

(1) Number of pages 16(2) Date of repair 15.6.38(3) Initials of the Referencer [Signature]

MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No.	<u>156</u>	Press Mis.
Dated	<u>16.3.</u>	<u>1872</u>

Not to be folded or roughly handled

*Proceedings of the Madras Government, Revenue Department,
15th March 1872.*

No. 182. Read the following letter from J. W. BREEKS, Esq., Commissioner of the Nilgiris, to the Secretary to Government, Revenue Department, Fort St. George, dated Ootacamund, 9th June 1871, No. 47 :—

I HAVE the honour to submit the report on the Government Cinchona plantations for 1870-71.

2. Two acres of the new varieties of *C. Calisaya* were planted during the year, and this was the only extension made. The other planting operations were confined to filling up vacancies, planting the edges of roads and spaces by the side of ravines. 602 plants and 45 oz. of seeds were distributed to the public. 51,352 lbs. of fresh bark were supplied to the Government Quinologist for the manufacture of his "amorphous quinine."

3. The Superintendent reports that the trees manured with guano, sulphate of Ammonia, and stable manure in 1870, have not yet shown any marked improvement in growth.

4. The Superintendent's calculation of the yield in the eighth year of an acre of Cinchona holds out a favourable prospect to Cinchona growers on the Nilgiris. There is, however, much force in his remarks on the length of time the grower has to wait for a return for his outlay—eight or nine years with red barks, and twelve or fourteen with crown barks. This seems to me to tell with great force in favour of the cowle-system of land tenure, if Government are desirous to see their waste land taken up for Cinchona cultivation. In connection with this I take leave to refer to my letter to the Board dated 26th October 1869, No. 149.

5. I need not here discuss the mossing and coppicing processes alluded to in paragraphs 10, 11, 12, 13, and 14 of Mr. McIvor's report. As stated in my letter of the 15th March last, No. 20, the value of mossed as compared with unmossed barks and the best mode of harvesting the bark are now being tested.

6. During the year under review Mr. McIvor, with the sanction of Government, paid a visit to the Bengal plantations, and has submitted an interesting report on their condition. I would suggest here that he be permitted in like manner to pay a visit to the Java plantations at a time of year when his services can be spared, in order to make himself acquainted with the system of Cinchona cultivation in force and the result obtained there.

7. I have visited the various Nilgiri plantations several times in the year under report, and am well pleased with all I have seen, except at Maillkoondah, regarding which plantation the Government are in possession of my opinion. I regret that Mr. Dawson has left the department; his practical knowledge of the state of our plantations and of the various experiments that were being carried on rendered his services of especial value in the absence of Mr. McIvor.

8. In the course of a month or so, I hope to be able to submit to Government detailed survey plans of all the Government Cinchona estates.

Proceedings of the Madras Government, Revenue Department,
15th March 1872.

REPORT ON THE GOVERNMENT CINCHONA PLANTATIONS, OOTACAMUND,
NILGIRIS, FOR THE OFFICIAL YEAR 1870-71.

The growth of the Cinchona plants during the past year has been very satisfactory. The older plants of the

Plants grown well:

C. officinalis assumed a tree-like habit.

and assumed a tree-like appearance.

Size of largest trees.

Red bark plants 30 feet high with stem 3 feet in circumference.

The older plants of the different varieties of *Cinchona officinalis* have formed fine leading shoots, and entirely thrown off the shrubby habit, The largest plants of *C. officinalis* vary from 22 to 23 feet in height, with a circumference of stem of from 18 to 21 inches. The finest plants of *C. Succirubra* are now 30 feet high, with a circumference of stem of 3 feet.

2. Three thousand five hundred plants of the new varieties of *C. Calisaya* have been permanently planted out on new land. These have been planted

Two acres added to permanent plantations.

close, and will cover about two acres of land. This is the only extension made to our permanent plantations, our operations having been confined to filling up failures, planting along the edges of the roads and spaces by the sides of ravines.

3. The number of plants of the new species propagated during the year is 16,379 against 17,000, the result of last

Plants propagated.

Plants and seeds distributed.

year's propagation. Only 662 plants have been distributed to the public, and 45 ounces of seed have been gratuitously

issued to planters in various parts of India.

4. Among the new species recently introduced, some of the varieties of

Increase of new and rare species.

