

MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No. 272

Press
~~Mis.~~

190-191

Dated

9-2-1865.

Not to be folded or roughly handled

*Proceedings of the Madras Government, Revenue Department,
9th February 1865.*

No. 190. Read the following letter from Lieutenant-Colonel J. C. ANDERSON, R. E.,
Superintending Engineer, 2nd Division, to Colonel C. A. ORR, R. E., Secretary to Govern-
ment, Department Public Works, dated Masulipatam, 19th January 1865, No. 127 :—

SIR,

1. I have the honor to submit, for the sanction of Government, an Estimate for repairing
the Sub-Magistrate's Cutcherry at Juggiapett, Kistna District, amounting to Rupees 622.

2. This building appears, from the Collector's records, to have been constructed in 1846 at
a cost of Rupees 850-13-2, and the repairs
executed since its transfer to this Department
amounts to Rupees 66 as per margin. As the
present estimate is much more than one-fourth

of the original cost of the building, it is beyond my power of sanction.

3. The wood work of the roof is much decayed, and is now in such a dangerous state that
it will not stand any longer unless immediate steps are taken to re-place it with new rafters, &c.

4. Funds for the execution of this work will be appropriated from the Budget allotment*
of the current year under the head "Repairs,
Civil Buildings."

* Rupees 8,125.

Referred to the Revenue Department.

CHEPAUK,
25th January 1865.

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government, P.W.D.

No. 191.

ORDER THEREON, 9th February 1865, No. 272.

Miscellaneous.

Approved.

(True Extract.)

(Signed) C. G. MASTER,
Under Secretary to Government.

To the Public Works Department.
,, the Board of Revenue.

Exd, S. T. Augustin.

No 127

Sup^d Engr^s & Eff^s & D^d
Madras
19th January 1865

From

Lieutenant Colonel J. C. Anderson R. E.

Superintending Engineer, D. P. C.

To

Colonel Charles A. Oxe R. E.

Secretary to Government
D. P. C.,

Sir

I have the honor to submit
for the sanction of Government an
estimate for repairing the Sub-
Magistrate's Quarters at Suggihatt
Kistna District amounting Rs. 622-
2 - This building appears
from the Collector's records to have
been constructed in 1846 at a cost
of Rs. 850-13-2 and the repairs
executed since its transfer to this
Department amounts to Rs. 66-

Rs. 61-
3-
86-

as per margin - As the present
estimate is much more than one
fourth of the original cost of the
building, it is beyond my powers

The wood work of the roof
is much decayed and is now in such
a dangerous state that it will not
stand any longer unless immediate
steps are taken to replace it with
new rafters & purlins

Funds for the Execution of
this work will be appropriated
from the Budget allotment of the
current year under the head "Repairs
Civil Buildings" -

Rs. 8,125

I have the honor to be
Yours
Very most Obedt Servt

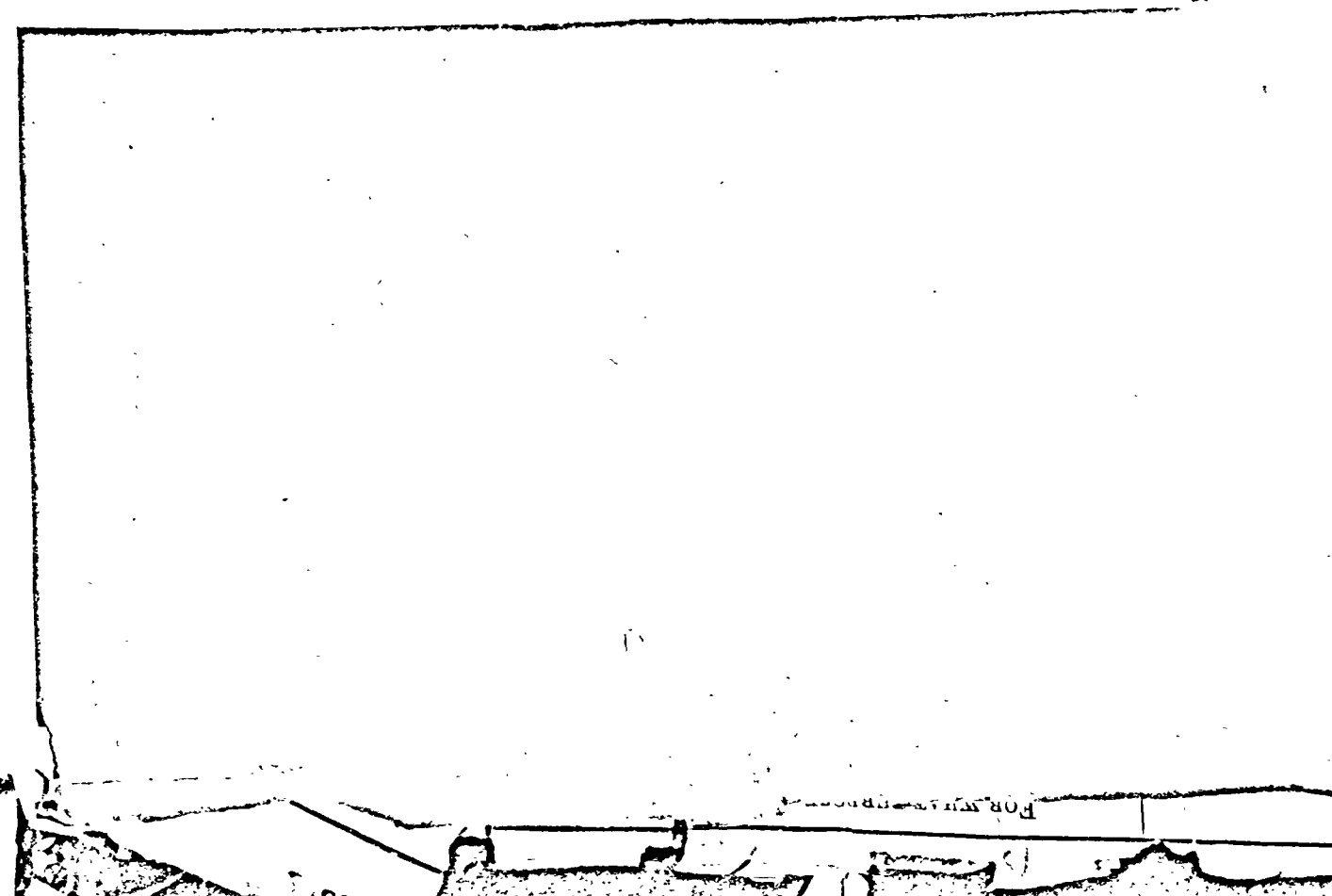
Henderson Lamb R. E.
Super Engineer

W-272-

Approved
J. H. [Signature]

[Signature]

For Mr. George
J. Kelly



Referred to the
Revenue Department.

Wm. A. C. Esq.
Secretary to Govt.
No. 2.

Chapauk
25th January 1865

No. 190 & 191.

Int. 25/7/6582

Rev.
Pres. H. C. Esq.
156 & 235
From
The Superintendent
2^d Division

To
The Secretary to Govt.
D. P. C.

Date 19th January 1865
Recd 25th

26th
No. 127
Submits for sanction
an Estimate for Repairing
Submagistrate's Quarters
at Juggiahpattah
amounting to Rs. 622.

No. 272-9 Feb

With an order.

With an order

*Proceedings of the Madras Government, Revenue Department,
9th February 1865.*

No. 192. Read the following letter from W. G. McIVOR, Esq., Superintendent Government Chinchona Plantations, to the Honorable A. J. ARBUTHNOT, Chief Secretary to Government, dated Ootacamund, 9th July 1864, No. 108 :—

SIR,

1. I have the honor to forward herewith the Report on the Government Chinchona Plantations and Botanical Gardens for the official year 1863-64.

