

MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No. 1367	Press Mis.
265 266	
Dated 20-6-1867.	

Not to be folded or roughly handled

*Proceedings of the Madras Government, Revenue Department,
20th June 1867.*

No. 265. Read the following letter from the Acting Superintendent Government Chinchona Plantations, to the Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 27th April 1867, No. 58:—

I have the honour to forward the Administration Report of this department for the official year 1866-67.

REPORT ON THE GOVERNMENT CHINCHONA PLANTATIONS AND BOTANICAL GARDENS, OOTACAMUND, NEILGHERRIES, FOR THE OFFICIAL YEAR 1866-67.

1. In submitting this report it affords me much satisfaction to be able to state that the season has been very favourable for planting operations, the rains extending to a later, and commencing at a much earlier period of the year than has been experienced since the introduction of the Chinchona plants to this country, consequently the plants have maintained a more than usual luxuriant state of growth throughout the whole of the year.

2. The works on our plantations have made more than average progress, and it is anticipated, by July 1868, the plantations will be completed to the sanctioned extent, viz., 1,200 acres of planted land. The average monthly increase by propagation throughout the year is 66,950 against 48,968, the result of last year. The maximum monthly increase by propagation has reached as high as 176,349 against 78,725, the highest monthly increase obtained during the season. The total number of plants on the 1st April 1867, was 1,926,044 against 1,156,070, the total number of plants on the 1st May last year. Thus the total number propagated during the year is 8,03,399 plants, or nearly double the number of plants propagated in 1865-66. The number of plants issued to the public is 42,065, making the total number 126,047 plants distributed up to the 1st April 1867. The number of plants permanently planted out to date is 557,551, or 156,340 planted during the present year. The first plants, which were permanently planted out in August and September 1862, have attained heights varying from fifteen to twenty-two feet. These trees are in the finest health, have recently been covered with bloom, and are now producing many millions of excellent seeds. Six hundred of these have been cut down for their bark to be sent into the market in order to test its commercial value. The seeds gathered last season have germinated freely, and have been extensively distributed. Reports daily reach us of their excellence, and the great number of young seedlings raised from them.

3. The result of the last analysis of our bark exhibits a farther and steady yearly increase in the yield of alkaloids, and is of such a nature as to be highly encouraging and interesting. Our barks submitted for analysis in the early part of June 1863 gave 3.40 per cent. of alkaloids, those submitted in 1864 gave six per cent; the highest result attained from the samples of 1865 was 9.72 per cent. of alkaloid, while some of those samples yielded as high as six per cent. of crystallized sulphates. The bark submitted in October 1866 for analysis gave 9.79 per cent. of alkaloid, and of this 8.45 crystallized sulphates; shewing an increase of nearly 2.50 per cent. of crystallized sulphates in one year's growth, or a yield in our young barks altogether unprecedented in the finest samples of mature American bark. Gratifying as this result is, we have not yet reached our maximum, but on the contrary have every reason to hope that two or three years' additional growth will

secure a yield of from twelve to fifteen per cent. of crystallized sulphates. These are the results obtained by Mr. Howard in the public reports of his analysis, and may be taken as the standard of the value of the bark, as being conducted by an eminent Chemist and practical manufacturer.

With these observations I proceed to particulars.

Heads of Report.

	Paragraphs.
1. Propagation	4 and 5
2. Condition and growth of plants	6
3. Cultivation in the open ground	7
4. Do. under the shade of living trees	8
5. Do. results obtained by private planters in	9
6. Do. accumulation of earth around the stems injures or destroys the plants	10 and 11
7. Formation of alkaloids	12 to 14
8. Cinchona, new varieties introduced, remarks on	15 and 16
9. Establishment	17
10. Convict labour	18 and 19
11. Progress of operations	20 to 24
12. Botanical gardens	25 and 26
13. Tea plantation	27
14. Concluding remarks	28 and 29
15. Appendix A. accounts from the commencement to 31st March 1867.	
16. " B. Meteorological observations at Neddiyattum.	
17. " C. Ditto at Ootacamund.	

4. During the present year nearly the whole of our plants have been propagated from seeds; the *Succirubra* as well as other species having produced a quantity of ripe seed in the spring and autumn of 1866. From the 1st May 1866 to the 31st March 1867, 803,399 seedlings have been raised, the majority of these of the *Succirubra* and *Condamenia* being the two most valuable species at present in cultivation. This large number of seedlings necessitated the erection of a temporary house in order to give the plants accommodation during the dry months; further enlargement will not be necessary, as we have now cover for more than sufficient plants to complete our plantations; the demand for plants by private planters being limited partly on account of loss by bad seasons, and partly because some have been successful in raising the number of seedlings they require, *Cinchona* plants being more easily propagated by seeds than by cuttings.

5. Our crop of seeds of this season will be large, and would suggest, with the sanction of Government, that a portion of the seeds be distributed gratuitously to such planters as are likely to take care of them and turn them to account. As we have now the means, it is desirable that we should offer every facility for extending the cultivation of this valuable product, and this cannot be better done than by the distribution of seeds. The *Cinchona Lancifolia* is the only species here which has not produced seed, and consequently this plant has still to be increased by cuttings.

6. *Condition and growth of plants.*—The growth of the plants throughout the whole of our plantations still continues to be most satisfactory, the stems of our

older plants increasing much in thickness, while the increase in the weight of bark has nearly doubled by the growth of 1866-67, thus shewing the loss sustained by cutting down our trees at an early stage of growth, as the increase of the stems and bark is much greater in proportion after the plant has attained a considerable size. The *C. Succirubra* still maintains the most robust habit and luxuriant growth of any of the species yet introduced, and consequently gives promise of being the most profitable plant to cultivate at elevations varying from 4,000 to 6,000 feet. The *C. Officinalis* *B. Condamenia* almost equals the *C. Succirubra* in luxuriance of growth; it yields a thick bark, and a large product of alkaloid, and in most situations comes next in value to the *C. Succirubra*; while at high elevations (that is between 6,000 and 8,000 feet) it is the most profitable plant to cultivate. The growth of the *C. Calisaya* is unsatisfactory; only one or two varieties of the Bolivian *Calisaya*, raised from Mr. Money's seeds, promise to have a luxuriant habit of growth, and suited to this climate, with these exceptions all our varieties of *C. Calisaya* or Bolivian barks are delicate, liable to disease and damp, and appearing to be, on the whole, a much more difficult plant to cultivate than the other species. The *C. Uritusinga* has the same habit and luxuriant growth as the *C. Officinalis* *B. Condamenia*, which in every respect it much resembles, in fact, varieties of one species run into the other, in such a manner as not to be distinguishable. This remark also applies to the *C. Crispa*. The bark of the *C. Pahudiana* has within the last year very much improved in appearance and in value. Although this is doubtless the least valuable of all the species in cultivation, it is still a bark which may ultimately be turned to account. The *C. Lanceolata*, which we received from Java, has turned out to be only a variety of *C. Pahudiana*. The *Cinchona Lancifolia*, also from Java, promises to be a very valuable species; it is hardy and well suited to the climate, but being of slow growth, its cultivation will be less profitable than the varieties of *C. Officinalis*, which it appears to resemble in its requirements, and apparently grows as well upon grass as upon forest land.

