABLE 5.5.1 (continued)

	<i>A. saligna</i>		<i>A. lophantha</i>		<i>H. gibbosa</i>		<i>H. sericea</i>	
	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants
1882	361	-	-	-	-	-	-	-
1883	790	-	-	-	-	-	-	-
1884	503	500	-	-	-	-	-	-
1885	453	275	-	-	-	-	-	-
1886	488	-	-	-	-	-	-	-
1887	594	-	-	-	-	-	-	-
1888	323	-	-	-	-	-	-	-
1889	376	-	-	-	-	-	-	-
1890	516	-	-	-	-	-	-	-
1891	1 155	-	-	-	-	-	-	-
1892	220	-	-	-	-	-	-	-
1893	192	-	-	-	-	-	-	-
1894	-	-	-	-	-	-	-	-
1895	-	220	-	-	-	745	-	50
1896	-	-	-	-	-	1 800	-	-
1897	-	-	-	-	-	3 075	-	-

(continued)

TABLE 5.5.1 (continued)

	<i>A. saligna</i>		<i>A. lophantha</i>		<i>H. gibbosa</i>		<i>H. sericea</i>	
	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants
1898	-	-	-	-	-	-	-	-
1899	-	1 675	-	-	-	13 098	-	-
1900	-	262	-	-	-	3 590	-	-
Total	5 971	2 932	-	-	-	22 308	-	50
Total no. of seeds (x 10 <sup>6</sup> )	303		-		-		-	

(continued)

TABLE 5.5.2 (continued)

	<i>H. suaveolens</i>		<i>L. laevigatum</i>		<i>P. halepensis</i>		<i>P. pinaster</i>	
	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants
1882	6	-	-	-	-	-	145	-
1883	8	8 800	-	-	-	-	435	-
1884	3	19 575	-	-	-	-	205	-
1885	1	18 225	1	-	1	1 625	128	-
1886	2	-	1	-	0,3	-	194	-
1887	1	-	1	-	1	-	65	-
1888	0,5	-	5	-	2	-	133	-
1889	0,5	16 450	0,3	-	0,6	-	125	-
1890	0,7	22,035	0,2	2 950	7	-	73	-
1891	1	32 000	5	2 225	3	-	62	-
1892	4	45 219	0,3	10 600	-	509	38	585
1893	4	39 918	1	9 012	6	292	224	6 557
1894	-	19 995	-	24 464	-	7 796	-	8 445
1895	-	35 841	-	34 887	-	-	-	29 773
1896	-	22 299	-	53 703	-	9 100	-	100 695

(continued)

TABLE 5.5.2 (concluded)

	<i>H. suaveolens</i>		<i>L. laevigatum</i>		<i>P. halepensis</i>		<i>P. pinaster</i>	
	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants	seeds (kg)	trans- plants
1897	-	34 375	-	43 921	-	4 000	-	4 925
1898	-	18 374	-	60 267	-	2 930	-	4 261
1899	-	14 704	-	89 919	-	823	-	2 967
1900	-	-	-	106 650	-	620	-	190
Total	32	347 810	15	438 148	21	27 695	1 827	158 398
Total no. of seeds (x 10 <sup>6</sup> )	-		15,8		1,0		33,5	

TABLE 5.5.2 Area afforested (ha) at Tokai forest reserve,  
1884-1918<sup>352</sup>

Year	Total area afforested at beginning of year	Area afforested during year	Total area afforested at end of year
1884	-	81	-
1885	-	113	-
1886	-	117	-
1887	-	66	-
1888	-	38	416
1889	-	36	-
1890	-	54	-
1891	-	19	-
1892	-	0	525
1893	-	11	-
1894	-	11	-
1895	-	78	-
1896	-	42	-
1897	-	29	-
1898	-	73	-
1899	-	77	-
1900	-	60	-
1901	-	73	-
1902	-	60	-
1903	-	69	-
1904	-	55	-
1905	1 182	47	1 229
1906	648	32	680
1907	-	0	680
1908	-	0	680
1909	-	0	680
1910	680	0	680

(continued)

TABLE 5.5.2 (concluded)

Year	Total area afforested at beginning of year	Area afforested during year	Total area afforested at end of year
1911	979	142	1 121
1912	1 121	91	1 212
1913	1 212	103	1 315
1914	1 315	64	1 379
1915	1 379	0	1 379
1916	1 379	1	1 380
1917	1 380	3	1 383
1918	1 383	1	1 195 <sup>353</sup>

TABLE 5.5.3 Area afforested (ha) at Table Mountain forest reserve, 1885-1901<sup>354</sup>

Year	Area afforested during year	Total area afforested at end of year
1885	16	-
1886	-	-
1887	6	-
1888	-	4
1889	-	12
1890	-	18
1891	1	-
1892	-	29
1893	6	-
1894	6	-
1895	17	-
1896	24	-
1897	5	-
1898	18	-
1899	15	-
1900	8	-
1901	7	74

TABLE 5.5.4 Receipts (pounds sterling) from the sale of wattle bark from Uitvlugt and Durban Road forest reserves, 1883-1896<sup>355</sup>

Year	Uitvlugt	Durban Road	Total
1883	-	-	12
1884	-	-	29
1885	-	-	33
1886	-	-	-
1887	-	-	139
1888	-	-	171
1889	-	-	188
1890	-	-	128
1891	44	357	401
1892	45	148	193
1893	31	65	96
1894	41	70	111
1895	155	171	326
1896	175	66	241
Total	491	877	2 068

TABLE 5.5.5 Production of tanning bark (metric tons) from government and private plantations on the Cape Flats, 1890-91 and 1891-92 <sup>356</sup>

Plantations	1890-91	1891-92	Total
Government-owned			
Uitvlugt			
old	7,7	0,2	7,9
new	4,1	8,2	12,3
Durban Road	30,8	34,5	65,3
Total	42,6	42,9	85,5
Privately-owned	109,8	162,4	272,2
Total	152,4	205,3	357,7

TABLE 5.5.6 Seed orders received from Messrs Vilmorin  
Andrieux & Co., Paris, by Department of  
Agriculture, 1895<sup>357</sup>

Invoice date	Quantity (kg)	Species as stated	Modern name
21 February	0,2	<i>Acacia cyclopis</i>	<i>A. cyclops</i>
	0,2	<i>A. leiophylla</i> var. <i>saligna</i>	<i>A. saligna</i>
	0,1	<i>A. longifolia</i>	<i>A. longifolia</i>
	0,1	<i>A. macrademia</i>	<i>A. macradenia</i>
	0,04	<i>A. penninervis</i>	<i>A. penninervis</i>
12 October	0,3	<i>A. cyanophylla</i>	<i>A. saligna</i>
	1,0	<i>A. melanoxyton</i>	<i>A. melanoxyton</i>

TABLE 5.5.7 Area planted (ha) with *Acacia saligna* by prize-winners of tree-planting competitions held in 1892 and 1894 on the Cape Flats

Subdivision name & allotment number(s) of farm <sup>358</sup>	Location of farm in modern terms <sup>359</sup>	Area planted <sup>358</sup>	
		1892	1894
Mowbray Flats			
Lots 11, 12	Athlone	7,9	-
Lots 41, 42, 47, 48	Rylands	14,6	-
Lots 33-37	Belgravia	-	16,4
Lot 39	Kewtown	-	7,0
Lots 45, 46, 51, 52, 54	Rylands	-	13,6
Claremont Flats			
Lot 5	Rylands	1,2	-
Lots 31, 32	-	1,2	-
Lot 40	-	0,6	-
Lot 4214 ( <i>sic</i> )	-	11,3	-
Lots 14, 15	Hanover Park	-	2,1
Wynberg Flats			
Lots 3, 4, 6, 14, 15	Hanover Park	17,7 <sup>360</sup>	-
Lots 17, 18, B7, B8	Philippi	4,0	-
Lots 26, 29	Hanover Park	1,6	-
Lot 69	Wetton	1,4	-
Lots 76A, 77A	Ottery	1,0	-
Lots H, I	Ottery	2,4	-
Lot TR	Ottery	1,0	-
Lots 49, 50	-	-	3,0
Lots 54, 55	Lotus River	-	2,3
Lots 59, 60	Ottery	-	2,6
Lots C, D, CC	Wetton	-	3,6
"Vaderlandsch-Riet-Vlei" farm	south of Philippi	-	2,2
Durban Road			
Lots 3, 6	Bellville South	-	2,5
Total		65,9	55,3

TABLE 5.5.8 Area afforested (ha) at Cecilia forest reserve,  
1899-1918<sup>361</sup>

Year	Total area afforested at beginning of year	Area afforested during year	Total area afforested at end of year
1899	-	-	-
1900	-	6	-
1901	-	6	-
1902	-	8	-
1903	-	13	-
1904	-	17	-
1905	35	13	49
1906	49	17	66
1907	-	5	71
1908	-	12	83
1909	-	0	83
1910	90	5	95
1911	-	31	126
1912	-	17	143
1913	143	16	159
1914	159	3	162
1915	162	4	166
1916	64 <sup>362</sup>	2	66
1917	66	31	97
1918	97	5	102

TABLE 5.5.9 Area afforested (ha) at Hout Bay plantation,  
1907-1910<sup>363</sup>

Year	Total area afforested at beginning of year	Area afforested during year	Total area afforested at end of year
1907	-	85	85
1908	-	148	233
1909	-	-	233
1910	267	32	299

## 5.6 Notes

1. G17-1897 Reports of the Conservators of Forests, p.32.
2. D.E. Hutchins: Tree-planting, 1893, p.3.
3. D.E. Hutchins: Tree-planting, 1899, p.61.
4. N.L. King: Historical sketch of the development of forestry in South Africa (1938), p.6; G1-1882 Report of the Superintendent of Woods and Forests. C.A. Lückhoff: Table Mountain (1951), p.113, gave the date of De Vasselot's appointment, incorrectly, as 1889.
5. G1-1882, G34-1884 Report of the Superintendent of Woods and Forests.
6. J.S. Lister: Practical Hints on Tree-Planting in the Cape Colony (1884).
7. G34-1884 Report of the Superintendent of Woods and Forests, p.19.
8. Africana Collection (University of Cape Town Libraries): BA916.821 CAP 67/8874, Cape Scenery, December 1884.
9. A.W. Heywood: Cape woods and forests (1886), p.151.
10. J.S. Gamble: A forester's short visit to the Cape Peninsula (1891), p.4.
11. SMW ADD 1/32 Letter Book: Nos. 52, 72, Heath - Cape Town District Waterworks Company, 9.4.1890, 16.4.1890; SMW 1 Minute Book: Main Committee, 21.12.1900, p.21; SMW 23 Letters Received, General: No. 7741, Acting Chief Conservator of Forests - Suburban Municipal Waterworks, 11.8.1911 (enclosure dated 19.7.1911).
12. A.W. Heywood: Cape woods and forests (1886), p.151.
13. P.J. Pelser: Tokai, C.P. (1974).
14. G105-1883 Report of the Superintendent of Woods and Forests, p.17.

15. Not 1893, as stated by C.A. Lückhoff: Table Mountain (1951), p.113, nor 1892, as stated by R.M. Cowling *et al.*: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.13.
16. G32-1885, G41-1887, G29-1889 Report of the Superintendent of Woods and Forests. G.A. Zahn & E.J. Neethling: The cluster pine (*Pinus pinaster*) at the Cape (1929), p.198-199, stated incorrectly that *P. pinaster* was first planted at Tokai in 1892.
17. G32-1885, G34-1886, G41-1887, G45-1888 Report of the Superintendent of Woods and Forests. R.M. Cowling *et al.*: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.13, incorrectly stated that the plantation was established "in the early part of this century". They attributed that information to C.A. Lückhoff: Table Mountain (1951), but no date was mentioned in the discussion of the afforestation of Back Table in that source (p.113).
18. G29-1889 Report of the Superintendent of Woods and Forests; G24-1900, G38-1902 Reports of the Conservators of Forests.
19. It is not included in the discussion on pines by E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), pp.19-22.
20. G38-1902, G26-1904 Reports of the Conservators of Forests.
21. The area was described as being on the Upper Plateau, north of Maclear's Beacon.
22. E.J. Moll: personal communication.
23. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (Herein: Maps 7 and 8).
24. R.S. Adamson & T.M. Salter (eds.): Flora of the Cape Peninsula (1950), p.32.
25. G34-1884, G32-1885 Report of the Superintendent of Woods and Forests.
26. G26-1904 Reports of the Conservators of Forests (Herein: Plan of Uitvlugt Forest).

27. Trigonometrical Survey Office: South Africa 1:50 000 sheets 3318CD, 3318DC (1970).
28. G29-1889 Report of the Superintendent of Woods and Forests.
29. G32-1885 Report of the Superintendent of Woods and Forests.
30. G34-1886 Report of the Superintendent of Woods and Forests.
31. G41-1887 Report of the Superintendent of Woods and Forests.
32. G34-1886 Report of the Superintendent of Woods and Forests, p.16.
33. G34-1886, G41-1887, G45-1888 Report of the Superintendent of Woods and Forests.
34. G34-1886 Report of the Superintendent of Woods and Forests, p.16.
35. G41-1887 Report of the Superintendent of Woods and Forests.
36. E.R. Roux: History of the introduction of Australian acacias on the Cape Flats (1961), p.101; S.P. Sherry: The Black Wattle... (1971), pp.100-101.
37. G34-1886 Report of the Superintendent of Woods and Forests.
38. G29-1889 Report of the Superintendent of Woods and Forests.
39. G34-1886, G41-1887 Report of the Superintendent of Woods and Forests.
40. 3/CT 1/7/1/9 Mayoral Minutes, 1904, p.65.
41. G36-1890 Report of the Superintendent of Woods and Forests.
42. G29-1889 Report of the Superintendent of Woods and Forests.
43. 3/CT 1/1/1/28 Minutes, 30.5.1877, pp.390,392; 6.6.1877, p.400; 3/CT 1/1/1/29 Minutes, 25.7.1877, p.50.
44. 3/CT 1/1/1/29 Minutes, 25.7.1877, p.52.
45. 3/CT 1/1/1/29 Minutes, 20.2.1878, p.332.
46. 3/CT 1/1/1/35 Minutes, 28.5.1885, p.203.
47. 3/CT 1/1/1/37 Minutes (Herein: The Mayor's Minute, 4.8.1887, opp. p.3).

48. 3/CT 1/1/1/43 Minutes, 25.7.1895, p.378.
49. 3/CT 1/1/1/36 Minutes, 5.8.1886, p.142; 3/CT 1/1/1/37 Minutes, 26.1.1888, pp.168-169.
50. 3/CT 1/1/1/39 Minutes, 3.9.1891, p.395.
51. G18-1883 Report upon the Botanic Gardens, p.1; G3-1885 Reports of the Committees of Public Parks and Botanic Gardens, p.6; Cape of Good Hope: Report upon the Botanic Gardens and Government Herbarium for the Year 1889, pp.7-8.
52. G13-1887 Reports of the Committees and Curators of Public Parks and Botanic Gardens, p.5.
53. Government Gazette, 19.3.1886, p.511 (Government Notice No. 247).
54. Government Gazette, 5.7.1889, p.18 (Government Notice No. 555).
55. G45-1888 Report of the Superintendent of Woods and Forests.
56. G105-1883 Report of the Superintendent of Woods and Forests, p.15.
57. G41-1887 Report of the Superintendent of Woods and Forests.
58. N.L. King: Historical sketch of the development of forestry in South Africa (1938), p.8.
59. G29-1889 Report of the Superintendent of Woods and Forests.
60. Cape of Good Hope: Act No. 28 of 1888 (Forest Act, 1888).
61. G36-1890, G41-1891 Report of the Superintendent of Woods and Forests; G23-1892 Reports of the Conservators of Forests. The position of the rifle range, also known as Wimbledon, is indicated on MAP REGISTER 4/177 General Map of the Cape Flats (sheet No. 5), 1893 and also on Trigonometrical Survey Office: South Africa 1:50 000 sheet 3318DC (1970).
62. G36-1890 Report of the Superintendent of Woods and Forests.
63. BRON-AGR 51 Correspondence Files, Folio No. 203 Eerste River Sands; BRON-AGR 180 Correspondence Files, Folio No. 1000 Eerste River Siding; G23-1892 Reports of the Conservators of Forests.
64. G23-1892, G27-1893 Reports of the Conservators of Forests.
65. G29-1889 Report of the Superintendent of Woods and Forests.

66. G36-1890 Report of the Superintendent of Woods and Forests.
67. G11-1896 Reports of the Conservators of Forests.
68. G24-1900 Reports of the Conservators of Forests.
69. BRON-AGR 45 Correspondence Files, Folio No. 157, Vol. 1 Nomenclature of Forest Trees, Etc.: Hutchins - Under-Secretary for Agriculture, 19.5.1894.
70. G45-1888 Report of the Superintendent of Woods and Forests.
71. MAP REGISTER 4/177 General Map of the Cape Flats (sheet No. 5), 1893.
72. G41-1891 Report of the Superintendent of Woods and Forests.
73. G27-1893, G50-1894 Reports of the Conservators of Forests.
74. G41-1891 Report of the Superintendent of Woods and Forests; G23-1892, G27-1893 Reports of the Conservators of Forests.
75. G23-1892 Reports of the Conservators of Forests.
76. G36-1890 Report of the Superintendent of Woods and Forests, p.56.
77. G27-1893 Reports of the Conservators of Forests.
78. S.P. Sherry: The Black Wattle... (1971), pp.108,110.
79. G27-1893 Reports of the Conservators of Forests.
80. L.O. Howard: A history of applied entomology... (1930), pp.393-394.
81. B. Smit: Insects in Southern Africa (1964), p.163.
82. G27-1893 Reports of the Conservators of Forests.
83. G36-1890 Report of the Superintendent of Woods and Forests, Appendix B; G41-1891 Report of the Superintendent of Woods and Forests.
84. D.E. Hutchins: Tree-planting, 1893, p.61.
85. D.E. Hutchins: Tree-planting, 1899, p.61.
86. D.E. Hutchins: Tree-planting, 1899, p.61.
87. N.L. King: Historical sketch of the development of forestry in South Africa (1938), p.8; G51-1895 Reports of the Conservators of Forests.

88. N.L. King: Historical sketch of the development of forestry in South Africa (1938), pp.7-8.
89. G.M. Theal: History of South Africa, Vol. 10 (1919), p.14.
90. G27-1893 Reports of the Conservators of Forests.
91. G41-1891 Report of the Superintendent of Woods and Forests.
92. G27-1893 Reports of the Conservators of Forests.
93. G27-1893 Reports of the Conservators of Forests.
94. G34-1886, G41-1887, G36-1890 Report of the Superintendent of Woods and Forests.
95. Cape of Good Hope: Report upon the Botanic Gardens and Government Herbarium, Cape Town, for the Year 1891, p.1.
96. Cape of Good Hope: Report upon the Botanic Gardens and Government Herbarium, Cape Town, for the Year 1889, p.8.
97. G24I-1893 Report of the Government Botanist.
98. R.S. Adamson & T.M. Salter (eds.): Flora of the Cape Peninsula (1950), p.454.
99. B.R. Maslin: Studies in the genus *Acacia*, 3. The taxonomy of *A. saligna*... (1974).
100. G36-1890 Report of the Superintendent of Woods and Forests.
101. G50-1894, G51-1895, G11-1896 Reports of the Conservators of Forests.
102. D.A. Herbert: Confusion between *Acacia cyanophylla*, *A. saligna*, and *A. cyclopis* (1919); B.R. Maslin: Studies in the genus *Acacia*, 3. The taxonomy of *A. saligna*... (1974).
103. CRB 69 Letters Received: McGibbon - Central Roads Board, 6.2.1857; J. McGibbon: Catalogue of Plants in the Botanic Garden, Cape Town, Cape of Good Hope (1858).
104. Government Gazette, 6.7.1880 (Government Notice No. 673); PWD (unclassified) Superintendent of Plantations, Letter Book: Lister - Brown, 6.1.1880; 26.7.1880; 30.8.1880.

105. G45-1888 Report of the Superintendent of Woods and Forests.
106. BRON-AGR 121 Correspondence Files, Folio No. 502, Vol. 7 Seed Lists and Requests: List of Seeds Available from District Forest Officer, Mowbray (Government Notice No. 280, 1892).
107. G27-1893 Reports of the Conservators of Forests.
108. G50-1894 Reports of the Conservators of Forests.
109. BRON-AGR 45 Correspondence Files, Folio No. 157, Vol. 1 Nomenclature of Forest Trees, Etc.: Lister - Under-Secretary for Agriculture, 17.4.1895.
110. E.R. Roux: History of the introduction of Australian acacias on the Cape Flats (1961), p.102.
111. BRON-AGR 149 Correspondence Files, Folio No. 632 Prizes for planting on Flats, 1892 and 1894: Report of Commissioners, 9.11.1892, 30.11.1894.
112. MAP REGISTER 4/172 General Map of the Cape Flats (sheet No. 3), 1893.
113. G50-1894 Reports of the Conservators of Forests.
114. J. Bowie: Hints on raising the leguminous plants of Australia and the Cape of Good Hope from seeds... (1832), p.5.
115. G50-1894 Reports of the Conservators of Forests.
116. G27-1893 Reports of the Conservators of Forests; BRON-AGR 180 Correspondence Files, Folio No. 1000 Eerste River Siding.
117. G29-1898 Reports of the Conservators of Forests.
118. G50-1894 Reports of the Conservators of Forests.
119. BRON-AGR 149 Correspondence Files, Folio No. 632 Prizes for Planting on Flats, 1892 and 1894: Report of Commissioners, 30.11.1894.
120. MAP REGISTER 4/174 General Map of the Cape Flats (sheet No. 4), 1893; Map Studio: Cape Town and Environs, p.32.
121. G50-1894 Reports of the Conservators of Forests.
122. G27-1893 Reports of the Conservators of Forests.
123. G11-1896 Reports of the Conservators of Forests.
124. G50-1894, G11-1896 Reports of the Conservators of Forests.

125. G11-1896 Reports of the Conservators of Forests.
126. D.E. Hutchins: Tree-planting, 1893, pp.47-48.
127. G17-1897, G12-1899, G26-1904 Reports of the Conservators of Forests. By "wild hakea", Hutchins probably meant *H. gibbosa* as he believed that species to be indigenous (D.E. Hutchins: Tree-planting, 1893, p.61). Kei apple (*Dovyalis caffra*) is indigenous to the eastern part of South Africa (M.R. Levyns: Guide to the Flora of the Cape Peninsula (1966), p.200).
128. G26<sup>+</sup>-1904 Reports of the Conservators of Forests.
129. BRON-AGR 132 Correspondence Files, Folio No. 553, Vol. 5 Peak Plantation.
130. G27-1893 Reports of the Conservators of Forests.
131. G29-1898 Reports of the Conservators of Forests.
132. Government Gazette, 19.2.1897, p.353 (Government Notice No. 133); Surveyor-General's Office: Plans Nos 3622, 7253.
133. G27-1893 Reports of the Conservators of Forests.
134. G50-1894, G51-1895, G11-1896, G17-1897 Reports of the Conservators of Forests; Trigonometrical Survey Office: South Africa 1:50 000 sheet 3318CD (1970).
135. BRON-AGR 132 Correspondence Files, Folio No. 553, Vol. 5 Peak Plantation. The origins of this road were discussed by J. Burman: Latest Walks on the Cape Peninsula (1979), pp.61-62, but no definite conclusion was reached.
136. G17-1897 Reports of the Conservators of Forests.
137. G17-1897, G29-1898, G12-1899, G24-1900, G39-1901 Reports of the Conservators of Forests. R.M. Cowling *et al.*: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.14, stated incorrectly that *Pinus radiata* was used at Devil's Peak from 1894 onwards. They attributed that information to C.A. Lückhoff: Table Mountain (1951), but that source (pp.113-114) mentioned only cluster pine.

138. Government Gazette, 13.8.1901, p.1342 (Government Notice No. 715);  
MAP REGISTER 4/174 General Map of the Cape Flats (sheet No. 4),  
1893; Map Studio: Cape Town and Environs, p.31.
139. G50-1894 Reports of the Conservators of Forests.
140. G25-1908 Report of the Chief Conservator of Forests.
141. G45-1888 Report of the Superintendent of Woods and Forests.
142. G41-1891 Report of the Superintendent of Woods and Forests.
143. G27-1893 Reports of the Conservators of Forests.
144. G11-1896 Reports of the Conservators of Forests.
145. C.D.H. Braine: Reclamation of drift-sands in Cape Colony (1902),  
p.20.
146. G27-1893, G50-1894 Reports of the Conservators of Forests.
147. G50-1894 Reports of the Conservators of Forests.
148. G39-1901 Reports of the Conservators of Forests.
149. G23-1892 Reports of the Conservators of Forests.
150. G50-1894, G51-1895, G11-1896, G17-1897 Reports of the Conserva-  
tors of Forests.
151. G51-1895 Reports of the Conservators of Forests.
152. G12-1899 Reports of the Conservators of Forests.
153. C.A. Lückhoff: Table Mountain (1951), p.113.
154. D.E. Hutchins: The cluster-pine at Genadendal (1897), p.543.
155. G51-1895 Reports of the Conservators of Forests.
156. C.E. Duff: The Varieties and Geographical Forms of *Pinus pinaster*,  
Soland, in Europe and South Africa (1928), pp.41-45.
157. G51-1895 Reports of the Conservators of Forests, p.27.
158. 3/CT 1/1/1/41 Minutes, 17.11.1892, p.173.
159. 3/CT 1/7/1/1 Mayoral Minutes, 1894, p.38.
160. 3/CT 1/7/1/1 Mayoral Minutes, 1894, p.38.
161. 3/CT 1/7/1/1 Mayoral Minutes, 1895, pp.30,66.

162. G11-1896 Reports of the Conservators of Forests.
163. G24-1900 Reports of the Conservators of Forests.
164. 3/CT 1/7/1/1 Mayoral Minutes, 1895, pp.30,66.
165. 3/CT 1/7/1/17 Mayoral Minutes, 1915, Appendix 6, p.i.
166. 3/CT 1/7/1/33 Mayoral Minutes, 1938 (Photographs between pp.28 and 29).
167. 3/CT 1/1/1/42 Minutes, 2.11.1893, p.146; 3/CT 1/1/1/43 Minutes, 27.12.1894, p.183; 3/CT 1/1/1/45 Minutes, 25.2.1897, p.126; 3/CT 1/7/1/1 Mayoral Minutes, 1895, p.29.
168. 3/CT 1/4/5/2/1/2 Corporation Markets, Public Gardens and Tree Planting Committee: Minute Book, 5.2.1902.
169. 3/CT 1/7/1/13 Mayoral Minutes, 1908, p.28.
170. D.E. Hutchins: The cluster-pine at Genadendal (1897), p.539.
171. R.S[mith]: The Cape Flats (1858), pp.305-306. That Smith was the author of this article is confirmed by G1-1866 Report of the Colonial Botanist, pp.91-92.
172. D.E. Hutchins: The cluster-pine at Genadendal (1897), p.540.
173. D.E. Hutchins: The cluster-pine at Genadendal (1897), p.539.
174. R.J. Poynton: Notes on Exotic Forest Trees in South Africa[1959], p.94.
175. M. Grut: Notes on the history of forestry in the western Cape, 1652-1872 (1977).
176. C.I. Latrobe: A Journal of a Visit to South Africa (1821), p.151.
177. Mountain Club of South Africa Annual, No. 3, 1896, p.26.
178. E. Esterhuysen, as quoted by R. Cowling: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.3.
179. G11-1896 Reports of the Conservators of Forests, p.31.
180. G11-1896 Reports of the Conservators of Forests, p.31.