Pitayo bark promise to be hardy and well suited to this climate. The total

number of plants of new and recently introduced varieties are as follow:—

<i>Cinchona lancifolia</i> (from Java)	...	...	279
„ <i>officinalis</i> (lanceolate-leaved variety)	...	...	2,140
„ <i>Pitayensis</i>	...	...	1,779
„ <i>Calisaya</i> new varieties	...	...	54,881
			59,079

5. The new varieties of *C. Calisaya* having been sufficiently propagated to

Calisaya yellow barks.

Pitayo barks.

meet the extensions desired by Government, the propagation of these sorts has

been discontinued. The imported plants of *C. Pitayensis*, received on the 6th December 1870, are being increased, as this imported variety is stated by Mr. Cross to be of very great value, and it may differ in quality from the seedlings raised from the imported seeds; it is, therefore, considered desirable to continue the

C. lancifolia.

propagation of this kind. The *C. lancifolia*, received from Java, makes slow

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growth in this climate, and consequently has not been extensively propagated.

Lanceolate-leaved variety of *C. officinalis*.

There are in all seven varieties of the lanceolate-leaved *Cinchona officinalis*.

These differ slightly in appearance one from another, and also in the quality of bark. Nos. 1 to 3 having been found to yield the greatest quantity of quinine, these numbers only are now propagated.

6. During the year 51,352 lbs. of fresh bark has been supplied to

Bark supplied for the manufacture of amorphous quinine.

Mr. Broughton, the Government Quinologist, for the manufacture of amorphous quinine.

7. The Cinchona trees which were manured in 1870 with guano, sulphate of Ammonia, and stable-manure, do not

Effect of manure on Cinchona trees.

show any marked difference in their growth, and probably the manure will have little or no effect upon the secretion of the alkaloids.

8. The bark is now being taken from the 4,000 plants of *C. Succirubra* and 2,000 of *C. officinalis* (Condemenia),

Collection of bark from mossed trees.

which were mossed during last year, in

order "to test the value of my mossing process when applied on a large scale." The results will hereafter be reported in a separate communication. I would, however, observe that from 1,000 unselected eight-year old plants of *C. Succirubra*, 1,060 lbs. weight of dry bark has been taken; these plants will yield in October and November of this year 1,500 lbs. more of dry bark; in all 2,560 lbs. during the year, or an average of over 2½ lbs. of bark per tree. This bark will realize in the home-market from 2s. 8d. to 3s. per lb., from which, deducting 8d. per lb. as cost of collection, carriage, etc., and

Yield and value per acre.

calculating 350 trees to the acre, a clear

profit of at least Rupee 1 per lb., or Rs. 875 per acre, will remain. Supposing the cost of Cinchona cultivation at the eighth year to be Rs. 1,000 per acre, the above return will make Cinchona cultivation a very good investment, especially as the yield in the ninth year will be almost equal in value to that obtained in the eighth. In the tenth and each succeeding

Increase of value with growth of plants.

year the yield will, in all probability,

increase with the growth of the trees and in consequence of the quality of the bark improving with each renewal. I make the above observations, as at the present

Impression that Cinchona cultivation will not pay.

moment there is a strong conviction that Cinchona cultivation will not

Money withdrawn and plantations neglected.

prove profitable. This conviction has

caused private individuals, who have invested in the cultivation as a speculation, to withhold expenditure; consequently, private estates on the Nilgiris are generally in a neglected or abandoned condition.

9. The above yield of bark is higher than could be expected from the average of private plantations in the eighth

Yield of bark from eight-year old trees in Government plantations higher than could be obtained from private plantations.

year. Such plantations would probably not yield more than half the quantity of bark given above, as the trees from

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which this bark was taken were planted in October 1862 on the Government plantations, and from the first were well cared for. The land was thoroughly prepared and trenched before the plants were placed in it, and from that time to the present date the plants had every attention and care; consequently their growth has been much above the average development of trees on private plantations, where a smaller expenditure of money and care has been considered sufficient.