7. *Cultivation on the open ground.*—This year a large extent of grass land has been planted, principally with the varieties of *C. Officinalis*, and these seem to succeed quite as well upon the grass as upon the forest land, especially when the land is trenched, and by this means we may convert a large portion of the numerous grassy hills, so common on the plateau of the Neilgherries, into forest. All the species of *Cinchona* are found to thrive best when fully exposed, a little shading by turf, wood, or fern, only being necessary to protect the plants when young. The system of staking so extensively used in the early part of our operations has been discontinued, except in such places as are exposed to the full force of the south-west monsoon.

8. *Cultivation under the shade of living trees.*—This system of cultivation has been entirely discontinued, as our experience proves that none of the species of *Cinchona* can be successfully grown under living shade. Even the *C. Calisaya* is injured when grown in this manner, while the stems of our plants of *C. Succirubra* and *C. Condamenia*, under dense shade, at four years' of age, are only a little thicker than a quill, and many of the plants have died altogether from drip and damp during the monsoon. The more the plants are exposed to light and air, the more robust is their growth, and greater the deposit of alkaloid.

9. *Cultivation—results obtained in, by private Planters.*—Numerous Chinchona planters at first entered the field, but several have recently had to dispose of their plantations, in consequence of their limited means not enabling them to carry the cultivation to a successful issue, others, being unable to meet the heavy annual rent of two Rupees per acre charged for forest lands on these hills, have been compelled to relinquish them. These results have been mainly brought about by the monetary crisis of last year. Some of the planters, however, have made rapid strides with their cultivation; among the most promising plantations are those of Mr. Money, Colonel Denison, Mr. Rohde, Major and Mr. Morgan, and Captain Jennings; these plantations are all in a very promising condition, and if carried on with the same perseverance will, in a few years, add to the exports of India a large supply of "Peruvian bark."

10. *Cultivation—accumulation of earth around the stems injures or destroys the plants.*—On examining private plantations, it was found that many fine plants were destroyed by earth being washed down, falling or being thrown around the stems of the plants in weeding. When the stems are covered for an inch or two above the collar with earth, a fungus attacks the bark, especially in wet weather. Fine plants of three or four years' growth are destroyed in a few days by this fungus, and the sudden death of plants, which a few days before were in the utmost health and luxuriance, so discourages planters unacquainted with the cause, as to lead them to suppose that something in the soil suddenly blasts the plant, and that sooner or later the whole may be destroyed in the same way.

11. To avoid the loss and disappointment likely to arise from the above cause, the plants should be placed on hillocks of earth cut out from the side of the hill, and slightly raised, as at A, with a drain of a few inches in depth cut around on the hill side, as at C, thus preventing the wash of earth around the stem of the plants. A plant in danger of being destroyed is shown at D, the loose earth having fallen down from the hill and covered the stem above the dotted line at the crown of the root at E, to the dotted line at F. Fermentation appears to set in on the covered bark, and is immediately followed by a fungus, which entirely destroys the texture of the bark and causes the death of the plant.



12. *Formation of alkaloids.*—The result of the analysis by Mr. Howard* of the fifth remittance of our Neilgherry bark is most satisfactory and encouraging. The quantity of alkaloid already obtained is unequalled by the finest selected samples of matured South American bark. In our bark also the alka-

* Report of an analysis of the fifth remittance of bark from India, by J. E. Howard, Esq., F. L. S.

Dated February 4th, 1867.

To the Under Secretary of State for India.

Sir,—I have to report that the specimens of bark removed from trees in September and October 1856 reached me in good condition. The No. 1 specimen shows at once its superiority, and approaches nearly in appearance to the fine Red Bark grown in South America. No. 2 does not differ much at first sight, except in the absence of lichens, from No. 3. Amongst the barks of this parcel suited for sale at public auction, the broker at once selected the specimen of *C. Paludiana*, as the most likely to give satisfaction, and as likely to realize at the present time from 1s. 6d. to 1s. 8d. per pound. Next to this, and at about the same value, comes No. 6, which is very much like the original specimen of this bark, as gathered by Mr. Cross, and now in my possession, together with a very well preserved specimen of a flowering branch of this sort, the Colorado del Rey of Pavon, and now named *C. Officialis*, var. *Bonplandiana*. (See Mr. Markham's Memorandum, at p. 5 of the Parliamentary Return (Chinchona) of June 18th, 1866.) I make this correction on the strength of the corresponding appearance with the specimen brought by Mr. Cross, and beg to direct particular attention to the discrimination of the varieties of *C. Officialis*, which, though classed together in some returns, and in others declared to be "not distinguishable," will be seen to be of totally different value for cultivation. Of this the *C. Officialis*, var. *Crispa*, is a remarkable illustration. I pointed out in 1852 the great inferiority of produce in alkaloids of this, the "fine Loja bark" of modern commerce, to the original Loja barks. This characteristic is not altered by the new place of growth, and this sort also preserves its peculiarly black appearance, and its very crisp fracture, from which peculiarities it was called *Cascarilla Crispilla Negra* by the Spanish dealers. It is, however, no longer noted in its new place of growth for the aroma (compared by Professor Guilbert to that of tobacco), nor has it the same pleasing appearance as when grown on the mountains of Loja. It would fetch probably 1s. 4d. to 1s. 5d. per pound in the market. The remaining parcels would not at first command a ready sale, as they differ so widely in appearance from any now in the market.

The quantity sent this time, especially of the earlier numbers, was more favourable for examination, affording the opportunity of correction by a second or third analysis of any point left obscure, an opportunity which I should desire for a future re-examination of No. 6, though I do not suppose that the result would be more favourable than it is this time.

No. 1. <i>C. Succirubra</i> .—Third crop of bark, renewed under moss.	
Crystallized sulphates, per 100 parts	8.45
Alkaloids, soluble in Ether, viz., Chinchonidine and Quinine	1.14
Insoluble in Ether (Chinchonine)	0.20
	9.79

Memo.—The sulphates (of mixed Quinine and Chinchonidine) refine well, but do not stand the Ether test.

No. 2. <i>C. Succirubra</i> .—Original bark, six months under moss.	
Crystallized sulphates	4.57
Alkaloids soluble in Ether, Chinchonidine and Quinine	3.78
Insoluble in Ether, Chinchonine	0.80
Chinchonine	0.11
	9.26

Memo.—The sulphates as No. 1, but less easily refined.

No. 3. <i>C. Succirubra</i> .—Original bark, unmossed.	
Crystallized sulphates	4.50
Alkaloids soluble in Ether	1.71
Insoluble in Ether, Chinchonine	0.40
Chinchonine	0.34
	6.95

Memo.—The sulphates as under No. 2.

No. 4. <i>C. Officialis</i> , var. <i>B. Condamentia</i> (<i>Bonplandiana</i> ?) Second crop of bark renewed under moss.	
Crystallized sulphates	6.32
Alkaloids soluble in Ether, Quinine and Chinchonidine	1.35
Insoluble in Ether, Chinchonine	0.15
	8.02

Memo.—The sulphate refines well, and stands the Ether test.