181. G11-1896 Reports of the Conservators of Forests, p.15.
182. G11-1896 Reports of the Conservators of Forests.
183. E. Maxwell: Afforestation in Southern Lands [1931], p.140.
184. Agricultural Journal, Vol. 3, 1890-91, pp.69,135; Vol. 7, 1894, pp.40-41; Vol. 8, 1895, pp.255-256; Vol. 10, 1897, pp.428-429; Vol. 11, 1897, p.153.
185. Agricultural Journal, Vol. 3, 1890, p.69.
186. Agricultural Journal, Vol. 10, 1897, p.429.
187. D.E. Hutchins: Tree-planting, 1893.
188. BRON-AGR 272 Correspondence Files, Folio No. 157, Vol. 2 Seeds and Transplants, Applications for: Hutchins - Secretary for Lands, Mines & Agriculture, 26.6.1893; 7.7.1894.
189. BRON-AGR 163 Correspondence Files, Folio No. 791 Seed Orders: Order to Messrs Vilmorin Andrieux & Co., Paris, 21.1.1895.
190. G17-1897 Reports of the Conservators of Forests.
191. Proceedings of the Royal Society of London, Vol. 63, 1898, p.xxxiv.
192. G19-1899 Report of the Government Botanist and Curator of the Cape Government Herbarium, p.3.
193. Agricultural Journal, Vol. 9, 1896, pp. 627-628.
194. F. von Mueller: Select Extra-Tropical Plants Readily Eligible for Industrial Culture or Naturalisation (1895).
195. G29-1898 Reports of the Conservators of Forests; Government Gazette, 13.8.1901, p.1342 (Government Notice No. 715); MAP REGISTER 4/172 General Map of the Cape Flats (sheet No. 3), 1893.
196. G29-1898, G12-1899, G24-1900 Reports of the Conservators of Forests.
197. G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests; UG58-1912 Report of the Chief Conservator of Forests.

198. G51-1895, G17-1897 Reports of the Conservators of Forests; 3/CT 1/1/1/44 Minutes, 26.11.1896, pp.451-452.
199. G50-1894 Reports of the Conservators of Forests; G.L. Shaughnessy: Nursery Ravine revisited (1978).
200. G50-1894, G51-1895, G29-1898, G39-1901 Reports of the Conservators of Forests.
201. C.H. Banks: The Lister Nursery (1975), p.31.
202. G.L. Shaughnessy: Nursery Ravine revisited (1978); 3/CT 1/7/1/2 Mayoral Minutes, 1897, Appendix 13.
203. 3/CT 1/7/1/2 Mayoral Minutes, 1897, p.43.
204. G12-1899 Reports of the Conservators of Forests.
205. G24-1900 Reports of the Conservators of Forests.
206. H.W.J. Picard: Grand Parade (1969) (Herein: Plates 38 and 39, between pages 110 and 111). The caption to Plate 39 stated wrongly that the opening ceremony for the Hely-Hutchinson reservoir occurred in 1905.
207. 3/CT 1/7/1/9 Mayoral Minutes, 1904, p.42.
208. 3/CT 1/7/1/9 Mayoral Minutes, 1904 (Herein: Plate 1, top).
209. J. Burman: The Cape of Good Intent (1969), p.106.
210. 3/CT 1/7/1/10 Mayoral Minutes, 1905, Appendix 8, p.v.
211. MAP REGISTER 1/69 North West Section of the Cape Peninsula, ca. 1900.
212. J. Burman: The Cape of Good Intent (1969), p.106.
213. Mountain Club of South Africa Annual, No. 4, 1898 (Herein: frontispiece and plate on p.45).
214. Mountain Club of South Africa Annual, No. 12, 1908 (Herein: plates opp. p.46).
215. Trigonometrical Survey Office: South Africa 1:50 000 sheet 3318CD (1970).

216. G29-1898, G12-1899, G24-1900, G39-1901, G38-1902 Reports of the Conservators of Forests.
217. G12-1899 Reports of the Conservators of Forests.
218. G12-1899 Reports of the Conservators of Forests.
219. G24-1900 Reports of the Conservators of Forests, p.9.
220. G29-1898 Reports of the Conservators of Forests.
221. G29-1898, G12-1899, G24-1900, G39-1901, G38-1902, G55-1903, G26-1904 Reports of the Conservators of Forests.
222. Forestry and Timber Bureau, Australia: Forest Trees of Australia (1962), p.76.
223. H.C. Taylor: Notes on the vegetation of the Cape Flats (1972), p.638.
224. H.C. Taylor: Notes on the vegetation of the Cape Flats (1972), p.638.
225. G38-1902 Reports of the Conservators of Forests.
226. G38-1902, G55-1903 Reports of the Conservators of Forests.
227. G26<sup>+</sup>-1904 Reports of the Conservators of Forests; G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests; G39-1907 Report of the Chief Conservator of Forests.
228. G29-1898 Reports of the Conservators of Forests.
229. Government Gazette, 7.12.1897, p.2575 (Government Notice No. 1126); Trigonometrical Survey Office: South Africa 1:50 000 sheet 3418BA (1970).
230. Surveyor-General's Office: Portfolio 333, Forest Reserve Index, VI Eerste River Plantation; VII Strandfontein Forest Reserve.
231. G11-1896 Reports of the Conservators of Forests.
232. G29-1898, G12-1899 Reports of the Conservators of Forests.
233. G17-1897 Reports of the Conservators of Forests.

234. Surveyor-General's Office: Portfolio 333, Forest Reserve Index, VII Strandfontein Forest Reserve; Trigonometrical Survey Office: South Africa 1:50 000 sheet 3418BA (1970).
235. G12-1899, G24-1900, G39-1901, G38-1902 Reports of the Conservators of Forests.
236. G26-1904, G26<sup>+</sup>-1904 Reports of the Conservators of Forests.
237. G38-1902 Reports of the Conservators of Forests.
238. The Alexandra Reservoir was completed in 1893 (3/WBG 3 Minutes, 31.7.1893, p.270); the Victoria Reservoir was completed in 1897 (3/WBG 4 Minutes, 12.8.1897, p.115). J. Burman: Latest Walks in the Cape Peninsula (1979), p.78, incorrectly stated that both reservoirs were completed in 1903. In fact, in 1903 it was decided to increase the capacity of Victoria Reservoir by raising the height of the parapet wall (3/WBG 5 Minutes, 4.5.1903, p.62; 2.11.1903, pp.97-98).
239. 3/WBG 3 Minutes, 28.9.1891, p.26; Government Gazette, 13.8.1901, p.1342 (Government Notice No. 715).
240. G34-1886 Reports of the Conservators of Forests.
241. G24-1900 Reports of the Conservators of Forests.
242. 3/WBG 53 Letters Received: Currey - Municipal Clerk, 15.10.1901; 3/WBG 4 Minutes, 2.12.1901, p.461.
243. Government Gazette, 13.8.1901, p.1342 (Government Notice No. 715); Surveyor-General's Office: Plan No. 3622.
244. G38-1902 Reports of the Conservators of Forests.
245. Trigonometrical Survey Office: South Africa 1:50 000 sheet 3318CD (1970).
246. G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests.
247. G38-1902 Reports of the Conservators of Forests.
248. G24-1900, G39-1901, G38-1902, G55-1903, G26-1904, G26<sup>+</sup>-1904 Reports of the Conservators of Forests; G50-1906 Reports of

the Acting Chief Conservator of Forests and the Conservators of Forests.

249. G38-1902 Reports of the Conservators of Forests; Trigonometrical Survey Office: South Africa 1:50 000 sheet 3318CD (1970).
250. Government Gazette, 13.8.1901, p.1342 (Government Notice No. 715); 3/CT 1/4/4/4/1/1 Electric and Water Works and Fire Brigade Committee Minutes, 19.2.1914, p.312; 6.8.1914, p.416.
251. G38-1902 Reports of the Conservators of Forests.
252. G26-1904 Reports of the Conservators of Forests.
253. G11-1896 Reports of the Conservators of Forests.
254. Agricultural Journal, Vol. 9, 1896, p.547; G17-1897 Reports of the Conservators of Forests.
255. G39-1901 Reports of the Conservators of Forests.
256. G38-1902 Reports of the Conservators of Forests.
257. Government Gazette, 8.11.1898, p.2444 (Government Notice No. 949); Surveyor-General's Office: Portfolio 333, Forest Reserve Index, pp.21-22; MAP REGISTER 1/69 North West Section of the Cape Peninsula, ca. 1900.
258. Government Gazette, 26.8.1902, p.485 (Government Notice No. 573), Surveyor-General's Office: Portfolio 333, Forest Reserve Index, pp.21-22; MAP REGISTER 1/69 North West Section of the Cape Peninsula, ca. 1900.
259. 3/KBY 2 Minutes, 24.7.1900, p.108.
260. G38-1902 Reports of the Conservators of Forests, p.6.
261. G26<sup>+</sup>-1904 Reports of the Conservators of Forests; G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests.
262. G24-1900, G39-1901 Reports of the Conservators of Forests.
263. G24-1900, G39-1901 Reports of the Conservators of Forests.
264. G38-1902 Reports of the Conservators of Forests.

265. G38-1902 Reports of the Conservators of Forests; 3/CT 1/4/5/2/1/2 Corporation Markets, Public Gardens and Tree Planting Committee: Minute Book, 5.2.1902. The area of Devil's Peak reserve was given as 320 ha in G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests. As the original reserve was 105 ha (Section 5.3.2), this means that the extension covered 215 ha.
266. G55-1903, G26-1904, G26<sup>+</sup>-1904 Reports of the Conservators of Forests; G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests.
267. G39-1907 Report of the Chief Conservator of Forests.
268. G50-1906 *Reports of the Acting Chief Conservator of Forests and the Conservators of Forests.*
269. The plaque is on the site of the forester's house, just below the King's Blockhouse. The construction of the house, as well as of the access road leading to it, was a contentious issue with Hutchins's superiors (BRON-AGR 132 Correspondence Files, Folio No. 553, Vol. 5 Peak Plantation).
270. 3/CT 1/4/5/2/1/2 Corporation Markets, Public Gardens and Tree Planting Committee: Minute Book, 4.10.1904, p.415; 3/CT 1/7/1/10 Mayoral Minutes, 1905, Appendix No. 3, p.l.
271. 3/CT 1/7/1/10 Mayoral Minutes, 1905, Appendix No. 8, p.v; 3/CT 1/4/5/2/1/3 Corporation Markets, Public Gardens and Tree Planting Committee: Minute Book, 17.7.1906, p.279.
272. 3/CT 1/7/1/10 Mayoral Minutes, 1905, Appendix No. 3, p.l.
273. BRON-AGR 132 Correspondence Files, Folio No. 553, Vol. 5 Peak Plantation.
274. N.L. King: Historical sketch of the development of forestry in South Africa (1938), p.9; G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests.
275. G25-1908 Report of the Chief Conservator of Forests.
276. D.E. Hutchins: National forests (1898), pp.535-536.

277. D.E. Hutchins: National forests (1898), p.537.
278. D.E. Hutchins: National forests (1898), pp.534-535.
279. H. Bolus & A.H. Wolley-Dod: A list of the flowering plants and ferns of the Cape Peninsula... (1904), pp.217-218.
280. H. Bolus & A.H. Wolley-Dod: A list of the flowering plants and ferns of the Cape Peninsula... (1904), p.218.
281. G25-1908 Report of the Chief Conservator of Forests.
282. G25-1908 Report of the Chief Conservator of Forests.
283. 3/CT 1/4/5/2/1/3 and 1/4/5/2/1/4 Corporation Markets, Public Gardens and Tree Planting Committee: Minute Book, 2.10.1906 and 3.8.1909, respectively.
284. G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests; G39-1907 Report of the Chief Conservator of Forests.
285. G39-1907 Report of the Chief Conservator of Forests, Table V; RP39-1977 Department of Forestry Annual Report, Table 3.1.1.
286. F.J. Kruger: Invasive woody plants in the Cape fynbos... (1977), p.60.
287. G24-1900, G55-1903, G26-1904 Reports of the Conservators of Forests; G24-1910 Report of the Chief Conservator of Forests.
288. G55-1903 Reports of the Conservators of Forests.
289. G39-1907 Report of the Chief Conservator of Forests, Table V.
290. N.L. King: Historical sketch of the development of forestry in South Africa (1938), p.10.
291. Union of South Africa: Act No. 16 of 1913 (Forest Act, 1913).
292. Union of South Africa, House of Assembly: Annexure No. 245, 1915 Annual Report of the Forest Department.
293. N.L. King: Historical sketch of the development of forestry in South Africa (1938), pp.9-13.
294. R.H. Compton: Kirstenbosch (1965), p.49.

295. M. Alexander Cook: An historical introduction to Kirstenbosch... (1965); Union of South Africa: Act No. 9 of 1910. (Rhodes' Will (Groote Schuur Devolution) Act, 1910).
296. H.H.W. Pearson: The National Botanic Gardens (1915), p.19.  
One wonders if the gentleman referred to might not have been Herschel, the astronomer. In 1864 the Colonial Botanist, J.C. Brown, stated that "extensive straggling plantations" in the vicinity of Claremont were "the result, according to popular belief, of Sir John Herschel when taking relaxation from his regular occupation having always taken with him on his walks a walking-stick and a pocket-full of seeds, and dropped a seed here and there as he rambled about" (G24-1865 Report of the Colonial Botanist, pp.19-20).
297. H.H.W. Pearson: The National Botanic Gardens (1915), p.19.
298. G25-1908 Report of the Chief Conservator of Forests, Table V; Trigonometrical Survey Office: South Africa 1:50 000 sheet 3418AB&AD (1970).
299. UG30-1911 Report of the Chief Conservator of Forests, Table V.
300. C.E. Legat: The cultivation of exotic conifers in South Africa (1930) (Herein: Plate 2: General view of Hout Bay Plantation, Cape Peninsula, showing *Pinus pinaster*, opp. p.33).
301. G.A. Zahn & E.J. Neethling: The cluster pine (*Pinus pinaster*) at the Cape (1929), p.204.
302. UG3-1918 Report of the Chief Conservator of Forests.
303. UG47-1919 Report of the Chief Conservator of Forests.
304. BRON-AGR 629 Correspondence Files, Folio No. T200 Papers Relating to Forestry Matters.
305. Union of South Africa, House of Assembly: Annexure No. 489, 1917 Annual Report of the Forest Department; UG3-1918 Report of the Chief Conservator of Forests.
306. G25-1908 Report of the Chief Conservator of Forests, Table V.

307. Government Gazette, 4.2.1916, p.249 (Government Notice No. 120).
308. R.H. Compton: Kirstenbosch (1965), pp.56-57.
309. 3/CT 1/4/4/4/1/2 Electric and Water Works and Fire Brigade Committee Minutes, 17.6.1915, p.146; 1.7.1915, p.154.
310. G.A. Zahn & E.J. Neethling: The cluster pine (*Pinus pinaster*) at the Cape (1929), p.198.
311. R. Cowling: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.3.
312. Government Gazette, 6.2.1914, p.785 (Government Notice No. 180).
313. Union of South Africa, House of Assembly: Annexure No. 245, 1915 Annual Report of the Forest Department; Annexure No. 280, 1915-1916 Report of the Forest Department.
314. G24-1910 Report of the Chief Conservator of Forests.
315. UG57-1918, UG47-1919 Report of the Chief Conservator of Forests.
316. UG30-1911 Report of the Chief Conservator of Forests.
317. SMW 22 Letters Received, General: No. 7084, Van Zyl & Buissinné - Suburban Municipal Water Works, 21.8.1911; Cape of Good Hope: Act No. 24 of 1898 (The Claremont and Woodstock Water Supply Act, 1898), Schedule A.
318. Cape of Good Hope: Act No. 24 of 1898 (The Claremont and Woodstock Water Supply Act, 1898); SMW 1 Minute Book, Main Committee, 21.12.1900, p.21.
319. SMW 3 Minute Book, Main Committee, 15.5.1911, p.250.
320. SMW 23 Letters Received, General: No. 7741, Acting Chief Conservator of Forests - Suburban Municipal Waterworks, 11.8.1911 (enclosure dated 19.7.1911).
321. SMW 3 Minute Book, Main Committee, 27.11.1911, p.296; 19.2.1912, p.318; 30.9.1912, p.367; 28.10.1912, p.372; 20.7.1913, pp.395-396.

322. H.W.J. Picard: Grand Parade (1969), p.150.
323. 3/CT 1/4/4/4/1/1 and 1/4/4/4/1/2 Electric and Water Works and Fire Brigade Committee Minutes, 30.4.1914, p.343 and 5.8.1915, pp.166-167, respectively.
324. 3/CT 1/4/5/2/1/5 Corporation Markets, Public Gardens and Tree Planting Committee Minute Book, 1.6.1910.
325. 3/CT 1/7/1/15 Mayoral Minutes, 1912, Appendix No. 6, p.ii.
326. 3/CT 1/4/5/4/1/1 Improvements and Parks Committee, Minute Book, 29.9.1913, p.29.
327. J.P. Rourke: The Proteas of Southern Africa (1980), pp.116,124,126,128.
328. 3/CT 1/4/5/4/1/3 Improvements and Parks Committee Minute Book, 9.6.1915, p.375.
329. 3/CT 1/4/5/4/1/4 Improvements and Parks Committee Minute Book, 16.6.1916, p.242; 26.7.1916, p.264.
330. 3/CT 1/7/1/18 Mayoral Minutes, 1916, Appendix No. 6.
331. 3/CT 1/7/1/20 Mayoral Minutes, 1919, Appendix No. 6.
332. G25-1908 Report of the Chief Conservator of Forests.
333. G45-1888, G29-1889, G36-1890, G41-1891 Report of the Superintendent of Woods and Forests.
334. G26<sup>+</sup>-1904 Reports of the Conservators of Forests.
335. Government Gazette, 22.3.1898, p.702 (Government Notice No. 230); Surveyor-General's Office: Plans Nos 5146,5521; Trigonometrical Survey Office: South Africa 1:50 000 sheet 3318DC, 3418BA (1970).
336. G12-1899 Reports of the Conservators of Forests.
337. G38-1902 Reports of the Conservators of Forests.
338. G26<sup>+</sup>-1904 Reports of the Conservators of Forests.
339. G24-1910, UG30-1911, UG58-1912, UG50-1913 Report of the Chief Conservator of Forests.

340. Union of South Africa, House of Assembly: Annexure No. 489, 1917 Annual Report of the Forest Department.
341. UG47-1919 Report of the Chief Conservator of Forests.
342. G25-1908, G35-1909 Report of the Chief Conservator of Forests.
343. UG47-1919 Report of the Chief Conservator of Forests, Table V.
344. G35-1909 Report of the Chief Conservator of Forests.
345. UG47-1919 Report of the Chief Conservator of Forests, Table V.
346. Union of South Africa, House of Assembly: Annexure No. 245, 1915 Annual Report of the Forest Department.
347. UG47-1919 Report of the Chief Conservator of Forests, Table V.
348. G35-1909 Report of the Chief Conservator of Forests.
349. Trigonometrical Survey Office: South Africa 1:50 000 sheet 3318CD (1970).
350. UG47-1919 Report of the Chief Conservator of Forests, Table V.
351. Data extracted from G105-1883, G34-1884, G32-1885, G34-1886 G41-1887, G45-1888, G29-1889, G36-1890, G41-1891 Report of the Superintendent of Woods and Forests; G23-1892, G27-1893, G50-1894, G51-1895, G11-1896, G17-1897, G29-1898, G12-1899, G24-1900, G39-1901 Reports of the Conservators of Forests. A dash (-) signifies that no information in that category was provided in the source. It generally, but not necessarily, represents a value of zero. Slight discrepancies in totals may result from the conversion to metric units. The total numbers of seeds (last line of table) have been calculated on the basis of the conversion factors in Table 4.9.3. As no conversion factor was available for *H. suaveolens* a value could not be calculated for that species.
352. Data extracted from G32-1885, G34-1886, G41-1887, G45-1888, G29-1889, G36-1890, G41-1891 Report of the Superintendent of Woods and Forests; G23-1892, G27-1893, G50-1894, G51-1895, G11-1896, G17-1897, G29-1898, G12-1899, G24-1900, G39-1901, G38-1902, G55-1903, G26-1904, G26<sup>+</sup>-1904 Reports

of the Conservators of Forests; G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests; G39-1907, G25-1908, G35-1909, G24-1910, UG30-1911, UG58-1912, UG50-1913 Report of the Chief Conservator of Forests; Annexure 245, 1915 Annual Report of the Forest Department; Annexure 280, 1915-16 Report of the Forest Department; Annexure 489, 1917 Annual Report of the Forest Department; UG3-1918, UG57-1918, UG47-1919 Report of the Chief Conservator of Forests. Every effort has been made to distinguish between new areas afforested and areas that were reforested because previous plantings had failed. Only the former values are shown in the third column of the table. A dash (-) signifies that no information in that category was provided in the source. It does not necessarily represent a value of zero. For a discussion of how the values in this table relate to those in Table 5.5.9, see Section 5.4.2.

353. This figure was reported as reduced by 189 ha because of a resurvey at Hout Bay (UG47-1919 Report of the Chief Conservator of Forests).
354. Data extracted from G34-1886, G41-1887, G45-1888, G29-1889, G36-1890, G41-1891 Report of the Superintendent of Woods and Forests; G23-1892, G27-1893, G50-1894, G51-1895, G11-1896, G17-1897, G29-1898, G12-1899, G24-1900, G39-1901, G38-1902 Reports of the Conservators of Forests. For the column headed "Area afforested during year", every effort has been made to include only values for new areas afforested and to exclude areas that were merely reforested after previous plantings had failed. A dash (-) signifies that no information in that category was provided in the source. It does not necessarily represent a value of zero. Slight discrepancies in totals may result from the conversion to metric units. For a discussion of how the values in this table relate to those in Table 5.5.8, see Section 5.3.8.

355. Data extracted from G34-1884, G32-1885, G34-1886, G41-1887, G45-1888, G29-1889, G36-1890, G41-1891 Report of the Superintendent of Woods and Forests; G23-1892, G27-1893, G50-1894, G51-1895, G11-1896, G17-1897 Reports of the Conservators of Forests. The values have been rounded to the nearest pound. A dash (-) signifies that no information in that category was provided in the source. It does not necessarily represent a value of zero.
356. Data extracted from G41-1891 Report of the Superintendent of Woods and Forests; G23-1892 Reports of the Conservators of Forests.
357. BRON-AGR 163 Correspondence Files, Folio No. 791 Seed Orders: Order to Messrs Vilmorin Andrieux & Co., Paris, 21.1.1895; Invoices from Messrs Vilmorin Andrieux & Co., Paris, 21.2.1895, 12.10.1895. Only selected species from these documents are shown in the table. The modern nomenclature is derived from Table 2.5.1 and from B.D. Jackson: *Index Kewensis* (1893).
358. BRON-AGR 149 Correspondence Files, Folio No. 632 Prizes for Planting on Flats, 1892 and 1894: Reports of Commissioners, 9.11.1892, 30.11.1894. A dash (-) signifies that no information in that category was provided in the source.
359. The allotments in Mowbray Flats and Claremont Flats were located on MAP REGISTER 4/174 General Map of the Cape Flats (sheet No. 4), 1893. Those in Wynberg Flats, and also "Vaderlandsch-Riet-Vlei", were located on Surveyor-General's Office: Wall Map, Cape Town & Environs (1965). Those at Durban Road were located on MAP REGISTER 4/177 General Map of the Cape Flats (sheet No. 5), 1893. A dash (-) indicates that this farm has not been located. Nevertheless, it may be assumed to have been in the general vicinity of the other farms in the same subdivision.
360. Includes some *Acacia pycnantha*.

361. Data extracted from G24-1900, G39-1901, G38-1902, G55-1903, G26-1904, G26<sup>+</sup>-1904 Reports of the Conservators of Forests; G50-1906 Reports of the Acting Chief Conservator of Forests and the Conservators of Forests; G39-1907, G25-1908, G35-1909, G24-1910, UG30-1911, UG58-1912, UG50-1913 Report of the Chief Conservator of Forests; Union of South Africa, House of Assembly: Annexure 245, 1915 Annual Report of the Forest Department, Annexure 280, 1915-16 Report of the Forest Department, Annexure 489, 1917 Annual Report of the Forest Department; UG3-1918, UG57-1918, UG47-1919 Report of the Chief Conservator of Forests. See also Note 354.
362. This figure was reported as corrected because of a survey (UG-1918 Report of the Chief Conservator of Forests).
363. Data extracted from G25-1908, G35-1909, G24-1910, UG30-1911 Report of the Chief Conservator of Forests. See also Note 352.

## CHAPTER 6

## THE PEST PLANTS IN THE CAPE TOWN

## REGION, 1918-1975

"...and then the road ran for miles between Australian wattles. These show a flash of golden flowers for two or three weeks in the spring, but for the rest of the year they are dull and scraggy, and all the while they are spreading over the Cape Flats and destroying the native heaths and proteas, which cannot stand up against their vulgar, pushing ways."<sup>1</sup>

"The *Hakea* hedge is a relic of the old days with which the Cape might well dispense - for if there is an uglier shrub or a scaggier and a greater dust-trap I do not know of it. I do not believe that there is a more unattractive shrub in the world than *Hakea gibbosa* as it may be seen bordering dusty little gardens in wind-swept districts such as Salt River or the road to Maitland."<sup>2</sup>

## 6.1 Afforestation

By 1918 afforestation with cluster pine had ceased in the forestry department's reserves in the Cape Town region. At some time between 1918 and 1931 parts of the Devil's Peak plantation must have been abandoned, for the area under forest in the former year was reported as 326 ha, while in the latter it was 218 ha,<sup>3</sup> a decrease of 108 ha. It may be assumed that the abandoned area was on the upper slopes and cliffs, for the present-day Devil's Peak plantation occupies only the lower slopes. Thus, the trees that are clearly visible on the cliffs of the Woodstock face in a photograph taken in 1913<sup>4</sup> were no longer considered to belong to the plantation.

All three major reserves, Tokai, Cecilia and Devil's Peak, now consisted of a well-defined plantation of pines, on the lower slopes, and an area of abandoned plantation, on the higher slopes, cliffs and plateaux.

At Ottery, the land on which the cluster pine plantation had been established between 1897 and 1904 was gradually appropriated for urban purposes and the trees were not exploited on a sustained basis.<sup>5</sup>

The department continued to own large tracts of land on the Cape Flats, but they were gradually reduced during the post-war years. Uitvlugt reserve, in particular, was substantially diminished in area in the 1920s when Pinelands garden suburb and Langa township were established.<sup>6</sup> No more planting was carried out in either Uitvlugt or Epping reserve and it appears that the trees there were never exploited for their intended purpose, railway sleepers.