2. As modifications in our system of cultivation have been found necessary, and as it may be inconvenient to print the whole of the report in pamphlet form 6×9½ inches, I would respectfully solicit the favor of 300 copies of paragraphs 9 to 13 and 24 to 38 inclusive be printed and furnished to me, in order that they may be attached to "Notes on Cultivation" published in 1863, and distributed to Cultivators.

Report on the Government Chinchona Plantations and Botanical Gardens for 1863-64.

Introductory observations. 1. Notwithstanding the unusually trying seasons of the past official year, it affords me much satisfaction to be able to state, that our Chinchona plants have, in every respect, made most satisfactory progress. In the propagation still greater results have been obtained than those previously described, the maximum monthly produce of 32,408 plants were obtained in February last, the average being 15,326. The oldest plants, viz., those permanently planted out in August 1862, have attained heights varying from 6 to 9 feet with thick stems well furnished with lateral branches, and presenting as robust and healthy appearance as could be wished. Like most trees of their age these plants are not now making so much perpendicular growth as they did in the first year, in consequence of the number of branches thrown out, whereby the direct increase in thickness of stems and growth of lateral branches. flow of sap is diverted from the leading shoots, the plants nevertheless are gaining in thickness more than they have hitherto done. The Chinchona Officinalis, Bonplandiana, and Cresspilla Condition of plants on Dodabetta plantation elevation 8,000 feet. have been found to succeed best on the Dodabetta plantation (about 8,000 feet elevation), where the plants are robust and luxuriant, although not making so great perpendicular growth as at lower elevations. The 1st Dodabetta plantation possesses every exposure and many varieties of soil, and over the whole of this site these three species have been found to thrive well. The result of this year's analysis has also established an extraordinary increase in the yield of alkaloids, showing the product to be 6 per cent. of rough alkaloids, while the previous analysis gave 4.3 per cent. From these observations it is plain that Peruvian bark will now be secured to India as one of its products. The cultivation of these very valuable plants has produced results far beyond our original expectations, and now that we have obtained considerable experience in their management, greater progress may reasonably be expected. With these preliminary remarks I proceed to particulars which, for the sake of convenience, are arranged under the following heads :—

Increase of propagation. Height and growth of plants. Growth well in all exposures on this site. Analysis of bark show great increase in Alkaloids. Progress of the plants exceeds original expectations.

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Appendix A.—Accounts from commencement of operations to 30th April 1864.

Do. B.—Meteorological observations. Neddivuttum.

Do. C. Ditto do. Ootacamund.

Growth and condition of plants on the 1st and 2nd Denison Plantations at Neddivuttum.

August 1862. Eleven plants of *C. Succirubra* selected for measurement, planted on the 30th idem by His Excellency Sir William Denison and other gentlemen, have made an average growth of

Attained 3 feet in height in first 9 months.

2 feet 11 inches in the preceding 13 months.

excess of the average growth of the whole of the plants of this species throughout the plantations;

Increased considerably in thickness and lateral growth. the older plants have gained much in thickness during the last year, and thrown out many strong branches varying from 1 to 5 feet in length.

Favorable appearance of bark.

transverse marking characteristic of the finest Peruvian bark becoming very apparent and rudimentary lichens and mosses have begun to develop themselves on the bark of the older plants, while their sturdy and robust habit, indicates beyond all doubt, that the Chinchona, in its new home, has found conditions quite as favorable to its growth and full

Robust habit indicating existence of as favorable conditions to growth in this locality as on the Andes.

development as in the most favorable localities on the Andes. The above remarks refer principally to the *C. Succirubra*, that species being more extensively planted on the Denison plantations, and found to thrive well at elevations varying from 4,000 to 6,000 feet.

C. Succirubra or red bark flourishing at elevations of 4,000 and 6,000 feet.

4. The *C. Calisaya* on the same plantations give an average annual perpendicular growth

of 2 feet 4 inches, or 7 inches less than that of *C. Succirubra*, the stems however have not

increased in proportion; in fact the stems of this valuable species do not give one-half the average diameter of plants of *C. Succirubra* of the same age, and consequently not more than one-half the quantity of bark in the same period

of growth, the plants are nevertheless healthy and robust; yet in a commercial point of view its comparative slow growth will, I fear, operate against its extensive cultivation.

Producing only half quantity of bark in the same period. Plants healthy and robust

The *C. Micrantha*, *Peruviana*, and *Nitida* or grey barks made annual growth of 2 feet 8 inches.

2 feet 8 inches, but the bark formed by these species is fully $\frac{1}{2}$ th thinner than that of the *C. Succirubra*.

C. Officinalis or crown bark on Markham plantation.

6. About 25,000 plants of *C. Officinalis*, planted on the Markham plantation (elevation

5,000 to 6,000 feet) have grown taller, but not so robust as plants at higher elevations. Here

C. Succirubra and *Calisaya*.

however the *C. Succirubra* and *Calisaya* have made growth quite equal to any of the plants of these species on the Denison plantation.

On the Wood plantation at Pykara only two species planted, viz., *C. Succirubra* or red bark, and *C. Officinalis* or crown bark.

7. On the Wood plantation at Pykara the *C. Succirubra* and *Officinalis* only have been planted, and have made progress equal to the plants at Neddivuttum.

1st Dodabetta plantation, elevation 7,830 to 8,350 feet.

Too cold for *C. Micrantha* and *C. Succirubra*.

Here all species of crown bark thrive better than at lower elevations.

plantations, that is, the plants have grown more robust and luxuriant, and this even on the most exposed parts of the plantation, and the important fact is now established, that these three species can, with ordinary care and skill, be

The important fact is established that these species may be successfully cultivated all over the plateau of the Neilgherries.

Thus opening an extensive field for enterprise.

And places cultivator in healthy and invigorating climate.

9. Forming an opinion on our experiences up to the present time, the elevations best suited to the growth of the different species of Chinchona appears to be in this latitude for the *Succirubra* from 3,000 to 6,000 feet, probably thriving best at altitudes from 4,500 to 6,000.

C. Succirubra grows at elevations from 3,000 to 6,000 feet.

The most hardy of all the species.

extremes of heat and cold than any of the other species yet introduced.

5,000 feet the best elevation for *C. Calisaya* or yellow bark.

a high temperature, although in the Wynaad District it grows at 3,000 feet.

Grey barks thrive best at elevations of about 4,500 to 6,000 feet.

Crown barks at elevations from 7,000 to 8,500 feet.

Makes more perpendicular growth at lower elevations, but is not so robust.

Two plants of *C. Lancifolia* Pitayo bark planted out at an elevation of 7,600 feet appears to require the same elevation as the crown barks.

injury, and the species may probably be found to require the same elevations as *C. Officinalis* and its varieties.

Results obtained by private planters in the cultivation of Chinchona.

with varied results; the efforts of some being highly successful, while others met with comparative

14. Upwards of sixty persons have, in a greater or less degree, undertaken the cultivation of Chinchona, but, as was to be expected,

failures; among the most unsuccessful attempts may be mentioned those of Professor Lees, and M. deFacien, both of these gentlemen in the first instance lost nearly $\frac{1}{4}$ ths of their plants either in transit or in the nurseries. Experience however has pointed out a remedy, and I learn from Mr. Lees' Superintendent that his plants are now doing well, and that he is propagating them at the rate of 200 per mensem. Mr. deFacien also writes that his plants "are, since the shade has been removed, growing as they never did before."

Successful also in North-West Provinces.

Mahableshwar, Belgaum, and Honore.

Darjeeling.

Assam and Cachar.

Wynaad.

On the eastern slopes of the Neilgherries.

In Coorg and Nuggur the cultivation most successful and encouraging.

31,000 Chinchona plants supplied from Ootacamund to every District in India suitable to their growth.

mund to every District in India considered suitable to their growth.

Prospects of the spread and increase of Chinchona cultivation.

Inducements to cultivate Chinchona in preference to other products.

plants when once established are easily managed, the preparation of the bark is much more simple than that of the manipulation of Tea, and after three years' growth the plantations can be maintained at little cost. These advantages are sufficiently understood and recognized to induce a number of cultivators to enter the field, consequently the applications for plants have been numerous, many of these however to the extent of upwards of 50,000 plants have lately been relinquished in consequence of the applicants being unable to procure the land they had

Many speculators have undertaken the cultivation of Chinchona.