No. 5. <i>C. Officialis</i> , var. <i>B. Condamentia</i> (<i>Bonplandiana</i> ?) Original bark, nine months under moss.	
Crystallized sulphates	6.66
Alkaloids soluble in Ether, Quinine and Chinchonidine	0.56
Insoluble in Ether, Chinchonine	0.15
	7.37

Memo.—As No. 4.

No. 6. <i>C. Officialis</i> , var. <i>B. Condamentia</i> (<i>Bonplandiana</i> ?) Original quill bark under moss.	
Crystallized sulphates	2.58
Alkaloids soluble in Ether, Quinine and Chinchonidine	2.10
Insoluble in Ether, Chinchonine	0.08
	4.73

Memo.—As No. 5.

No. 7. <i>C. Paludiana</i> .—Original bark, nine months under moss.	
Crystallized sulphates	0.581
Alkaloids soluble in Ether, Quinine chiefly	0.180
Insoluble in Ether, Chinchonine, a trace	...
	0.761

Memo.—The Quinine refined (with some loss) and separated from a very little Chinchonidine (apparently) gave 0.530 per cent.

Proceedings of the Madras Government, Revenue Department,
20th June 1867.

loid is found in a state of greater purity and more easy of separation and crystallization, while the yield of the superior alkaloid (quinine) is much higher in proportion to the other alkaloids. Thus our barks are at present unequalled in value, but great as are the results already secured, they are of such a nature as to indicate to a certainty that still greater results will be obtained by each successive year's growth. Hence in two or three years we may reasonably expect our barks to yield twelve or fifteen per cent. of crystallized sulphates.

13. The samples of bark forwarded for this analysis were not selected merely with a view of ascertaining the present maximum yield of alkaloid, but principally with a view of testing practically and by experiment the exact conditions required to increase the alkaloids, and the period necessary under different conditions for the inferior to pass into the superior alkaloids. The following conditions all more or less affect the yield of alkaloids, and the time necessary to transform one into the other. The density or sparseness in the covering of moss in barks thus treated;

No. B. C. Officinalis var. Crispa—Original bark, unmossed.	
Crystallized sulphates	0.359
Alkaloids soluble in Ether, chiefly Quinine	0.379
Insoluble in Ether, Chinchonine, a trace	0.029
Memo.—The Quinine refined as above, still retaining a characteristic tinge of green, gave 0.590 per cent.	
Two specimens of this bark in 1851 and 1854 gave me—	
1851—A particular fine and unmixed parcel—	
Quinine and uncrystallized Quinine	0.40
Chinchonine	0.04
1851—Another parcel, slightly mixed with "rudy brown."	0.43
Quinine	0.37
Chinchonine	0.06
	0.65

(See Pereira's "Mat. Med." Vol. II, p. 1,642, and "Pharmaceutical Journal," August 1854.)

I trust that these trials will be useful in the guidance of the cultivation in India. It is evident that the plan adopted in No. 1 is the best. This was practised to some extent in the collection of the Lige barks (as described by Ruiz in a manuscript in the Herbarium, under the name of *Cascarilla Resacata*), but unless the bark is covered with moss immediately, as discovered by Mr. Meyer, the subsequent windy portions suffer serious injury. On the other hand, if this is attended to, the operation may be repeated with advantage, increasing as it would seem for every time of renewal. No. 2 is the most perfect of alkaloids, larger in the bark, and more abundant, but of this a more considerable percentage consists of Quinine, and the less valuable Chinchonine, with the yellow coloring matter, so as to be more easily purified. The specimen reminds one of the granulated formation of bark over a wound, and does not exhibit the customary fibres, or at least in a very much smaller proportion to the mass of the bark. This great richness in alkaloids does not seem to connect, therefore, with the views entertained by Wagnon and others, that these other fibres are the pens of the alkaloids. That improvement is less apparent in the present sample of No. 3, (Official No. 4), but it is probable that some slight attention might add a large portion of the present uncrystallized, but not of alkaloids soluble in Ether to the present amount of crystallized sulphates. In the meantime, the examination of No. 4 and No. 5 discloses some crystalline masses, in the excellence of which I conclude to be the predominant variety cultivated in India.

759,373 plants out of 1,125,000 in May 1866. See "The Port," p. 253.

I have not yet had specimens for examination of the East India *C. Officinalis* var. *Utricularia*, but have reason to suppose this must also be a valuable species, while it must be evident that the variety *Crispa* should not be propagated, as it will not repay the expense of cultivation. The same remark, in my opinion, applies to the *C. Calisaya*, var. *Prutes*, (as the *Utricularia* chiefly cultivated is very properly named by Mr. Meyer.) Also to the *C. Pahudiana*, which yields no more than the same amount of alkaloids soluble in Ether than it has done to Mr. Meyer. It is only to plant this sort, but where, as in Java, it is so extensively grown, it would be a pity, as I think, not to turn the bark to some useful purpose in the way of decoloration.

I think the variety of *C. Officinalis*, which bore the name of *Cascarilla Amarilla del Rey*, and which would now be *C. Officinalis* var. *Bomplandiana* (Lige), should also be introduced into the Indian cultivation. The bark of this sort fetches a high price in the market, as it is selected for pharmaceutical preparations, and contains Quinine in a very pure state.

It seems to me that none of the small quill barks intended for sale to the Druggists should be mossed, as the natural appearance of the bark would be more acceptable to the general dealer.

The effect of the application of moss in a few months to No. 2 does not show, as compared with the original unmossed bark of No. 4, so much real advantage as might have been expected. There is an increase in alkaloid, but this bears more upon the uncrystallizable portion of the quinine (as I ascertained by repeated experiment), and also upon the Chinchonine, which was apparently doubled in the mossed bark at the expense of the Quinine. I cannot account for this, but perhaps Mr. Meyer may gain some light upon it. The examination in these two samples was obtained in a beautifully crystalline form as in No. 1, and inwards in a more or less crystalline form as in No. 2. On the whole, the present remission of barks is unquestionably the most instructive, and the most encouraging that I have had the opportunity of examining from India.

Proceedings of the Madras Government, Revenue Department,
20th June 1867.

the condition of the soil, &c. Trees with abundant and luxuriant foliage always yield more alkaloid than trees with spare foliage. Trees with the foliage fully exposed to light and air, while their stems are under dense shade, are rich in alkaloids. These conditions affect the yield of alkaloids in nearly the same ratio in all the species, but individual plants of the same species are occasionally found which yield permanently more alkaloids than others; this seems to arise from a peculiarity in the individual, and may secure great results if taken advantage of.