10. There exists, however, serious difficulties to be encountered by speculators in Cinchona cultivation. With red bark it is necessary to wait eight to nine years, and with crown bark twelve to fourteen years, before a profitable crop can be obtained. It is few who can be so long out of their money, and at the same time maintain an expensive cultivation. Apart from this it is difficult to enter into successful competition with American grown bark. In America Cinchona bark is a wild product, and its growth costs nothing. Here, in India, as a cultivated plant, the cost of production forms the heaviest item of charge. From the quantity of bark brought into the home-market, it appears that the supply from America, instead of decreasing as was anticipated, is yearly becoming more abundant, so that the supply from this source keeps pace with the increasing demand. It is therefore evident that, with a low quality of bark, we can never hope successfully to compete in the home-market with American bark of like quality; but with higher quality barks I believe that a successful and profitable competition can be established. The mossing-process is indispensable to obtain a bark of high quality, as by each successive renewal of bark its value increases; and this will, no doubt, continue until red bark will yield from 10 to 12 per cent. of crystallizable alkaloids, and of this from 6 to 8 per cent. of quinine sufficiently pure to pass the commercial tests. From crown barks a like quantity of crystallizable alkaloids will probably be procured, of which from 8 to 10 per cent. will be commercial quinine. Bark of this quality would defy competition, as no such bark could be procured from America. The freedom with which these high qualities of bark are worked greatly enhances their value, while the cost of collection, preparation, and shipment, would be the same as for an inferior bark. It appears, therefore, to be an object of importance to aim at producing only the highest quality of bark.

11. The bark from loppings and prunings, such as we have during last year supplied to Mr. Broughton for the manufacture of amorphous quinine, if sent into the London market, would scarcely pay the cost of collection and carriage. The coppicing-system has the disadvantage of always producing a bark of ordinary quality and only giving a crop every eighth year.

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12. In Mr. Broughton's letter of the 31st August 1870, recorded in Proceedings of Government of the 7th February 1871, that gentleman estimates the yield of an unmossed tree at eight years of age to contain 7.55 per cent.* of alkaloids in the trunk bark and 3.2 per cent. in the branch bark, or an average of 5.375 per cent. Mr. Broughton does not say how much of this is crystallizable, or how much is quinine. When the bark is to be sold, this would be important, although it is not so when the bark is made into "amorphous quinine." In paragraph 11 Mr. Broughton says, "I assume that after a tree, aged eight years, has been cut down, that the shoots, after a lapse of eight years, will produce as much bark as the original tree—an assumption that will not, under any circumstances, entail a great error." In Appendix at paragraph 1, the yield of dry bark from a tree of eight years' growth is given at a little less than 1 lb. 5 oz. of dry trunk bark, worth from 2s. 8d. to 3s. per lb. in the home-market, and 1 lb. 6 oz. of branch bark, worth from 1s. to 1s. 4d. per lb., or a total value of Rs. 2-10-0 per tree. These trees being cut down every eight years will entail the cost of keeping the land clean, otherwise weeds will spring up and choke the young shoots. This would cause considerable additional expense, perhaps equal to that of mossing and removing the bark annually from mossed trees. The commercial value of Cinchona depends on the quantity of crystallizable sulphates it contains, not on the total alkaloids.

13. Mr. Howard found the first crop of renewed red bark of 1 year and 5 months' growth from a plant of 3 years and 5 months old to give 5 per cent. of crystallized sulphates and 7.70 per cent. of total alkaloids.† The second crop of renewed bark of 17½ months' growth gave of crystallizable sulphates 8.45 per cent., and total alkaloids 9.79 per cent.‡ The application of moss to red bark trees does not act materially till after twelve or fourteen months in increasing the crystallizable alkaloids. In the red barks it is between the twelfth and the eighteenth month of the growth of the bark that the crystallizable alkaloids rapidly increases; therefore a harvest of bark of high value can only be obtained from mossed trees of this species every eighteen months, namely, one-half of the bark being taken in May and the other half in October in each succeeding year; these being the best seasons for the removal of mossed bark.

14. The total quantity of alkaloids in mossed bark is as great at twelve months' growth as at eighteen, and for the manufacture of "amorphous quinine" the harvest of bark could be obtained annually, thus

* Appendix, paragraph 1.

† Report of an analysis of the fourth remittance of the bark from India, by J. E. Howard, Esq., F.L.S., to the Under-Secretary of State for India, August 1, 1865.

‡ Report of an analysis of the fifth remittance of bark from India, by J. E. Howard, Esq., F.L.S., to the Under-Secretary of State for India, February 4, 1867.

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Mr. Howard in the first renewal of bark of 1 year's growth from a plant of 3 years and 5 months' old found of crystallizable sulphates 2.72 per cent., of alkaloids soluble in alcohol 7.00 per cent., or a total of 9.72 per cent.* of alkaloids. The third harvest of renewed bark of 12 months' growth from a tree of 7 years old gave 6.15 per cent. of salts of quinine and 11.20 per cent. of total alkaloids.† From the above results it appears that the total alkaloids are greatest about the twelfth month, and increase with each renewal of bark, and that the crystallizable alkaloids reach their maximum about the eighteenth month of the growth of the bark; but to fix this definitely, and to insure the bark being taken at the best time for the preparation of crystallizable sulphates and for amorphous quinine, a few further experiments are necessary.

