

The Decline of the St Helena Gumwood *Commidendrum robustum*

Q. C. B. Cronk

Botany School, Downing Street,
Cambridge, CB2 3EA, Great Britain

ABSTRACT

I argue that St Helena was formerly well wooded between 400 and 600 m and that the main constituent of this woodland was gumwood, Commidendrum robustum (Roxb.) DC., with smaller amounts of bastard gumwood Commidendrum rotundifolium (Roxb.) DC. Further, although this woodland was fragmented by goats between discovery (1502) and settlement (1659), large wooded areas are known to have existed when the island was settled. With few exceptions all these gumwood woods have disappeared through a combination of extensive cutting for firewood and grazing of stock in the wood, mainly in the 18th century.

When conditions are right, however, gumwood still regenerates freely. Because gumwood is botanically and historically important it is perhaps essential that fenced areas of St Helena should be deliberately afforested with this tree, to ensure the future survival of gumwood woods. In addition, I hope that existing areas of gumwood woodland (at Peak Dale) will be carefully fenced and maintained.

INTRODUCTION

In previous papers (Cronk, 1983, 1986) I outlined the decline of two plants formerly of great ecological importance in St Helena, and now very rare. A third case, although very different, is provided by the gumwood *Commidendrum robustum* (Roxb.) DC.

The genus consists of a few species all endemic to St Helena. The genus

shows no strong affinities with any other particular genus of the tribe Astereae of the Compositae to which it belongs.

Gumwood is a small tree to c. 8 m, producing nodding capitula with a white disc (c. 1.5 cm across) terminally on the branches, 1–3 side shoots subsequently appearing below the inflorescence. Growth thus conforms to the *modèle de Leeuwenburg* (Hallé & Oldeman, 1970). Although flowering occurs sporadically throughout the year, the main flowering season is in the winter (June and July). The flowers are visited by microlepidoptera and diptera. Of the former, I have collected *Hymenia recurvalis* Fabricius and *Scoparia cf. similis* Wollaston from gumwood flowers (det. BM(NH)). Under suitable conditions seeds germinate copiously on bare damp soil, the seedlings establishing themselves before the summer dry weather. The seedlings bear leaves which are larger and more flaccid than those of the adults. The species shows a great deal of variation in leaf and capitulum morphology, which may be a result of

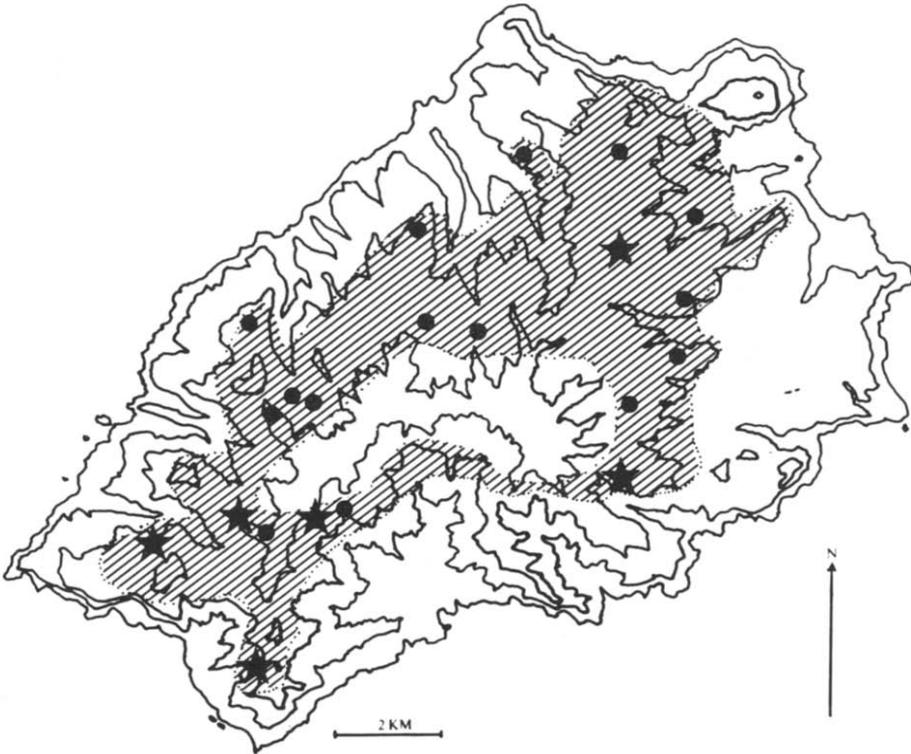


Fig. 1. Map of past (●) and present (★) distribution of gumwood.