14. It is of the utmost importance that we should thoroughly understand the true value of the above conditions, and the effects they produce to enable us to take advantage of them to the fullest extent. For this reason our samples of bark have been submitted from time to time for analysis, as it was most desirable that the effects on the product of alkaloids should be established by the independent and undoubted authority of Mr. Howard, and the more so in consequence of that gentleman being uninformed of the exact conditions under which the bark was produced. For the above reasons, the result of our analysis do not enable us to pronounce with certainty the superiority of one species over another, and until each species has been placed under like conditions, we cannot form a decided opinion of their relative value. In paragraph 5, Mr. Howard observes that the variety *C. Crispa* and also *C. Pahudiana* should not be propagated, as they will not repay the expense of cultivation. This is so far correct with reference to *C. Pahudiana*, the bark of which has already been subjected to some of the most favourable conditions for the production of alkaloids, but not without advantage, and although this is no doubt the least profitable species in cultivation, still it is susceptible of improvement, and we may yet hope to cause the bark of this species to produce as much alkaloid and as valuable a bark in the market as the average barks of South America. With the *C. Crispa* the case is quite different. The bark of this plant submitted for analysis was taken from a plant not improved by art, and on which no care had been bestowed further than ordinary cultivation. The object of submitting this bark to analysis was to see to what extent the yield of alkaloids could be increased in the same plant when placed under different conditions, and this was done immediately on the removal of the bark, which formed the subject of the last analysis, and already the alkaloids have increased four-fold, therefore this species will prove valuable. As an example, I would mention that specimen No. 6 of Mr. Howard's Report of 1865 of *C. Condaminia* bark gave 1.50 per cent. of alkaloids, of this 0.90 was crystallized sulphates, while renewed bark from the same tree gives in his present analysis 8.20 per cent. of alkaloids with 6.52 of crystallized sulphates. With reference to paragraph 8 of Mr. Howard's Report noted above, I would observe that the application of moss, in the first instance, increases the inferior alkaloids, as observed in No. 2 of the present sample, and especially in No. 3 of the samples submitted for analysis in 1865. The transformation is a matter of time, as renewed bark from the same plant as yielded in No. 3 of 1865, of which 2.72 per cent. only was crystallizable sulphate out of a total of 9.72 of alkaloid, gives in the present analysis 9.79 of alkaloid, of which 8.45 is crystallized sulphates. This is an improvement almost inconceivable, and a longer period or denser covering would have added the greater portion of the 1.14 uncrystallizable quinine to the crystallized sulphates. In our experiments we have found all changes of alkaloid in the bark, by whatever condition effected, to be more or less gradual.

15. *Chinchona, new varieties introduced, remarks on.*—Of the Bolivian Chinchonas raised from Mr. Monoy's seeds we have at least five distinct varieties, four of which are entirely new. Two of these varieties give promise of succeeding in this climate, but the others are unpromising, and die off rapidly from any sudden change from drought to damp, or from damp to drought, and which, as our climate is liable to sudden variations, renders the cultivation of these varieties precarious and troublesome, although the difficulties in this respect are not insurmountable were it certain that all or any of the varieties would by an additional product of alkaloids repay the extra cost and trouble attendant on their cultivation. This is by no means certain, as our C. Condanoma in its present stage of growth has produced a quantity of alkaloid, which in quantity and purity has not been exceeded by the finest and mature Bolivian barks of commerce.

16. In my previous reports attention was drawn to the circumstance of the failure of the seeds of the Pitayo barks, with a suggestion that a fresh collection of the seeds should be made and transmitted to India, in order to add this very valuable species to our collection of quinine yielding chinchonas. Without the very valuable Pitayo barks our collection is still incomplete, I would therefore respectfully submit, for the favourable consideration of Government, the desirableness of making a further attempt to secure this species.

17. *Establishments.*—It affords me much satisfaction to be able to report the hearty co-operation and zeal with which my Assistants have carried out the various duties entrusted to their care. Mr. Batcock, Deputy Superintendent, has shewn much diligence, attention, and skill, in carrying out the works connected with the Propagating Department and Botanical Gardens, and in disbursing pay to the various establishments and auditing of accounts. Mr. Charles Dawson, the Assistant Superintendent at Nedddivuttam, has been most attentive to his duties, and is gaining a better knowledge of the treatment and management of the plants. Mr. Meakin, Assistant Superintendent at Malakoondah, has pressed forward the work in this plantation to the best of his ability, and under serious difficulty in consequence of imperfect communication. Mr. Sherman, the Overseer in charge of the Hooker estate, has carefully carried out his instructions, and been most successful in his planting operations. Mr. McDonald, the Overseer in charge of the Wood estate, Pykara, has been attentive and careful. In the Office Establishment, Narrasawmy Naidoo and Mr. McNair continue to give every satisfaction in the performance of their duties as Office Manager and Pay Clerk.

18. *Convict labour.*—The convicts continue to work cheerfully and contentedly, and perform more work than can be obtained from free labourers. On the Dodabetta plantation they are employed under the supervision of Mr. Gibson, a West Indian planter, who has shewn much skill in the arrangement and direction of their labour. Here the health of the convicts has been excellent, their conduct good, no escapes or attempts at escape, but few instances of malingering, and no mortality. On the Nedddivuttam plantation the labour of the convicts has been very satisfactory; here however there have been two deaths, three escapes have been effected, and only one of the convicts re-captured. The men, as a whole, are healthy and contented, the deaths having arisen from disease contracted on the plains, and the escapes effected by men of the wandering tribes who are impatient of restraint, and their

habit of life renders them almost certain to evade re-capture. The system of reward at the rate of six Pice for a quarter of a day's work is still paid to the convicts; this stimulates exertion, and induces them to perform a much greater work than could otherwise be procured from them. Here the convicts are employed under Mr. Bunkall.

19. This year free labour has been plentiful, many of the labouring population of the Mysore country having been induced by the scarcity of provisions to leave their homes and visit the hills in search of employment.

20. *Progress of operations.*—In the Propagating Department a new temporary house has been erected feet in length by feet wide, and as the necessity for extensive propagating operations has now ceased, no farther accommodation will be required in this branch. The total number of plants produced from the beginning of the undertaking to the 31st March 1867 is 1,926,044, exclusive of plants distributed to the public, the number of plants propagated during the eleven months being 803,399. On the 31st March 1867 the number and distribution of our plants stood as follows:—

Plants permanently planted out on the plantations	557,551
Plants in open air nurseries	299,464
Rooted plants and seedlings in propagating houses	1,069,029
Estimated number of unrooted cuttings and untransplanted seedlings	100,000
Total	2,026,044

21. On the Nedddivuttam plantations eighty-seven additional acres have been planted, making the total number of acres under cultivation on these plantations 444; the planting of this season has taken place principally on the Kilgraston and 2nd Denison plantations, and on the Hooker plantation twenty-six acres have been planted. Here the land has been enclosed, and 42,000 pits prepared for the reception of plants next season, while on the Kilgraston estate 83,000 pits have been prepared for planting. At the Jail a new range of Police lines, covered with corrugated iron, has been completed, permanent cook-rooms erected, and a bungalow for the accommodation of the Jailer and Apothecary and their families; the verandah rooms vacated by the Jailer and Apothecary will be prepared for a Jail Hospital.

22. On the Wood plantation at Pykara twenty-one acres of land have been planted during this season, which gives a total of 113 acres under cultivation on this plantation. A fence has been completed around the plantation to exclude wild animals, especially the elk, as they crop the young plants, and have done serious damage especially in the avenue.

23. On the Dodabetta plantation the work has made very satisfactory progress; here eighty-eight acres have been brought into cultivation this year, making the total extent of land under cultivation on these plantations 312 acres. Adjacent to the Jail a dwelling house for the Jailer and Overseer of convicts has been completed.