50,000 plants relinquished by applicants in consequence of difficulty in procuring land.

On application, informed it was reserved.

selected, being informed that it was reserved. The loss of time and trouble thus incurred has had the effect of discouraging further applications, the more especially as an impression prevails that no forest land on the Neilgherries will in future be sold. I submit that this impediment may be removed by the reserved lands being marked on a map kept in the Collector's Office for reference, this would facilitate the extension of

Suggests that the lands reserved be marked on a map kept in the Collector's Office for reference.

Chinchona cultivation as parties would then select unreserved land with a certainty of its being put up to auction three months after date of application. I make these remarks as all the lands on the slopes and on the plateau of the Neilgherries is well suited to the growth of the different

All the lands on the Neilgherries suitable to the growth of Chinchona.

15. In the North-West Provinces considerable success has been obtained, as also in Mahableshwar, Belgaum, Honore, and elsewhere in the Bombay Presidency. From Darjeeling, I learn that Mr. Fitzgerald received all his plants in excellent condition. From Assam and Cachar, the accounts are varied. The Wynaad Coffee Planters have been generally successful with the plants forwarded to them, and on the eastern side of these hills a similar success has been gained. I learn from Mr. Mullaly that the plants he received have made great progress. In Coorg and Nuggur, the success seems to be general, and several Planters there contemplate embarking largely in the cultivation. It will be observed that in little more than two years, upwards of 31,000 Chinchona plants have been supplied from Ootacamund to every District in India considered suitable to their growth.

16. The cultivation is one in which planters are eager to embark, as in fact it offers advantages which no other on the Neilgherries possesses. It promises a greater return on the capital invested than Coffee, while the cultivation can be carried on in a healthy climate; the preparation of the bark is much more simple than that of the manipulation of Tea, and after three years' growth the plantations can be maintained at little cost. These advantages are sufficiently understood and recognized to induce a number of cultivators to enter the field, consequently the applications for plants have been numerous, many of these however to the extent of upwards of 50,000 plants have lately been relinquished in consequence of the applicants being unable to procure the land they had selected, being informed that it was reserved. The loss of time and trouble thus incurred has had the effect of discouraging further applications, the more especially as an impression prevails that no forest land on the Neilgherries will in future be sold. I submit that this impediment may be removed by the reserved lands being marked on a map kept in the Collector's Office for reference, this would facilitate the extension of Chinchona cultivation as parties would then select unreserved land with a certainty of its being put up to auction three months after date of application. I make these remarks as all the lands on the slopes and on the plateau of the Neilgherries is well suited to the growth of the different

Desirable to remove impediments and encourage extension of the cultivation.

every legitimate encouragement afforded to bring all available lands under cultivation.

17. In the preceding paragraph it has been stated that upwards of 50,000 Chinchona

Influence of trees on rainfall and climate.

Forest land reserved in consequence of an impression that clearing the trees causes a deficiency of rain on the Hills and the Coimbatore District.

plants have been relinquished owing to the difficulty of procuring land, in consequence I am informed of an opinion that felling the forests on the Neilgherries causes a deterioration of climate and deficiency in the rainfall, which it is stated does not now extend so far into the Coimbatore District as formerly, owing to the forests on the Neilgherries having been felled for the cultivation of Coffee and other products.

Impression erroneous.

If this impression could be shewn to be correct, it would be important to maintain the fertility of the Coimbatore District by preserving the natural forests on the Neilgherries. But, theory and observation, combined with experience of practical effects, prove this conclusion to be erroneous. The Neilgherries like other high mountain ranges generate and are covered by a cold stratum of air which condenses the moisture contained in the warm atmosphere in its passage from the sea, hence, if our hills were 4,000

In south-west monsoon rainfall in the Coimbatore District dependent on the elevation and temperature of Neilgherries.

feet lower, the temperature of the stratum of air would be increased, consequently its condensing powers reduced, and thus the rains at

Coimbatore would be nearly as copious during the western monsoon as on the Malabar coast. On the contrary were the Neilgherries 7,000 or 7,500 feet above their present elevation, then not a drop of rain would pass over the hills as every particle of moisture in the heated air from the sea would be precipitated by coming in contact with a freezy atmosphere, in this case not only Coimbatore, but the whole of the eastern side of the Hills would be devoid of rain, while torrents

Examples.

would fall on the western face, as exemplified in many parts of the Andes, and the Himalayas, in short the same effect takes place in a greater or less degree on all mountain ranges according to their elevation. On the sea face of the Scandinavian Alps, there is an annual rainfall of 80.12 inches, while on the other side the mean annual fall is only 20 inches.

Trees increase rainfall by increasing cold stratum of air.

More effectually deprive clouds of moisture in passing over the Neilgherries.

The more trees on the Neilgherries the less rain at Coimbatore.

the Neilgherries, the more effectually is the Coimbatore District deprived of the western rains.

18. That trees do exercise considerable influence on the rainfall is undoubted, as by

Evaporation great cooling agent.

A tree of 45 feet in height covering 100 square feet of ground adds 80 times to the evaporating surface without completely destroying the evaporation from the ground it covers.

proportion to the amount of exposed surface. Suppose, for example, a tree of 45 feet in height covering 100 square feet of the surface of the ground, this tree will, at the lowest calculation, present an evaporating surface of at least 8,000 square feet, as evaporation goes on from every leaf and green shoot, and unless under very dense shade, the evaporation and radiation from the 100 square feet of ground it covers would not be entirely destroyed, thus a tree increases 80 times the evaporating surface, and would perspire from two to three times the amount of water that would be evaporated from the ground were the tree felled, as the average evaporation from

Leaf evaporates $\frac{1}{5}$ th part of water raised from the same surface of moist ground, and $\frac{1}{10}$ th part of that raised from the surface of water.

the surface of a leaf is only $\frac{1}{5}$ th part of that from a similar surface of moist ground, and $\frac{1}{10}$ th from the same surface of water, all being under

the same relative conditions. However, as the air becomes charged with moisture, evaporation from the surface of the leaves becomes less active, and ceases entirely at saturation, when another function directly the reverse commences; the leaves now beginning to imbibe moisture.

20. From the above point of view it is obvious that trees exercise considerable influence on the rainfall and deposit of dew. But there exists another and counterbalancing effect too frequently overlooked, which makes trees in a climate like ours a far greater drain on the moisture than they prove a source of supply. It has been shewn that trees by expending moisture (evaporation) convey to the air the power (cold) of condensing moisture, hence, it becomes an object of enquiry to ascertain how far the waste exceeds the supply gained by this process, especially on these hills where we have about three months of continuous clear weather, and dry atmosphere with a difference of from 8° to 13° Fahrenheit between the wet and dry bulb thermometers. Here large extents of evaporating foliage throw off daily an enormous quantity of moisture, drawn from a depth of the soil so far as the roots penetrate, this the springs, is thrown off by the leaves into the dry and arid atmosphere where it is dissipated and driven by currents of air into higher latitudes.

In wet weather trees increase rainfall and deposit of dew.

In dry weather a counterbalancing agency at work making trees a far greater drain on the springs of the Neilgherries than a source of supply.

Trees draw the moisture they evaporate from considerable depth, and thus intercept its passage to the streams.

moisture which would otherwise have supplied the springs, is thrown off by the leaves into the dry and arid atmosphere where it is dissipated and driven by currents of air into higher latitudes.

Is dissipated never to return.