introgression with other species after the destruction of the island's natural vegetation by man. Gumwoods occur at medium elevations in St Helena (Fig. 1) and are thus frequently exposed to dry conditions to which they are resistant.

In this paper I suggest that the gumwood formerly covered huge areas of St Helena. Presently, however, it is reduced to a few relict populations. I examine the causes of this massive decline, with a view to the possibility of re-establishing gumwood woods in areas where they formerly occurred.

HISTORICAL RECORDS AND THE FORMER DISTRIBUTION OF GUMWOOD

Old maps and drawings

It is clear that many areas of St Helena which are no longer wooded formerly were. According to Bishop Osorio (1752) the early Portuguese visitors (1502 onwards) found the island covered with 'fine trees'. Likewise Linschoten's view of the island (Tiele, 1885) illustrates trees on the tops of hills around the coast. As the gumwood is now by far the commonest indigenous tree of such areas it may be that it is the principal tree of such accounts, but without corroborating evidence this is uncertain. However, on a Portuguese map published in 1604 (Amaral, 1604) such evidence does exist. A wood is marked in a position where a large gumwood wood is known to have persisted until the early 19th century (Longwood and Deadwood). Interestingly the woodland areas marked on this map are patchy—possibly the result of a century of goat grazing on the island.

Burchell's views of the island (1805–1810; Burchell MS.7) include several drawings of recognisable gumwood trees in specific localities, and these too have been used in conjunction with the first accurate map of the island (Barnes, 1817) in compiling Fig. 1.

Place name evidence

The following names refer to the former occurrence of indigenous woodland on the island: (1) Longwood, (2) Deadwood, (3) Bottom Woods, (4) Woody Ridge, (5) Gumwoods, (6) Half-Tree Hollow, (7) Woodlands, (8) Woodlands Hill, (9) Thompson's Wood, (10) Woody

Point, (11) Levelwood. All can be found on the present (ODS 360) map of the island. At Longwood and Thompson's Wood relict populations of 8 and 3 gumwoods, respectively, are found today. At Longwood, Deadwood and Bottom Woods there is also documentary evidence of large gumwood woods. Grant (1883) records the local tradition that a thick wood once occupied Half Tree Hollow. It seems likely that all these place names refer to the former occurrence of gumwood.

Written evidence

There are numerous mentions of gumwood in the island records (Janisch, 1885), e.g. at Horse Pasture (14) and Ruperts Valley (15), and additionally in the works by Brooke (1824), Beatson (1816), e.g. at Horse Point (12) and Roxburgh in Beatson (1816), Grant (1883) and Melliss (1875). In addition, Burchell in his manuscript journal (Burchell MS. 9) mentions gumwoods in several localities (e.g. Broad Bottom (13)). Brooke mentions that the gumwood was used for building but that it was not suitable for exterior work. By 1875 the gumwood was reduced to relict localities and Melliss gives the details of these.

All these localities are mapped in Fig. 1.

PRESENT DISTRIBUTION OF THE GUMWOOD

Relict localities

At present gumwood only occurs in the following localities: (16) Peak Dale Waterfall (a few trees on the cliffs); (17) Peak Dale woods (large population, see below); (18) Longwood (8, probably planted, old trees by the golf course); (19) Deep Valley (c. 6 trees in *Olea africana* L. scrub); (20) Devil's Hole (3 trees on the cliffs); (21) Man and Horse (one old tree in pasture) and Thompson's Wood (3 young trees at the edge of a mixed forestry plantation, the dead stumps of the parent trees are further into the wood; Kerr recorded 6 trees here in 1958). In addition, gumwoods have been planted at High Peak (5 trees planted c. 1955) and Scotland (several young trees planted by R. O. Williams, c. 1970, raised from seed gathered at Peak Dale).