At the forestry department's other reserves on the Flats, a new form of afforestation was instituted. From 1920 onwards, areas where *Acacia cyclops* and *A. saligna* were sown were recorded as "afforested". They were distinguished from areas where marram was grown, which were classified as "reclaimed other than by afforestation".<sup>7</sup>

The purpose of this form of afforestation was not made clear in the annual reports. Control of drifting sand was the ostensible reason, but no great concern was expressed about any threat posed by drifts. It appears that the acacias were employed to vegetate dumping sites as much as for any other reason, for much of the afforestation was conducted in conjunction with the spread of town refuse at Bellville forest reserve. The railway siding from Bellville was extended further southwards in 1919<sup>8</sup> and, subsequently, as the reclaimed and afforested areas expanded southwards, the siding was lengthened. In 1925 a new line from Bellville, extending 3,2km "towards the Klipfontein sands" was completed.<sup>9</sup>

Of the two acacias used in this afforestation, *A. saligna* was reported to be more suited to the conditions at Bellville, being better able to withstand the heat and drought of summer because it developed a deeper tap-root.<sup>10</sup>

The dumping of refuse at Bellville appears to have ceased in 1928.<sup>22</sup> The Municipality of Cape Town then used the refuse for its own land-fill purposes at various sites, including Green Point vlei and the Wingfield airport (on the former 6th Mile Outspan).<sup>12</sup> Afforestation with the two acacia species continued at Bellville until 1937 when the total afforested area was stated to be 2 037 ha.<sup>13</sup> The forestry department had thus deliberately planted the two species over a vast tract of the eastern Cape Flats in this reserve.

The establishment of the acacias on the Flats was described by N.L. King, a forester, at that time as having converted "a barren waste" into "a valuable asset" which was yielding a steady revenue from the sale of fuel (i.e. firewood) and which would in the course of time become of great value for building and industrial sites.<sup>14</sup>

The two acacias were also used at both Strandfontein and Eerste River reserves, being sown on sand that had first been stabilised with marram grass. In 1921 only *A. cyclops* was used,<sup>15</sup> but from 1925 both species

were sown.<sup>16</sup> In contrast to the situation at Bellville, no fertiliser in the form of refuse, or otherwise, was applied.

In 1932 the Eerste River reserve was formally demarcated. It covered 7 235 ha and extended from the coast northwards to the Bellville reserve.<sup>17</sup> Thus, the two reserves together covered more than 10 000 ha and occupied the whole of the eastern side of the Cape Flats. By 1934 the total afforested area in the Eerste River reserve was 299 ha, while a further 573 ha had been reclaimed.<sup>18</sup>

Although planting of acacias also occurred in the Strandfontein reserve, this was evidently not on a very intensive scale, for in 1937 there were 547 ha of reclaimed land in the reserve, but no area was described as afforested.<sup>19</sup>

At this time a policy of "more systematic reclamation" of sand dunes at the Blaauwberg reserve commenced.<sup>20</sup> There was no sustained attempt to afforest the dunes, marram being almost the sole species planted. Nevertheless, *A. cyclops* and *A. saligna* were sown in 1924 and 1925.<sup>21</sup>

The Municipality of Cape Town also rationalised its forestry activities at this time. There were no further expansions of afforested areas. Instead, attempts were made to improve the quality of the existing forests. At Newlands a policy of harvesting the *Pinus pinaster* and replacing it with *P. radiata* was followed.<sup>22</sup> On the southern and western slopes of Lion's Head, where silver trees had been sown in 1917, but had germinated very poorly, *P. radiata* and *P. pinea* were sown in 1919.<sup>23</sup>

As the silver trees had been sown with the avowed intention of establishing indigenous species in preference to exotics, it is surprising that they were so readily abandoned. As it happened, during 1925 and 1926 drought conditions prevailed and many of the pines that had been established over the years on Signal Hill and Lion's Head died, whereas silver trees flourished. Thereafter, a policy of growing indigenous shrubs of various species was followed in this locality.<sup>24</sup>

## 6.2 Drift Sands

By 1930 the forestry department's worst drift sand problems near Cape Town were under control and its activities in the sandy areas were concentrated on establishing acacias as part of its policy of afforestation. The Municipality of Cape Town, on the other hand, was at this time first confronted with a drift sand problem, on the coast of False Bay, just east of Muizenberg. It appears that gradual denudation of the vegetation had exposed the sand to the strong south-east winds and it was being carried inland over the suburban roads. As a first control measure, screens were erected, but they proved ineffectual and so planting of marram was resorted to.<sup>25</sup>

Further to the east, sand driven inland was found to be gradually silting up the southern end of Zeekoevlei, a large shallow lake. An attempt to control it was begun in 1936. The dune area was fenced and a section of it was "bushed" with branches of *A. cyclops* (that is, the cut branches were laid over the surface of the sand<sup>26</sup>). In another section, grass was planted. To stimulate plant growth, sewage effluent from the adjacent sewage ponds (south of Zeekoevlei) was discharged over the bare sand.<sup>27</sup>

After three years the original problem area of 49 ha at Zeekoevlei had been stabilised and seeds of indigenous species were then sown. As a final step in the reclamation program, to achieve "permanent protection", 91 kg of seed of *A. cyclops* were sown over the entire area. It was stated that the value of the land had increased sixty-fold as a result of the reclamation program and that it would continue to increase as tree growth became further advanced.<sup>28</sup>

In subsequent years the same technique of reclamation was applied to adjoining areas and it was stated in 1939 that at Zeekoevlei there were 317 ha of land undergoing the process of protection and reclamation.<sup>29</sup>

Meanwhile, at Muizenberg the planting of marram, in combination with the use of fencing to protect the dunes from trampling by people and animals, had brought the worst drifts under control by 1941 and indigenous shrubs were found to be re-establishing themselves on the stabilised sand.<sup>30</sup> In 1942, 272kg of acacia seed (mainly *A. cyclops* and *A. saligna*) were sown among the marram plants. It was also reported that artificial resting places for birds had been built to encourage dispersal of seed.<sup>31</sup>

In subsequent years repeated attempts to establish trees were made in this area. *Acacia cyclops* was again sown in at least two years, as well as various indigenous shrubs.<sup>32</sup>

### 6.3 The Controversy Over Exotics

It was noted in Section 5.4.4 that a change in the public attitude towards exotic plants was already manifesting itself by 1917. Even earlier, some botanists and foresters had had misgivings about certain of the species that are now regarded as pests. Brown had considered *A. lophantha* to be a "nuisance" (Section 4.7). Hutchins had referred to *A. longifolia* as a "pestilent (*sic*) weed".<sup>33</sup> MacOwan had condemned *A. cyclops* and *A. saligna*, which were "over-running the Cape Flats", as useless for fodder trees, noting that even the "wretched undersized little trek-oxen" that brought to Cape Town the market produce from "the poorer class of German farmer on the Flats" disdained their foliage.<sup>34</sup> In 1908 R. Marloth had drawn attention to the infestations of acacias on the Flats, in his description of the vegetation of the Cape.<sup>35</sup>

The antagonism towards exotics gradually gained momentum. In 1922 representatives of the Wild Flower Protection Society drew the attention of the Municipality of Cape Town to their spread. They

stressed the danger of allowing exotics to grow unchecked and become "a menace to the natural beauty of the Peninsula by killing the indigenous flora".<sup>36</sup>

That there was a certain ambivalence in the official attitude is evidenced by the fact that, even when *A. cyclops* and *A. saligna* were found to be pests in areas set aside for recreation on the western side of the Cape Flats, such as Keurboom Park and Rondebosch Common,<sup>37</sup> these species continued to be planted elsewhere on the Flats (Section 6.2). Likewise, with the changeover from *P. pinaster* to *P. radiata* in the forests, the former species was no longer being planted in the Cape Town region by the 1930s, and yet it was still being planted at the municipality's forest at Steenbras Dam,<sup>38</sup> in the Kogelberg mountains, 50km south-east of Cape Town.<sup>39</sup>

In 1936 the question of planting exotics in the mountains near Cape Town became a topic of popular debate after a fire destroyed 121 ha of pines at Devil's Peak plantation. This fire revived the "generation-old controversy concerning the planting of trees on Table Mountain". Some members of the public suggested that the fire should have been allowed to sweep through the entire Cape Peninsula and destroy all the plantations of cluster pine. At the very least, this "influential section of the public" wanted the remainder of the Devil's Peak plantation removed. This the forestry department would not countenance, "especially as a large section of the public do not see in a background of bare slopes and Gibraltar-like rock the proper aesthetic setting for Cape Town and Table Bay".

According to the forestry department's interpretation, public opposition to the plantations stemmed from "the fact that the cluster pine, during later years, has spread along the face of the mountain, and on top of it, to an extent certainly not contemplated originally, and admittedly not desired now".<sup>40</sup> In fact, many of the pines so observed must have been growing in the old plantations that had been abandoned in earlier years, on Table Mountain, Devil's Peak and Constantiaberg.

Some, at least, must have germinated from seed scattered by mountain climbers. To attribute the presence of all these trees totally to natural spread showed an ignorance of past afforestation practices on the mountains.

The municipality also became involved in the debate about exotics, as it now possessed 502 ha of planted exotics at Steenbras and 91 ha at Newlands and other plantations on Lion's Head, Signal Hill and Table Mountain. When consulted by the municipality, the Conservator of Forests gave his opinion that all plantations around reservoirs should be maintained and protected, for they served "to reduce evaporation of water by breaking the forces of the wind, increase condensation from the clouds, act as filters for dust-laden winds, and prevent siltation into the reservoirs of ash and soil after fires".<sup>41</sup>

The forestry department had no intention of removing its plantations, but decided as a compromise to implement a scheme "for removing cluster pine that has encroached on the veld in parts where it threatens to obscure outstanding features of the mountain or suppress desirable aspects of the natural flora".<sup>42</sup> Thus, in some fifty years the government policy with regard to pines on the Cape Peninsula mountains had changed from a determination to achieve a total cover of trees (1884-1905), through a stage when there were defined plantations plus areas beyond of abandoned plantations in which a policy of *laissez-faire* applied (1906-1935), to a stage where the areas beyond the defined plantations were to be actively cleared of pines (1936 onwards).

Likewise, the municipality revised its attitude to the stands of pines on the lower plateau of Table Mountain. The forestry officer "thinned or removed" some 16 ha of "naturally regenerated self-sown pines" in 1939.<sup>43</sup>

While the attitude of officialdom towards cluster pine and acacias thus indicated a certain ambivalence, its approach to the three species of

hakea was quite clearcut. There was a complete change of attitude from the proselytising of these plants that had occurred in the 19th century. Now these extremely prickly plants, so useful for hedges, were found to be pests in certain areas, particularly in the mountains of the southern Cape. The forestry department commenced research on methods of controlling *H. sericea* in 1937 and also began studies of the rate of spread, mode of seed dispersal, seed viability and general ecology of the species.<sup>44</sup> In the following year the Department of Agriculture launched a campaign to educate farmers about the threat that the hakeas were perceived to pose.<sup>45</sup> All three species were proclaimed as Noxious Weeds in 1938. This meant that landowners were required to remove any plants growing on their property.<sup>46</sup>

Condemnation of alien plants by botanists continued. In Adamson's detailed description of the vegetation of South Africa, he noted that on the Cape Flats *A. cyclops* and *A. saligna* had spread "and become completely dominant, with an elimination of most of the original plants".<sup>47</sup> Ironically, this statement was made in the same year that King was justifying the establishment of the acacias there by the forestry department (Section 6.1). Adamson also commented on the threat to the natural vegetation on mountain slopes from *P. pinaster*, *Hakea* spp., *Albizia lophantha*, *Acacia longifolia* and *Eucalyptus* spp.<sup>48</sup> In a discussion of afforestation he observed that the planting of exotics often had a great effect on the indigenous vegetation, "in extreme cases even leading to extinction".<sup>49</sup>

A committee sponsored by the Royal Society of South Africa issued a report in 1945 in which it warned of the danger that the unique vegetation of the south-western Cape might be replaced by aliens, particularly cluster pine.<sup>50</sup>

#### 6.4 Afforestation by the Municipality of Cape Town

While the forestry department was steadily reducing both its holdings of afforested land and its tree-planting activities near Cape Town, the municipality's role in this regard was expanding. In 1938 the post of City Forest Officer was created and the administration of all mountain, forest, and drift sand areas owned by the city was consolidated under his authority.<sup>51</sup>

These areas were of three kinds. Firstly, there were the tracts of land acquired for water supply dams in the mountains to the east of Cape Town and outside the region of this study: in the Kogelberg mountains (8 155 ha altogether) and in the Wemmershoek mountains (1 863 ha). Secondly, there were the drift sand areas comprising 334 ha at Zeekoevlei and 877 ha at Muizenberg. The third category comprised the forest and mountain areas on the Cape Peninsula.<sup>52</sup> The areas in the last category are indicated in Table 6.8.1, which shows that in 1939 there were 148 ha of indigenous forest and 537 ha of exotic forest on a total of 3 801 ha of land.

The reserve referred to as Kloof Nek in Table 6.8.1 included Signal Hill, Lion's Head, "The Glen" estate, and the northern slopes of Table Mountain as far as the privately-owned "Highlands Deer Park" estate.

Orange Kloof reserve, which is also listed in Table 6.8.1, incorporated the valley at the southern end of Table Mountain. The municipality had acquired this land in 1927 when it had incorporated the Municipality of Wynberg.<sup>53</sup> The Wynberg municipality had bought "Orange Kloof" farm in 1887 in order to obtain access to the water in Disa Stream.<sup>54</sup> At the time of the farm's purchase, there was a stand of oaks there,<sup>55</sup> but whether other exotic trees were present then is not known. In 1931 the area of the farm was reported to be 97 ha, of which 23 ha were occupied by "Forest, Oaks, Firs and Poplars".<sup>56</sup> There is no record of planting of exotics there by either the Wynberg or Cape Town municipality

before 1939. As the farm was leased to private individuals from 1891<sup>57</sup> until about 1910,<sup>58</sup> and again for a period beginning in 1931,<sup>59</sup> the exotics recorded there in 1939 (Table 6.8.1) may have been planted by the lessees.

The Silvermine reserve, although treated as the property of the Municipality of Cape Town (Table 6.8.1), still belonged formally to the forestry department as part of the Tokai forest reserve. Transfer of the Silvermine reserve to the municipality took place in 1948.<sup>60</sup>

The area under the City Forester's jurisdiction was increased in 1940 when three privately-owned estates were acquired. Two of them were "Highlands Deer Park" and the adjoining "Rocklands" on the northern slopes of Table Mountain.<sup>61</sup> With the inclusion of these properties, the Kloof Nek reserve now extended along the slopes below the Devil's Peak Extension (operated by the forestry department).<sup>62</sup> The third property acquired by the municipality at this time was "Sanddrift", near Milnerton, in the north-western part of the Cape Flats.<sup>63</sup>

One of the first projects tackled by the newly organised forestry administration was the construction of a series of paths in the mountain areas of the Peninsula. These fulfilled the dual purpose of providing access for fire-fighting and serving the recreational needs of the public.<sup>64</sup>

Another project was a more concerted effort to remove pest plants. Between 1940 and 1944, 3,8 ha were cleared of hakea at Orange Kloof, 86 ha at Rocklands and Highlands, 49 ha at Silvermine and 202 ha at Sanddrift.<sup>65</sup> Removal of *Acacia longifolia* and *Nicotiana glauca* began at Newlands in 1939.<sup>66</sup> Despite the antipathy towards aliens, *P. pinaster* was planted at the Muizenberg drift sands in 1948.<sup>67</sup> A new use for hakeas was found when branches were used to form screens to protect newly-planted trees at a housing subdivision at Kewtown on the Cape Flats.<sup>68</sup>

On the city's mountain lands an afforestation program based on the use of *P. radiata* was implemented by the City Forester. The public was assured that trees would not be planted in "hard and fast lines" and that hardwoods would not be used, so that these new plantings would "tone in with the landscape and locality".<sup>69</sup> At the forest stations at Silvermine, Orange Kloof and Kloof Nek this plan was followed, although on a small scale, until 1945.<sup>70</sup> The onset of World War II made imported timber expensive and this justified the construction of a timber mill at Newlands to exploit the mature trees there.<sup>71</sup>

In 1947 a revised policy was adopted. Now, "ornamental and scenic tree planting in the forest areas" was accepted as a legitimate function of the City Forester.<sup>72</sup> It was perceived that public opinion favoured the enhancement of the aesthetic beauty of the forested areas of the mountains, and it was decided that there should be "a gradual transition from rather sombre pine forests to attractive mixed forests through more diversified planting".<sup>73</sup> The hardwoods *Eucalyptus cladocalyx*, *E. diversicolor*, *Populus deltoides* and *Fraxinus americana*, as well as *Pinus canariensis* and other tree species, both exotic and indigenous, were then gradually introduced to the forest areas, even while *P. radiata* continued to be planted.<sup>74</sup>

A further justification for the use of other exotics was their reputed value in decreasing the dangers of fire. There was a serious fire on Table Mountain and Lion's Head in January 1950 and this prompted the construction of more access roads to facilitate fire-fighting and the clearing of a series of firebreaks.<sup>75</sup> As it had been noted that the "glades of poplars" in Orange Kloof appeared to have "helped to reduce fire hazards",<sup>76</sup> many of the firebreaks were planted with "fire-resistant" trees. In at least one case, this term meant eucalypts.<sup>77</sup> That it may also have meant acacias is suggested by the fact that in recent years the Divisional Council of the Cape has been obliged to clear alien acacias from firebreaks.<sup>78</sup> On the other hand, those acacias may have spread to these disturbed sites from elsewhere.

By 1954 sufficient trees in the municipal forests had reached maturity that a system of sustained-yield harvesting for timber could be implemented. Thereafter, clearfelling and replanting became a regular part of the forestry program.<sup>79</sup>

## 6.5 The Retreat of the Forestry Department

The next stage in the retreat of the forestry department from the Cape Town region began in 1947. In that year the last planting occurred at Eerste River reserve. This reserve then achieved its maximum of 3 529 ha "afforested" and 879 ha "reclaimed other than by afforestation".<sup>80</sup> It has been noted already (Section 6.1) that the maximum area of "afforested" land at Bellville reserve was 2 037 ha. Thus, over these two reserves, which occupied virtually the whole of the eastern side of the Cape Flats, a total of 5 566 ha had been afforested, that is, deliberately sown with *A. cyclops* and *A. saligna*, by the forestry department.

In 1947 there was a massive transfer of land from the Bellville reserve to other government and local government authorities, involving 997 ha.<sup>81</sup> Over the next two years both Uitylucht and Ottery forest reserves ceased to exist as the last parcels of land were transferred to new owners.<sup>82</sup>

In 1951 the department expanded briefly into a new drift sand area in the region. This was at Witsands, south of Kommetjie on the west coast of the Cape Peninsula.<sup>83</sup> This was not a major undertaking and it appears that marram was the main plant used, although on at least two occasions "other grasses and shrubs" were planted there as well. It may be surmised that those shrubs included *A. cyclops* and/or *A. saligna*, as those species were still being used in the department's coastal reserves elsewhere in the Cape at that time.<sup>84</sup>

The forestry department's plantations were reduced still further when a serious fire destroyed the whole of the Hout Bay forest in 1959.<sup>85</sup> The dead trees were subsequently cut down and the area has been allowed to revert to a quasi-natural state.

The depletion of the department's pine forest resources continued in 1962 when the Devil's Peak Extension reserve was returned to the Municipality of Cape Town after 60 years of management.<sup>86</sup> The city now had control of all land on the northern slopes of Table Mountain and the western and north-western slopes of Devil's Peak.

The last stage in the retreat of the forestry department was reached in the period 1969-1974. The remaining portions of the three largest reserves on the Cape Flats, namely Strandfontein, Eerste River and Bellville, were handed over to new owners in that period.<sup>87</sup> Thus, the department's holdings in the region were reduced by 1976 to Cecilia, Devil's Peak and Tokai forest plantations, together with Blaauwberg drift sand reserve.<sup>88</sup>

The decline in the forestry department's influence in the Cape Town region is summarised in Table 6.8.2. The table shows that the fifteen reserves owned by the department at various times covered a total area exceeding 197km<sup>2</sup>, of which 114km<sup>2</sup> (58%) were affected by planting activities. Of that total planted area, only 11,6km<sup>2</sup> (10,2%) continues to belong to the forestry department today. Thus, present-day patterns of land ownership give little hint of the major role played in the past by the department in altering the natural environment of the Cape Town region by the planting of exotics. The major clue to this role is provided by the wide distribution of certain exotic species, the legacies of former plantations. Without the knowledge that the forestry department's holdings were formerly much more extensive, as indicated in Table 6.8.2, one would tend to explain the occurrence of those exotics in terms of natural dispersal from a few limited areas of plantation.

## 6.6 Municipal Activity

There is insufficient information available about the reserves operated by the Municipality of Cape Town for a table analogous to Table 6.8.2 to be constructed, but all of the reserves listed in Table 6.8.1 still exist today.

The municipality continued its afforestation activities both in the Cape Town region and further beyond. In the period 1954 to 1975, 2 409 ha were afforested. The effect of this was short-lived, however, for in the years 1972 to 1975 a total of 1 876 ha of municipal plantations was destroyed by fire.<sup>89</sup>

Clear-felling of forested land occurred in certain areas, particularly on the north-western slopes of Devil's Peak (which had originally been afforested by the forestry department). Aerial photographs indicate that this area was almost totally covered with trees in 1960 but that most of them had been removed by 1977.<sup>90</sup> Since 1975, pines have also largely been cleared from the eastern face of Devil's Peak and some of the buttresses of the eastern escarpment of Table Mountain. The fact that labourers have been able to work on the steep slopes proves that they are accessible, contrary to Roux's belief.<sup>91</sup> The suggestion that the pines may have been planted there by the forestry department in earlier times (Section 5.4.2) is therefore not untenable. It is not necessary to assume that dispersal of seed from plantations below was the only possible means of their establishment.

While this forestry activity was in progress, stabilisation of sand dunes at Retreat and along the coast of False Bay continued.<sup>92</sup> Pest plant eradication programs on City lands were intensified.<sup>93</sup> Nevertheless, as late as 1964, there was a report of wattle being planted at a camping site at Sandvlei.<sup>94</sup>

The Divisional Council of the Cape was also involved with drift sand

control in the early 1970s. This was revealed in a report that "sand-fixing species" (a term that could well have included acacias) were sown at Swartklip, at Witsands and at Blaauwberg and Melkbos in this period.<sup>95</sup>

## 6.7 Summary of the Period 1845-1975

This historical survey of man's role in the establishment and spread of the thirteen pest plant species in the Cape Town region is now complete. By the nature of the topic, the quality of the source material is variable. While a great deal has been said about the forestry department's role, less information on municipal activity has been presented, while the part played by private individuals has been but sparsely covered. Likewise, certain areas of the Cape Town region have received considerable attention, while others have been ignored, for want of material.

Despite these limitations, a series of maps has been prepared to show the areas where the pest plants are known to have been planted in the region as a result of this study (Maps 4 to 16). They are visual representations of the information that has been presented verbally in Chapters 4 to 6 and they stress the spatial rather than the temporal component of that information. The maps obviously depict minimum estimates of the areas affected by planting, since all such activity has not been recorded. Thus, areas outside those indicated on the maps may also have been planted with one or more of the pest species. It should also be noted that the fact that an area was once planted with a certain species does not mean that that species necessarily occurs there now. It may have died out or it may have been eradicated by fires or by mechanical clearing.

## 6.8 Tables

Table 6.8.1 Area (ha) of forest and mountain land in the Cape Peninsula controlled by the Municipality of Cape Town, 1939<sup>96</sup>

Reserve	Total area	Area occupied by indigenous forest	Area occupied by exotic forest
Kloof Nek	1 069	65	170
Newlands	208	16	191
Top of Table Mountain	607	2	61
Orange Kloof	526	65	111
Silvermine	567	0	4
Muizenberg Mountains	824	0	0
<b>Total</b>	<b>3 801</b>	<b>148</b>	<b>537</b>

TABLE 6.8.2 Temporal and spatial information relating to reserves owned by the forestry department and its predecessors in the Cape Town region, 1845-1975<sup>97</sup>

Reserve	Planting in	Reserve	Max. area		Max. planted		Planted area (ha) remaining in the reserve in 1975
	reserve begun	relinquished	of reserve	year	area in reserve	year	
	year	year	ha		ha		
Uitvlugt/Epping	1845	1948	2 188	1898	1 579	1917	0
Bellville	1858	1974	2 961	1915	2 037	1937	0
Tokai	1884	still exists	2 652	1902	1 194	1918	648
Table Mountain	1885	1905	-	-	67	1901	0
Rogge Bay	1887	1891	-	-	-	-	0
Kuils River	1889	1891	370	1889	370	1891	0
Eerste River	1891	1974	7 235	1932	4 408	1947	0
Springfield	1893	1907	47	1893	3	1893	0
Devil's Peak	1893	still exists	337	1914	326	1913	86
East End	1895	1906	13	1895	13	1901	0
Ottery	1897	1949	88	1905	88	1905	0
Cecilia	1899	still exists	797	1916	166	1915	156
Strandfontein	1898	1969	1 793	1897	603	1955	0
Blaauwberg	1909	still exists	1 158	1940	478	1947	274
Witsands	1951	1969	104	1951	32	1959	0
<b>Total</b>			<b>19 743</b>		<b>11 364</b>		<b>1 164</b>

## 6.9 Notes

1. D. Fairbridge: Gardens of South Africa (1924), p.77.
2. D. Fairbridge: Gardens of South Africa (1924), p.55.
3. UG47-1919 Report of the Chief Conservator of Forests; UG11-1932 Forestry Development in South Africa and Annual Report of the Department of Forestry.
4. UG50-1913 Report of the Chief Conservator of Forests (Herein: Plate entitled "Artificial planting on the slopes of Devil's Peak, Table Mountain, Cape").
5. UG50-1913 Report of the Chief Conservator of Forests; UG9-1924 Forest Department Annual Report; UG44-1941 Annual Report, Division of Forestry; UG24-1950 Department of Forestry Annual Report.
6. UG7-1921 Report of the Chief Conservator of Forests; UG9-1924 Forest Department Annual Report.
7. The distinction between "afforested" and "reclaimed other than by afforestation" was first made in UG57-1918 Report of the Chief Conservator of Forests, Table V, but no indication was given there of which species were involved. In UG7-1921 and UG14-1923 Report of the Chief Conservator of Forests, it was stated that *Acacia cyclops* and *A. saligna* were sown at Bellville. In UG15-1925 Forest Department Annual Report, it was stated that 28 ha had been planted with marram there while another 10 ha had been sown with seeds of wattle and pyggras. It is thus clear that both types of reclamation were proceeding at that time. Table A in UG11-1932 Forestry Development in South Africa and Annual Report of the Department of Forestry, showed that 36 ha of drift sands at Bellville that had been "reclaimed otherwise than by afforestation" had been excised, while simultaneously 36 ha had been added to the area "afforested". In UG37-1932 Forestry Development in South Africa and Annual Report of the

Department of Forestry, it was reported that 270 ha of drift sands, chiefly at Bellville and Eerste River, that had previously been reclaimed with grasses, were sown with tree seeds. It is thus clear that a method had evolved of establishing a cover of grasses and then growing trees. As *A. cyclops* and *A. saligna* are the only woody species mentioned in the reports in this period, it must have been those species that were being employed as trees in this "afforestation" program.