21. A tree 45 feet high and covering 100 superficial feet throws off at least 6 cubic feet of water every warm and dry day. An acre would contain 433 of such trees, but reduce this number to 300; and it gives a daily evaporation from every acre of forest of 1,800 cubic feet, or the enormous quantity of upwards of 11,000 gallons; yet, incredible as this may appear, it does not represent one-half the moisture thrown off daily by an acre of forest on the Neilgherries during the months of January, February, and March. In each year the average number of warm and dry days exceeds 190, but reduce this number to 150, and we have upwards of a million and a half gallons of water extracted from the soil and dissipated by every acre of forest. The practical effect of an agency so arising in, and passing through, valleys destitute of trees, maintain their flow throughout the dry season far better than those which arise in, and pass through, wooded valleys; it being obvious

In 150 clear and dry days in the year upwards of a million and a half gallons of water dissipated by every acre of forest.

Practical effect apparent on the streams and springs.

enormous is very apparent on the springs and streams on the Neilgherries, as all springs arising in, and passing through, valleys destitute of trees, maintain their flow throughout the dry season far better than those which arise in, and pass through, wooded valleys; it being obvious

• "Vegetable Statistics" by Doctor Hales, quoted in Lindley's "Introduction to Botany," Volume II, p. p. 288, 289, 291.
"July 3rd, 1824, in order to find out the quantity imbibed and perspired by the sunflower, I took a garden pot with a large sunflower, 3½ feet high, which was purposely planted in it when young. I covered the pot with a plate of thin milled lead, and cemented all the joints fast, so as no vapour could pass, but only air, through a small glass tube nine inches long, which was fixed purposely near the stem of the plant, to make a free communication with the outward air, and that under the leaden plate. I cemented also another short glass tube into the plate, two inches long and one inch in diameter. Through this tube I watered the plant and then stopped it up with a cork, I stopped up also the holes at the bottom of the pot with corks. I found the greatest perspiration of twelve hours in a very warm dry day to be one pound fourteen ounces, the middle rate of perspiration one pound four ounces. The perspiration of a dry warm night without any sensible dew was about three ounces."

• "From July 3rd to August 3rd, I weighed for nine several mornings and evenings, a middle size cabbage plant, which grew in a garden pot, and was prepared with a leaden cover as the sunflower. Its greatest perspiration in twelve hours was one pound nine ounces, its middle perspiration one pound three ounces, 32 cubic inches.

that the roots of the trees intercept and drink up the water in its descent through the soil to the streams. Many extraordinary convincing proofs of this potent agency are to be met with on the Neilgherries, and I give, as an example, the spring that supplies the Botanical Gardens here, which has its rise in the valley partially cleared of forest two years ago for the 1st Dodabetta plantation, the flow of water in the stream during the last excessively dry season was fully twice as much as prior to the forest being felled.

Many convincing examples to be met with on the hills.

An example in the stream which supplies the Government Gardens.

Neilgherries destitute of trees, twice as much water would flow to the low country during the dry season.

22. The foregoing favors the opinion that if the Neilgherries were destitute of forest, the streams in the dry season would carry to the low country a flow of water twice as much as they do at present. But the great advantages which trees bestow cannot be overlooked, they improve the soil on which they grow, render the temperature more equable, reduce the violence of storms, afford shelter and shade very grateful to man, and their presence gives a pleasing effect to the eye, while their gaseous emanations are highly beneficial to animal life. These advantages apart from their economical uses require (so far as is consistent with general cultivation) the presence of trees in every locality where they can be produced.

Advantages of trees.

Object of foregoing remarks.

23. In the above observations the important fact has not been taken into consideration, that the trees forming the natural forests on the plateau and upper slopes of the Neilgherries are quite useless except for firewood, and that planting Chinchonas would be substituting valuable for worthless trees. My object in introducing this subject is to show the reservation of the natural forests to be unnecessary so far as they affect the local rainfall and that of the Coimbatore District.

Cultivation. Modification of former treatment.

24. The treatment described in previous reports and "Notes on cultivation, 6th March 1863," has been found generally adapted to the requirements of the plants, especially as regards their propagation. In transplanting from the propagating houses into the nurseries a modification has been found necessary. In order to enable the plants to be removed without damage to their roots, a layer of moss is introduced under each line of plants. A. represents a transverse section of the nursery bed with moss B. introduced, C. being the longitudinal section. The manner in which the plants are planted being the same as described in paragraph 26, it being essential to success not to catch the roots of the

Transplanting plants in nurseries.

NURSERY BEDS.

LONGITUDINAL SECTION SHEWING THE ENDS OF THE LINES OF MOSS UNDER THE SOIL



TRANSVERSE SECTION SHEWING THE LINES OF MOSS.



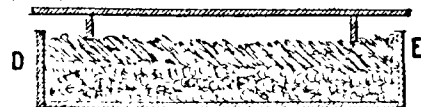
plants in the hand, as the least bruise destroys them, therefore the plants should invariably be lifted by the leaves.

Permanently in the plantations

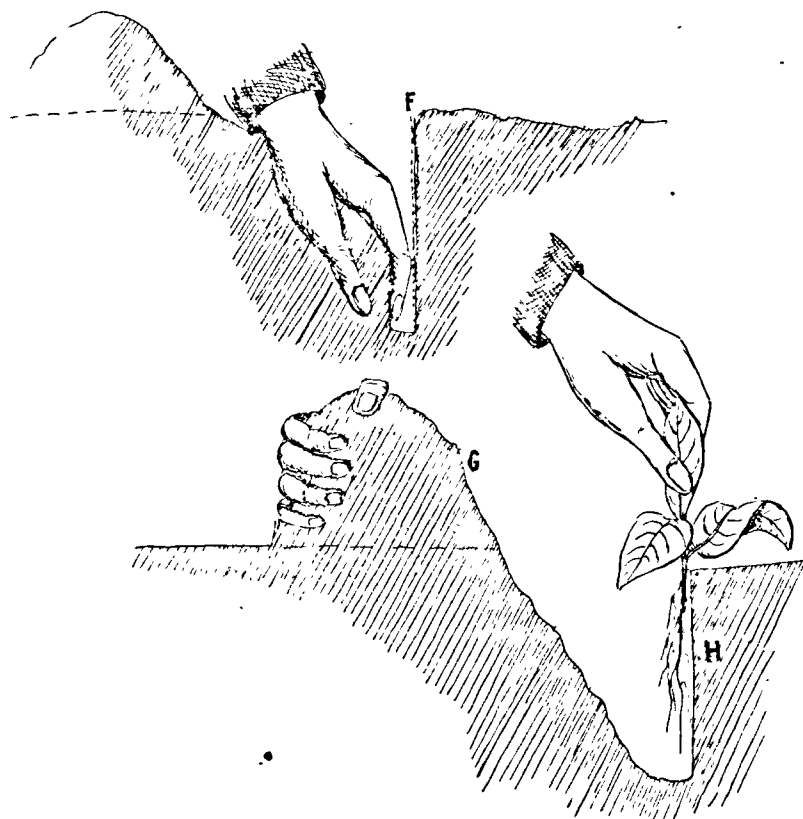
feet to 6 and 7, and a modification of our former

Removing plants from nurseries to plantation.

SECTION OF BOX FOR CONVEYANCE OF PLANTS FROM NURSERIES TO PLANTATIONS, THE COVERING BEING RAISED ABOUT 2 INCHES ON CROSS BARS TO ALLOW A FREE CIRCULATION OF AIR OVER THE TOPS OF THE PLANTS, WHILE IT SHELTERS THEM FROM THE SUN.



Manner in which they are planted.

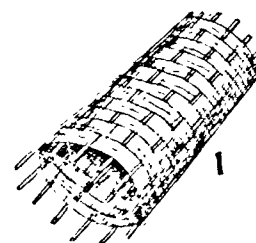


the roots, but not pressed, and thus the operation of planting is completed, in this way a man can plant from 400 to 500 plants daily

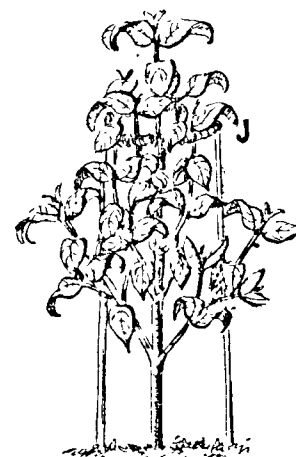
25. In permanently planting out, the distance apart has been reduced from 10 and 12 feet to 6 and 7, and a modification of our former method of planting has also been found necessary. In order to facilitate this operation the plants when removed from the nurseries, beds, or pots are laid in a deal box in nearly a horizontal position between thin layers of moss, beginning to fill the box at D. and finishing at E., in this way from 1,000 to 2,000 plants are placed in each box, and carried by one or two men from the nursery ground to the planters, where the box is placed in the centre of the line between the planters in order that it may be conveniently moved along as the operation proceeds. The planters remove the plants one at a time beginning at E. and continue this operation until the box is emptied.