Peak Dale Woods

These are the only gumwood woods now left on the island and are consequently of very great significance. They comprise an area of c. 2 ha between Peak Dale Cottage and Luffkins (Fig. 2). Gumwood woods are known to have been present in the area for some time, and there is a local tradition that gumwoods used to cover the adjacent Lower House Plain. The land is owned by Solomon & Co.; Major Moss, a former Director of Solomons, took a great interest in the gumwoods. Mrs Irene Benjamin can remember in the 1950s that her family, then living in Peak Dale Cottage, was forbidden to use any gumwood timber for fuel unless a tree had died of natural causes. The woods have thus been preserved for some time. Interestingly, the trees display a great deal of morphological variation. They regenerate freely especially in open, bare areas. One small area that was cleared of scrub (*Lantana camara* L. and *Solanum*

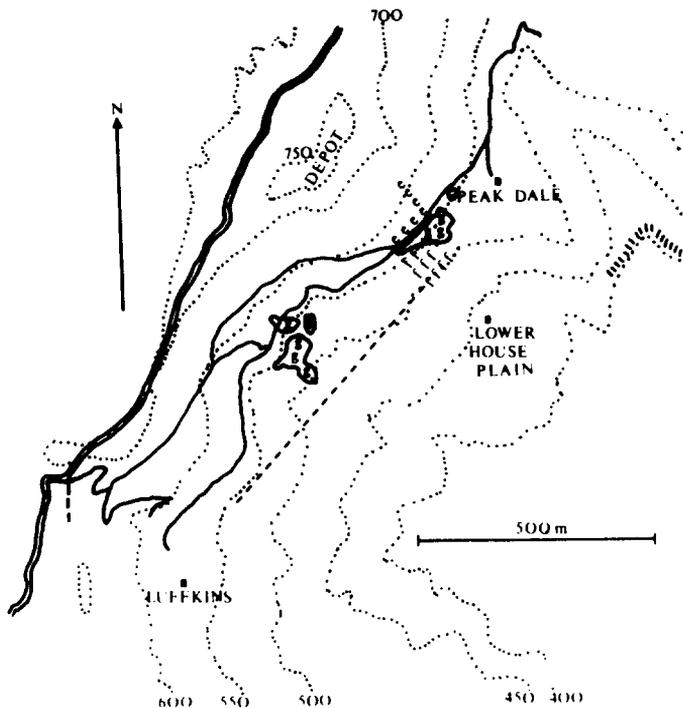


Fig. 2. Map of gumwood woods at Peak Dale.

mauritianum Ait.) by the Agriculture and Forestry Department in 1979 is now (1983) thick with gumwood saplings, some up to 3 m high (Fig. 3).

Unfortunately, however, the bark of gumwood saplings is highly palatable to sheep and at present this is preventing good regeneration over most of the area. In 1978 a fence was erected below the gumwoods (Fig. 2) with the purpose of keeping sheep out, but this has not been fully effective.

The ground vegetation in the area is *Lantana* scrub, composed exclusively of introduced species: *Lantana camara* L., *Sporobolus*