8. UG7-1921 Report of the Chief Conservator of Forests.
9. UG6-1927 Forest Department Annual Report.
10. UG14-1923 Report of the Chief Conservator of Forests.
11. The last report of the use of refuse was in UG4-1929 Department of Forestry Annual Report.
12. 3/CT 1/7/1/26 Mayoral Minutes, 1931, p.10; City of Cape Town: Annual Report of the City Engineer and Surveyor, 1932, p.31.
13. UG46-1938 Division of Forestry Annual Report.
14. N.L. King: Historical sketch of the development of forestry in South Africa (1938), p.6.
15. UG14-1923 Report of the Chief Conservator of Forests.
16. UG6-1927 Forest Department Annual Report.
17. Government Gazette, 15.4.1932, p.75 (Government Notice No. 490); Surveyor-General's Office: Plan No. 5520.
18. UG38-1935 Division of Forestry Annual Report.
19. UG46-1938 Division of Forestry Annual Report.
20. UG9-1924 Forest Department Annual Report.
21. UG21-1926, UG6-1927 Forest Department Annual Report.
22. 3/CT 1/7/1/22 Mayoral Minutes, 1925, Appendix 2, p.ii.
23. 3/CT 1/7/1/20 Mayoral Minutes, 1919, Appendix 6.
24. 3/CT 1/7/1/22 Mayoral Minutes, 1924, Appendix 6, p.ii; Mayoral Minutes, 1925, Appendix 6, p.ii; 3/CT 1/7/1/23 Mayoral Minutes, 1926, Appendix 6, p.iv.

25. 3/CT 1/7/1/27 Mayoral Minutes, 1932, Appendix 3, p.32; City of Cape Town: Annual Report of the City Engineer and Surveyor, 1939, p.41.
26. The practice of "bushing" is described in J.D.M. Keet: Report on Drift Sands in South Africa (1936), p.33.
27. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1936, p.31.
28. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1938, p.36.
29. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1939, pp.38,41.
30. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1941, p.38.
31. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1942, p.35.
32. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1944, pp.10-11; 1945, pp.10-11.
33. BRON-AGR 45 Correspondence Files, Folio No. 157, Vol. 1 Nomenclature of Forest Trees, Etc.: Hutchins - Under-Secretary for Agriculture, 8.5.1894.
34. BRON-AGR 456 Correspondence Files, Folio No. 3461 Fodder Trees: MacOwan - Under-Secretary for Agriculture, 24.1.1902.
35. R. Marloth: *Das Kapland* (1908), p.78.
36. 3/CT 1/4/5/4/1/10 Improvements and Parks Committee Minute Book, 8.5.1922, pp.165-166.
37. 3/CT 1/7/1/23 Mayoral Minutes, 1926, Appendix 6, p.iii; 3/CT 1/7/1/35 Mayoral Minutes, 1940, p.32.
38. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1935, p.4.
39. Trigonometrical Survey Office: South Africa 1:250 000 topographical sheet 3318 (1977).

40. UG53-1936 Division of Forestry Annual Report, pp.6-7.
41. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1935, p.4.
42. UG53-1936 Division of Forestry Annual Report, pp.6-7.
43. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1939, p.42.
44. UG46-1938 Division of Forestry Annual Report.
45. E.P. Phillips: The naturalized species of *Hakea* (1938).
46. Union of South Africa: Act No. 42 of 1937 (Weeds Act, 1937); Government Gazette, 12.8.1938, pp.434-436 (Proclamation No. 161).
47. R.S. Adamson: The Vegetation of South Africa (1938), p.95.
48. R.S. Adamson: The Vegetation of South Africa (1938), p.95.
49. R.S. Adamson: The Vegetation of South Africa (1938), p.228.
50. C.L. Wicht: Report of the Committee on the Preservation of the Vegetation of the South Western Cape (1945).
51. 3/CT 1/7/1/33 Mayoral Minutes, 1938, p.12.
52. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1939, p.38.
53. H.W.J. Picard: Grand Parade (1969), p.150.
54. 3/WBG 2 Minutes, 12.9.1887, p.143; 19.9.1887, p.146.
55. 3/WBG 2 Minutes, 5.3.1888, p.195.
56. 3/CT 1/4/4/4/1/16 Electric and Water Works and Fire Brigade Committee Minutes, 8.4.1931, p.340.
57. 3/WBG 2 Minutes, 11.5.1891, pp.551-552.
58. 3/CT 1/4/4/4/1/16 Electric and Water Works and Fire Brigade Committee Minutes, 10.6.1931, p.410.
59. 3/CT 1/4/4/4/1/16 Electric and Water Works and Fire Brigade Committee Minutes, 8.4.1931, p.359; 10.6.1931, p.410.
60. Government Gazette, 16.7.1948, p.165 (Government Notice No. 1458); UG24-1950 Department of Forestry Annual Report.

61. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1940, pp.42-43.
62. MAP REGISTER 1/69 North West Section of the Cape Peninsula, ca. 1900.
63. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1940, p.43; Trigonometrical Survey Office: South Africa 1:50 000 sheet 3318CD (1970).
64. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1939, p.42; 1940, p.46; 1941, p.38; 1942, p.36; 1944, pp.10-11.
65. Totals calculated from data in City of Cape Town: Annual Report of the City Engineer and Surveyor, 1940, 1941, 1942, 1943, 1944.
66. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1939, p.42.
67. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1948, p.8.
68. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1948 (Herein: Plate opp. p.6).
69. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1941, pp.38-39.
70. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1941, 1942, 1943, 1944, 1945.
71. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1940, p.42.
72. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1947, pp.9-10.
73. City of Cape Town: Annual Report of the City Engineer and Surveyor, 1949, p.10.
74. City of Cape Town: Annual Report of the City Engineer, 1949, 1950, 1951, 1952, 1953, 1954.
75. City of Cape Town: Annual Report of the City Engineer, 1950, p.10.

76. City of Cape Town: Annual Report of the City Engineer, 1951  
(Herein: Plate opp. p.11).
77. City of Cape Town: Annual Report of the City Engineer, 1953  
(Herein: Plates opp. pp.23-25).
78. Divisional Council of the Cape: Report by the Chairman, 1975-76,  
p.37.
79. City of Cape Town: Annual Report of the City Engineer, 1954,  
pp.21-23.
80. UG79-1948 Department of Forestry Annual Report, Table III.
81. UG79-1948 Department of Forestry Annual Report.
82. UG26-1948, UG24-1950 Department of Forestry Annual Report.
83. UG26-1953 Department of Forestry Annual Report, Table III; Trigonometrical Survey Office: South Africa 1:50 000 sheet 3418AB&AD (1970).
84. UG35-1956, UG33-1959 Department of Forestry Annual Report.
85. RP20-1961 Department of Forestry Annual Report.
86. RP58-1965 Department of Forestry Annual Report.
87. RP19-1971, RP51-1976 Department of Forestry Annual Report.
88. RP39-1977 Department of Forestry Annual Report, Tables 3.1.1 and 3.4.  
Devil's Peak plantation was included in Cecilia forest reserve in Table 3.1.1, because the two units were administered as one reserve by this time (RP37-1968, RP21-1970 Department of Forestry Annual Report).
89. Totals calculated from data in City of Cape Town: Annual Report of the City Engineer, 1954-1975.
90. Trigonometrical Survey Office: Aerial Photographs, Job No. 454, Photographs Nos 7573-7574, 1:36 000 (1960); University of Cape Town, Department of Land Surveying, Coastal Photogrammetric Research Unit: Aerial Photographs, Job No. 282, Photographs Nos 268-269, 1:18 000 (1977).
91. E.R. Roux: The Australian acacias in South Africa (1964), p.138.

92. City of Cape Town: Annual Report of the City Engineer, 1966, 1972.
93. City of Cape Town: Annual Report of the City Engineer, 1969, p.31.
94. City of Cape Town: Annual Report of the City Engineer, 1964, p.22.
95. Divisional Council of the Cape: Report by the Chairman, 1971-72, p.12.
96. Data extracted from City of Cape Town: Annual Report of the City Engineer and Surveyor, 1939, p.38, and modified on the basis of revised information in City of Cape Town: Annual Report of the City Engineer and Surveyor, 1940, p.42.
97. All information in this table has been compiled from an analysis of the sources used in this study. A dash (-) indicates that information in this category is not available.

## CHAPTER 7

## DISCUSSION AND CONCLUSIONS

"The general and extensive planting of trees I consider the first practical measure which should be adopted with a view to the development of the agriculture of the [Cape] Colony."<sup>1</sup>

"Of the many activities which have gone into the making of the South Australian landscape, the clearing of the woodland must have brought about the most striking and widespread transformation. One has only to realize that most of the open country in the agricultural areas of today was once clothed in a dense stand of timber to appreciate the work that has gone into the using and subduing of the woodland during the last one hundred years."<sup>2</sup>

## 7.1 Planting by Man: An Important Process in Aiding the Spread of the Pest Species

### 7.1.1 The pest plants as part of the relict landscape

This historical investigation of man's relationship with 13 alien plants in the Cape Town region indicates unequivocally that deliberate establishment by man has been a major process in aiding the spread of those plants. The relative importance of that process varies among the species, but all have been affected by it. While some of the species have also been grown as crops, they have all been used as "landscape modifiers" (to use Bates's terminology - see Section 1.4.9). This study confirms Bates's observation of the worldwide tendency to use Australian woody plants for that purpose. It also provides partial support for the hypothesis made in Section 1.7 that the fact that many of those species occur as naturalised plants in both the Cape and New Zealand is a consequence of their having been widely planted in both regions.

As a result of the evidence for widespread planting presented in this study, it is clear that in the Cape Town region, at least, an ecological assessment of a stand of pest plants should not begin from the premise that the plants dispersed there from elsewhere and invaded, suppressed and eventually replaced the natural vegetation. Instead, it should take into consideration the possibility that the plants in question are the remnants or descendants of an earlier planting episode. It should further consider that such planting may have involved clearing or burning of the original vegetation and ploughing or trenching of the ground, to the extent that the original plant community was completely eradicated.

These considerations place one's interpretation of the aggressiveness of the pest plants *vis-à-vis* the indigenous flora in a different perspective. They also indicate the need for a critical reappraisal of the contention that the "evidence of spread and establishment [of the pest plants] everywhere to be seen in uncontrolled, infested areas" is proof that fynbos is under threat of total suppression.<sup>3</sup> Such infested areas may actually be the remnants of old plantations.

From the point of view of the historical geographer, old plantations are relics: "indicators of the ever-moving frontiers of the past which make up the ecology of the present".<sup>4</sup> Like other relics, such as old farmhouses,<sup>5</sup> covered bridges<sup>6</sup> and dry stone walls,<sup>7</sup> they represent stages in the evolution of the present man-made landscape and reflect the customs and attitudes of former times.

The three last-named types of relics have all been cited as worthy of preservation as historical monuments. In one case this was because they offer "relief from the emerging sameness of place by providing varied environmental experiences historically derived and defined, and [they serve] to remind us of our environmental origins in less complicated technological times".<sup>8</sup> A dry stone wall on the northern slopes of Table Mountain has been considered worth preserving because it is "one of the last remaining relics of an era of farming prior to the invention of barbed wire".<sup>9</sup>

As hedges of hakea species performed a role similar to that of such walls in the 19th century, it could be argued that stands of hakea should also be preserved. Such an argument would be unsupportable because of the possibility that hakea would spread into adjacent fynbos. Nevertheless, contemplation of such an argument adds a new dimension to one's perception of a stand of hakeas (or other pest species).

### 7.1.2 Relative importance of planting to various species

As mentioned above, the extent to which the pest plants have been deliberately established varies from species to species. An attempt to assess this variation is now presented.

The information on planting in Chapters 3 to 6 is of several kinds. There is the spatial information summarised in Maps 4 to 16. Next, there is the quantitative information on distribution of seeds and transplants such as that presented in Table 5.5.1. Then there is qualitative information from the text, such as comments by Brown and MacOwan on the planting of particular species, as well as the various plant catalogues issued from time to time by the forestry department.

Because those items of information are of different kinds, it is not possible to give them numerical values and then, by an additive process, calculate a score for each species by which the extent to which it has been planted may be rated. Nevertheless, I believe that it is possible, by a combination of objective and subjective interpretation of the information referred to in the previous paragraph, to make an assessment of the importance of human activity in aiding the spread of each of the species. The species can then be grouped into categories according to the degree of human influence. The results of my assessment are set out in Table 7.9.1.

It is difficult to draw any conclusions about the six species in the intermediate category in Table 7.9.1, but the species in the two extreme categories merit comment. Those for which human agency has played a major role (*Acacia cyclops*, *A. saligna*, *Hakea suaveolens* and *Pinus pinaster*) have been so widely influenced by this factor, that their present-day distribution must largely reflect this initial dispersal. Therefore, one cannot say that they are invasive simply because they are widespread today. Evidence for invasive tendencies must be sought by repeat mapping studies, as discussed in Section 1.2.

Conversely, the species in the third category, that is, those for which there is little evidence of active dispersal by human agency (*Acacia longifolia*, *Albizia lophantha* and *Hakea sericea*), must, if found to be widespread, owe their distribution pattern largely to their own invasive powers. This conclusion must be interpreted with caution, in view of the fact that this study has not necessarily traced all planting activity for every species.

### 7.1.3 Reasons for planting

This study also shows that the reasons for planting the pest species in the past were more numerous than has previously been thought. Table 7.9.2 sets out the reasons in regard to each species. It shows that, in addition to the well-known justifications: drift sand control, production of fuel and timber, and the provision of hedges for shelter and security, there were other, equally important reasons. The latter included: production of tanning bark, shelter for other species, reduction of fires, amelioration of climate and production of railway sleepers.

There was another reason, one to which it is difficult to apply a label, but one that was nevertheless very real. This was the apparently innate urge to plant trees evidenced by many of the men whose names recur in this history. While they generally cloaked that urge in pragmatic trappings, it is quite evident from their writings that they gained pleasure from seeing an apparently bare landscape (albeit one covered with fynbos) transformed to a woodland or forest of exotics. This urge manifested itself in activities such as the effort to afforest Table Mountain, the granting of financial incentives for tree-planting and, in the 20th century, the "afforestation" of the Cape Flats.

In some cases this fondness for trees can be explained as resulting from their training in forestry, for example, Lister, De Vasselot and Hutchins. Others lacked that training, but it may be that it was their foreign origins that made them unappreciative of the natural vegetation of the Cape, for example, Smith, Brown and Heywood. Both De Vasselot and Hutchins were also from abroad.<sup>10</sup>

It should be said in Brown's defence that he advocated the use of indigenous trees but, noting how slowly they grew in comparison with exotic species, he felt obliged to promote the latter. During his term as Colonial Botanist, the Cape Colony experienced a severe drought, as we have seen. Since he believed that trees would increase the rainfall, his duty obviously lay with fast-growing trees.

The other name that is mentioned frequently in this history is that of MacOwan. While he did advocate the planting of exotic species, he was more selective in his approach. The titles of several of the reports he produced in the 1890s show that he deplored the indiscriminate use of exotic plants, namely, "Identification of an Australian fodder grass... and the harkening after foreign novelties to the neglect of better native plants";<sup>11</sup> "Comparison of the 'Kangaroo Thorn' of Australia... with our much superior hedge-plant *Lycium afrum*, L."; "Identification of *Maclura aurantiaca*, Nutt.... and its inferiority as a hedge plant compared with several native bushes".<sup>12</sup>

The obsession of these men (other than MacOwan) with exotic plants reflected the era to which they belonged. As has been mentioned, the 19th century saw the proliferation of botanical gardens first in Britain and later in her colonies. In both New Zealand and Australia, acclimatisation societies flourished in this period also. Their purpose was to introduce and foster exotic animals and, to a lesser extent, plants.<sup>13</sup> In summarising the effect of this acclimatisation phase in New Zealand, A.H. Clark described the approaches to a farm in South Canterbury as follows:

"... one walks through flocks of English sheep grazing on English grasses under the spreading limbs of English oaks."<sup>14</sup>

It appears from this present study that in the Cape there was no need for acclimatisation societies to be formed to introduce exotic plants, because governmental agencies were already fulfilling that role.

It is only in the 20th century that the perception of the indigenous flora by the residents of these southern regions has changed to a widespread appreciation of its intrinsic values.<sup>15</sup> In the Cape, MacOwan appears to have been one of the instigators of this change in attitude. This present study has traced the waning interest in the growing of exotics that was a concomitant of the waxing enthusiasm for indigenous plants in the Cape Town region and has shown how the present antagonistic attitude towards the pest species developed.

#### 7.1.4 Factors favouring planting

Apart from the reasons for the planting of exotics discussed in the previous section, a number of causal factors may be recognised. These factors at various times and places played a role in determining the distribution of certain species.

The basic factor was the paucity of trees in fynbos, this being aggravated by the early destruction of most of the forests that had occurred on the mountains near Cape Town. When certain exotic trees and shrubs were found to be suited to the Cape environment, their rapid growth and prolific production of seeds provided the positive feedback that ensured their increasingly wider use.

Another factor was the severe drought of the 1860s. As discussed above, Brown felt obliged to encourage the planting of exotic trees and shrubs

in order to ease the situation created by these unusually dry conditions.

The advent of the railway in the 1860s can also be viewed as an important influence determining the use of exotic woody plants. Because of the lack of coal deposits in the western Cape,<sup>16</sup> plantations to produce wood for fuel were encouraged. Later, plantations of *Pinus pinaster* were established at Uityvlugt (which later became Pinelands and Epping) expressly to provide timber for railway sleepers. Another impact of the railway was the number of fires started by sparks from locomotives. Such fires caused acacias, hakeas and myrtles to flourish alongside the line in the plantation that occupied what is now the site of the Maitland cemetery. Although it is not recorded in this history, it is obvious from casual observation at such places as Sir Lowry's Pass in the mountains east of the Cape Flats that fire belts of exotic trees have been planted in the past in an effort to prevent the spread of fires from railway lines.

On the Cape Flats there was an association between the planting of *Acacia cyclops* and *A. saligna* by the forestry department, on the one hand, and the disposal of Cape Town's refuse, on the other. This began in 1877 and continued until 1928. From the comments of those responsible, it is obvious that they believed that some form of fertiliser was necessary for the establishment of the acacias and the refuse served this purpose well. Thus, the availability of the refuse can be seen as yet another factor responsible for the promotion of the planting of alien species. The fact that fertiliser was deemed so important casts doubt on the ability of the acacias to invade nutrient-deficient mineral sand unaided. It also suggests that much of the improvement of the soil of the Flats that has made it more suitable for agriculture and that has been attributed to the acacias<sup>17</sup> may actually result from its enrichment by Cape Town's refuse.

Another factor to be taken into account is the impact of the Australian bug (*Icerya purchasi*) from the early 1870s until 1892. Because

*Acacia saligna* was immune to the insect, it was widely planted. Because biological control was introduced to reduce the insect's depredations on citrus trees, this insect that might have prevented *Acacia mearnsii* and *A. melanoxylon* from becoming pests was effectively eliminated as a control mechanism.

The temporary confusion between *Acacia mearnsii* and *A. saligna* in Cape Town between 1878 and 1885 can also be viewed as a factor in the spread of the latter species. Because *A. saligna* was mistakenly thought to be the prime source of tannin, it was planted far more widely than would have been the case otherwise.

For *Pinus pinaster*, a critical factor in its wide spread was the practice of *in situ* sowing introduced in the 1890s to the forest reserves on the mountains of the Cape Peninsula. The copious quantities of seed distributed in this way extended the plantations far beyond that which could have been achieved by the slower process of methodical transplanting.

The failure of the bark of *A. saligna* on the export market in the early 1890s was another important factor. This led in some cases to the abandonment of stands of that species and in other cases to the practice of burning them as part of the process of exploiting them for firewood. As burning encourages the germination of the seeds, this may have caused a proliferation of the species in areas where it would otherwise have died out.

On the mountains the construction of paths and firebreaks in conjunction with forest plantations played an important part in opening up new areas to alien species. The paths allowed ready access to people, some of whom undoubtedly carried seeds on their boots and clothing. Furthermore, the disturbance associated with these paths and firebreaks aided the establishment of aliens, as noted in Section 6.6. This effect can be seen on the Contour Path above Kirstenbosch, for example. Alongside the path, an occasional pest plant occurs. Away from the path, the

dense fynbos is uninfested.

A final factor that may be recognised is the abandonment of certain parts of forest plantations on the higher parts of the mountains. This occurred mainly in the first two decades of this century. As a result, stands of *P. pinaster*, and also other species such as *P. halepensis*, *A. mearnsii* and *A. melanoxylon*, remained untended at scattered localities. Later they provided the focus for resentment against exotics. They also must have acted as sources of seeds from which natural dispersal took place.

## 7.2 Manner and Date of Arrival of the Pest Plants

In Section 1.4.9 it was suggested that information relating to the circumstances of the arrival of each species could be important to our understanding of their behaviour. From this study it is obvious that all of the 13 pest species were introduced deliberately to the Cape. Their arrival was not a matter of chance as is believed to have been the case with *Stipa trichotoma* (one of the potential pest plants listed in Table 1.8.2). The arrival of that species has been attributed to seeds having been caught up in shipments of hay imported from Argentina during the South African War.<sup>18</sup> As an accidental introduction that has successfully invaded areas of the eastern Cape Province, *S. trichotoma* must, in terms of the argument applied by Blaisdell (see Section 1.4.9) be particularly "adaptable and aggressive" when compared with the 13 species in this study, which were deliberately introduced and planted.

This study has not revealed exact dates for the first introduction of any species. Nevertheless, the dates of the earliest known occurrence of each species can be stated. This information is set out in Table 7.9.3.

It may be noted that for seven species the dates given in Table 7.9.3 are later than the dates given as the "first records of plant invaders" in a table in Chapter 3 of Stirton's manual on invasive plants.<sup>19</sup> Careful comparison of those latter dates with the text of Chapter 6 of the same book reveals that they were not supported by documentary evidence, as the following discussion indicates.

In regard to *Pinus pinaster*, it was stated in Chapter 6 of the book that it "was probably introduced to South Africa by the French Huguenots".<sup>20</sup> It is presumably from this tentative statement that the date 1680 given in Chapter 3 was derived. Even so, the first Huguenots arrived in 1688, not 1680.<sup>21</sup>

For the three species of *Hakea*, the date of earliest record was given in Chapter 3 of Stirton's book as 1830, but in Chapter 6 it was stated that they "may have been" or were "probably" introduced "in the 1830s" or "during the 1830s".<sup>22</sup>

For *Acacia saligna* and *A. cyclops*, the earliest dates were given in Chapter 3 as 1833 and 1835, respectively. In the text of Chapter 6, on the other hand, it was stated that the former "could well have been included in the batch of Australian acacias which Baron von Ludwig refers to in a letter in 1835", while it was "probable" that the latter was also one of those.<sup>23</sup>

Of the seven species, only for *Albizia lophantha* was there an unequivocal confirmation elsewhere in the book of the date given in the table in Chapter 3. In Chapter 6 it was stated that "our earliest records" showed that Baron von Ludwig introduced this species to his garden in 1833.<sup>24</sup> Even so, this statement was undocumented and it is not clear what form the earliest records take. Thus, it is not possible to accept this earlier date either.

As it has been shown that none of the seven instances of earlier records has been substantiated, then the dates given in Table 7.9.3 must at

this stage be accepted as the earliest known occurrences of the pest species that are supported by documentary evidence.

It should also be pointed out that the dates given for another three species, *Acacia longifolia*, *A. melanoxylon* and *A. mearnsii*, in the table in Chapter 3 of Stirton's book coincide with the dates given in Table 7.9.3. The dates in the book were derived from information emanating from this present study.

Finally, it should be stated that for the three species not mentioned in the foregoing discussion, *Acacia pycnantha*, *Leptospermum laevigatum* and *Pinus halepensis*, the dates in Table 7.9.3 are earlier than those given in Stirton's book.

### 7.3 History of Australian Acacias on the Cape Flats

Another outcome of this study is that it is possible to revise the history of the introduction of the Australian acacias on the Cape Flats that was presented by Roux in 1961.<sup>25</sup> In Chapters 3 to 6 comparisons with Roux's account have been made where relevant, but now a summary of events is set out in Table 7.9.4.

The table emphasises, firstly, that planting of acacias on the Flats was a continuous process from 1847 to 1947. It is therefore misleading to say, as Roux did, that after 1886 spread of the acacias was largely by natural means. While natural spread may well have been occurring (an assumption), a great deal of deliberate planting was also going on (a fact). Thus, man's role as an agent of dispersal cannot be ignored. A corollary of this is that it is meaningless to seek, as Roux did, a "critical period" in the establishment of these plants, after which natural dispersal replaced planting as the major mode of spread.

To extrapolate further, as some authors have done, and not only say that the acacias dispersed over the Cape Flats but also that they have spread from there and invaded vast areas of the Cape (Section 1.4.7), can also not be substantiated. While this study has concentrated on the Cape Town region, it is quite clear that its history represents in microcosm a process that occurred throughout the Cape of Good Hope and beyond. Exotic plants were distributed far and wide by the Botanic Garden, the Colonial Botanist and the forestry department. They were deliberately planted by individuals, municipalities and government authorities.

Examination of historical documents peripheral to this present study, such as the annual reports of the Grahamstown Public Gardens and the sections of the forestry department's annual reports relating to regions other than Cape Town, provides ample evidence of widespread planting. In particular, the sand dune reclamation schemes carried out by the forestry department along both the western and southern coasts must have played a large role in the dispersal of *Acacia cyclops* and *A. saligna* into those regions. Those schemes began at Port Elizabeth in the 1890s and Port Nolloth and Still Bay in 1901 and were inspired by the successful planting schemes on the Cape Flats.<sup>26</sup>

This study shows that, contrary to the impression conveyed by Roux (and many other authors), control of drifting sand was not the sole reason for which acacias were planted on the Flats. Equally important in some areas were the use of *Acacia saligna* as a nurse plant in plantations of *Pinus pinaster* and its potential as a source of tanning bark. Areas where planting for those purposes took place were not bare, denuded sand drifts; they were covered with natural vegetation which was deliberately destroyed to make way for the acacias.

It is also important to note that it was not only the forestry department that planted acacias on the Flats. Private individuals were responsible for large plantations of *A. saligna*, particularly in the last 20 years of the 19th century. The Municipality of Cape Town also

planted acacias in the 1930s and 1940s.

Table 7.9.4 also indicates that, from a range of acacia species used on the Flats in the earlier stages, there was a gradual reduction in the number employed until, after 1920, only *A. cyclops* and *A. saligna* were being used. This reflects the outstanding success of those two species in that environment.

Finally, Table 7.9.4 reiterates the importance of the forestry department's planting activities in this century. As those activities were referred to as "afforestation" in the annual reports, it was not obvious to the casual reader that they involved large-scale planting of *A. cyclops* and *A. saligna*.

In summary, human agency has played an important role in dispersing Australian acacias, particularly *A. cyclops* and *A. saligna*, over the Cape Flats. It created the wide basic framework of their distribution. While natural dispersal must also have played a role in their spread, it occurred subsequently to the creation of the framework. Its function, therefore, was to fill in the gaps in the basic pattern.

## 7.4 Management Practices on Table Mountain

### 7.4.1 Summary of past management practices

The conservation of Table Mountain (in the broader sense of the term - see Section 2.2) is currently a focus of concern in South Africa. An important aid to the formation of management policies is an understanding of strategies employed in the past, but, as has been pointed out by Moll and Campbell, "the success of much of the past management on Table Mountain is difficult to assess due to lack of documentation".<sup>27</sup> A useful outcome of this present study, therefore, is that it does

document a number of management activities of the past. The major events in this regard are summarised in Table 7.9.5.

The table emphasises the point made several times already in this report that certain areas that do not form part of formal plantations today have done so at some time in the past. Trees that occur in those areas today are the remnants or the descendants of the original trees that were deliberately established and it is not necessary to invoke dispersal as the explanation for their presence.