26. Each plant is lifted from the box by catching the leaves between the forefinger and thumb of the left-hand, while with the right-hand the roots are freed from any obstruction, it is then carried to the spot where intended to be planted, the right-hand being thrust into the soft prepared soil in a sloping direction, and gently raising the back of the hand to the dotted line shown at F., the earth is then drawn forward as at G. leaving a straight bank behind the hand at H., the plant is now placed by the left-hand against the face of the bank, the collar or top of the root being held on a level with the ground, the roots are now spread out with the right-hand and the hole deepened should the length of the roots require it, the earth from G. is then brought forward with the right-hand against

And shaded.



Usual mode of staking the plants proves to be injurious by the ties cutting into the bark.



Cultivation under shade of living trees and in the open ground.

want of light, while the roots of the trees in the neighbourhood penetrate the holes and draw up all the nourishment from the young plants; they are also liable to damage from the branches as well as the trees being broken and falling during storms.

Partially cleared forests quite unsuited to the cultivation of the plants.

tops of the trees are driven down in strong eddies, as the current from the top of one tree meets that from another, and thus twists the plants in all directions producing much greater injury than a steady gale. In short, the more exposed the situation in which the plants are growing, the more healthy and robust they appear, although they do not attain so rapid growth, as in more sheltered localities, thus establishing beyond all doubt, that the more the plant is exposed to light

Plants fully exposed to light and air more perfectly perform their functions.

of alkaloid, which may counterbalance the comparative slower growth.

27. The young plants immediately after being planted (instead of being sheltered as formerly by a screen made by bamboo branches) are covered by a cylindrical basket open at both ends, 12 inches in diameter, and 14 inches long as at I., made out of the common wattles so plentiful on these hills, one man making from 8 to 10 of such baskets daily, this is found the most efficient as well as the most economical Method of shading plants. as the most economical way of protecting the plants, as when they are established the baskets can be removed and are available for further use.

28. It has been found that the plants when staked in the usual way are injured by the tie cutting into the bark, to remedy this, one or two stakes are placed on opposite sides at a distance of about 12 inches from the plant and a hoop formed of rattan covered with moss for large, or willow twigs for small, plants is placed around the branches and tied to the stakes at both ends when two are used as at J. In stormy situations, and steep lands, it would appear desirable, instead of staking to secure the plants to the ground by bending them forward and pegging them against the face of the hill, the plants would then throw up numerous shoots, and these shoots would protect each other from the force of the wind.

29. Cultivation under living trees has been entirely abandoned, the plants having been found to suffer from the effects of the drip, and the high gales of wind being caught by the tops of the trees are driven down in strong eddies, as the current from the top of one tree meets that from another, and thus twists the plants in all directions producing much greater injury than a steady gale. In short, the more exposed the situation in which the plants are growing, the more healthy and robust they appear, although they do not attain so rapid growth, as in more sheltered localities, thus establishing beyond all doubt, that the more the plant is exposed to light

30. Partially cleared forests have also been found quite unsuited to give shelter, as the high gales of wind being caught by the tops of the trees are driven down in strong eddies, as the current from the top of one tree meets that from another, and thus twists the plants in all directions producing much greater injury than a steady gale. In short, the more exposed the situation in which the plants are growing, the more healthy and robust they appear, although they do not attain so rapid growth, as in more sheltered localities, thus establishing beyond all doubt, that the more the plant is exposed to light and air, the more perfectly it performs its functions, thus the juices being more effectually elaborated, we may expect a large proportion

Effect of storms, and wet and dry weather on cultivation.
Plants suffer from, when young.

the leaves are frequently blown to pieces, and occasionally in very exposed situations the branches are broken, and the plants twisted out of the ground. As the plants grow older, their leaves become smaller and consequently not so much affected by the wind; the yellow and crown barks do not suffer so much from storms, their leaves being much smaller, they are however occasionally injured in heavy gales. The storms of hail so frequent here in March and April, although productive of temporary damage by cutting the leaves, yet the plants have not materially suffered from this cause.

As attain age, less liable to injury.

Continuous wet weather, effects of.
tractured around the margin towards the under surface, causing rough undulations in the texture of the leaf along the midrib and between the lateral veins. It also induces a succulent and unhealthy condition of the plant, in some instances causing an unnatural development of pith, rendering the plant liable to disease, 25 plants having died from the effects of the continued rain of last season. The grey barks suffer most from the constant stream of water thrown down their channelled leaf stalks, communicating rot to the bark which occasionally penetrates to the stem, and thus permanently injures the plant. The heavy rains have been found to carry down a large quantity of earth, which covered the plants and caused much time to be occupied in its removal, this has been effectually obviated by a system of surface drains.

Showers alternated with sunshine, prove most favorable to the growth of plants.

most favorable for the growth and full development of the Chinchona under cultivation. The plants however when established bear a considerable amount of drought without injury.

Bear considerable drought without injury.

During the first two months of last severe dry season, the plants maintained their growth and healthy appearance, the drought then began to make itself felt, the leaves of the plants assuming by degrees the contracted form and yellow tint as during the continuous rains. After three months continuous drought a few of the plants on the more exposed parts of the plantation began to droop, in a few days this tendency increased, and on the 98th day it became necessary to water the plants by the hand. These were plants of one year's growth, and probably plants of two years' growth, in good soil, would bear greater drought without injury.

98 days of continuous drought necessary to hand water young plants.

Gathering the bark and treatment of plants for this purpose.

to within a few inches of the ground has been found the most advantageous. Removing the bark in strips from the stems of the plants has been discontinued, for although new bark is formed over the spaces, it is not until more or less decay has been communicated to the wood, and thus the stems are prevented from expanding.

Removing bark in strips, injures growth of plants.

"Red," "grey," and "yellow" barks throw out shoots from the stools when cut down between March and August.

August have uniformly thrown strong shoots from the stools, these shoots have grown with great vigour, and this may be found a profitable way of treating the plants, particularly in exposed situations, as the number of shoots thrown from the stools afford mutual protection.

But not when cut between September and February.

36. It is however important to note that of the plants cut down between September and

February (although of the same species) not one in five threw shoots from the stools; of these "Crown" barks an exception, as they throw shoots at any plants two retained life for a few days then gradually died away. The varieties of "crown" season.

barks however form an exception, as these possess sufficient vitality to produce strong shoots at whatever season of the year they are cut.

If cut during dry weather, plants must be prepared.

37. From the above it is obvious that if the harvest of bark is to be obtained by cutting down the plants in the dry season or between December and March, they must be prepared during the preceding wet weather as described and illustrated at paragraph 21, Plate VI in "Notes on cultivation, &c., dated March 1863."

Lopping and pruning adopted, species readily produce fresh branches.

38. When the system of lopping and pruning is adopted, all the species are found readily to produce fresh branches at any season of the year.

Chinchona Pitayocensis, attempt to introduce.

39. On the 4th of April 1864, I received from Mr. Markham of the India House a small packet of seeds of C. Pitayocensis, these were sown on the same day; a large packet received on the 20th idem, through the Government, were also sown on their receipt, and I regret to add that up to the present date not one seed has germinated, and fear there is now no hope of their doing so. This is much to be regretted as the species is one of great value, and although we possess the C. Lancifolia from Java a Pitayo bark, yet there being three varieties the Lancifolia may not be the most valuable kind, it is therefore desirable that another attempt should be made to procure fresh seeds of these plants.