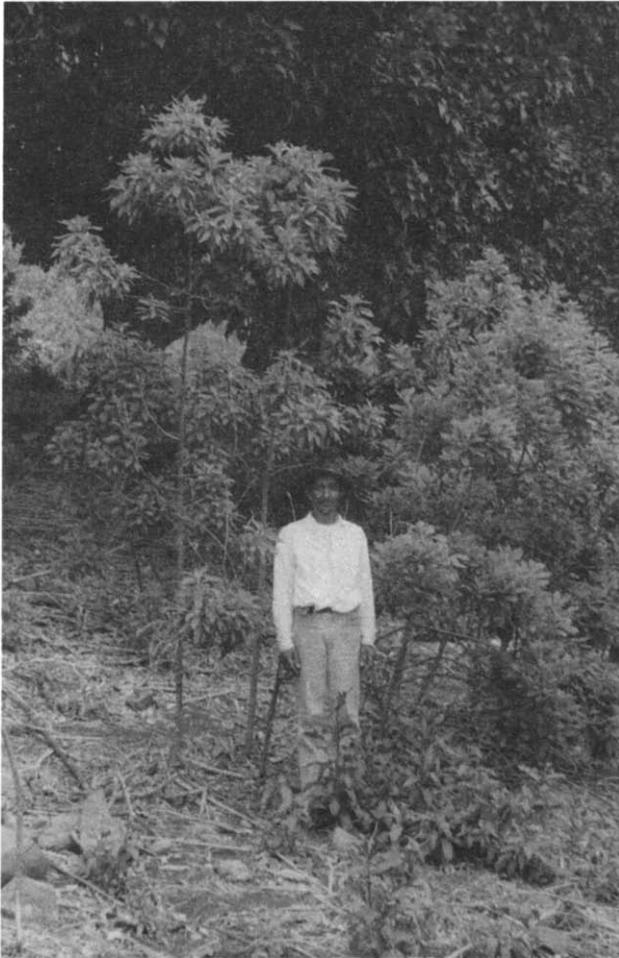


Fig. 3. Regeneration at Peak Dale (scale provided by Mr G. Benjamin).

africanus (Poir.) Robyns & Tournay, *Helichrysum bracteatum* L., *Cyperus polystachyus* Rottb. etc. However, under the gumwoods the ground vegetation is sparser and in many places the ground is completely bare, particularly on the steeper slopes. In one place, where gumwoods have grown up on former cultivations, a dense sward of 'bird-seed grass' *Erharta erecta* Lam. has developed.

The trees have domed interlocking crowns (Fig. 4) with a monolayer of foliage which casts a light shade. They are up to 8 m high, mostly branched about 1 m or so above ground level. I carried out extensive sampling using the point-centred quarter method (Mueller-Dombois & Ellenberg, 1974) and showed that the mean trunk diameter measured at breast height (or if the tree forks below breast height, measured just below first fork) is 12.3 cm ($n = 91$). The average canopy diameter is 3.27 m and the density is about 1200 trees ha^{-1} . These figures include saplings above breast height, but exclude smaller plants. The largest tree measured had a trunk diameter at breast height of 36 cm. The numbers of individuals recorded in girth classes are: 9–19 cm: 19, 20–29 cm: 19, 30–39 cm: 16, 40–49 cm: 13, 50–59 cm: 5, 60–69 cm: 8, 70–79 cm: 6, 80–89 cm: 3, 90 cm: 2. These woods are thus the result of comparatively recent regeneration.

The older trees support rich lichen floras, the most important species of which being *Teloschistes flavicans*, *Ramalina* cf. *elegantula*, *Parmelia*



Fig. 4. Gumwood wood at Peak Dale.

dilatata, *Pannaria* sp., *Phaeographis* sp., *Graphis* sp., *Heterodermia leucomelos* and *Pseudocyphellaria aurata* (P. D. James, pers. comm.). The gumwoods grow on a steeply sloping site; the slopes were carefully measured with an Abney level to be (4-)20-30(-46) degrees. The soils are mid-brown cambisols which when dry flocculate into rock hard crumbs. On the steeper slopes the soil is eroding rapidly. The population size of the gumwood here is probably in the order of 2500 individuals.

The case for conservation

The Peak Dale woods are the last sample of an important primeval vegetation type of St Helena. Their existence means that the gumwood is one of the most abundant indigenous trees: unique in that all the other indigenous trees of the dry region are either extinct or reduced to populations of less than 10 individuals. The woods at Peak Dale preserve a great deal of genetic variation which would ultimately be lost if the population were allowed to dwindle further. In addition, gumwood woods were a major source of firewood and timber during the early days of settlement and thus this remaining wood has considerable historical, cultural and educational importance.