24. On the Malakoondah plantations 35,000 pits have been made, nurseries finished, and stocked with a like number of plants. Here the Jail buildings and Police lines have been completed, but until a road has been made to this plantation,

it is considered undesirable to locate prisoners there, as a danger exists of the supplies being cut off during the monsoon, in consequence of the roads being unbridged and rendered otherwise almost impassable.

25. *Botanical Gardens.*—The plan in Appendix D. shews a sketch and description of the gardens. The improvements effected in them will be observed by comparing this with the old plan E. It is proposed, during the present year, to begin to lay out the upper portion noted "Proposed new Botanical Garden." I would respectfully suggest that, with the approval of Government, this portion be laid out strictly as a Botanical garden "according to Lindley's natural system," each group or natural order to be presented so far as practicable, and this can be done to a greater extent here than in perhaps any other part of the world, where plants of temperate climates grow freely alike with sub-tropical and even tropical plants. Thus great facilities are offered for the formation of a valuable Botanical Garden; our collection of plants are already extensive, and opportunities for obtaining more yearly increasing. The advantages of this arrangement would interest, as well as instruct, and prove of great practical value in this country, by shewing the variations of climate which plants are susceptible of bearing without injury. The portion marked "Economical Garden" to be reserved for the growth of useful and economic plants only, where could be seen at a glance the plants yielding the various products of commerce. With this arrangement a catalogue would be of great importance and convey much useful information, which is not the case at present, the plants being arranged for beauty and effect, rather than to utility and economy. Several interesting plants have been added to our collection during the present year; to Dr. Cleghorn we are indebted for seeds of various Himalayan stone fruits and ornamental trees and shrubs; to Dr. Hooker for the Shiraz tobacco, the true Jalap (*Convolvulus Jalapa*), the false Jalap (*Convolvulus Chicorhiza*), the Dragon's blood (*Dracena Draco*), and other ornamental and economic plants kindly brought out by Mr. Broughton; to Major Hutton for seeds of handsome new varieties of Veronicas; and to Captain Boddeme for some rare and interesting ferns.

26. The following table exhibits the distribution of garden plants and seeds for the official year 1866-67 :-

	Fruit trees and shrubs.	Timber trees.	Shrubs and flowers.	Collection of seeds.	Amount.
					Rs. A. P.
1866. May		160	189	34	184 12 0
June	78	4,000	111	31	250 6 0
July	34	925	368	19	186 12 0
August	36		193	37	234 4 0
September	12	0	49	21	91 8 0
October	0		74	24	86 0 0
November	30		35	6	44 10 0
December	20	100	22	4	34 2 0
1867. January			41	5	67 0 0
February			4	10	22 10 0
March		25	64	8	35 8 0
Total distribution ..	210	5,155	1,150	199	1,207 8 0

27. *Tea plantation.*—The experimental Tea plantation has not been extended, and the number of plants remain as formerly, namely 13,500. There is a great and marked difference in the individual plants of tea, as regards both yield and quality, some plants producing from four to five times as much tea as others, it is thus obvious that for profitable cultivation, only the most productive plants should be propagated, and as individual qualities can only be perpetuated by cuttings or grafting, the plants must be propagated by one or other of the above modes; cuttings are the least expensive and quite as effectual.

28. *Concluding remarks.*—It will be observed by the above details that during the present year our operations have made more than usual progress; the buildings, roads, enclosing and draining the extent of our plantations (with the exception of Malakoondah), are nearly completed, 222 additional acres of land have been planted, making the total number of 895 acres under cultivation.

29. In conclusion, I beg to tender my acknowledgments to the Madras Government for the liberality in which my suggestions have been met, and for the interest they have shewn in promoting the interests of the public in this national undertaking; to Mr. J. E. Howard, and Mr. Clements R. Markham of the India House, my best thanks are due for most important and valuable information.

(Signed) W. G. McIVOR,
Supt. Govt. Cinchona Plantations.

OOTACAMUND,
25th April 1867.

Proceedings of the Madras Government,

APPENDIX
Sanctioned estimate cost of each Chinchona Plantation

Particulars.	Operations preparatory to receipt of plants.	Superintendent and Office Estab- lishment.					Nursery Department.					Dodabatta			
		1860-61.	1861-62. 1862-63.	1863-64.	1864-65.	1865-66.	1866-67.	1861-62. 1862-63.	1863-64.	1864-65.	1865-66.	1866-67.	1861-62. 1862-63.	1863-64.	1864-65.
Grant for the propagation of sites.	2,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Establishments, including salaries, &c.	...	9,550	5,880	8,180	8,708	7,773	7,629	1,609	8,948	4,048	3,711	7,080	5,700	7,248	...
Buildings	...	...	...	...	...	...	1,200 2,000	...	800	...	...	500	...	600	...
Tool and Store-rooms	...	...	...	...	...	...	...	...	...	...	...	250	...	250	...
Coolies' quarters	...	...	...	...	...	...	...	...	...	...	...	700	...	...	...
Felling	...	...	...	...	...	...	...	...	...	...	...	1,000	...	550	...
Clearing	...	...	...	...	...	...	...	...	...	...	...	1,780	...	550	...
Pitting	...	...	...	...	...	...	...	...	...	...	...	1,000	...	550	...
Carriage of plants	...	...	...	...	...	...	...	...	...	...	...	150	...	150	...
Planting and shading	...	...	...	...	...	...	...	...	...	...	...	700	...	200	...
Trenching	...	...	...	...	...	...	...	...	...	...	...	1,800	...	500	...
Enclosing	...	...	...	...	...	...	750	...	...	...	...	5,850	...	550	...
Road-making	...	...	...	...	...	...	...	...	...	...	...	2,025	...	...	...
Tools	...	...	...	...	...	...	...	...	...	...	...	400	1,200	...	800
Contingencies	...	...	...	...	...	95	190	...	300	500	600	1,590	...	500	...
Clothing	...	...	...	...	...	...	...	...	...	...	...	100	...	...	...
Total...	2,000	9,550	5,880	8,180	8,708	7,608	11,781	4,000	5,048	4,518	4,811	28,094	5,700	12,448	...

Actual expenditure on each Chinchona Plantation

Particulars.	Operations preparatory to receipt of plants.	Superintendent and Office Estab- lishment.					Propagation and Nursery Department.					Dodabatta			
		1860-61.	1861-62. 1862-63.	1863-64.	1864-65.	1865-66.	1866-67.	1861-62. 1862-63.	1863-64.	1864-65.	1865-66.	1866-67.	1861-62. 1862-63.	1863-64.	1864-65.
Establishments, in- cluding salaries, &c.	114 2 3	9,690	6,487	7,071	8,142	7,715	5,353 11 6	9,440	8,478	4,539	6,536	3,755	2,605	7,083	...
Buildings	...	...	...	...	...	...	6,225 0 0	3,000	1,500	...	1,501	605	...	7,250	...
Tool and Store-rooms	...	...	...	...	...	...	...	...	...	...	...	250	500	...	...
Coolies' quarters	...	...	...	...	...	...	...	...	...	...	...	1,108	500	650	...
Felling	302 5 3	...	...	...	...	...	...	...	...	...	...	1,160	400	650	...
Clearing	...	...	...	...	...	...	...	...	...	...	...	1,508	1,010	500	...
Pitting	...	...	...	...	...	...	...	...	...	...	...	445	140	250	...
Carriage of plants	...	...	...	...	...	...	...	...	...	...	...	805	560	700	...
Planting and shading	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Trenching	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Enclosing	...	...	...	...	...	...	...	...	...	...	...	2,800	...	357	...
Road-making	300 0 0	...	...	...	...	...	...	...	...	...	...	1,300	2,070	1,000	...
Tools	271 0 0	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Contingencies	67 0 0	...	...	50	200	...	...	...	170	...	...	698	600	499	...
Freighting	...	...	...	...	...	...	...	...	...	...	...	450	700	383	584 500 800
Total...	1,054 7 6	9,690	6,487	8,021	8,342	7,715	11,578 11 6	6,440	5,428	5,409	8,433	16,448	10,915	20,089	...