40. Mr. Cross* collected the seeds in July and August 1863, and conveyed them to the port of Guayagnil with the intention of forwarding them to Mr. Markham. By some mistake the sum which Mr. Cross was to have received for collecting the seeds had not reached Her Majesty's Consul, this gave offence, and Mr. Cross returned carrying the seeds with him into the interior of the country. After a delay of five months, and in compliance with the entreaties of Mr. Markham, the seeds were ultimately despatched, apparently after having lost their germinating powers.

Establishments.

41. The difficulties previously experienced in procuring efficient men has been severely felt this year, in consequence of the number of Coffee and Tea plantations lately opened in the neighbourhood (no less than 36 having been commenced within the last eighteen months), many of our best men have left either to open plantations for themselves, or to fill situations where

* EXTRACTS FROM MR. CROSS' LETTERS:—

Bogota, September 16th, 1863.

"There are three varieties of Pitayo Chinchona, white, yellow, and red, of which the latter is by far the finest and most valuable, having actually in several instances, yielded five per cent. of sulphate of quinine. It rarely falls below 3 per cent. but its general yield is 3½ to 4. This variety has been much sought for, and at the time I write it scarcely exists. It is dug up, roots and all, whenever found. After searching through mountains, ravines, and wild broken ground near Popayan, I found a splendid clump owned by an Indian, and made a clean sweep of all the seeds that were on the trees. On returning to my encampment I carefully dried the precious collection. I say precious, for neither I nor any one else can ever make a similar collection again, simply because the species will very soon be entirely annihilated. The Indian was about to dig up the roots of the clump and when this is done the valuable species will be lost for ever. I have seen plants of this variety dug up in the surrounding forests whose stems were not thicker than a writing quill, but these are rarely to be met with, for the plant, as already stated, is nearly exterminated. On drying the collection I found I had secured nearly a million and a half, a million of which I considered to be the finest seeds I had yet collected in the Andes."

January 20th, 1864. "I believe the seeds to be as fresh for purposes of germination as the day they were collected on the Pitayo mountains. I send a few seeds in this letter because I find I will not be able to get down in time for the Steamer. The rest will certainly come by the following Mail. The seeds were well ripened, carefully dried, and have been carefully protected up to the present time. Give the seeds on the Neilgherries about the same temperature as the Loxa seeds until they germinate. Then treat them as hardy as possible. Care must be taken that this species does not get overloaded at the roots with moisture. It is the most rapid growing of all the Chinchonas and perhaps the best."

(Signed) CLEMENTS R. MARKHAM.

greater inducements are offered. Mr. Batcock, the Deputy Superintendent, has given great satisfaction in carrying out the work entrusted to his charge. Lieutenant Nichol, recently placed in charge of the Neddivuttum plantations, has shewn energy and activity in pushing forward the operations. I have also reason to be satisfied with the diligence and care shewn by Mr. Smith, Assistant Superintendent of the Dodabetta plantation. Overseers Burrows, Ramsey, and Wilkinson have been attentive and careful in conducting the work. In the office Establishment Narrainsawmy Naidoo and Mr. McNair have given every satisfaction in the performance of their duties as Pay Clerk and Accountant.

Progress of operations.

Propagation and nurseries.

the five propagating houses described in previous reports give ample appliances for the production of between 20,000 and 30,000 plants monthly. The total number of plants produced up to 31st May 1864 being 4,16,909, of this number 31,662 have been distributed to the public.

4,16,909 Plants propagated.

31,662 Plants distributed to the public.

Nurseries formed for 3,50,000 young plants.

Neddivuttum Plantations.

the temporary buildings for the coolies; the wood covering the drains and culverts formed in 1862, have been renewed and re-placed by stones; the surface drains on the Denison plantations widened and increased in number, in order to prevent the severe wash occasioned by the heavy rain of last monsoon; there 220 acres are

220 Acres planted; roads, drains, &c., finished.

finished; on the 1st Denison plantation the plants have attained considerable size and promise to rise rapidly into a luxuriant forest. On the Markham plantation, the plants have only recently been planted and are necessarily small;

205 additional acres cleared and in a forward state of preparation for planting.

205 additional acres have also been cleared and are in a forward state of preparation for planting, the earth-work of the roads and bridges completed; though here and there interrupted by rocks which are being removed; the propagating house on this plantation has been extended and affords sufficient space for 20,000 cuttings.

Wood plantation at Pykara works made less progress.

165 acres more or less prepared.

8 acres only planted.

8 acres only have been planted. The permanent buildings finished, and comfortable lines for coolies, erected.

Dodabetta plantations, 95 acres planted.

being planted and 60 additional acres in progress; here upwards of 500 acres have been enclosed with

And commenced on 60 additional acres.

Total extent of 500 acres enclosed by a trench.

the removal of the firewood and thus increase its market value. The wood has realized Rupees 5,050 and paid to the credit of the Forest Department.

New plantation on Koondahs.

Koondahs, great difficulty has been experienced in pushing forward the operations, owing to the

42. A range of hardening pits has been added to our propagating departments which affords shelter for 75,000 plants, and these with

the five propagating houses described in previous reports give ample appliances for the production of between 20,000 and 30,000 plants monthly. The total number of plants produced up to 31st May 1864 being 4,16,909, of this number 31,662 have been distributed to the public.

Extensive nurseries have been formed on the different plantations for the accommodation of the plants produced during the current year, in all sufficient to contain 3,50,000.

43. On the Neddivuttum plantations, it has been found necessary to renew several of

the temporary buildings for the coolies; the wood covering the drains and culverts formed in 1862, have been renewed and re-placed by stones; the surface drains on the Denison plantations widened and increased in number, in order to prevent the severe wash occasioned by the heavy rain of last monsoon; there 220 acres are already planted; roads, drains, trenches, &c., finished; on the 1st Denison plantation the plants have attained considerable size and promise to rise rapidly into a luxuriant forest. On the Markham plantation, the plants have only recently been planted and are necessarily small;

44. On the Wood plantation at Pykara, the work has not made such satisfactory progress, owing to the difficulty in obtaining an efficient Assistant. Here however 165 acres of land have been more or less prepared, of which

45. On the Dodabetta plantations, the work has progressed satisfactorily, 95 acres being planted and 60 additional acres in progress; here upwards of 500 acres have been enclosed with a trench, and 11,000 yards of road cut intersecting this extent of land, the object in cutting these roads prior to planting, being to facilitate

46. In opening the new plantation on the

160 acres felled.

75 lopped and burned.

Temporary Buildings finished.

ings have been completed, and a contract entered into for making the road, I therefore trust shortly to be able to procure sufficient labor to complete the permanent buildings.

Botanical gardens.

especially towards the end of the year, notwithstanding considerable improvement has lately been effected. Between the upper and lower gardens

Improvements effected.

enclosed by a revetment wall raised so as to form a parapet to the adjoining terrace, this terrace is in the form of a crescent, and is now being laid out into parterre, with a band-stand in the centre and three fountains on each side. In the upper portion of the garden three fountains have been erected and are working well, here also parterres and ornamental vases have been introduced, and the whole made as attractive as possible by planting with choicest flowers and shrubs. In the lower garden a labyrinth has been formed on the plan of that at Hampton Court, the hedges of Rose floire de Rosamere and Blairü, here also an ornamental piece of water has been added; in this portion of the garden the plants suffer much from the attacks of the grubs of the cockchafer, rendering it difficult to secure that luxuriance of vegetation which prevails in the upper garden.

Plants introduced.