It is quite clear that it will regenerate and expand of its own accord if a dedicated move is made to exclude grazing animals. In addition it is important to preserve all the other relict pockets of gumwood for reasons of genetic conservation.

CAUSES OF THE DECLINE OF GUMWOOD

Failure to enclose the Great Wood

The Great Wood was an anciently wooded plain comprising the areas now known as Deadwood, Longwood, Bottom Woods and Horse Point. It remained wooded long after most of the gumwood woods elsewhere had been destroyed for firewood. With a good deal of foresight the East India Company suggested in 1683 that the area should be enclosed to forestall the impending timber shortage and supply all the Company's timber needs. It was, as the island records show, then covering an area of about '2 miles square' (10 km²), stretching from Hutt's Gate to Flagstaff and out to Horse Point. Its enclosure was seen to be needed because, as it was common land, stock—especially pigs—was turned out to feed in it by

the settlers. This caused a progressive thinning of the wood, particularly in marginal areas, by regeneration failure following the destruction of seedlings and saplings. It was never enclosed despite repeated suggestions and now all that remains are 8 gumwood trees (probably planted in the early 20th century) beside the golf course at Longwood. The reasons for this failure to enclose were twofold. First, the sheer labour of fencing (i.e. walling) was too great given that the Company's slaves were always in demand for other tasks and the stone had to be brought from a considerable distance. Secondly, it failed for political reasons in that the settlers bitterly resented an enclosure of their common land by the Company, preventing them from feeding stock and gathering wood there.

Because of this political opposition, and aware of the increasing fuel and timber shortage, Governor Roberts in 1709 introduced a planting law, forcing settlers to plant a certain proportion of their land with trees (i.e. gumwood). Successful for a time, this law subsequently fell into disuse and the Directors in London again instructed the Governor and Council to fence the Great Wood (EIC records, India Office Library, London). Because the task was so great it was decided to start (in 1722) by fencing a small marginal area (Horse Point) which was becoming thin of wood. This was completed in 1725, with success, as many seedlings sprang up after the rains and subsequently the saplings had to be thinned. A start was made on the rest of the fencing. It was soon abandoned, however, and the wood continued to diminish. In 1728, 4 acres (1.7 ha) at Longwood were tried for crops, and despite the acute timber shortage the settlers saw more promise in the Great Wood for crops and pasturage. Consequently, in 1733 an idea for parts of the common to be enclosed for tree planting was opposed and it foundered. In 1756 crops were again tried at Longwood but failed, and in c. 1777 a final and unsuccessful attempt to enclose the Great Wood started.

Around 1810, the planting law was revived by Gov. Beatson, in response to the perennial problem of timber and fuel shortage. By now, however, the emphasis had changed. Beatson encouraged the planting of *Pinus pinaster* Ait. and *Acacia melanoxylon* R.Br. in Ait., rather than gumwood. He also believed that Longwood's potential lay in crops rather than gumwood. In any case, almost all the gumwoods had disappeared. Beatson (1816) did note with surprise, however, that there were many stumps of dead gumwood in the vicinity of Horse Point. These may have been the last remains of the regeneration that took place in 1725 on the enclosure of Horse Point.

Depredations of stock

The bark of the gumwood is highly palatable to sheep and almost certainly also to goats. The Portuguese discovered the island in a primeval state in 1502 and are said to have introduced the goat in 1513 with the abandonment of Lopez on the island (Brooke, 1824). In fact goats were probably introduced earlier, in line with Portuguese policy (Hakluyt, 1589). By 1588 the population had exploded into great flocks. Thus even before settlement in 1659 gumwood regeneration would have been severely affected and this may account for the fragmented and localised wooded areas which remained at the time of settlement. The depredations of goats continued until recently and continued to contribute to the decline of gumwood.