COBHAMOND,
April 1867.

Revenue Department, 20th June 1867.

DIX A.

from commencement of operations to 31st March 1867.

Plantations.	Neddivattam Plantations.					Pycara Plantations.					Malcondah Planta- tions.					Total.
	1863-64.	1864-65.	1865-66.	1866-67.	1867-68.	1863-64.	1864-65.	1865-66.	1866-67.	1867-68.	1863-64.	1864-65.	1865-66.	1866-67.	1867-68.	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2,000
8,790	10,730	12,470	15,343	12,860	10,260	12,856	4,033	6,404	7,014	2,860	...	5,600	3,120	4,225	...	2,07,066
7,000	2,500	2,080	...	750	8,500	3,300	1,550	...	...	...	...	750	2,500	1,075	...	37,145
...	300	250	...	400	...	...	250	330	375	...	125	150	...	400	...	3,000
200	...	2,000	...	300	400	300	1,000	200	...	100	500	250	...	200	...	6,150
...	400	4,500	...	900	1,500	800	1,500	900	750	800	5,150	900	...	900	...	22,450
...	300	4,500	...	900	1,500	650	1,500	900	750	500	...	800	...	800	...	15,550
...	800	5,000	...	900	2,000	400	...	900	1,000	700	...	900	...	600	...	15,850
400	1,000	900	...	400	900	1,000	...	350	450	200	...	50	...	300	...	6,250
350	700	1,100	...	350	800	900	1,300	250	450	300	...	...	...	100	...	7,800
600	603	4,000	...	1,100	900	...	2,000	1,250	700	...	1,250	...	...	542	...	20,950
...	500	3,900	...	...	1,350	600	750	...	550	800	375	300	550	500	...	16,831
800	...	1,520	...	550	1,000	...	1,550	200	600	430	375	1,500	500	433	...	11,603
525	1,000	1,282	...	900	1,000	1,200	1,282	500	...	600	941	700	500	600	...	13,130
1,000	790	2,824	...	600	1,300	1,300	2,040	820	500	500	846	250	500	500	...	17,716
...	150	...	...	...	...	200	...	...	...	50	...	...	...	...	...	550
19,605	19,204	48,342	15,345	20,410	37,410	23,500	26,541	12,714	13,139	7,460	9,312	13,500	7,570	11,425	...	4,04,921

from commencement of operations to 31st March 1867.

Plantations.		Neddivattam Plantations.					Pycara Plantations.					Malcondah Plan- tations.			Total.
1863-64.	1864-65.	1861-62-63.	1864-64.	1864-65.	1865-66.	1866-67.	1861-63- 1864.	1864-65.	1865-66.	1866-67.	1863-67- 1865.	1865-66.	1866-67.		
5,235	6,403	9,195 0 0	5,874	2,507	12,052	15,250	1,608	1,880	2,086	1,035	671	1,671	3,050	1,56,587 13 9	
4,500	3,033	1,550 0 0	1,000	3,550	4,000	3,294	1,083	...	...	...	850	890	448	50,142 0 0	
200	...	350 0 0	500	450	169	...	275	250	525	...	200	...	...	3,014 0 0	
808	...	1,750 0 0	1,000	500	400	...	1,050	250	...	...	250	...	...	6,858 0 0	
1,300	257	3,280 7 3	2,200	800	...	653	1,500	750	1,500	...	3,251	...	...	20,471 13 6	
1,600	28	1,500 0 0	2,200	600	700	700	3,425	750	1,500	222	1,625	825	415	17,740 0 0	
2,000	394	2,308 7 3	2,000	700	1,500	913	1,000	600	1,555	...	738	750	240	17,886 7 3	
790	259	1,140 1 9	750	805	950	300	...	350	400	200	...	...	150	6,061 1 9	
2,000	621	1,540 1 5	895	500	1,000	583	65	300	400	130	...	...	250	10,728 1 8	
890	800	1,972 0 0	1,750	1,185	500	3,104	...	1,000	700	800	...	200	200	12,291 0 0	
1,200	850	1,550 0 0	500	...	780	280	679	...	750	200	300	750	...	10,816 0 0	
1,300	625	2,100 0 0	2,000	327	...	1,080	1,500	504	400	602	1,327	800	22	17,017 0 0	
343	470	1,100 0 0	608	650	500	239	1,400	1,000	250	200	1,000	...	350	11,431 0 0	
1,219	510	1,255 0 0	850	1,200	1,000	357	400	250	450	300	225	250	435	13,353 0 0	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12,738	14,509	61,041 1 11	32,820	25,181	24,710	26,044	11,050	7,884	10,211	4,129	10,587	6,136	6,200	2,56,971 4 11	

(Signed) W. G. McIVOR,
Superintendent Government Chinchona Plantations.

*Proceedings of the Madras Government, Revenue Department,
20th June 1867.*

B.

*Meteorological observations made on the Government Chinchona Plantations at
Neddivuttum from 1st May 1866 to 31st March 1867.*

Months.	HYGROMETER.		Maximum in shade.	Minimum in shade.	Solar radiation.	Terrestrial radiation.	Rain in inches.	Days with rain.	Days without rain.
	Dry bulb.	Wet bulb.							
May	69.85	61.28	66.71	59.93	...	68.17	3.40	9	22
June	60.09	58.71	60.50	57.67	...	59.33	32.01	21	9
July	57.73	57.10	60.31	55.24	...	58.88	20.62	28	3
August	58.52	57.72	59.27	54.63	...	58.25	22.18	25	6
September	59.40	57.23	60.09	53.90	...	56.59	10.85	20	10
October	59.18	58.55	60.81	54.09	...	...	10.50	17	14
November	58.64	55.05	...	...	...	...	0.65	4	26
December	58.16	56.37	61.30	51.17	...	...	2.73	4	27
January	56.34	52.08	58.03	45.80	...	...	0.00	0	31
February	63.19	57.05	65.21	56.64	...	...	0.02	1	27
March	62.47	57.38	64.81	54.35	...	...	1.22	3	28
Total...	...	...	...	...	...	...	104.18	132	23
Mean...	60.33	57.14	61.70	54.44	...	69.25			

C.