48. During the year many valuable plants have been added to our collection. To His Excellency Sir William Denison, Governor of Madras, we are indebted for the very valuable Araucarias Bidnellii and Cookii, the beautiful Clanthus Dampieri, twelve varieties of Australian grapes, and numerous seeds of valuable timber trees as Eucalypti, Acacias, &c., and to Mr. Lascelles for the Cupressus Macrocarpa, Dammara Brownii and a few species of unnamed Japan Conifera. From Dr. Anderson of the Calcutta Botanical gardens, Podocarpus longifolia; to Messrs. E. B. Thomas, and E. Thomas for a collection of European fruit trees and shrubs; to Mr. J. D. Sim, for Amherstia Nobilis Stigmaphyllon Ciliatum, Meyenia erecta, and the white variety of Lagerstræmia Indica; to Major Hutton for four fine varieties of Fuchsia and a few British forest trees; to Mrs. Arbuthnot for numerous ornamental plants, and to Dr. Birdwood of Bombay for Strelitzia Angustifolia.

Distribution.

The following table exhibits the distribution of garden plants, seeds, &c., for 1863-64.

Months.	Fruit trees and shrubs.	Timber trees.	Shrubs and flowers.	Collections of seeds.	Amount.
1863.					RS. A. P.
May	...	74	...	19	186 4 0
June	53	10	38	17	139 0 0
July	77	56	138	23	248 1 0
August	86	33	58	33	246 1 6
September	44	47	134	34	217 15 6
October	168	5	250	15	288 3 6
November	6	22	202	17	138 4 0
December	...	122	165	12	117 0 0
1864.					
January	...	...	...	1	1 14 0
February	...	...	3	2	3 10 0
March	...	...	9	11	45 14 0
April	50	245	343	2	152 2 0
Total Distribution ...	484	614	1,340	186	1,784 5 6

Concluding remarks.

49. From the above observations it will be observed that during the past official year, we have made great progress, still the scarcity of labor has been severely felt rendering it difficult to perform the different operations at the proper seasons. In conclusion, I beg to tender my grateful acknowledgments to His Excellency Sir William Denison, Governor of Madras, for the liberality with which he has met every suggestion tending to facilitate the progress of this important undertaking. To Mr. Markham of the India House, my best thanks are due for much valuable assistance, and the deep interest he has evinced in the progress of the Chinchona plantations, also to Mr. Howard, for the very important information he has so liberally furnished on the formation of alkaloid in the bark.

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

OOTACAMUND, 7th July 1864.

A.
Estimated cost of each Chinchona Plantation from

Particulars.	Operations preparatory to receipt of plants.	Superintendent and Writer Establishment.				Nursery Department.			Dodabetta Plantations.		
		1860-61.	1861-62.	1862-63.	1863-64.	1861-62.	1862-63.	1863-64.	1861-62.	1862-63.	1863-64.
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Grant for the preparation of sites.....	2,000	...	...	...	...	...	...	...	...	...	...
Establishments... ..	...	4,200	5,350	5,880	3,324	4,305	4,609	2,280	5,400	5,700	...
Buildings.....	...	...	...	...	1,200	...	...	560	...	...	...
Tool and Store-rooms.	...	...	...	...	2,000	...	...	...	250	...	...
Coolies' quarters.....	...	...	...	...	...	...	...	200	500	...	...
Felling.....	...	...	...	...	...	...	...	400	1,500	...	...
Clearing.....	...	...	...	...	...	...	...	280	1,500	...	...
Pitting.....	...	...	...	...	...	...	...	400	1,500	...	...
Carriage of plants...	...	...	...	...	...	...	...	150	...	...	...
Planting and Shading.	...	...	...	...	...	...	...	200	500	...	...
Trenching.....	...	...	...	...	...	...	...	1,800	...	...	...
Enclosing.....	...	...	...	...	756	...	...	...	5,850	...	...
Road-making.....	...	...	...	...	...	...	...	...	2,025	...	...
Tools.....	...	...	...	...	...	...	...	...	1,200	...	...
Contingencies.....	...	...	...	...	156	...	...	399	1,200	...	...
Total...	2,000	4,200	5,350	5,880	7,476	4,305	4,609	6,669	21,425	5,700	...

OOTACAMUND,
7th July 1864.

A.
Actual expenditure on each Chinchona Plantation

Particulars.	Operations preparatory to receipt of plants.	Superintendent and Office Establishment.				Propagation and Nursery Departments.			
		1860-61.	1861-62.	1862-63.	1863-64.	1861-62.	1862-63.	1863-64.	
	RS.	RS.	RS.	RS.	RS.	A. P.	RS.	RS.	
Establishment.....	114 2 3	4,347	5,313	6,437	2,024	11 6	3,329	3,410	
Buildings.....	...	...	...	...	2,647	0 0	3,578	3,000	
Tool and Store-rooms.	...	...	...	...	...	...	...	...	
Coolies' quarters.....	...	...	...	...	...	...	...	...	
Felling.....	302 5 3	...	...	...	...	...	...	...	
Clearing.....	...	...	...	...	...	...	...	...	
Pitting.....	...	...	...	...	...	...	...	...	
Carriage of plants ...	...	...	...	...	...	...	...	...	
Planting and shading.	...	...	...	...	...	...	...	...	
Trenching.....	...	...	...	...	...	...	...	...	
Enclosing.....	...	...	...	...	...	...	...	...	
Road-making.....	300 0 0	...	...	...	...	...	...	...	
Tools.....	271 0 0	...	...	...	...	...	...	...	
Contingencies.....	67 0 0	...	...	...	...	...	...	...	
Total...	1,054 7 6	4,347	5,343	6,437	4,671	11 6	6,907	6,440	

OOTACAMUND,
7th July 1864.

commencement of operations to 30th April 1864.

Neddivuttum Plantations.			Pykara Plantations.		Malah Koondah Plantations.	For the Plantations of 1864-65.	Total.
1861-62.	1862-63.	1863-64.	1862-63.	1863-64.	1863-64.	1864-65.	
RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
...	...	...	...	...	...	...	2,000
5,064	8,412	15,348	...	4,033	...	...	73,905
2,080	...	...	1,530	...	...	4,000	18,445
250	...	...	2,000	...	125	...	...
1,000	1,000	...	1,000	...	500	...	...
1,500	3,000	...	1,500	...	6,150	2,250	48,930
1,500	3,000	...	1,500	...	...	...	...
2,000	3,000	...	...	...	...	...	...
450	450	...	...	...	...	...	...
550	550	...	...	1,300	...	...	...
4,000	...	...	...	8,000	...	...	11,631
3,900	...	...	...	750	375	...	5,570
1,520	...	...	...	1,350	675	...	4,405
1,282	...	...	...	1,282	641	...	8,521
2,003	1,831	...	...	2,046	846	...	...
27,099	21,243	15,348	7,780	18,761	9,312	6,250	1,73,407

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

from commencement of operations to 30th April 1864.

Dodabetta Plantations.			Neddivuttum Plantations.			Pykara Plantations.		Malah Koondah Plantations.	Total.
1861-62.	1862-63.	1863-64.	1861-62.	1862-63.	1863-64.	1862-63.	1863-64.	1863-64.	
RS.	RS.	RS.	RS.	A. P.	RS.	RS.	RS.	RS.	RS. A. P.
1,481	2,274	2,605	2,910	0 0	6,195	5,874	...	1,608	47,981 13 9
865	...	...	1,560	0 0	...	1,000	1,683	...	...
...	...	230	...	...	350	500	275	...	21,188 0 0
...	250	500	...	...	1,750	1,000	1,100	550	...
448	750	500	1,780	7 3	1,500	2,200	1,500	2,000	2,400
400	750	400	...	...	1,500	2,200	1,125	2,000	1,125
848	750	1,010	1,680	7 3	858	2,000	...	1,000	...
245	200	140	540	1 9	900	750	...	65	...
355	450	560	640	1 8	900	898	...	65	...
...	...	1,200	...	...	1,972	1,780	...	...	...
...	2,800	...	...	...	1,550	900	...	679	5,929 0 0
600	700	2,070	1,100	0 0	1,000	2,000	...	1,500	9,772 0 0
394	304	600	700	0 0	400	860	...	1,500	5,029 0 0
124	460	500	340	0 0	915	850	...	400	3,756 0 0
5,760	9,688	10,315	11,351	1 11	19,790	22,812	5,683	11,367	4,477
									1,36,343 4 11

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

B.