The East India Company introduced further goats in 1676 in an attempt to improve the strain. At first the EIC regulated the culling of goats ranging on its land (it ordered that there be no shooting in 1678). Later it granted the privilege for the settlers to range goats in certain specified goat ranges, for periodic pounding and culling. Later the goat ranges became commons and the privilege became a right. Because of the damage the goats were causing, a programme of extermination was agreed upon in 1731, which lasted for 10 years and was repeated in 1745. The goat population quickly bred up to strength again, however. In 1809 Gov. Beatson recorded a population of 2887 goats based on that year's pounding. He revived the policy of extermination but to do this he had to buy back the goat ranges from the settlers. Nevertheless the population again increased. In the 1960s and 1970s an extermination policy was again followed, with the result that there are very few feral goats today, and only in the most inaccessible areas. Sheep are still grazed in the dry pastures (often in places formerly wooded with gumwood) and prevent gumwood regeneration in some places. Pigs on the other hand, which used to be turned out in the Great Wood to the great detriment of the gumwoods, are now only reared in pens.

Building

Gumwood timber was formerly used for buildings (Brooke, 1824) but was not very satisfactory as it rotted quickly if exposed to the weather. There seems to be very little gumwood timber now present in buildings, doubtless having been consumed by termites at the lower altitudes.

However, the kitchen rafters and the fireplace lintel at Lower House Plain were made of gumwood as recently as the 1920s (George Benjamin, pers. comm.). But the gumwood's use for timber can only have contributed in a small way to its decline by comparison with the huge quantities consumed as firewood, and the centuries of regeneration failure caused by stock.

Burning

Gumwood timber was burnt for two main purposes: domestic fires and the distillation of arrack. Yams were the principal starch staple of the settlers until the 1680s when potatoes were introduced. After that date they continued to be the staple food of slaves and pigs, but had to be cooked before they were edible (even for pigs). With the introduction of the potato, the habit of making arrack began, causing a considerable strain on the timber resources of the island. In 1701, arrack was discouraged by a duty of '12d a hundred' on firewood and '4d a gallon' on the distillate, in order to preserve wood (primarily) and to increase the prosperity and curb the drunkenness of the islanders. However, the demand for arrack remained high and in 1713 the Court of Directors of the EIC was forced to complain to the Governor about excessive arrack drinking on the island. In 1717 it was still blamed for the shortage of wood despite increasing imports of arrack from India, which, in 1716, allowed the Company to bargain with the settlers, offering to lower the arrack price if the beef price was to be lowered. The islanders claimed that a large consumption of arrack was essential to counteract the deleterious effect of eating yams. No good example was set from above: in 1723 the parson was said to drink '2-3 quarts' (2.3-3.4 litres) daily. The quantities consumed were indeed enormous: in 1717 diners at the governor's table had to be limited to one bowl of punch between three to combat drunkenness and in 1690 a funeral party consumed '28 gallons' (130 litres).

By the latter half of the 18th century, however, almost all the spirits were imported from India, thus relieving the pressure on island wood. Yet spirits continued to be troublesome to the island and when Gov. Beatson banned the import of cheap spirits from India in 1811, a mutiny ensued.

Thus from c. 1680 to c. 1750 a vast amount of wood must have been used for distilling. In addition sugar was tried in the island in the 1680s and 1709-14, but had relatively little effect on timber supplies, although

the copper stills imported for refining sugar were certainly put to good use in distilling arrack.

The wood shortage was first felt by the Company as early as 1687: when a slave was sentenced to death by burning in that year it was ordered that 'all ye inhabitants do cause all their Blacks to be present at ye execution—and that every one of them . . . do bring down a turn of wood for ye same purpose'. In the vicinity of Jamestown no wood was left. By 1705 there was no wood even around Plantation House and the Company's slaves had to be sent every day to fetch firewood from Horse Pasture (some kilometres away).

To supply Jamestown with fuel in the early 18th century, slaves were sent regularly to Rupert's Valley (the edge of the Great Wood). The supply of fuel was a constant problem which in the mid-18th century was partially solved by the introduction of furze *Ulex europaeus* L.—still common on the island where it invades pastures and is still esteemed as a fuel-wood. In 1778 the Company called for extensive furze planting, as by this time the supply of gumwood was far too small to meet the fuel-wood demands of the island.