#### 7.4.2 Eradication of *Pinus pinaster*

The eradication of alien plants and the restoration of indigenous species are major management problems on the mountains of the Cape Peninsula. This study can throw light on the long-term effects of mechanical clearing, the main method of eradication. It shows that in at least two areas *Pinus pinaster* has been successfully eliminated by such clearing. These are on the upper cliffs of the north-eastern side of Devil's Peak and on the western slopes of Constantiaberg. Both are sites of former plantations that were accidentally burnt and were then subsequently cleared of trees. Both are now covered with quasi-natural vegetation (see Sections 6.1, 6.3 and 6.5).

Whether the success of clearing efforts in these two areas can be emulated elsewhere is not certain, for in both of them the rainfall is lower than in the major areas where *P. pinaster* is a problem. Nevertheless, these results support the findings of McLachlan *et al.* that felling of *P. pinaster* is an effective control measure,<sup>28</sup> particularly in conjunction with burning.

### 7.4.3 Paths

Another major problem on Table Mountain is the management of the network of walking paths. A survey of this problem was carried out recently by McLachlan and Moll.<sup>29</sup> The present study adds a certain amount of historical perspective to some of their interpretations.

This study indicates that paths were constructed in the late 19th and early 20th centuries to give access to forestry plantations from lower altitudes, to allow for movement within the plantations, and to link the plantations together, as well as for fire-control purposes. It further indicates that another spate of path-building activity occurred in the early 1940s, when paths were built both to provide access for fire-fighting and to provide recreation for the public.

The fact that many of the paths on the mountain were deliberately constructed indicates that the statement by McLachlan and Moll that "most of the paths have been formed by the trampling of thousands of feet"<sup>30</sup> must be interpreted cautiously. Their statement in regard to the recreational origins of the Thousand Steps in First Waterfall Ravine on Devil's Peak and of the Contour Path is also misleading.<sup>31</sup> The former must have been part of the network of paths constructed for afforestation purposes on Devil's Peak between 1893 and 1909 (Section 5.4.2). The latter was constructed primarily for fire-control purposes (Section 5.3.7).

Likewise, we cannot be certain, without quantitative data, that the numbers of walkers on the mountain have increased dramatically only in recent years, as McLachlan and Moll suggested.<sup>32</sup> It appears that certain paths were more popular in 1909 than now, for at that time the paths on Devil's Peak were said to be heavily used (Section 5.4.2), whereas today, according to McLachlan and Moll, many of them are overgrown,<sup>33</sup> an indication that they are little used.

Several other observations indicate that walking and riding on the paths on the mountain have long been popular recreational activities among the residents of Cape Town. In 1892 it was reported that "many visitors" had ridden the entire length of the Bridle Path from Constantia Nek to the plantation on the lower plateau of Table Mountain.<sup>34</sup> In the month of November 1897, 468 persons were recorded as having visited the water catchment area on the mountain.<sup>35</sup> Finally, in 1912 a "good number" of visitors was said to have walked from Kloof Nek to Waterfall Ravine, along the Contour Path.<sup>36</sup>

## 7.5 Ecological Implications Relating to Alien Plants on Table Mountain

### 7.5.1 Distinction between plantations and stands of invasive plants

In their report on the ecological status of Table Mountain in 1976, Moll and Campbell commented that they had difficulty at times in determining "whether a dense stand of a species was a plantation or merely a dense stand of invasive plants".<sup>37</sup> This present study should enable such a determination to be more readily made in future.

Although those authors were aware that these two major types of stands of pine must exist, they (together with Cowling) made no attempt to differentiate between them in their study of the communities of indigenous plants forming the understorey among stands of pines on the mountain. Instead, they referred to all of their sample plots that contained pines as "invaded by *Pinus* spp.". <sup>38</sup> As a result, their ecological interpretations of the understorey communities were based on the assumption that the communities of indigenous species had been invaded by the pines. They took no cognizance of the opposite possibility that the stand of pines might have been invaded by the indigenous plants.

From this present study it is clear that plantations of pines were established in the late 19th and early 20th centuries on both Devil's Peak and Back Table, the two major sites for the sampling program conducted by Cowling, Moll and Campbell.<sup>39</sup> On Devil's Peak, sowing of *Pinus pinaster* was extended to the summit on both the north-western and north-eastern faces. Cowling *et al.* believed that the afforestation program on Devil's Peak had employed only *P. radiata* from the outset,<sup>40</sup> but this study has shown that *P. pinaster* was the only pine used until 1900 (except for some *P. pinea* sown in the second year, 1894). As they were unaware that the presence of *P. pinaster* could signify a former plantation of that species, they interpreted its presence as resulting from invasion.<sup>41</sup>

#### 7.5.2 Invasiveness of the pest plants

Because this study documents areas where the pest plants have been deliberately established in the past, it should be possible to compare its findings with present-day distributions of those species and thereby to make inferences about their invasive capacity and their ability to persist once established. It was noted in Sections 5.3.6 and 5.3.8 that various exotic trees not considered to be pest plants have persisted at the "Lister Nursery" on Table Mountain since being planted there in the period 1893 to 1900.

The distribution of pest plants on Table Mountain was mapped by Moll and Campbell in 1976. An attempt is made to relate their findings to those of this study in Table 7.9.6.

In Table 7.9.6 the thirteen species are first grouped according to the extent to which this study indicates that they have been deliberately planted on Table Mountain. Then the present-day distribution of each species, as revealed by Moll and Campbell's maps and discussion, is assessed.

It is categorised according to whether it appears to be more extensive than, approximately the same as, or less extensive than, the area of original planting, in the various parts of Table Mountain where this planting occurred.

A particular problem in constructing this table arose from references by Moll and Campbell to the western slopes of Table Mountain and to Orange Kloof. The former area is predominantly privately-owned while the latter was leased to private individuals until the 1930s. Because this present study relied mainly on governmental records, no planting activity in those areas was recorded. This does not necessarily mean, however, that planting of aliens has never occurred there. That problem represents in extreme form the caution with which all the information regarding past planting in Table 7.9.6 must be treated. This study in no way claims to present a complete record of all planting of all thirteen species.

The other major problem of interpretation ensues from the fact that clearing of alien plants, particularly *Pinus pinaster*, is being actively carried out on Table Mountain. The effect of clearing is to conceal the extent of spread that has actually occurred. This becomes particularly important in one's interpretation of the invasiveness of those species whose range today is less extensive than when they were planted. With this proviso in mind, together with that of the preceding paragraph, we move to an interpretation of Table 7.9.6.

If a species occurs more widely now than when it was planted, it may be classed as invasive. If its distribution is similar to that when it was planted, it may be classed as persistent, but not invasive. Finally, if it is less widespread now than when it was planted, it may be classed as non-invasive. To enable the thirteen pest plants to be considered in this way, the information from Table 7.9.6 is presented again in a simplified form in Table 7.9.7. The details relating to the extent of past planting and to the names of localities are omitted

from this second table.

It is clear that there are three groups of species in Table 7.9.7. At one extreme are the species that are recorded only in the "more extensive" category, together with those that occur both in the "more extensive" and "as extensive" categories. For all the species in this group there is evidence that they are invasive, for they occur more widely on Table Mountain that is accounted for by past planting activity recorded in this study.

At the other extreme from that group are those species that occur only in the "less extensive" category, in both the "as extensive" and "less extensive" categories, or in no category. Those species must be considered non-invasive on the evidence used to complete this table, but it must be remembered that deliberate clearing of alien plants may have disguised the actual behaviour of the plants.

The third group comprises those species for which there is conflicting evidence about their capacity to invade, for in some localities they occur more extensively than would be expected on the evidence of past planting, yet in others they occur less extensively.

The species in each of the three groups are now considered in more detail, reference being made to Table 7.9.6 where necessary. There are seven species in the group classed as invasive: *Acacia longifolia*, *A. melanoxylon*, *Albizia lophantha*, *Hakea gibbosa*, *H. sericea*, *H. suaveolens* and *Pinus halepensis*.

For the three species of *Hakea* the localities on which this conclusion is based are the western slopes and Orange Kloof, for both of which there is some doubt about planting activities, as discussed above. Therefore, one cannot conclude unconditionally that they are invasive. Nevertheless, examination of Table 7.9.1 shows that *H. sericea* is one of the three species for which this study found very little evidence of planting in the Cape Town region (in contrast to the other two species of

*Hakea*). This suggests that *H. sericea* is less likely to have been planted at Orange Kloof or on the western slopes than the other two and therefore its classification as invasive appears to have the strongest support.

By the same reasoning, *Acacia longifolia* and *Albizia lophantha*, both of which are shown in Table 7.9.1 as having been little planted in the Cape Town region, are particularly likely candidates for classification as invasive. Thus, it is concluded here that *H. sericea*, *A. longifolia* and *A. lophantha* are particularly aggressive on Table Mountain, having shown definite signs of invasion. Support for this conclusion in regard to two of the species comes from McLachlan *et al.* In their repeat mapping study they found that *H. sericea* and *A. longifolia* were two of the species that occurred more widely in 1976 than in 1959-60.<sup>42</sup>

Another of the seven species in this invasive category that deserves comment is *Acacia melanoxylon*. The evidence for its invasiveness is based solely on its occurrence in Disa Gorge; otherwise, it would merely be classed as persistent. The presence of this species in Disa Gorge can almost certainly be attributed to seeds being washed down Disa Stream from the original plantation on Back Table. This suggests that spread of this species is primarily by water and that establishment may occur only on disturbed stream banks.

We turn now to the three species in the group classed as non-invasive. Both *Acacia pycnantha* and *Leptospermum laevigatum* clearly qualify for this classification on Table Mountain. The former species occurs less widely now than when it was planted, while the latter species has not succeeded in invading the mountain from plantings elsewhere.

The third species in this group, *Pinus pinaster*, deserves closer examination. Table 7.9.6 indicates that its present distribution generally reflects the extent of original planting, except on Devil's Peak where its present distribution is smaller than would be expected from our knowledge of planting activities there. This undoubtedly results from

clearing operations conducted on the Peak, and also, presumably, from the effects of fires.

Even though *P. pinaster* now occurs approximately where it was planted, as stated above, and therefore should be classed as persistent rather than non-invasive, there is other evidence from this study that should also be considered. This evidence comes from the photographs referred to in Section 5.3.6. They show that the original plantation of *P. pinaster* on Back Table comprised several discrete stands. Today those stands have coalesced. It may therefore be concluded that a certain amount of dispersal from the original stands has occurred. Therefore *P. pinaster* can be classed as invasive in this situation.

The third group of species in Table 7.9.7 comprises *Acacia cyclops*, *A. mearnsii* and *A. saligna*. As commented earlier, there is conflicting information about their invasiveness. This may reflect differential success according to varying environmental conditions. Thus, *A. cyclops* is shown to have spread to the western slopes and Signal Hill, whereas it has retreated on Devil's Peak. This may result from the greater proximity to the sea of the first two sites, for *A. cyclops* is generally successful close to the sea.

*Acacia saligna* still occurs on Devil's Peak, where it is known to have been sown in the period 1893 to 1896, whereas *A. cyclops* and *A. pycnantha*, which were also sown at that time, appear not to have persisted. This possibly indicates a greater tolerance by the first species of the environmental conditions of this area, which include a substrate of shale, a relatively low rainfall (compared with other parts of the mountain), and very strong winds.

On the other hand, *Acacia saligna* appears not to have survived on the bridle path from Constantia Nek to Back Table, on Back Table itself, or at Cecilia. It was noted at the time of its planting at Cecilia that it was not a success. Its inability to persist there may be related to the higher rainfall. It might be thought that altitude was an

important factor also, for Back Table is higher than the site on Devil's Peak where *A. saligna* was sown. However, McLachlan *et al.* showed that *A. saligna* was capable of spreading to higher altitudes.<sup>43</sup> It is likely that characteristics of specific sites, such as soil depth, drainage and nutrient supply, are more important in determining the success of *A. saligna* than altitude *per se*.

In regard to *Acacia mearnsii*, Moll and Campbell commented that its "rather peculiar localised distribution" was "probably dependent on areas where specimens were originally introduced".<sup>44</sup> That interpretation is supported by this study in regard to Devil's Peak, as Table 7.9.6 shows, but not in the case of Signal Hill. On the other hand, *A. mearnsii* appears not to have survived at Back Table, Nursery Ravine or Cecilia, which is surprising in view of its observed preference elsewhere for moist habitats. Geological conditions cannot explain the difference as Moll and Campbell's maps show that this species grows on shale, sandstone and granite in various parts of the mountain.

### 7.5.3 Other alien species

Moll and Campbell dealt with a number of alien species other than the thirteen pest plants considered in Table 7.9.6. As a result of this present study it is possible to comment on some of their interpretations in regard to those species.

They noted that on Devil's Peak there was a "localised, but extensive area of *P. radiata* (with some *P. canariensis*)... not under plantation management".<sup>45</sup> This area must represent an abandoned plantation of the kind that is discussed in Section 6.1. Thus the presence of *P. radiata* and *P. canariensis* beyond existing managed plantations on Devil's Peak need not necessarily mean that those species are invasive there, as the

authors appear to have believed. On the other hand, the results of the study carried out by McLachlan *et al.* suggest that *P. canariensis* does have invasive tendencies.<sup>46</sup>

Moll and Campbell's observation of *Pinus pinea* growing within otherwise indigenous forest on the eastern slopes of Table Mountain is of interest. They suspected that the trees had been planted.<sup>47</sup> We know from Section 3.2.4 of this report that the overseer of the *Wittebomepos* was instructed to sow *dennebome* in this area in 1793 and it was surmised that this name may have meant *P. pinea* (Section 3.4.1). This suggests that the stone pines recorded there by Moll and Campbell were planted in the late 18th century or that they are the descendants of ones so planted.

While this study has not been particularly concerned with poplar (*Populus alba*), it has produced some information that can be related to the findings of Moll and Campbell. They noted that the major stands on Table Mountain occurred in areas that once supported indigenous forest (by which they presumably meant the more mesic habitats) and commented that the understorey of these stands consisted largely of scattered indigenous trees.<sup>48</sup> From Section 5.4.2 of this report we know that the ravines at Cecilia plantation were planted with poplars in 1907 and that this was done in the expectation that it would lead to an increased flow of water in the streams. The stands of poplars found by Moll and Campbell must be the result of this planting episode. The indigenous species in the understorey must have invaded the poplar plantations since their establishment. As the other stands of poplar mapped by those two authors are within the Newlands and Orange Kloof forest reserves, it appears highly likely that they too were originally planted as a water-conservation measure.

While many of the foregoing conclusions are tentative, they represent the kinds of interpretation that can be made from historical studies if they are combined with studies of present distribution.

## 7.6 Information for Management of the Pest Plants

It was suggested in Chapter 1 that an historical study of the pest plants might produce information that was useful to those responsible for their control. It is quite clear from Chapters 4 and 5 that for two of the pest species, *Acacia mearnsii* and *A. melanoxylon*, there is a natural enemy whose capacity for severely controlling their population size has been amply demonstrated in the past. This is the Australian bug (*Icerya purchasi*). Despite this, it does not appear feasible to suggest that it be employed now as a biological control agent, because of the threat it poses to the citrus industry. The Australian bug is controlled by the ladybird (*Vedalia cardinalis*) and by spraying with nicotine sulphate to prevent its depredations on fruit trees.<sup>49</sup>

Another form of information that is potentially available from historical studies and is useful for management purposes is the provenance of the pest species. There are two reasons for interest in this aspect. One is that knowledge of the place of origin of a species may lead to the recognition of taxonomic varieties and therefore provide information that is needed for the effective introduction of biological control mechanisms (see Section 1.2). The second reason is that it may be found that the presence of a certain pest plant species in the Cape results from a single introduction from one source area. If that single introduction was characterised by a particularly aggressive genetic strain then the successful spread of that species may be attributable to the founder principle, as that aggressiveness would tend to recur in subsequent generations of the plant.<sup>50</sup>

The present study has not located specific information on the provenance of any of the pest species. On the other hand, it provides a form of negative information in this regard, inasmuch as it shows that multiple introductions of several of the species have occurred. This minimises the likelihood that a single strain was introduced, as the following discussion indicates.

The evidence is of two kinds. Firstly, there is the generalised impression that vast quantities of seeds of exotic species were introduced during the 19th century. While this does not give information relating to particular species, it does mean that there was an increased probability of a species being brought in more than once. The evidence in this regard is set out in Table 7.9.8. It must be stressed that the table is based only on the information recorded in this study and that it therefore must underestimate the total effect.

The second type of evidence in regard to multiple introductions relates to individual species. It was shown by C.E. Duff in 1928 that seeds of *P. pinaster* were imported repeatedly from various parts of Europe in the years 1893 to 1918. The resultant genetic diversity was examined by Duff<sup>51</sup> and later by H.B. Rycroft and C.L. Wicht. The latter two showed that six geographical races of *P. pinaster* occurred in the south-western Cape.<sup>52</sup>

This present study has located evidence for multiple introductions of eight other pest species. This is set out in Table 7.9.9. Again, this may be an underestimate, but in any case, we can say with certainty for those eight species that their presence today does not result from only a single introduction.

For the other four species (other than *P. pinaster*) not included in Table 7.9.9 (*Albizia lophantha*, *Hakea suaveolens*, *Leptospermum laevigatum* and *Pinus halepensis*), it may be stated that no evidence for multiple introductions has been presented in this study. It may be concluded that if any of the thirteen pest species represents a single strain, the most likely candidates are those four species.

## 7.7 Indigenous Vegetation of the Cape Town Region: Some Historical Perspectives

While this study has been concerned with exotic plants, it has also gathered a certain amount of information on indigenous species. The information is of two types. Firstly, there is evidence relating to the natural vegetation as it existed in the past. Secondly, there are reports of the planting of indigenous species.

The former type of information is not very detailed. It consists mainly of allusions to the need to clear the indigenous vegetation before planting of exotics was carried out, for example, at Uitylugt (Section 5.1.1), on Devil's Peak and Lion's Head (Section 5.3.7) and at Cecilia (Section 5.4.2). Such reports emphasise that it was not solely through superior competitive ability that the pest plants flourished.

Another aspect of this type of information is the insight it provides on the original vegetation of the Cape Flats. As remarked in Section 7.3, we can be sure that the Flats were by no means vast stretches of bare dunes in the 19th century. There was still a good cover of natural vegetation in many parts but, as that vegetation was perceived to be "useless bush", it was replaced with aliens.

The second type of information relates to the planting of indigenous species in conjunction with the establishment of aliens. Table 7.9.10 lists seven indigenous species for which planting is recorded in this report and gives details of that planting. In addition, the table indicates the range of each species as described by Adamson and Salter in their Flora of the Cape Peninsula in 1950.

From the table it is evident that the natural habitats of the seven species include sites comparable to those where they are known to have been planted. Therefore, one cannot infer that any of the indigenous species occurs now at a particular site solely because it was planted there in the past. It is more likely that because it already occurred in that vicinity, seeds were readily procurable and therefore it was planted there. Thus it seems unlikely that human activity has

extended the range of any of these species.

It might at first appear that *Leucadendron argenteum* was a possible exception to that conclusion, for its presence on Lion's Head appears anomalous in view of Adamson and Salter's general statement that it occurs on eastern slopes. On Lion's Head it occurs on the southern slopes and it might therefore be thought that this was as a result of its being planted there in the period 1905-1917 and that otherwise it would not occur on Lion's Head at all. In fact, however, Bunbury reported in 1842 that this species was growing naturally "below the peak of the Lion's Head".<sup>53</sup> Thus, it would appear that, as with the other species in Table 7.9.10, planting by man has not extended the range of *L. argenteum*.

One other indigenous species that deserves comment is *Acacia karroo*. While its natural distribution range is very large, including nearly the whole of South Africa,<sup>54</sup> it is generally believed not to include the extreme south-western Cape. Both Adamson and Salter and also Levyns assumed that the occurrence of this species on the Cape Peninsula resulted from artificial introduction from inland.<sup>55</sup> In Section 4.4 of this report it was noted that a species that was referred to at the time as *A. horrida*, but that was probably *A. karroo*, had been planted at the White Sands in 1857. No further planting of *A. karroo* is recorded in this report, but Adamson and Salter noted it on Signal Hill in 1950.<sup>56</sup> Although this present study can provide no direct evidence of its being planted there, there is the general statement in Section 6.1 that a policy of planting indigenous shrubs on Lion's Head and Signal Hill was followed from 1926. That policy could have included *A. karroo*.

## 7.8 Concluding Remarks

In Section 2.1 it was pointed out that this study was interdisciplinary

in concept. The ideas discussed there are further developed in this final Section to emphasise the links between this study and a number of disciplines.

As Barkham has noted, the last millenium is of particular interest to ecologists and nature conservationists who wish to explain the present-day structure and composition of ecosystems. As changes in vegetation in this time period cannot be analysed by means of palynological research, it is necessary to turn to other sources and modes of analysis.<sup>57</sup> This present study, which was based on documentary sources extending through more than three hundred years, has produced evidence of past activities involving man's manipulation of the vegetation cover of the Cape Town region. Many of those activities could not have been detected from field studies alone. The study thus conforms to one of the aims of historical ecology as expressed by Peterken in that it helps to "break the circular argument whereby field observations are held to suggest a certain sequence of development, which in turn enables certain present day features to be explained in historical terms".<sup>58</sup>

Likewise, this study has supported Egler's contention that to understand why plants grow where they do it is insufficient to examine the ecological factors of the site and explain a plant's presence as the product of the interaction of those factors. One must go further, he maintained, and consider the influence of phenomena such as chance, genetics, history and geography.<sup>59</sup> In particular, this study has shown that the distribution patterns of the pest plants can only be understood after their history at the hands of man is taken into consideration.

By stressing man's contribution to the present structure of the vegetation of the Cape Town region, this study should lead to a greater appreciation of the anthropogeneous character of that vegetation. As H. Schluter has pointed out, "a clear distinction between natural and anthropogeneous causes is important both for geobotanical problems and practical forest problems".<sup>60</sup>

When dealing with anthropogeneous vegetation in Europe, one has the problem that large-scale, intensive use of the land by man extends far back into prehistoric times. This was pointed out by H.M. Raup, who added that in North America, on the other hand, the effects of this intensive use are easier to examine because of the existence of a "datum plane" from which to begin the reconstruction of the history of the vegetation: the time of the earliest European settlement.<sup>61</sup> This concept of a datum plane has been shown by this present study to be applicable to the situation at the Cape. While anthropogeneous effects certainly preceded the arrival of Europeans at the Cape, they must have been of lower intensity and, in particular, they did not involve the introduction of alien plant species.

In addition to the difference in intensity of land-use between the indigenous occupants and the European settlers, there is the major difference that the latter left written records. Their activities can therefore be studied by the historian's methods, whereas those of the former are the domain of the archaeologist and the anthropologist. While this distinction between prehistoric and historic is a convenient division, it should nevertheless be borne in mind that the interrelationships of man and plants throughout man's total history form a continuum. R.I. Ford has recently stressed this by suggesting a revised definition of the discipline of ethnobotany. In place of V.H. Jones's definition of it as "the study of the interrelations of primitive man and plants",<sup>62</sup> he defined it as "the study of direct interrelations between humans and plants".<sup>63</sup> He was thus including civilised man's involvement with plants within the purview of ethnobotany. In that sense, this present study could be classed as an ethnobotanical work. It would also conform to G. Carter's concept of ethnobotany as "an ecological science capable of forging a link between geography, botany and ecology".<sup>64</sup>

This study also has obvious connections with a relatively new discipline, that of environmental history. R. Nash has proposed that this field should be concerned with the history of attitudes and actions towards the land, portraying environmental change as evidence of man's values, ideals,

emotions and fears. Man's environment, which is largely man-made, would be seen as an historical document. If read correctly, this document would reveal a society's culture and traditions "as surely as [does] a novel or a newspaper or a Fourth of July oration".<sup>65</sup>

As well as its links with historical ecology, ethnobotany and environmental history, this study can also be classed as historical geography in that it describes the changes wrought by man to the landscape of a region through time. This study has shown that tree-planting must be regarded as one of the important processes responsible for the creation of the present landscape of the Cape Town region. This fact contrasts strongly with the historical geography of Europe and South Australia, where the opposite process, clearing of the woodlands, has been a major force.<sup>66</sup>

The emphasis on tree-planting at the Cape was a direct result of the lack of trees in the indigenous vegetation and this lack is a biogeographical problem in its own right.<sup>67</sup> The fact that the opposing processes of tree-planting and tree-clearing have operated in the mediterranean climate regions of the Cape and South Australia, respectively, serves to emphasise the point made by ecologists and biogeographers that, despite the many similarities among the mediterranean-type ecosystems of the world, there are also important dissimilarities.<sup>68</sup>

While this study is thus applicable to the broad discipline of biogeography, it has its roots particularly in cultural biogeography (or modern historical biogeography) inasmuch as it deals with man's transfer of organisms from their place of origin to other parts of the world. This study has highlighted the deliberate nature of the introduction and spread of certain alien plants in the Cape Town region. It has shown that their arrival was a part of the larger process of wholesale transfer of exotic plants that was particularly characteristic of the late 18th and the 19th centuries. In this regard, the Cape shared the experience of other former British colonies such as those of Australia and New Zealand.

In historical biogeography, efforts to explain the distribution patterns of organisms frequently focus on the question of dispersal: by what route and what mechanism did a given taxon disperse from its ancestral centre of origin? This present study has examined this question in regard to the pest plants and shown that man's role as an agent of dispersal has been critical in creating the broad outlines of the pest plants' distribution patterns in the Cape Town region. In stressing man's role, it does not deny the capability of the plants for natural dispersal. Instead, it emphasises the need for both aspects to be taken into consideration in studies of the pest plants. It is now seen to be inappropriate to assume that the presence of a pest plant at a given site results from its having dispersed there naturally from elsewhere; one must also consider that it may have been planted there.

The centre of origin/dispersal paradigm has in recent years become a topic of debate amongst historical biogeographers.<sup>69</sup> There is a move away from excessive reliance on this model, which has characterised the discipline since the time of Charles Darwin, and towards a greater emphasis on vicariance as an explanation for distribution patterns. The vicariance paradigm sees present-day distributions of related taxa as resulting from the subdivision of the original distribution area of a taxon ancestral to both. In other words, distribution areas of taxa result from subdivision rather than from accretion. In this model, dispersal as a means of creating distribution patterns becomes subsidiary and needs to be invoked only to explain sympatry.<sup>70</sup>

While the centre of origin/dispersal paradigm was pre-eminent in biogeographical reasoning, it is not surprising that the behaviour of alien plants was believed to follow a similar pattern. It seemed obvious that an alien species, once introduced in the past at a particular locality, spread by natural dispersal from that centre of origin to occupy the whole of its present distribution range. Today, as a result of the use of reasoning based on vicariance, a more appropriate working hypothesis is that man created the broad outlines of the species' distribution, while natural dispersal played a subsidiary role

by filling in the detail in that pattern. In general terms, the results of this study confirm that hypothesis for alien woody plants in the vicinity of Cape Town.