Meteorological observations from 1st May 1863, to 30th April 1864, made on the Government
Chinchona Plantations at Neddivuttum.

MONTH.	Mean monthly temperature.	Mean daily range.	Maximum observed during the month.	Rain-fall in inches.	Days without rain.	Days with rain.
1863. July	62° 5	12° 6	76°	15.46	5	26
August	61° 6	16° 3	74°	23.77	9	22
September	66° 5	15° 6	83°	5.59	9	21
October	66° 0	17° 3	82°	10.17	14	17
November	70° 0	23° 0	85°	0.50	26	4
December	80° 4	27° 0	82°	1.35	26	5
1864. January	65° 7	25° 0	85°	0.52	30	1
February	69° 6	28° 0	87°	—	29	0
March	72° 1	29° 4	90°	0.38	29	2
April	71° 4	29° 5	90°	2.80½	18	12
Annual	68° 8	21° 9	84° 5	61.44½	196	110

The readings in this table are high in consequence of the sun occasionally striking on the board upon which the Thermometers were placed.
OOTACAMUND,
7th July 1864.

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

C.

Meteorological observations from 1st May 1863, to 30th April 1864, made at the Government
Gardens, Ootacamund.

MONTH.	Monthly mean of dry bulb thermometer.	Monthly mean of wet bulb thermometer.	Due point of monthly means.	Maximum observed during the month.	Greatest daily range.	Rain-fall.	Days without rain.	Days with rain.
1863. May	62° 5	60° 8	59°	75°	23°	5.98	13	18
June	53° 7	58° 0	53	73	18	3.99	14	16
July	57° 8	56° 7	56	72	18	1.49	16	15
August	59° 1	58° 5	56	71	17	3.58	16	15
September	58° 9	57° 6	56	72	24	2.16	14	16
October	58° 1	57° 1	56	72	23	8.45	14	17*
November	56° 4	54° 8	53	70	22	1.86	22	8
December	56° 3	53° 2	51	71	26	2.38	24	7
1864. January	55° 0	51° 0	47	73	31	—	31	0
February	58° 0	52° 0	48	76	28	—	29	0
March	62° 0	55° 0	50	80	30	0.8	30	1
April	59° 0	57° 0	56	77	26	8.18	13	17
Annual	Mean 58° 5	Mean 55° 9	Mean 53° 8	Mean 73° 7	Mean 23° 8	Total 38.17	Total 236	Total 130

South-west monsoon commenced on the 31st of May 1863.

* On the 26th of October 1863, and two following days, rain most excessive and gauge overflowed, a calculation from a quarter of an hour's reading on the morning of the 26th, gave 4 inches, 56 cents., as the rain of the preceding night which was probably below the correct amount. This amount is omitted in the monthly total.

OOTACAMUND,
7th July 1864.

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

No. 193.

ORDER THEREON, 9th February 1865, No. 273.

Miscellaneous.

1. The Governor in Council considers the foregoing report of the progress of the Chinchona plantations during the official year 1863-64, to be extremely satisfactory. The season was an unusually trying one, the drought being so long continued that it became necessary to resort to watering by the hand, yet the plants made good progress.

2. The propagation has been more successful than in previous years, the monthly average having been 15,326 plants, and the maximum, in February 1864, 32,408. The total number of plants produced up to the 31st May 1864 has been 416,909, of which 31,662 have been distributed to the public.

3. The extent actually planted out in the different Government plantations is stated to be 323 Acres.

4. The first plants were permanently planted out at Neddivuttum in August 1862, and have, in the twenty months which have since elapsed, "attained heights varying from six to nine feet, with thick stems, well furnished with lateral branches, and presenting as robust and healthy an appearance as could be wished." This growth is said to be about three inches in excess of the average of the same species (*C. Succirubra*) throughout the plantations.

5. The results of the year's analysis of the bark is also highly encouraging, the yield of rough alkaloids having been six per cent, while in the previous year it was only 4.3.

6. There can no longer be room for doubt as to the successful introduction of the Chinchona on the Neilgherries, and the extraordinary success which has attended its culture, whether regard be had to extensive propagation, rapid and healthy growth, or the rich production of alkaloids.

7. For these results the Government are indebted to Mr. McIvor, whose able and zealous exertions in this important enterprise merit the highest praise.

8. The total expenditure up to the 30th April 1864 has amounted to Rupees 1,36,343, under the following heads:—

	RS.
Buildings	21,188
Plantations	58,388
Tools	5,029
Establishment	47,982
Contingencies	3,756

9. The progress of the different plantations appears to be as follows:—

At Neddivuttum 220 Acres have been planted out, with roads, drains, &c., completed; 205 acres are in a forward state of preparation for planting, and the earth-work of the roads and bridges completed. The propagating house has been extended, and afford space for 20,000 cuttings.

At Pykara 8 Acres have been planted out; and 165 more or less prepared; the permanent buildings and cooly lines have been finished.

At Dodabetta 95 Acres have been planted; 60 Acres are in progress; 500 Acres have been enclosed with a trench, and 11,000 yards of road cut.

At the Koondahs (sanctioned only in December 1863) 75 Acres have been lopped and burned, and are in course of preparation for planting; 85 Acres have been felled and cooly lines and temporary buildings erected.

A range of hardening pits, affording shelter for 75,000 plants, has been added to the propagating houses, and there are thus ample means for producing from 20,000 to 30,000 plants monthly. Extensive nurseries have also been formed on the different plantations.

10. This is a very satisfactory state of affairs.

11. The failure of the seeds of *C. Pitayensis* is much to be regretted, and will be brought to the notice of the Home Government, that efforts may be made to procure a further supply.

18 *Proceedings of the Madras Government, Revenue Department,*
9th February 1865.

Paragraphs 9 to 13.
Do. 24 to 33.

12. The paragraphs marginally noted contain much valuable information as to the culture, &c., of the Chinchona, and will be

separately printed uniformly with the Manual to which they will be added.

13. The Government have already issued orders for the preparation of a list of reserved lands, so that intending planters may have the means of readily ascertaining what lands are, and are not, available. The impression, which is said to prevail, that no more forest land will be sold, is altogether without foundation; the extreme difficulty of obtaining competent Surveyors and the necessity, which the Law imposes, of advertising all lots for three months, necessarily cause delay in the transfer of land; but the Government are not aware of applications having been refused, on the plea of the land being reserved, so frequently as to afford ground for the impression stated. The Collector will report how many cases of refusal on this account have occurred during the last year. In order to avoid delay the Government, it may be remarked, now allow lands to be sold prior to actual survey, on condition of the boundaries being carefully and permanently marked, and the purchase being subject to adjustment on the survey.

14. The Government do not deem it necessary here to discuss the subject of paragraphs 17 to 23 of Mr. McIvor's report. They will merely observe that Mr. McIvor's views are not these in general acceptance.

15. Mr. McIvor's account of the Botanical gardens is highly satisfactory. The Government consider it desirable that he should now prepare for publication a catalogue of the different trees, shrubs, &c., in the gardens.

16. In future reports the progress of the Tea plantation and nurseries of Australian trees should be specially noticed. The Government wish attention paid to the latter, and will continue to supply Mr. McIvor with seeds from Australia. The plants when grown can be sold to the public at a fair price, and furnished to the Forest Department for the Government Sholas. The commoner kinds of Australian trees, as the *Acacia Melanoxylon*, need not of course be raised by Mr. McIvor.

17. The Government note with satisfaction the testimony borne by Mr. McIvor to the services of Mr. Batcock, Lieutenant Nichol, Mr. Smith, and Overseers Burrows, Ramsay, and Wilkinson, and of his Office Assistants Narrainsawmy Naidoo and Mr. McNair.

(True Extract.)

(Signed) A. J. ARBUTHNOT,

Chief Secretary.

To W. G. McIvor, Esq.

To the Collector of Coimbatore.

„ Officiating Conservator of Forests.