This constant drain on the resources of gumwood during the 17th and 18th centuries for fuel, coupled with the inadequate protection of those resources by planting and enclosing, is undoubtedly the major reason why gumwood, once so abundant, is now so rare.

ACKNOWLEDGEMENTS

I thank Mr George Benjamin for help with the field-work, particularly with the point-centred quadrats. Dr A. M. Sugden kindly commented on the manuscript.

REFERENCES

- Amaral, Melchior Estacio do (1604). *Tratado das Batalhas . . . na Ilha da Santa Elena*. Lisbon, Antonio Alvares.
- Barnes, J. (1817). *A tour through the island of St Helena*. London, J. M. Richardson.
- Beatson, A. (1816). *Tracts relative to the island of St Helena; written during a residence of five years*. London, Bulmer & Co.
- Brooke, T. H. (1824). *History of the island of St Helena . . . to 1823*, 2nd edn London, Kingsbury, Padbury & Allen.

- Cronk, Q. C. B. (1983). The decline of the redwood *Trochetiopsis erythroxylon* in St Helena. *Biol. Conserv.*, **26**, 163–74.
- Cronk, Q. C. B. (1986). The decline of the St Helena ebony *Trochetiopsis melanoxylon*. *Biol. Conserv.*, **35**, 159–72.
- Grant, B. (1883). *A few notes on St Helena and descriptive guide*. Jamestown, St Helena.
- Hakluyt, R. (1589). *The Principall Navigations, Voiages and Discoveries of the English nation*, 1st edn, facsimile with an introduction by D. B. Quinn and R. A. Skelton, 1965, p. 812, Cambridge, University Press.
- Hallé, F. & Oldeman, R. A. A. (1970). *Essai sur l'architecture et la dynamique de croissance des arbres tropicaux*. Paris, Masson.
- Janisch, H. R. (1885). *Extracts from the St Helena Records*. Jamestown, privately printed.
- Melliss, J. C. (1875). *St Helena*. London, Reeve.
- Mueller-Dombois, D. & Ellenberg, H. (1974). *Aims and methods of vegetation ecology*. New York, Wiley.
- Osorio, J. (1752). (Trans. J. Gibbs). *The history of the Portuguese during the reign of Emmanuel*, 2 vols. London, A. Millar.
- Tiele, P. A. (1885). *The voyage of John Huyghen van Linschoten to the East Indies*, 2, London, Hakluyt Society.

APPENDIX I

Burchell Manuscripts Relating to the Botany of St Helena.

Burchell, W. MS(1) *Flora Heleniana*; manuscript florula in the Archive Room, Royal Botanic Gardens, Kew.

Burchell, W. MS(2) *Flora Insulae Sanctae Helenae*; tabulated flora in the Archive Room, Royal Botanic Gardens, Kew.

Burchell, W. MS(3) *Burchell Plant Lists* (St Helena Plants, Index to Localities of Plants Contd. in African Herbarium & South African Compositae); Archive Room, Royal Botanic Gardens, Kew.

Burchell, W. MS(4) *Hortus Fulhamensis* (Catalogus Plantam Africa Australis extratropica (exceptis 2 ad 51) quarum Semina in horto propriis apud Fulham servit); Archive Room, Royal Botanic Gardens, Kew.

Burchell, W. MS(5) *Memoranda Botanica Vol. 2*; Archive Room, Royal Botanic Gardens, Kew.

Burchell, W. MS(6) *St Helena—Sandwich Islands etc*, unbound manuscript material; Archive Room, Royal Botanic Gardens, Kew: containing the 'Catalogus plantarum quae Sta Helenae variis in hortis inveniuntur'.

Burchell, W. MS(7) *St Helena*, folio of St Helena drawings; Library, Royal Botanic Gardens, Kew.

Burchell, W. MS(8) *St Helena sketches*, volume of 65 sketches; Africana Museum, Johannesburg Public Library.

Burchell, W. MS(9) *St Helena Journal*, Burchell's St Helena diary; Hope Department, Oxford University Museum: the original and a transcript by Prof. E. B. Poulton.