## 7.9 Tables

TABLE 7.9.1 An assessment of the role of active human agency in the dispersal of thirteen pest plant species in the Cape Town region, as ascertained in this study

Extent of active human agency	Species (in alphabetical order)
major	<i>Acacia cyclops</i> <i>A. saligna</i> <i>Hakea suaveolens</i> <i>Pinus pinaster</i>
intermediate	<i>Acacia mearnsii</i> <i>A. melanoxylon</i> <i>A. pycnantha</i> <i>Hakea gibbosa</i> <i>Leptospermum laevigatum</i> <i>Pinus halepensis</i>
minor	<i>Acacia longifolia</i> <i>Albizia lophantha</i> <i>Hakea sericea</i>

TABLE 7.9.2 Thirteen pest plant species: reasons given for their planting in the Cape Town region, as ascertained in this study

Species	Reasons for planting											
	Alteration of physical environment					Useful products			Functional purposes			
	Drift sand control	Erosion control	Reduction of fires	Amelioration of climate	Afforestation	Fuel	Timber	Tanning bark	Railway sleepers	Hedges	Nurse plants	Fire belts
<i>Acacia cyclops</i>	X				X					X	X	
<i>A. longifolia</i>	X											
<i>A. mearnsii</i>								X			X	X
<i>A. melanoxylon</i>	X										X	X
<i>A. pycnantha</i>								X				
<i>A. saligna</i>	X	X			X	X		X		X	X	
<i>Albizia lophantha</i>												
<i>Hakea gibbosa</i>										X		
<i>H. sericea</i>												

(continued)

TABLE 7.9.2 (concluded)

Species	Reasons for planting											
	Alteration of physical environment					Useful products			Functional purposes			
	Drift sand control	Erosion control	Reduction of fires	Amelioration of climate	Afforestation	Fuel	Timber	Tanning bark	Railway sleepers	Hedges	Nurse plants	Fire belts
<i>Hakea suaveolens</i>	X									X		
<i>Leptospermum laevigatum</i>	X									X		
<i>Pinus halepensis</i>		X	X	X	X							
<i>P. pinaster</i>		X	X	X	X		X		X			

TABLE 7.9.3 Earliest known occurrence of thirteen pest plant species in the south-western Cape, as ascertained in this study (in chronological order)

Species	Year of earliest known occurrence	Locality	Relevant section in this report
<i>Pinus pinaster</i>	1685-1693	Company's Garden, Cape Town	3.3.3
<i>Acacia longifolia</i>	1827	Cape Town	3.5.1
<i>Pinus halepensis</i>	ca. 1830	"Elsen Kloof" farm, River Sonderend	3.4.2
<i>Albizia lophantha</i>	1835	Claremont	3.5.2
<i>Hakea gibbosa</i>	1835	Half Way House, near Cape Town	3.5.2
<i>Acacia saligna</i>	1848	"Blumenthal" farm, between Claremont and Wynberg	3.5.2
<i>Acacia melanoxylon</i>	1848	Ludwig's-burg Garden, Cape Town	3.5.2
<i>Hakea suaveolens</i>	1850	White Sands plantation, Cape Flats	4.3
<i>Leptospermum laevigatum</i>	1850	White Sands plantation, Cape Flats	4.3
<i>Acacia cyclops</i>	1857	White Sands plantation, Cape Flats	4.3
<i>Acacia mearnsii</i>	1858	Cape Town Botanic Garden	4.5
<i>Hakea sericea</i>	1858	Cape Town Botanic Garden	4.5
<i>Acacia pycnantha</i>	1865	Diep River	4.7

TABLE 7.9.4 Chronological summary of the role of human agency in the introduction and spread of Australian species of *Acacia* on the Cape Flats, as ascertained in this study

Period	Events	Species involved	Relevant sections or tables in this report
1827-1858	Many acacias introduced.	<i>A. cyclops</i> <i>A. longifolia</i> <i>A. mearnsii</i> <i>A. melanoxyton</i> <i>A. saligna</i> various others	3.5; 4.5
1847-1857	Experimental planting for drift sand stabilisation, afforestation.	<i>A. armata</i> <i>A. cyclops</i> <i>A. longifolia</i> <i>A. melanoxyton</i> <i>A. saligna</i>	4.1; 4.2; 4.3; 4.4
1858-1872	Consolidation of planting for sand stabilisation.	<i>A. cyclops</i> <i>A. longifolia</i> <i>A. melanoxyton</i> <i>A. saligna</i>	4.6; 4.7

TABLE 7.9.4 (concluded)

Period	Events	Species involves	Relevant sections or tables in this report	
1875-1892	Planting on a large scale for sand stabilisation, tanning bark, nurse plants, shelter belts. Australian bug: 1872-1892. Prizes for plantations. Important role of private land-owners.	<i>A. cyclops</i> <i>A. pycnantha</i> <i>A. saligna</i>	4.8; 5.1.2; 5.1.4; 5.2.1; 5.2.3; 5.5.4; 5.5.7	5.1.1; 5.1.3; 5.1.5; 5.2.2; 5.3.1; 5.5.5;
1893-1920	Planting on a smaller scale for sand stabilisation, tanning bark. Burning of plantations.	<i>A. cyclops</i> <i>A. mearnsii</i> <i>A. saligna</i>	5.3.2; 5.3.8; 5.4.3	5.3.6; 5.4.2;
1921-1947	Planting on a large scale for "afforestation", sand stabilisation. Role of Municipality of Cape Town.	<i>A. cyclops</i> <i>A. saligna</i>	6.1; 6.5;	6.2; 6.6

TABLE 7.9.5 Chronological summary of planting activities on Table Mountain, as ascertained in this study:

Date	Events	Relevant sections or tables in this report
1793	Overseer of <i>Wittebomepos</i> instructed to sow <i>wittebome</i> or <i>dennebome</i>	3.2.4
19th century	Private plantations: eastern slopes of Table Mountain northern slopes of Table Mountain Orange Kloof	5.1.1 4.7 6.4
1885-1905	Table Mountain plantation on Back Table and top of eastern escarpment	5.1.1; 5.3.1; 5.3.3; 5.3.6; 5.3.7; 5.3.8; 5.5.3; 6.8.2
1893 to date	Devil's Peak plantation	5.3.2; 5.3.7; 5.4.2; 6.1; 6.5; 6.8.2
1894-1895	Municipal plantations: lower Platteklip Gorge, eastern side of Signal Hill, eastern side of Lion's Head, Pipe Track	5.3.3
1899 to date	Cecilia plantation	5.3.7; 5.3.8; 5.4.2; 5.5.8; 6.8.2
1905	Municipal plantation: Lion's Head	5.3.7
1912-1924	Municipal plantation: Signal Hill and Lion's Head	5.4.2; 6.1
1913 to date	Kirstenbosch National Botanic Gardens	5.4.1
1915 to date	Municipal plantation: Newlands Forest	5.4.2; 6.1; 6.4

(continued)

TABLE 7.9.5 (concluded)

Date	Events	Relevant sections or tables in this report
1936-1944	Clearing of unwanted exotics	6.3; 6.4
1939 to date	Municipal plantations: Orange Kloof, Kloof Nek, Newlands, Back Table	6.4; 6.8.1
Post 1960	Clearing of pines	6.5; 6.6

TABLE 7.9.6 Thirteen pest plant species on Table Mountain: relationship between past planting activity, as ascertained in this study, and their present distribution, as ascertained by E.J. Moll and B.M. Campbell<sup>71</sup>

Extent of past planting	Species	Extent of present distribution in relation to extent of original planting, in various localities		
		more extensive	as extensive	less extensive
planted very extensively	<i>Pinus pinaster</i>	-	eastern slopes eastern escarpment Back Table northern slopes Signal Hill	Devil's Peak
planted fairly extensively	<i>Acacia saligna</i>	northern slopes Signal Hill above Hout Bay	Devil's Peak	Bridle Path Back Table Cecilia
	<i>A. mearnsii</i>	Signal Hill	Devil's Peak	Back Table Cecilia Nursery Ravine
	<i>A. melanoxylon</i>	Disa Gorge	Devil's Peak Back Table eastern escarpment	-
	<i>P. halepensis</i>	northern slopes	eastern escarpment Back Table	-

TABLE 7.9.6 (concluded)

Extent of past planting	Species	Extent of present distribution in relation to extent of original planting, in various localities		
		more extensive	as extensive	less extensive
very limited planting	<i>A. cyclops</i>	western slopes Signal Hill	-	Devil's Peak
	<i>A. pycnantha</i>	-	-	Devil's Peak
	<i>Hakea gibbosa</i>	western slopes Orange Kloof	-	-
	<i>H. suaveolens</i>	western slopes Orange Kloof	-	-
no record of planting	<i>A. longifolia</i>	eastern slopes northern slopes western slopes	-	-
	<i>Albizia lophantha</i>	eastern slopes Orange Kloof	-	-
	<i>H. sericea</i>	western slopes Orange Kloof	-	-
	<i>Leptospermum laevigatum</i>	-	-	-

TABLE 7.9.7 Thirteen pest plant species on Table Mountain: extent of present distribution in relation to extent of original planting (a summary of Table 7.9.6)

Species	more extensive	as extensive	less extensive
<i>Acacia longifolia</i>	X	-	-
<i>Albizia lophantha</i>	X	-	-
<i>Hakea gibbosa</i>	X	-	-
<i>H. sericea</i>	X	-	-
<i>H. suaveolens</i>	X	-	-
<i>Pinus halepensis</i>	X	X	-
<i>Acacia melanoxylon</i>	X	X	-
<i>A. mearnsii</i>	X	X	X
<i>A. saligna</i>	X	X	X
<i>A. cyclops</i>	X	-	X
<i>P. pinaster</i>	-	X	X
<i>A. pycnantha</i>	-	-	X
<i>Leptospermum laevigatum</i>	-	-	-

TABLE 7.9.8 Evidence for large-scale introductions of exotic plants to Cape Town, as discussed in this report

Date	Person(s) responsible	Details	Relevant sections in this report
1830-1847	C.F.H. von Ludwig	Introduced at least 1660 species from all over the world, including Australia	3.5.2
1854-1861	G. Grey	Presented large quantities of Indian, Tasmanian, Australian and English seeds to Cape Town Botanic Garden	4.5
1855	J. McGibbon	Imported parcels of seeds and cases of living plants from Harvard, Melbourne, Sydney, England and Mauritius	4.5
1861-1896	F. von Mueller	Sent large collections of seeds from Melbourne in 1861. In 1896, South Africa said to be indebted to him for the groves of eucalypts, acacias and other trees that adorned the countryside	4.5; 5.3.5
1866	J.C. Brown	Imported seeds of 700 species from Europe, California, Victoria and New South Wales	4.7
1889	Seed merchants in Europe	Their products said to be brought so cheaply by the Parcel Post that they outcompeted the Botanic Garden	5.1.5
1896	D.E. Hutchins	Government spent 691 pounds on seeds from England and Australia	5.3.5

TABLE 7.9.9 Evidence for multiple introductions of pest plant species to Cape Town, as ascertained in this study

Species	Earliest known occurrence (from Table 7.9,3)	Subsequent introductions		
		year	source	relevant sections or tables in this report
<i>Acacia cyclops</i>	1857	1895	France	5.5.6
<i>A. longifolia</i>	1827	1895	France	5.5.6
<i>A. mearnsii</i>	1858	1885	Australia	5.1.2
<i>A. melanoxylon</i>	1848	1895	France	5.5.6
<i>A. pycnantha</i>	1865	1885	Australia	5.1.2
<i>A. saligna</i>	1848	1881	Australia	4.8
		1885	Australia	5.1.2
		1895	France	5.5.6
<i>Hakea gibbosa</i>	1835	1895	France	5.3.5
<i>H. sericea</i>	1858	1895	France	5.3.5

TABLE 7.9.10 Indigenous species for which planting is recorded in this study

Species	Planting recorded in this study			Habitat in Cape Peninsula, according to Adamson & Salter <sup>72</sup>
	locality (in modern terms)	period	relevant sections(s)	
<i>Carpobrotus edulis</i> (Hottentot fig)	Pinelands	1847-1851	4.2; 4.3	Sand near the sea; flats and slopes
	Heathfield	1849-1850	4.2	
<i>Chrysanthemoides monilifera</i>	Montague Gardens	1858	4.6	Flats and mountains
	Bellville South	1858	4.6	
<i>Ehrharta villosa</i> (pyggras)	Pinelands	1850-1853	4.3	Deep sands on Cape Flats
	Bellville South	1877-1886	4.8; 5.1.3	
	S.E. Cape Flats	1891-1897	5.2.1; 5.3.6	
<i>Leucadendron argenteum</i> (silver tree)	Pinelands	1857	4.4	Eastern slopes between 150 and 300m
	Devil's Peak	1902	5.3.7	
	Lion's Head & Signal Hill	1905-1917	5.3.7; 5.4.2; 6.1	
<i>Myrica cordifolia</i> (wax berry)	Pinelands	1852-1853	4.3	Stable sand dunes
	Heathfield	1853	4.3	
	Vasco	1858	4.6	
<i>Protea repens</i> (sugar bush)	Pinelands	1850-1851	4.3	Mountain slopes; almost exterminated on flats
	Vasco	1858	4.6	
	Montague Gardens	1859	4.6	
<i>P. lepidocarpodendron</i> (black and pink sugar bush)	Lion's Head & Signal Hill	1912-1913	5.4.2	Exposed hill and mountain slopes

## 7.10 Notes

1. G24-1865 Report of the Colonial Botanist, p.149.
2. M. Williams: The Making of the South Australian Landscape (1974), p.124.
3. A.V. Hall: Invasive weeds (1979), p.139.
4. J.W. Watson: Relict geography in an urban community (1959), p.111.
5. A.J. Christopher: Southern Africa (1976), p.255.
6. J.A. Jakle & R.L. Janiskee: Why covered bridges (1975), p.194.
7. D. Hey: Report on the Future Control and Management of Table Mountain... (1978), p.75.
8. J.A. Jakle & R.L. Janiskee: Why covered bridges (1975), p.194.
9. D. Hey: Report on the future Control and Management of Table Mountain... (1978), p.75.
10. Reference to the country of origin of most of these men has been made in the appropriate places in Chapters 3 to 6. In the case of Smith, it is obvious that he was of Scots origin from a quotation attributed to him by J.C. Brown: Management of Crown Forests at the Cape of Good Hope... (1887), p.342. Heywood was from England (K. Heywood: Cape Hills in Sunlight (1964), p.73).
11. G11-1894 Report of the Government Botanist and Curator of the Government Herbarium, report No. 310.
12. G13-1895 Report of the Government Botanist and Curator of the Government Herbarium, reports No. 386, 404. The Osage orange (*Maclura aurantiaca*) from North America was evidently a popular hedge plant at this time.
13. G.M. Thomson: The Naturalization of Animals and Plants in New Zealand (1922), pp.22-23; J.A. Gibb & J.E.C. Flux: Mammals (1973), pp.341,345; M.E. Hoare: Learned societies in Australia ... (1967), pp.20-21.

14. A.H. Clark: *The Invasion of New Zealand...* (1949), p.362.
15. J.P. Rourke: *The Proteas of Southern Africa* (1980), pp.31-34;  
A.M. Blomberg: *Australian Native Plants* (1977), p.v.
16. The only known coal deposits in the Cape Province are in the Queens-  
town region, in the far eastern part of the province (B. Moodie:  
*Coal* (1971), p.277).
17. R. Marloth: *Das Kapland* (1908), p.78; E.R. Roux: *The Australian  
acacias in South Africa* (1964), p.140.
18. M.J. Wells: *Nassella fussock* (1978), p.141.
19. C.H. Stirton (ed.): *Plant Invaders* (1978), p.31.
20. F.J. Kruger: *Cluster pine* (1978), p.124.
21. C.G. Botha: *The French Refugees at the Cape* (1919), p.7.
22. S. Naser: *Rock hakea* (1978), p.72; S. Naser & S.R. Fugler:  
*Silky hakea* (1978), p.76; S. Naser: *Sweet hakea* (1978), p.80.
23. C. Boucher & C.H. Stirton: *Port Jackson* (1978), p.60; C. Boucher &  
C.H. Stirton: *Rooikrans* (1978), p.40.
24. H.C. Taylor: *Stinkbean* (1978), p.64.
25. E.R. Roux: *History of the introduction of Australian acacias on the  
Cape Flats* (1961).
26. J.D.M. Keet: *Report on Drift Sands in South Africa* (1936), p.9;  
G38-1902 Reports of the Conservators of Forests.
27. E.J. Moll & B.M. Campbell: *The Ecological Status of Table Mountain  
(1976)*, p.51.
28. D. McLachlan *et al.*: *Re-survey of the alien vegetation in the Cape  
Peninsula* (1980), p.134.
29. D. McLachlan & E.J. Moll: *A Path and Recreation Report of Table  
Mountain* (1977).
30. D. McLachlan & E.J. Moll: *A Path and Recreation Report of Table  
Mountain* (1977), p.24.
31. D. McLachlan & E.J. Moll: *A Path and Recreation Report of Table  
Mountain* (1977), p.33.

32. D. McLachlan & E.J. Moll: A Path and Recreation Report of Table Mountain (1977), pp.5,13.
33. D. McLachlan & E.J. Moll: A Path and Recreation Report of Table Mountain (1977), pp.108-110.
34. G23-1892 Reports of the Conservators of Forests.
35. 3/CT 1/1/1/46 Minutes, 13.1.1898, p.215.
36. 3/CT 1/7/1/15 Mayoral Minutes, 1912, p.37.
37. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.19.
38. R.M. Cowling *et al.*: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.15.
39. R.M. Cowling *et al.*: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.15.
40. R.M. Cowling *et al.*: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.14. As pointed out in Section 5.6, Note 137, they wrongly attributed this information to C.A. Lückhoff: Table Mountain (1951).
41. R.M. Cowling *et al.*: The ecological status of the understorey communities of pine forests on Table Mountain (1976), p.19.
42. D. McLachlan *et al.*: Re-survey of the alien vegetation in the Cape Peninsula (1980), Table 1, p.128.
43. D. McLachlan *et al.*: Re-survey of the alien vegetation in the Cape Peninsula (1980), p.132.
44. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.40.
45. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.22.
46. D. McLachlan *et al.*: Re-survey of the alien vegetation in the Cape Peninsula (1980), p.128.

47. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.22.
48. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), p.24.
49. Reader's Digest Association: Complete Guide to Gardening in South Africa, Vol. 1 (1971), p.281.
50. E. Mayr: Animal Species and Evolution (1963), pp.211-212.
51. C.E. Duff: The Varieties and Geographical Forms of *Pinus pinaster*, Soland... (1928), pp.41-55.
52. H.B. Rycroft & C.L. Wicht: Field trials of geographical races of *Pinus pinaster* in South Africa (1948).
53. C.J.F. Bunbury: Botanical excursions in South Africa (1842), p.554.
54. K. Coates Palgrave: Trees of Southern Africa (1977), p.241.
55. R.S. Adamson & T.M. Salter (eds.): Flora of the Cape Peninsula (1950), p.453; M.R. Levyns: A Guide to the Flora of the Cape Peninsula (1966), p.163.
56. R.S. Adamson & T.M. Salter (eds.): Flora of the Cape Peninsula (1950), p.453.
57. J. Barkham: [Review of] Bedford Purlieus... (1976).
58. G.F. Peterken: Historical approach to woodland ecology and management (1975), p.3.
59. F.E. Egler: Landmark... (1976).
60. H. Schluter: *Abgrenzung der Natürlichen Fichtenwälder...* (1966), p.270.
61. H.M. Raup: [Review of] Trees, Woods and Man (1961), p.608.
62. V.H. Jones: The nature and scope of ethnobotany (Chronica Botanica, Vol. 6 No. 10, 1941, pp.219-221) (as cited by R.I. Ford: Ethnobotany: historical diversity and synthesis (1978), p.41).
63. R.I. Ford: Ethnobotany: historical diversity and synthesis (1978) p.44.

64. G.F. Carter: Ecology - geography - ethnobotany (Scientific Monthly, Vol. 70 No. 2, 1950, pp.73-80) (as cited by R.I. Ford: Ethnobotany: historical diversity and synthesis (1978), p.43.
65. R. Nash: American environmental history: a new teaching frontier (1972), p.363.
66. H.C. Darby: The clearing of the woodland in Europe (1956), p.183; M. Williams: The Making of the South Australian Landscape (1974), p.124.
67. B.M. Campbell *et al.*: Should there be more tree vegetation in the mediterranean climatic region of South Africa (1979).
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69. D.A. Webb: Dispersal and establishment: what do we really know (1966).
70. L. Croizat *et al.*: Centers of origin and related concepts (1974); G. Nelson: Biogeography, the vicariance paradigm, and continental drift (1975); J. Cracraft: Historical biogeography and earth history... (1975).
71. E.J. Moll & B.M. Campbell: The Ecological Status of Table Mountain (1976), pp.19-27, Maps 7, 10-15.
72. R.S. Adamson & T.M. Salter (eds): Flora of the Cape Peninsula (1950), pp.390, 825, 56, 319-320, 312, 324-325, 324.

## CHAPTER 8

## SOURCES

"Although all types of reference lists give roughly the same information, stylistic conventions in presentation differ markedly between the humanities and the natural sciences. This stems partly from the fact that journal articles rather than books make up the bulk of a scientific reference list, partly from the preferred methods of citation, and partly perhaps from tradition. Whatever the causes, however, a great gulf is fixed between the two families of disciplines, and publishers and editors must adjust their practices to the differences." (A Manual of Style for Authors, Editors and Copywriters, 12th ed. Univ. of Chicago Pr., 1969, p.375.)

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G65-1877.

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 G4-1900, G2-1901, G8-1902, G2-1903.

## Central Board of Commissioners of Public Roads : Report

G18-1856, G22-1857, G18-1858, G57-1859.

## Forests, Crown, and Drift Sands : Reports on Conditions of

G56-1877, G14-1878, G35-1879.

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## Forests, Superintendent of Woods and : Report

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 G45-1888, G29-1889, G36-1890, G41-1891.

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G23-1892, G27-1893, G50-1894, G51-1895, G11-1896, G17-1897,  
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 G26-1904, G26<sup>+</sup>-1904.

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G28-1873, G42-1874, G42-1875, G49-1876.

Railway Engineer : Report  
G35-1875, G47-1876.

Railways : Reports and Annexures  
G49-1877.

Roads, Chief Commissioner of : Report  
G31-1860, G21-1861, G37-1862, G34-1863, G39-1864.

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G30-1876.

#### *Government Gazettes*

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3.5.1849, 11.4.1850, 28.4.1853, 8.5.1860, 24.8.1875, 18.5.1877,  
6.7.1880, 19.3.1886, 5.7.1889, 19.2.1897, 7.12.1897, 22.3.1898,  
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of Forestry

UG11-1932, UG37-1932, UG35-1933

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UG47-1954, UG38-1955, UG35-1956, UG59-1958, UG33-1959,

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*Annual Reports*

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## 8.4.5 Divisional Council of the Cape

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 3318CD Cape Town, 4th ed., 1970; 3318DC Bellville, 4th ed., 1970;  
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C 691 *Brieven van Commissarissen Generaal Nederburgh en  
 Frykenius, 1792-1793, III, 74-148.*

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1/16 COLONIAL OFFICE (1806-1912)

CO 625 Letters Received from Municipalities and Sundry Committees,  
 1853.

CO 704 Letters Received from Road Board, 1857.

CO 983 Letters Received from Crown Lands and Public Works, 1874.

CO 3943, 3946 Memorials Received, 1829, 1830.

- CO 4427 Arrears Correspondence, Miscellaneous, Heads of Department, 1871.
- CO 4923 Letter Book Civil, Vol. 26, 1845.
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- CO 5309 Letter Book, Miscellaneous, Vol. 8, 1847-1848.
- CO 5417 Letter Book, Appointments, Vol. 7, 1874-1875.
- CO 6017 Blue Book and Statistical Register, 1875.
- 1/27 CENTRAL BOARD OF COMMISSIONERS OF PUBLIC ROADS (1843-1859)
- CRB 1-15 Minutes, 1843-1859.
- CRB 38, 43, 44, 46, 47, 48, 52, 56, 67, 68, 69, 71, 74 Letters Received, 1847-1858.
- CRB 85, 89, 90 Letters Despatched, 1845-1850.
- 1/54 SURVEYOR-GENERAL (1828-1942)
- SG 1/1/3/22 Letters Received from Colonial Secretary, 1857.
- 3A/1 TOWN CLERK, CAPE TOWN (1840 - )
- 3/CT 1/1/1/27 - 1/1/1/46 Council Minutes, 1876-1898.
- 3/CT 1/4/4/4/1/1 - 1/4/4/4/1/16 Electric and Water Works and Fire Brigade Committee, Minute Book, 1913-1931.
- 3/CT 1/4/5/1/1/1 Municipal Gardens and Tree Planting Committee, Minute Book, 1894-1899.
- 3/CT 1/4/5/2/1/1 - 1/4/5/2/1/7 Corporation Markets, Public Gardens and Tree Planting Committee, Minute Book, 1899-1913.
- 3/CT 1/4/5/4/1/1 - 1/4/5/4/1/22 Improvements and Parks Committee, Minute Book, 1913-1931.
- 3/CT 1/7/1/1/a - 1/7/1/42 Mayoral Minutes, 1886-1949.
- 3A/5 TOWN CLERK, KALK BAY (1895-1913)
- 3/KBY 1 - 4 Minutes, 1895-1913.
- 3A/10 TOWN CLERK, WYNBERG (1886-1927)
- 3/WBG 2 - 7 Council Minutes, 1886-1927.
- 3/WBG 53 Letters Received, Town Clerk, 1901.
- 4/7(b) SUBURBAN MUNICIPAL WATERWORKS COMMITTEE (1900-1913)
- SMW 1 - 3 Minute Book, Main Committee, 1900-1913.
- SMW 22, 23 Letters Received, General, 1911-1913.
- SMW ADD 1/32 Letter Book, 1890-1891.

## 9/2/1 - 9/2/3 SECRETARY FOR AGRICULTURE (1892-1911)

## Reference Letters : BRON-AGR

Vol.	Folio	Subject	Period
45	157	Nomenclature of Forest Trees, Etc.	1894-1895.
51	203	Eerste River Sands	1890-1896.
121	502	Seed Lists and Requests	1892-1895.
132	553	Peak Plantation	1892-1894.
149	632	Prizes for Planting on Flats	1892, 1894.
163	791	Seed Orders	1893-1895.
180	1000	Eerste River Siding, Extension of	1891-1895.
272	157	Seeds and Transplants, Applications for	1903.
456	3461	Fodder Trees	1902.
629	T200	Papers Relating to Forestry Matters	1907-1910.

## (unclassified) PUBLIC WORKS DEPARTMENT

PWD 222, 246, 250, 261, 268, 288 Letters Received from  
Superintendent of Plantations, 1860-1865.

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## MAP REGISTER

1/69 North West Section of the Cape Peninsula, ca. 1900.

4/172 General Map of the Cape Flats (sheet No. 3), 1893.

4/174 General Map of the Cape Flats (sheet No. 4), 1893.

4/177 General Map of the Cape Flats (sheet No. 5), 1893.

*Surveyor-General's Office, Cape Town*

Plans : Nos 3622, 5146, 5520, 5521, 7253.