*Meteorological observations made at the Botanical Gardens, Ootacamund, from 1st May
1866 to 31st March 1867.*

Months.	HYGROMETER.		Maximum in shade.	Minimum in shade.	Solar radiation.	Terrestrial radiation.	Rain in inches.	Days with rain.	Days without rain.
	Dry bulb.	Wet bulb.							
May	64.95	58.35	74.03	54.39	109.57	81.73	4.70	19	12
June	58.78	55.90	65.10	52.93	94.13	71.20	6.14	15	15
July	56.07	54.58	63.86	50.68	93.46	69.79	3.05	19	12
August	56.90	55.61	66.48	50.64	100.15	71.43	2.63	20	11
September	58.72	55.75	67.86	50.33	101.52	75.35	1.79	25	5
October	58.02	55.78	67.61	51.68	104.42	70.55	10.38	20	11
November	56.45	52.01	68.27	47.10	109.63	65.40	2.20	8	23
December	57.16	53.44	68.26	46.48	108.39	63.00	5.11	9	22
January	60.06	48.94	71.30	44.76	119.93	...	0.00	...	31
February	62.15	51.43	73.67	45.89	127.74	...	0.39	1	27
March	63.71	53.05	74.30	49.55	129.33	...	1.14	6	25
Total...	...	...	...	...	...	...	37.65	142	193
Mean...	59.31	51.67	69.16	49.51	108.93	71.08			

(Signed) G. BATCOCK,

Dy. Supt. Govt. Chinchona Plantations.

OOTACAMUND,
25th April 1867.

The new plan of the Gardens, which accompanies this Report, will shew the improvements effected since 1857. On the lawn, No. 6 in the old plan, a labyrinth has been laid down, the hedges formed of the Rose Gloire de Rosamere. On the lawns, Nos. 11 and 5 in the old plan, a number of flower beds have been made and planted with florist's flowers, and the ornamental piece of water No. 11 has been extended into a serpentine lake across the lawn. On the portion No. 21 of the old plan, an Italian parterre has been laid out and planted, a large octagonal bower is

*Proceedings of the Madras Government, Revenue Department,
20th June 1867.*

built in the centre, to be used as a band-stand, and also as an ornamental erection on the terrace; six circular basins have been built, intended as fountain basins, the jets, however, have not yet been fixed, but will be this year. Vases have been placed on the most prominent parts of the walls, each filled with suitable plants. This parterre necessarily involved a great amount of labour on account of the deep excavations required, but its formation has produced a great improvement in the gardens, as the part now occupied by the lake was formerly a swamp in which nothing would thrive. On lawns 23 and 24 a number of beds have been formed and edged with daisies and forget-me-not, the jets are supplied by bamboos from a reservoir in the nursery grounds. On lawn No. 29 a large excavation has been made for the new fern house, which has been built, and the exterior covered with epiphytal orchids and ferns, the space around the house being laid out in box edged beds and borders, filled with a miscellaneous selection of florist's flowers; in the wet parts, ornamental basins have been made. Above this are shown in the new plan the Chinchona nursery and propagating houses, and to the north the site for the proposed Botanical Gardens; this site possesses a considerable diversity of soil and aspect, and now that a main road has been completed, access to every part of it is comparatively easy.

No. 266.

ORDER THEREON, 20th June 1867, No. 1,367.

Miscellaneous

1. His Excellency the Governor in Council considers that the results reported relating to the Chinchona plantations are most satisfactory, and will have pleasure in bringing to the notice of Her Majesty's Secretary of State Mr. Melvor's successful exertions in the promotion of this national undertaking.

2. The Government approve Mr. Melvor's suggestion, that a portion of the seed collected be distributed gratuitously to such planters as are likely to turn the supply to good account. A record of the distribution made will be kept, and appended to the periodical list of plants distributed.

3. The experiment of felling the trees for the supply of bark will be restricted to the area already fixed.

4. It is observed that the Home Government have expressed their intention to cause further steps to be taken for the collection of the seed of the Pitayo varieties.

5. The Government approve Mr. Melvor's proposal to lay out the upper portion of the Government Gardens at Ootacamund as a Botanical Garden on Lindley's natural system.

6. They desire that, without any material extension of the Tea plantation, Mr. Melvor will carry out his suggestion for propagating the more valuable individual tea plants by cuttings, as they manifest their qualities, so as to be in a position to supply a superior class of young plants in moderate quantities to any of the planters in the Presidency who may desire to secure them.

(True Extract.)

(Signed) W. HUDLESTON,

Secretary to Government.

To the Acting Superintendent Government Chinchona Plantations,
the Conservator of Forests,
the Director General, Medical Department,
Esq. S. T. Augustin