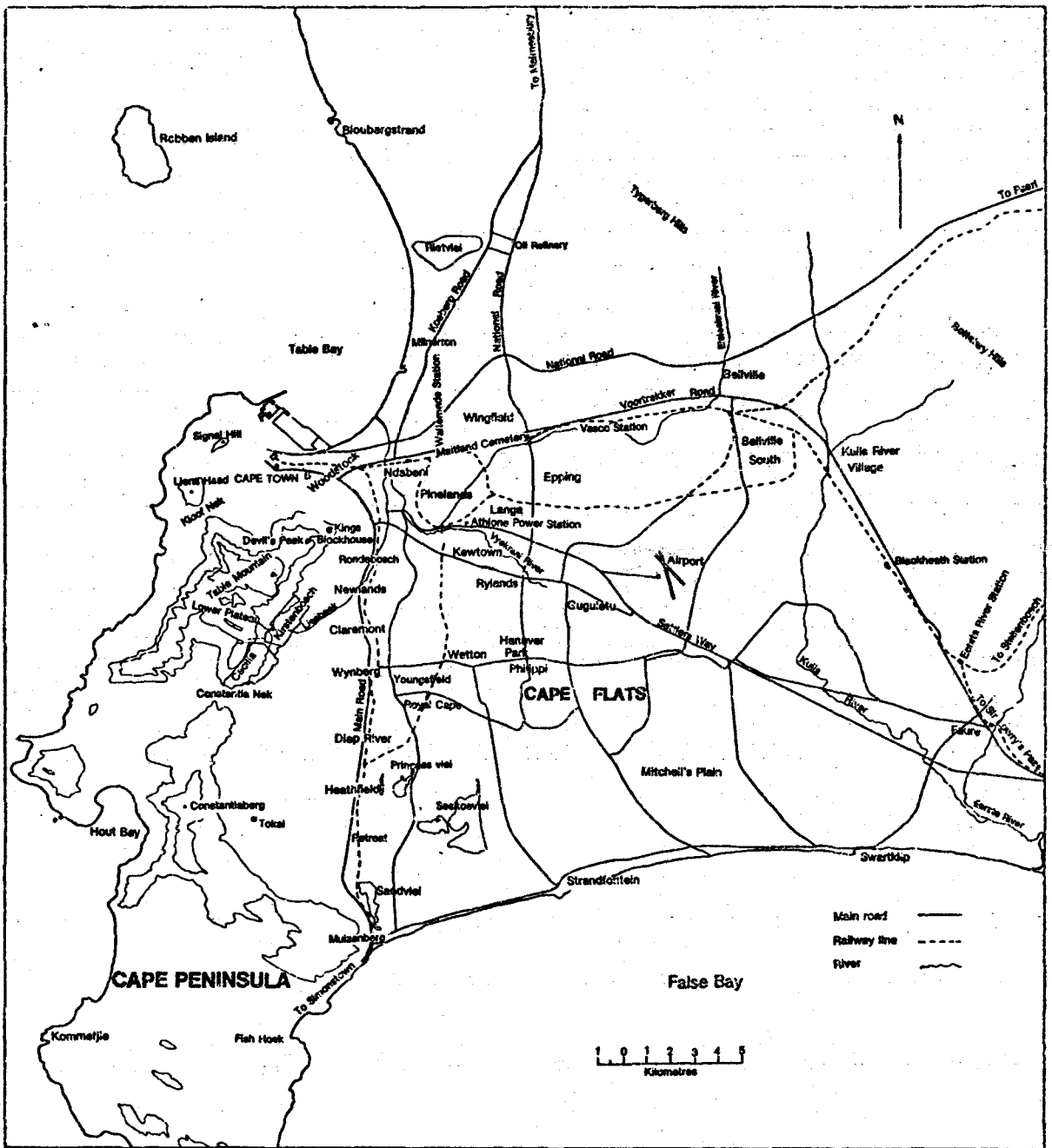
Portfolio No. 333, Forest Reserve Index.

## 8.8 Herbarium Specimens

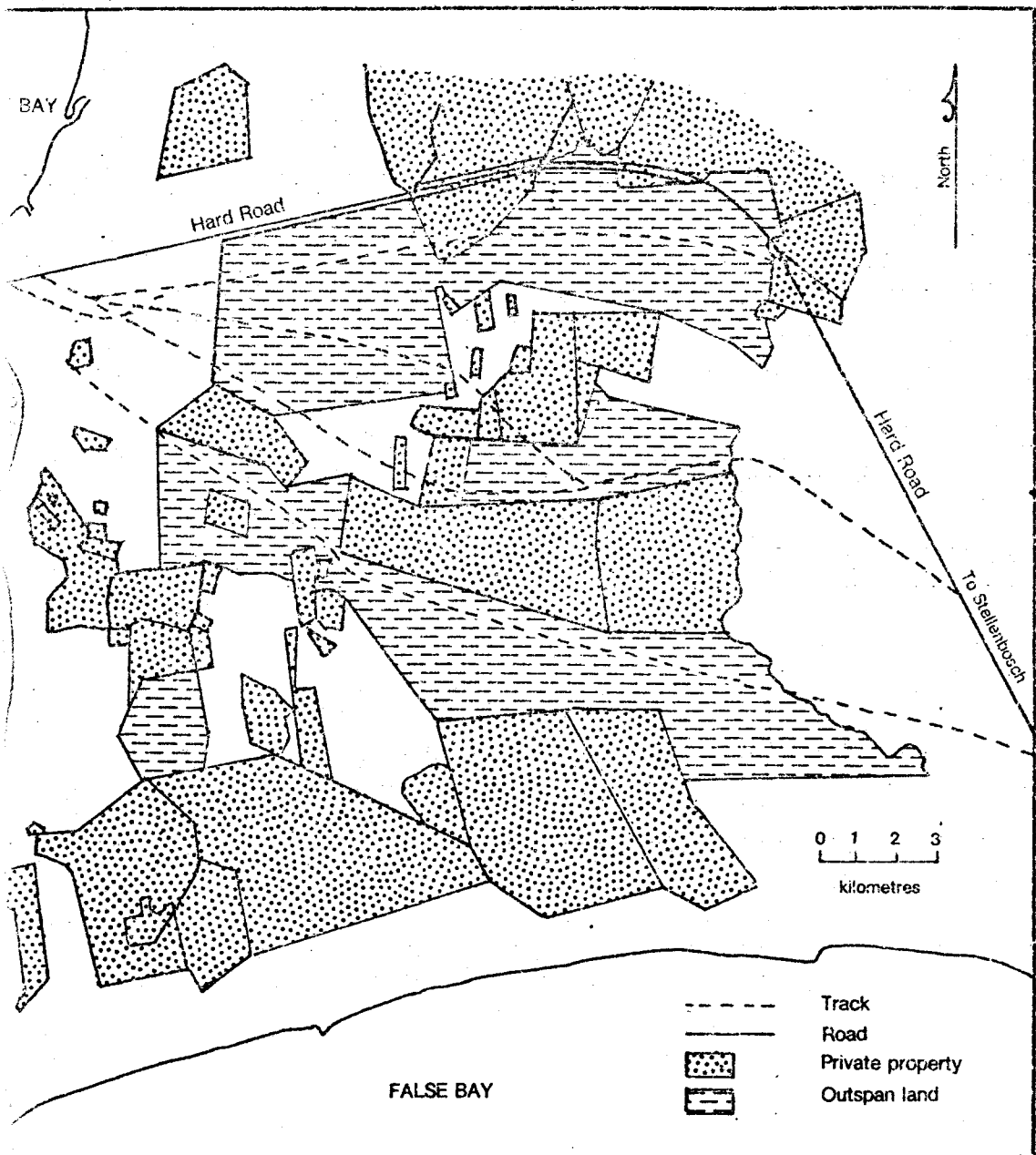
Thunberg, C.P.: Herbarium (No. 1036, Uppsala Institute of Systematic Botany) (Extended micro-edition, International Documentation Centre AB). (Housed in Bolus Herbarium, University of Cape Town.)

MAPS

MAPS



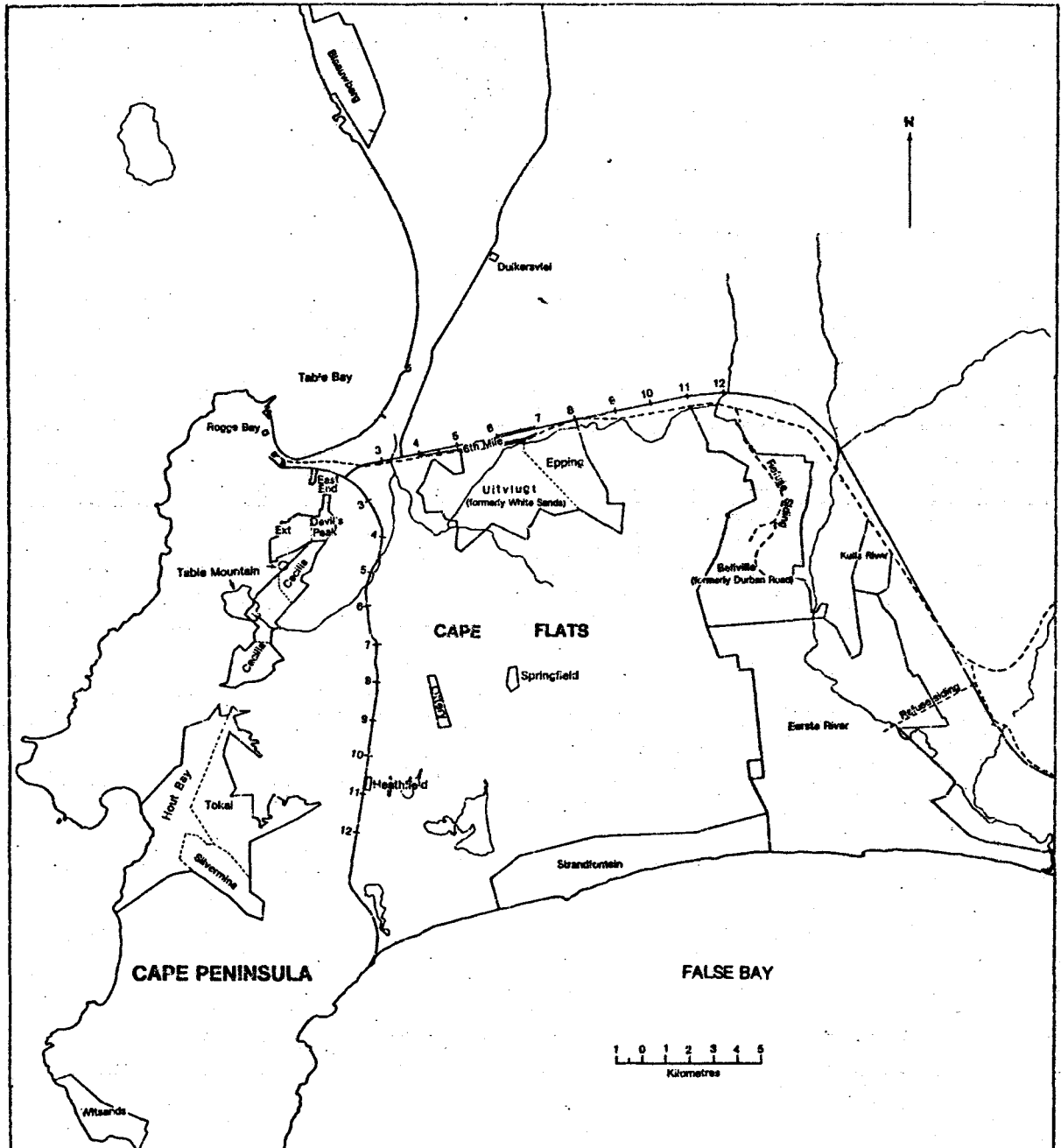
Map 1: The Cape Town region, showing modern place names.  
 (Source: Trigonometrical Survey Office : South Africa,  
 1:50 000 sheets 3318CD, 3318DC, 3418AB&AD, 3418BA (1970).)



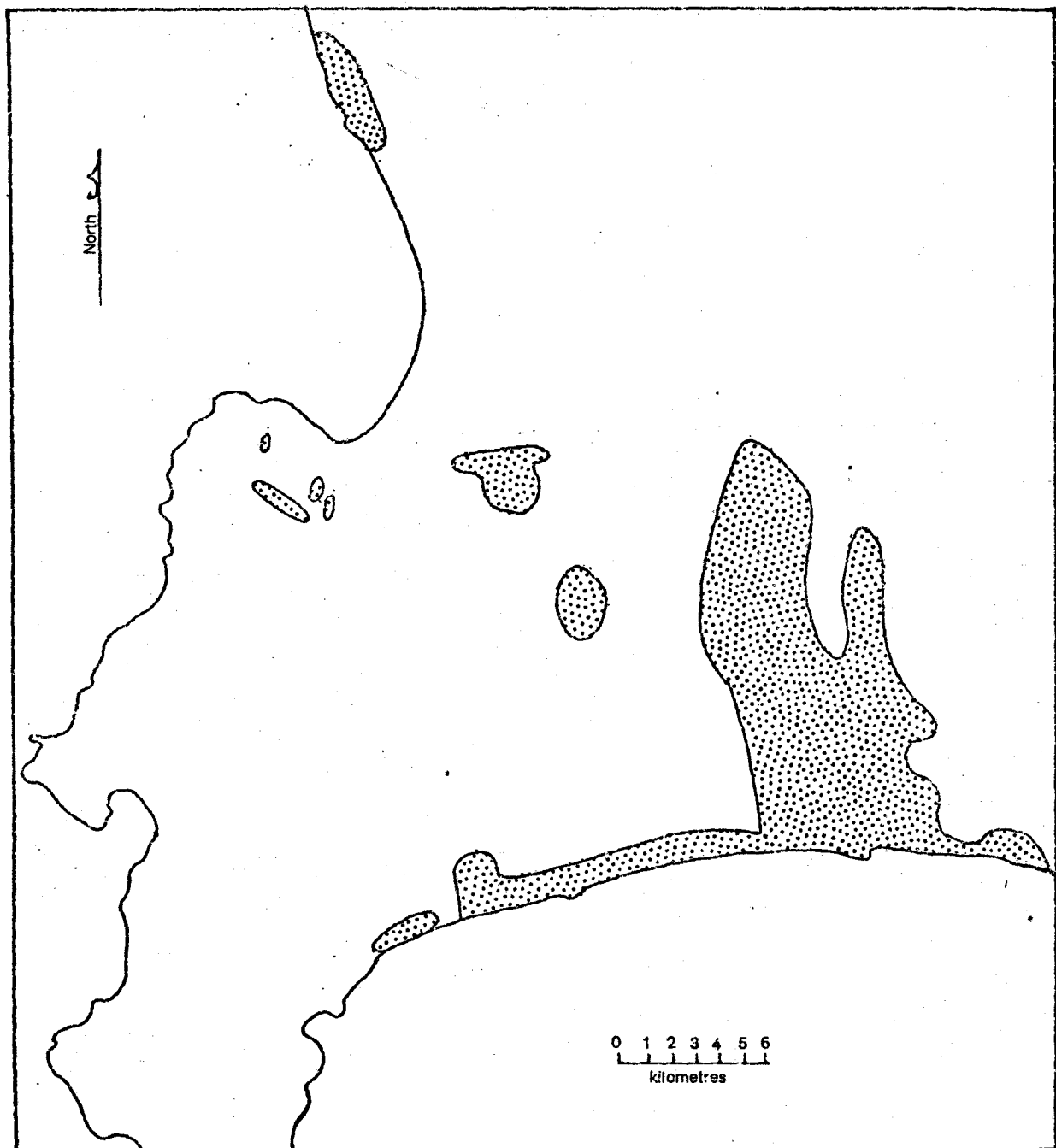
Map 2: The Cape Flats in 1846, showing land tenure.

(Source: CO 4427 Arrears Correspondence, 1871 No. 146, De Smidt - Rawson, 31.10.1857 (Herein: Sketch Plan of the Cape Flats and Downs).)

(The map has been redrawn on the basis of property boundaries shown on Trigonometrical Survey Office : South Africa, 1:50 000 sheets 3318CD, 3318DC, 3418AB&AD, 3418BA (1970).)

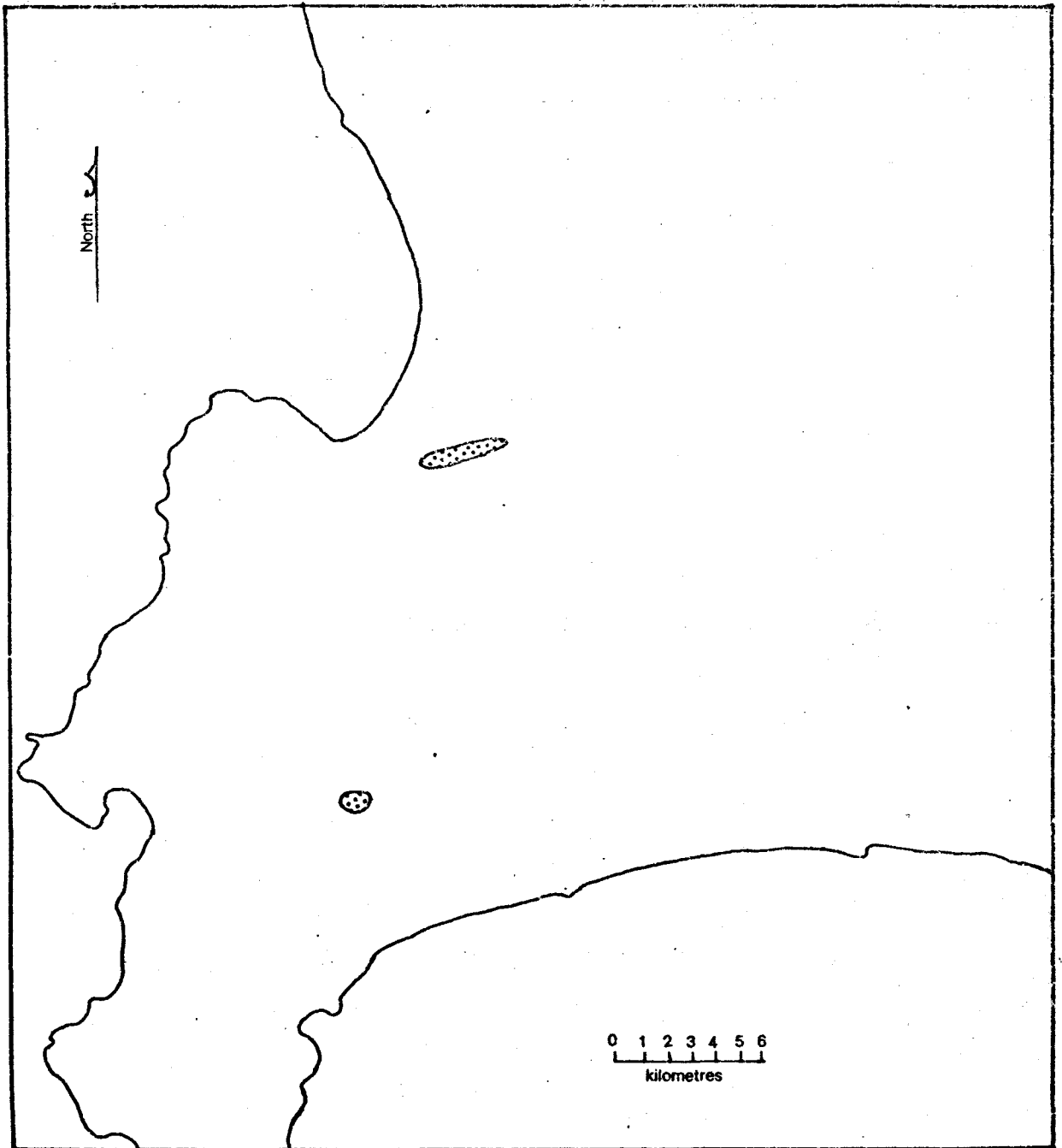


Map 3: Forestry department reserves, past and present, in the Cape Town region. The old milestones on the main roads are also shown. (Source: as for Map 1, together with MAP REGISTER 1/69, 4/172, 4/174, 4/177 and Surveyor-General's Office : Plans Nos 3622, 5146, 5520, 5521, 7253, Portfolio 333.)



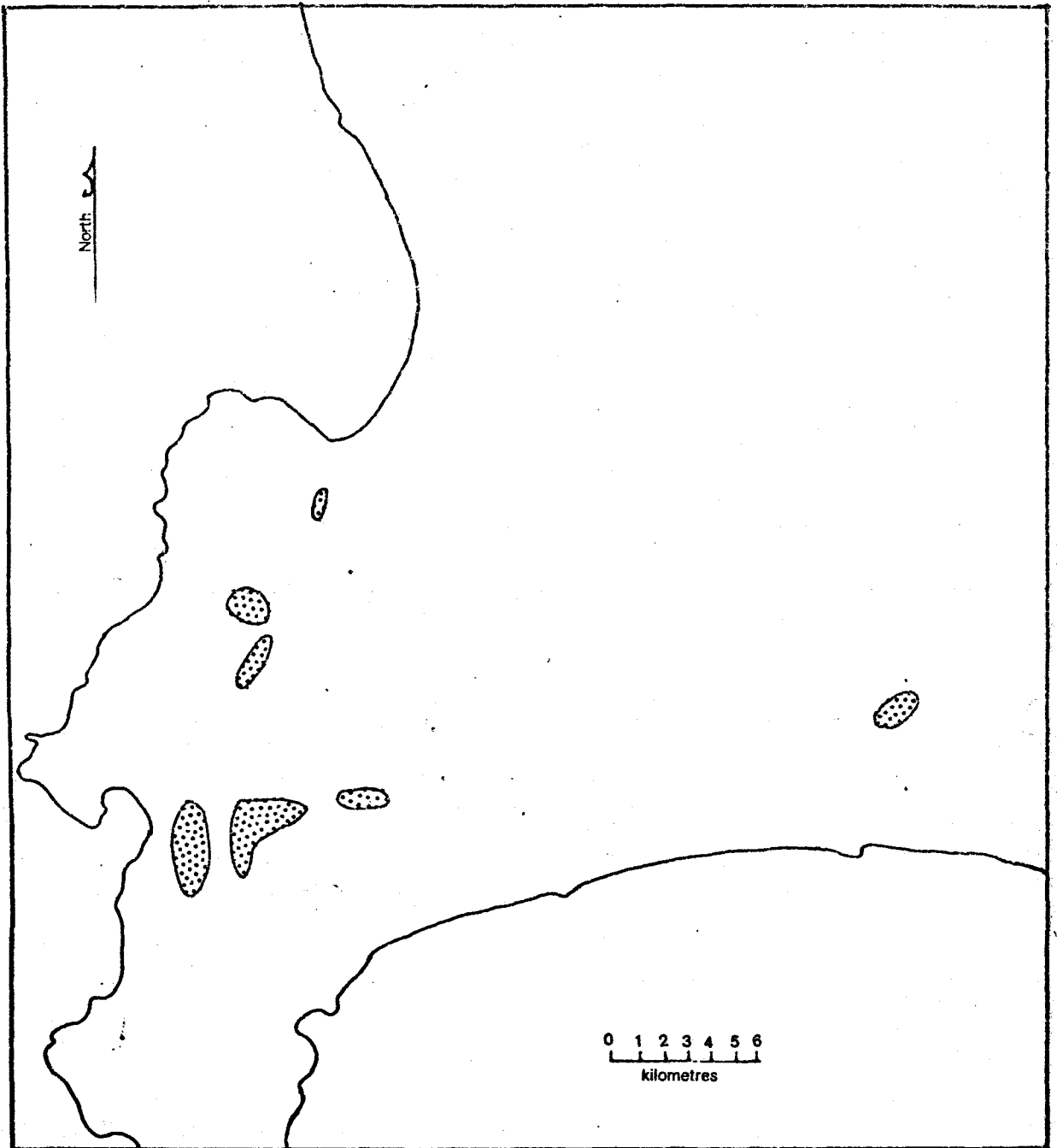
Map 4: Areas where planting of *Acacia cyclops* is recorded in this report.

(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)



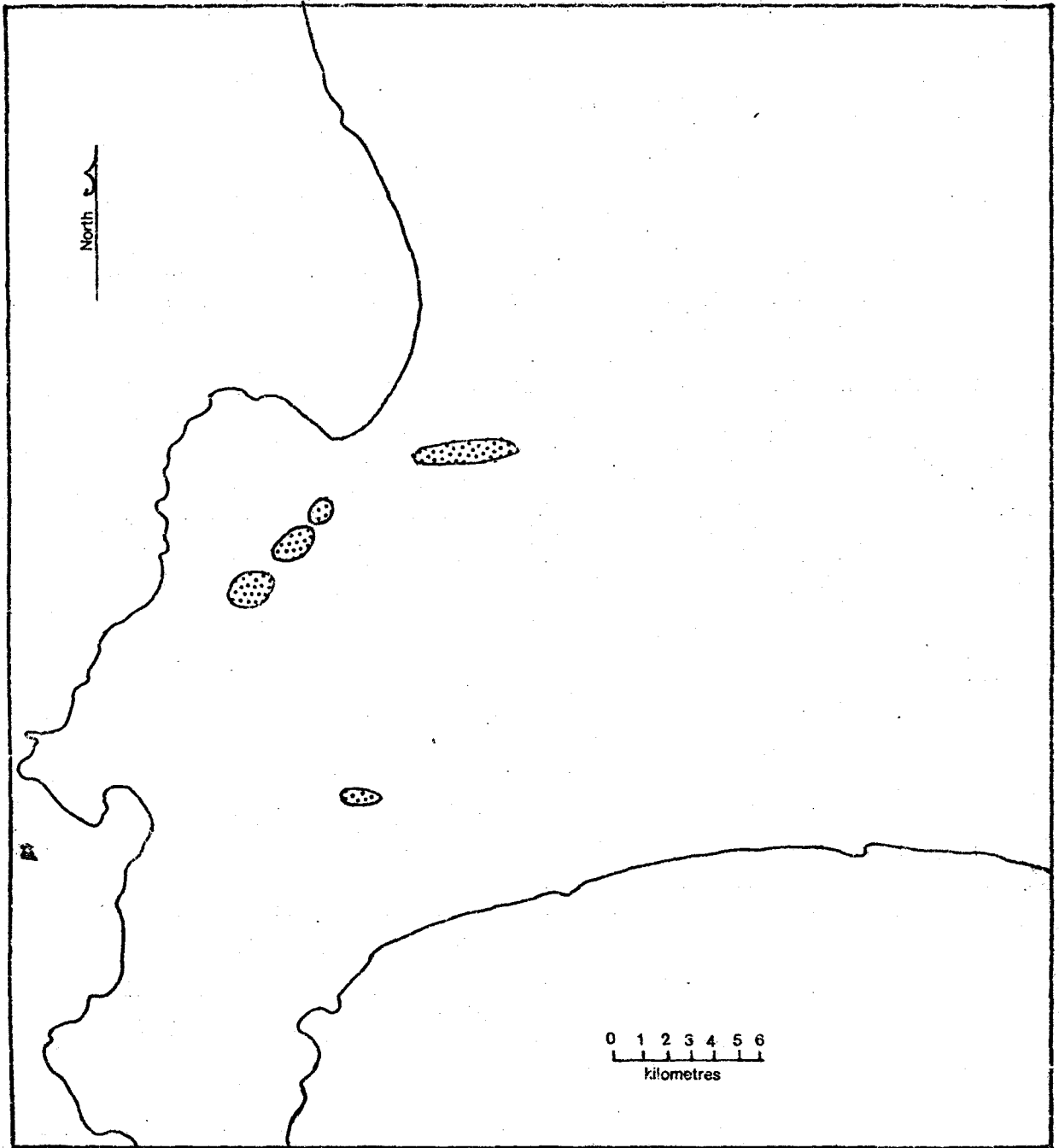
Map 5: Areas where planting of *Acacia longifolia* is recorded in this report.

(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)



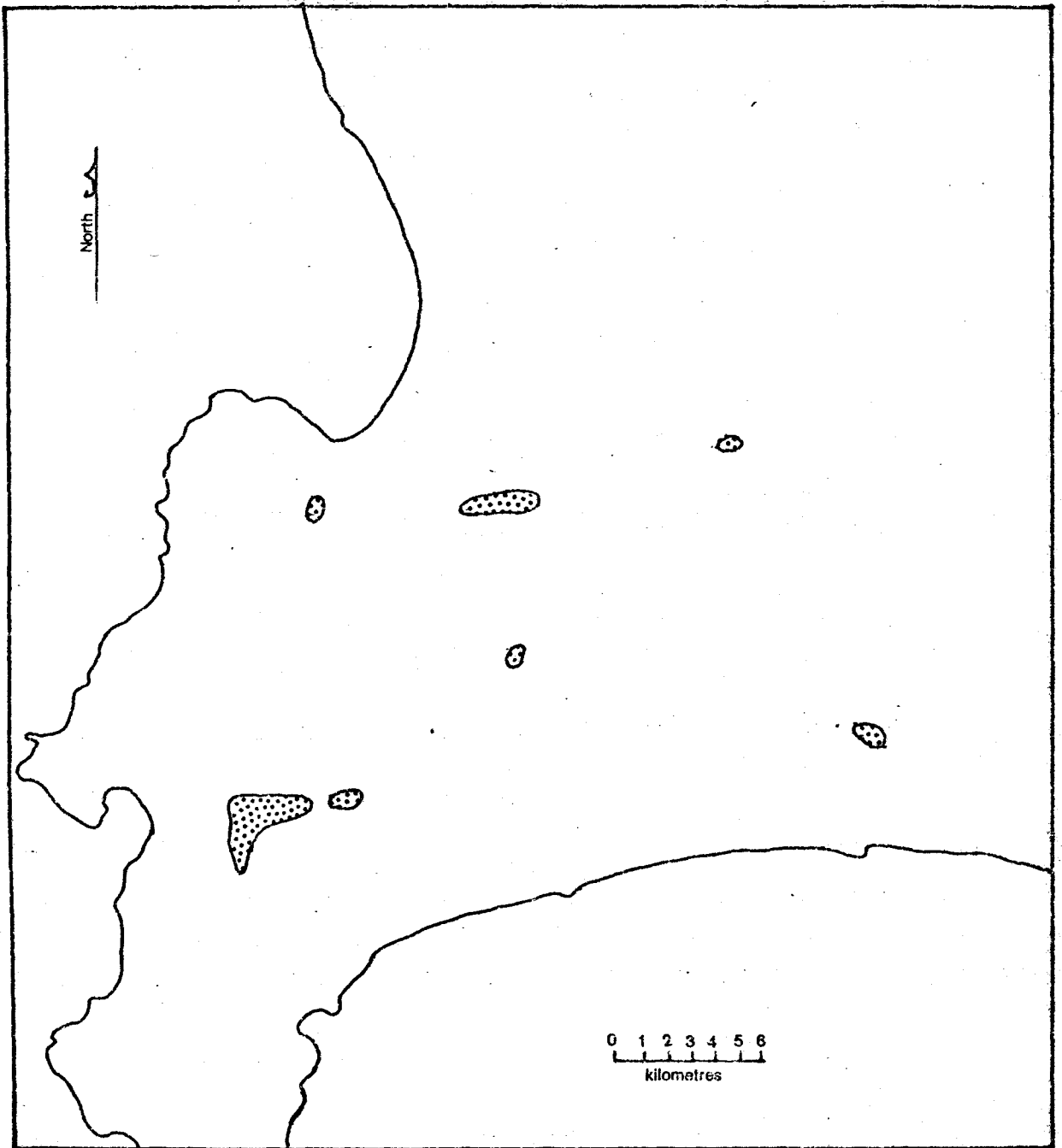
Map 6: Areas where planting of *Acacia mearnsii* is recorded in this report.

(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)



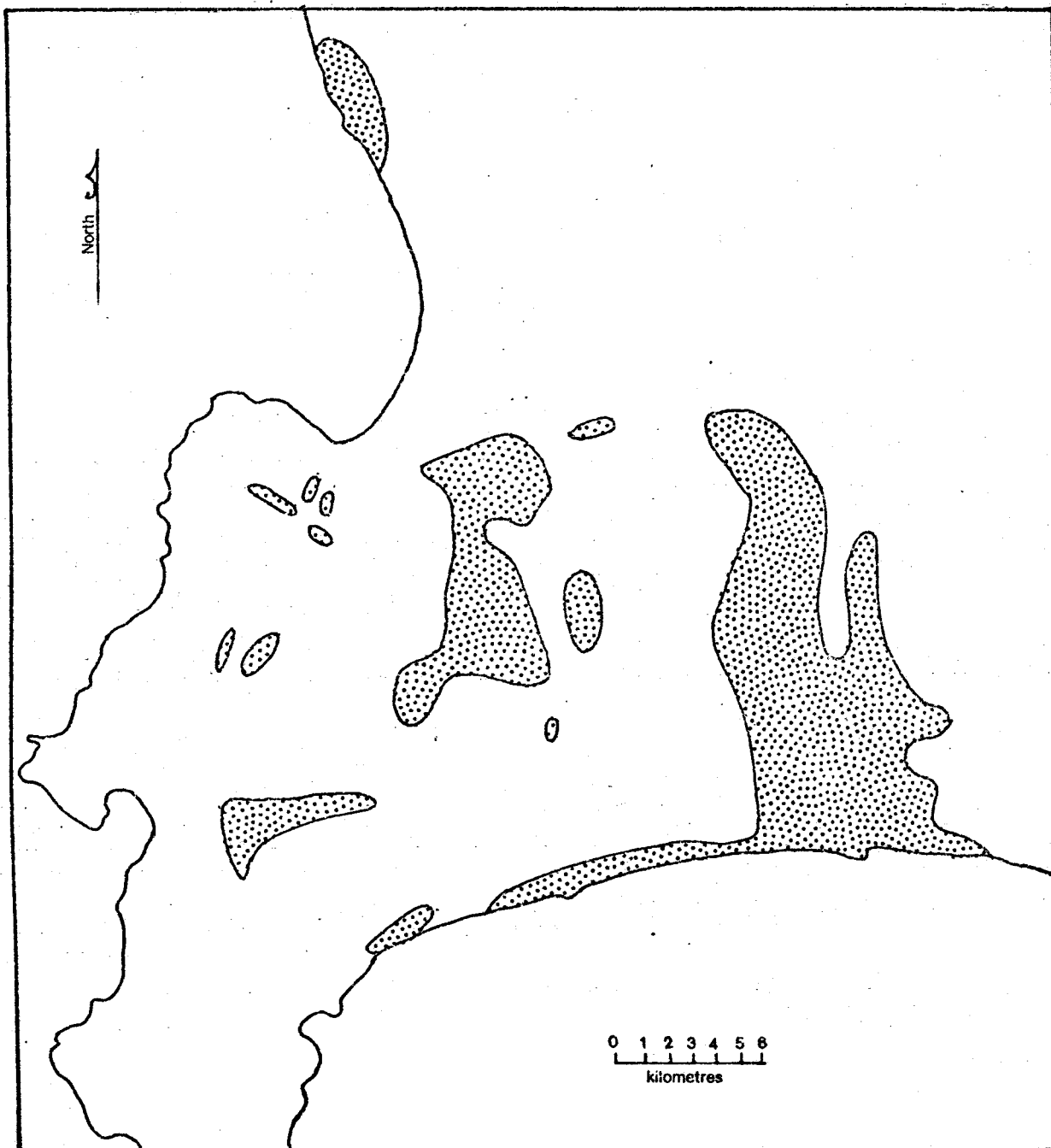
Map 7: Areas where planting of *Acacia melanoxylon* is recorded in this report.

(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)

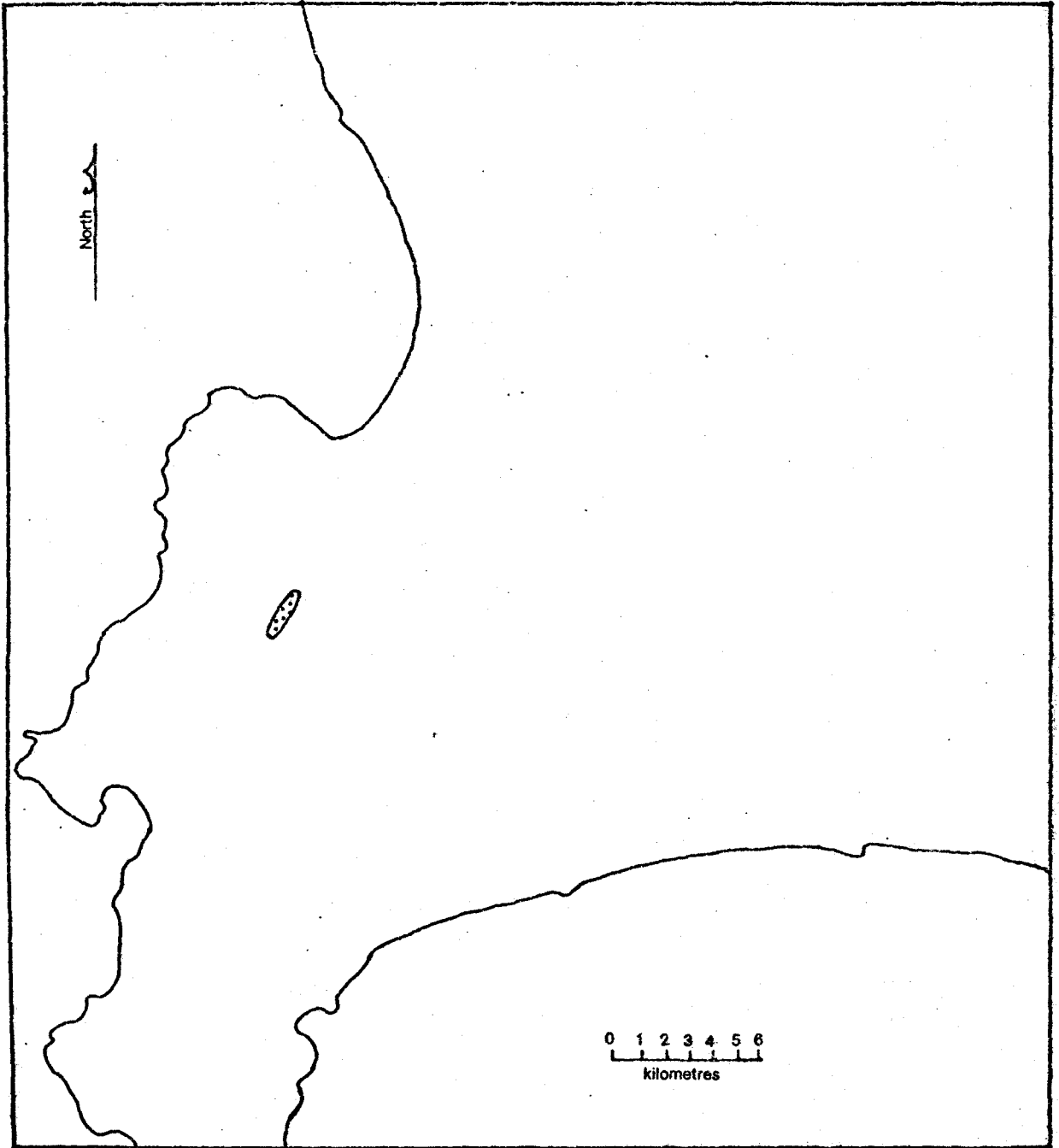


Map 8: Areas where planting of *Acacia pycnantha* is recorded in this report.

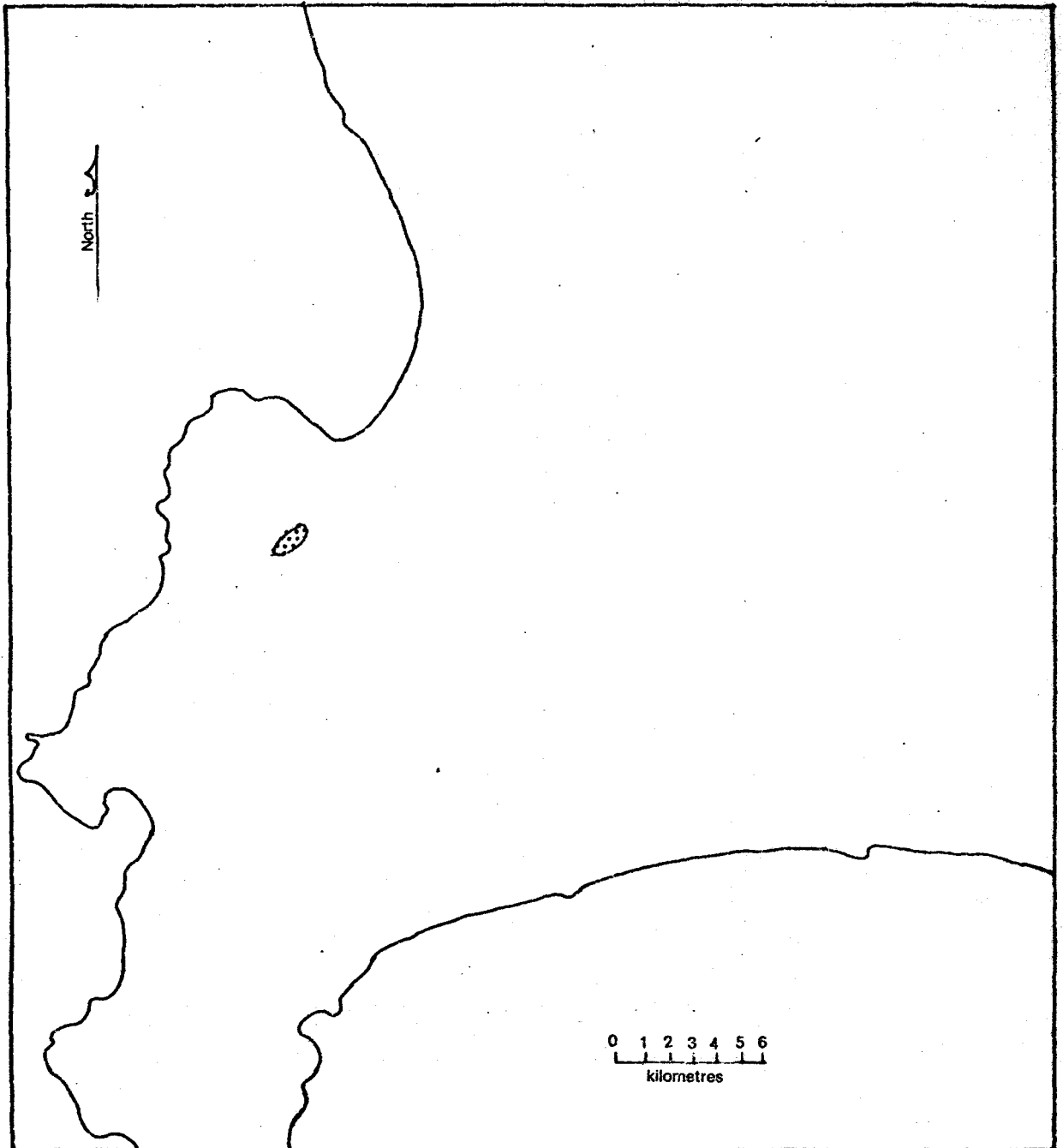
(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)



Map 9: Areas where planting of *Acacia saligna* is recorded in this report.  
(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)

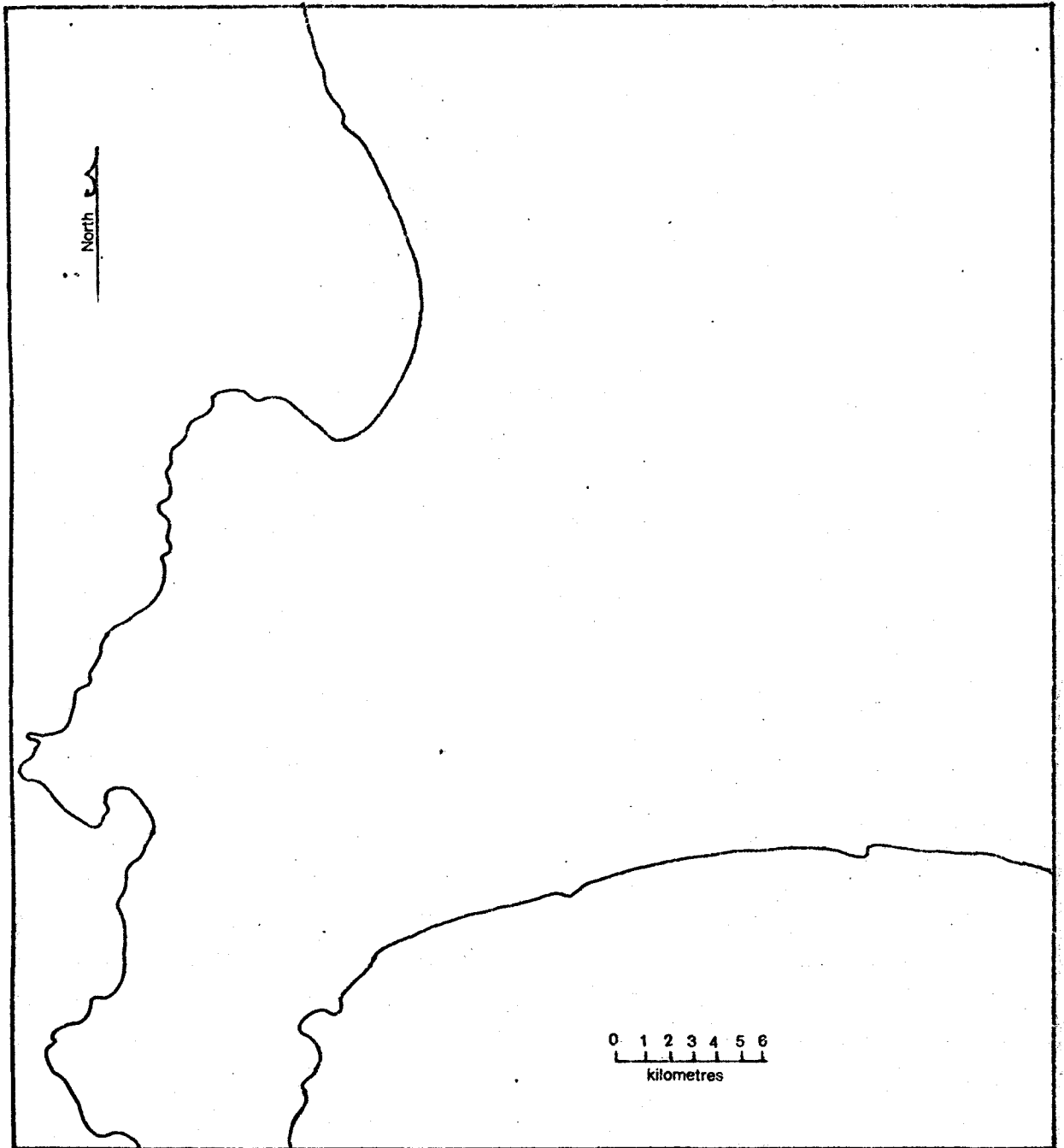


Map 10: Areas where planting of *Albizia lophantha* is recorded in this report.  
(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)



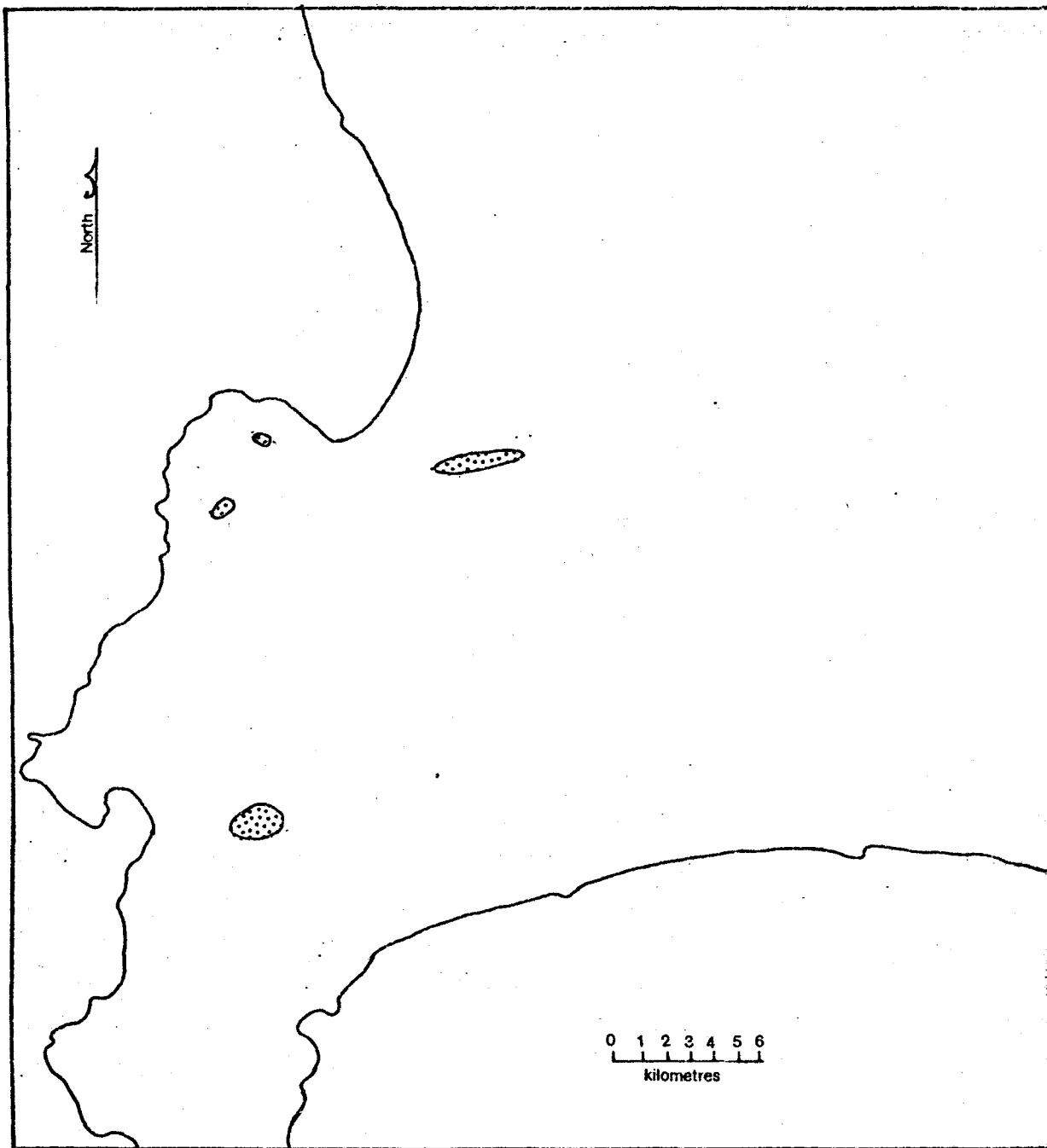
Map 11: Areas where planting of *Hakea gibbosa* is recorded in this report.

(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)



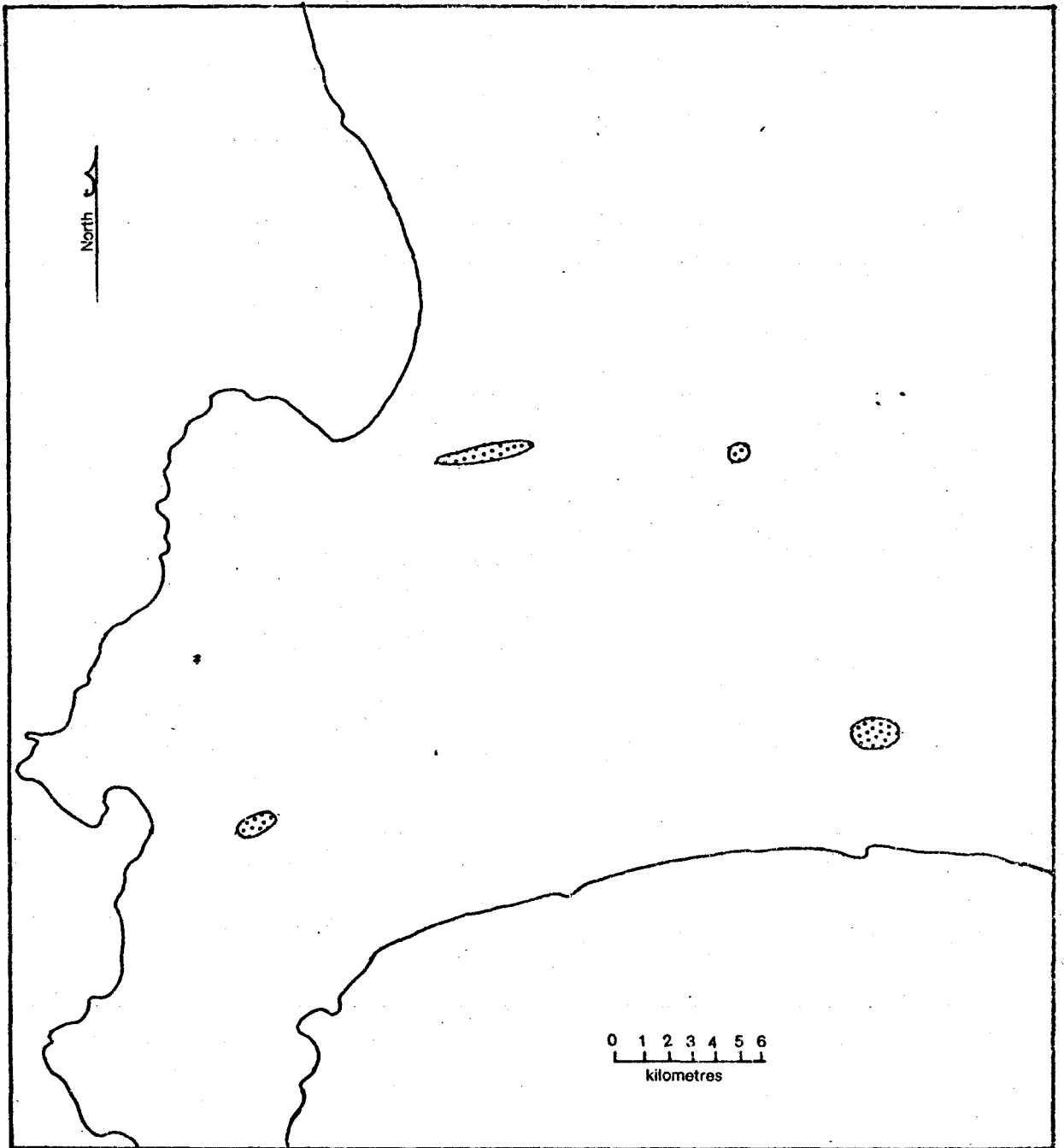
Map 12: Areas where planting of *Hakea sericea* is recorded in this report.

(No planting of this species was actually recorded. For place names, etc. see Maps 1 and 3.)



Map 13: Areas where planting of *Hakea suaveolens* is recorded in this report.

(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)



Map 14: Areas where planting of *Leptospermum laevigatum* is recorded in this report.

(Boundaries are approximate. For place names, etc. see Maps 1 and 3.)