F. N. A. N.

of the

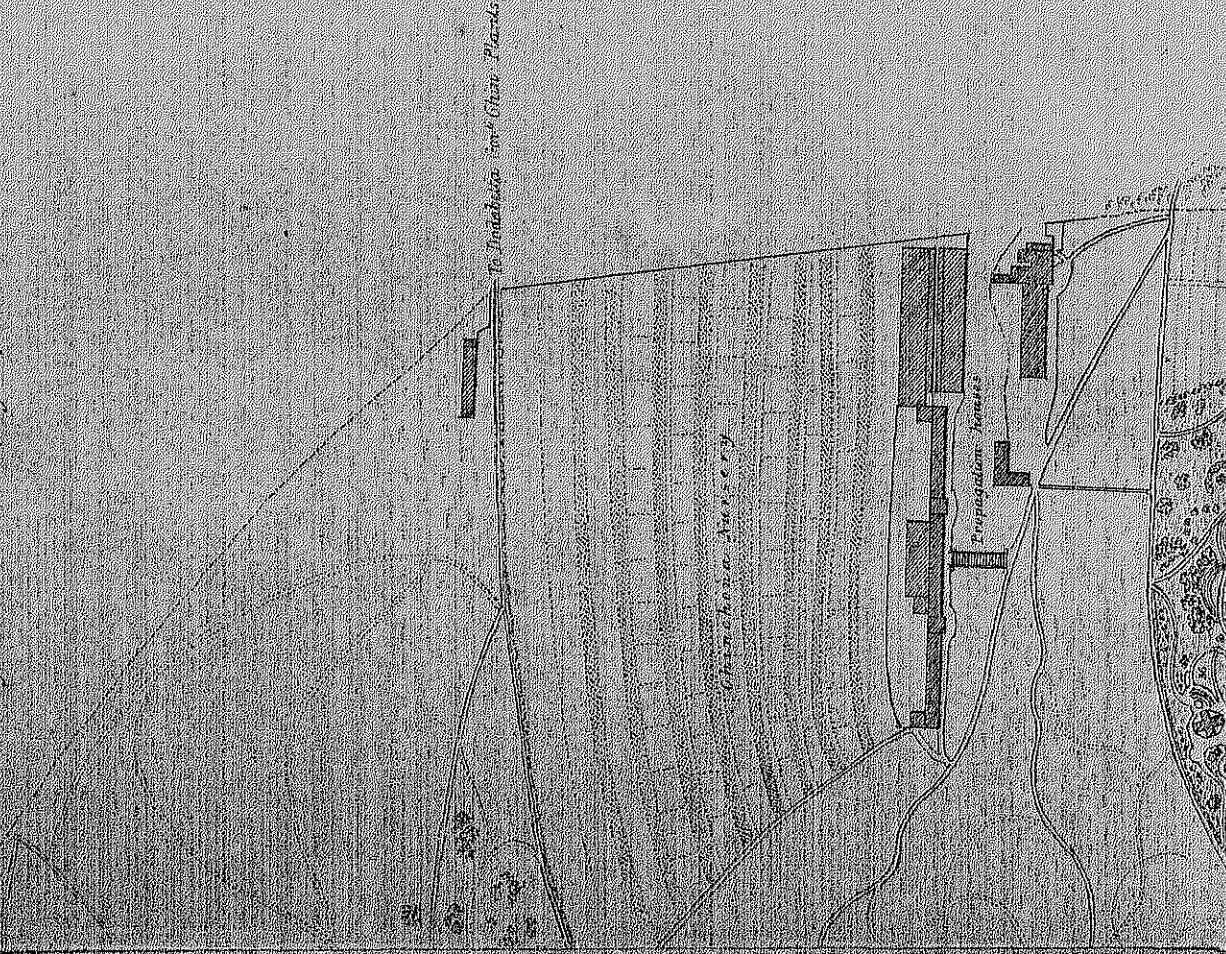
GOVERNMENT GARDENS

AT

OOTACAMUND.

Prepared to illustrate the Report of 1866-67.

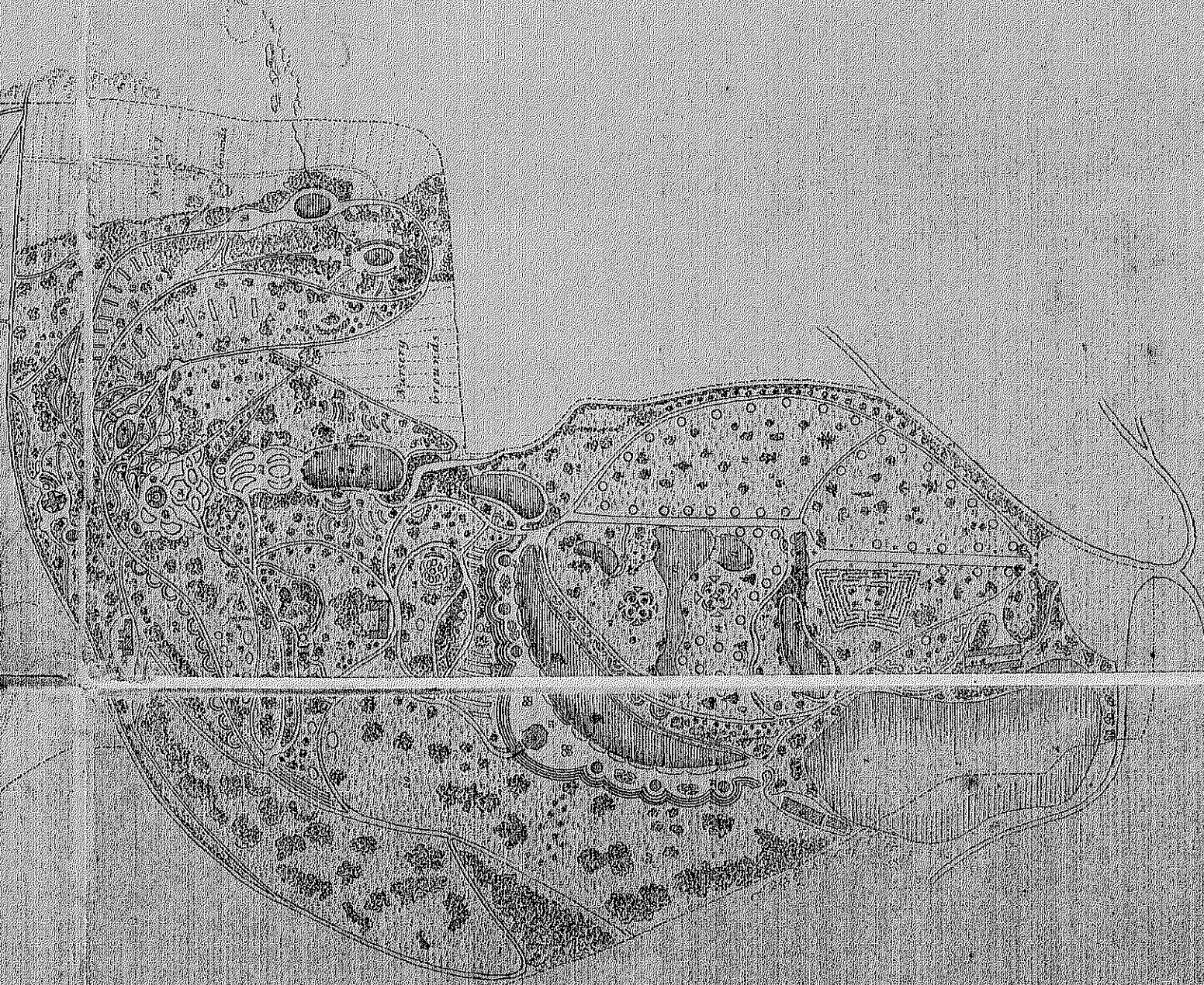
By G. B. F. C. O. K. Deputy Superintendent.



To illustrate the Report of 1866-67.

Chenopodium

Propagation



Printed by the Press of F. N. A. N. Ootacamund.
Madras, July 1867.

Charles A. M.

Colonel, R.E.

Secretary to Government F. N. D.

Revenue Department

Proceedings of the Madras Government
Under date the 2nd May 1867.

Read the following
letter from the acting Super-
intendent Gov^t B. K. Chinnappa
Plantations.

Forwarding administration
report of his Department for
the official year 1866/67. (Here enter 27th April 1867.
No 58)

His Excellency the
Governor in Council considers
that the results reported
relating to the Cutchora
plantations are most satis-
factory and with pleasure
in bringing to the
notice of Her Majesty's Secre-
tary of State the successful
actions in the
promotion of this national
undertaking.

The Government

approve Mr. Meador's sug-
gestion that a portion of
the seed collected be dis-
tributed gratuitously by
to such planters as are
likely to turn the supply
to good account. A record
of the distribution made
will be kept and appended
to the periodical list of
plants distributed.

The experiment of
felling the trees for the
supply of bark will be
restricted to the area al-
ready fixed.

It is observed that
the Home Government have
expressed their intention
to cause further steps
to be taken for the collec-
tion of the seed of the
Delagoa varieties.

The Home
Government have
approved Mr. Meador's propo-
sition to lay out the upper portion
of the Government Gardens
at Botswana as a Bo-
tanical garden on Lindley's
natural system. They
desire that without any
material extension of the
plantation Mr. Meador
will carry out his sugges-
tion for propagating the
more valuable individuals
of the plants by cuttings and
they manifest their opinion
as to be in a position
to supply a superior class
of young plants in moderate
quantities to any of the
planters in the Presidency
who may desire to secure
them.

England
apt. Sub 1939 of 1867

No. 4: 276.277 & 18.1.67

1867
of Govt for June

1867

Madras Govt
20th June 1867.

Maps & Plans
Sent to S.

Provisional report
by considered satisfactory. The successful
execution of the decision
brought to the notice
of the Home Government

27265 & 266.