15. The high system of cultivation hitherto maintained on our plantations has not been carried out during the past year, the expenses having been reduced to the lowest point possible. The result, however, of last year's cultivation makes it evident, that to secure the greatest possible benefit from our Cinchona plantations, it is necessary and economical to maintain a liberal system of cultivation.

16. The establishment in the Cinchona Department has been very materially reduced. Mr. Jamieson, the Deputy-Superintendent, was removed at the end of the year from the department, and placed in sole charge of the Botanical Gardens. Mr. Dawson, the Assistant Superintendent of Neddivuttum Plantation, has left the department and accepted employment in the Ouchterloney Valley.

17. No new buildings have been erected during the year, the principal work performed being weeding the plantations, maintaining roads, cutting drains, and filling up failures.

18. The tea plantation has not been further extended, and a considerable number of the rooted tea cuttings in the nursery at the end of autumn died during last dry weather.

19. The acclimatization of the European fresh-water fish, introduced in December 1867, has proved most successful. The Trout, Rudd, Carp, Tench, Gold and Silver fish are increasing rapidly. The Tench especially are most prolific, and grow to a large size in one year; a dozen of these fish bred here were caught, and weighed from 1½ to 2 lbs. each.

20. Appended are the meteorological tables, and table of expenditure from 1860 to 31st March 1871.

OOTACAMUND,
31st May 1871.

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

* Report of an analysis of the fourth remittance of bark from India, by J. E. Howard, Esq., F.L.S., to the Under-Secretary of State for India, August 1, 1865.

† Report of an analysis of the eighth remittance of bark from India, by J. E. Howard, Esq., F.L.S., to the Under-Secretary of State for India, September 1, 1868.

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15th March 1872.

Meteorological Observations from 1st April 1870 to 31st March 1871 made on the Government Cinchona Plantations at Neddivuttum.

Months.	DRY BULB.				WET BULB.				Minimum observed during the month.	RAINFALL.		Days with rain.	Days without rain.				
	7 A.M.	2 P.M.	6 P.M.	Daily mean.	7 A.M.	2 P.M.	6 P.M.	Daily mean.		Inches.	Cents.						
April 1870 ...	...	...	...	...	60.90	79.53	67.53	69.32	56.90	64.56	60.96	60.80	54.00	...	89	2	28
May "	...	...	...	...	60.45	74.71	61.20	65.45	57.96	65.42	58.64	60.67	54.40	2	86	7	24
June "	...	...	...	...	60.33	60.33	61.00	60.55	60.33	60.00	61.06	60.46	56.00	22	73	28	2
July "	...	...	...	...	55.13	57.10	57.26	56.40	56.00	57.32	57.26	56.86	55.03	29	86	26	5
August "	...	...	...	...	56.32	57.48	57.06	56.95	56.13	56.81	56.32	56.42	55.61	25	24	23	8
September "	...	...	...	...	55.86	56.33	56.13	56.11	55.83	56.13	55.96	55.97	55.40	22	39	23	7
October "	...	...	...	...	57.19	59.36	60.93	59.16	57.16	59.10	59.10	55.12	56.77	19	44	23	8
November "	...	...	...	...	56.27	70.23	56.80	61.30	54.13	61.43	52.50	56.02	47.23	2	67	7	23
December "	...	...	...	...	58.55	72.16	67.16	65.16	55.39	54.71	53.71	54.60	49.61	...	39	2	29
January 1871 ...	...	...	...	...	65.64	70.84	65.77	63.75	67.41	65.36	64.55	65.94	56.06	...	35	1	30
February "	...	...	...	...	65.68	68.18	61.54	65.13	61.43	67.11	64.71	64.42	55.46	...	65	3	25
March "	...	...	...	...	64.65	79.90	70.16	71.57	51.25	75.87	53.03	60.05	53.68	...	74	3	28
Total...	...	...	...	...	...	...	...	...	...	...	...	...	...	128	21	148	217
Annual Mean...	...	...	...	...	59.75	67.18	61.88	62.13	57.48	61.98	58.15	58.94	54.10	...	...	...	...

OOTACAMUND,
1st April 1871.

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

Meteorological Observations made at the Botanical Gardens, Ootacamund, from April 1870 to March 1871.

Months.	DRY BULB.			WET BULB.			Maximum in shade.	RAINFALL.		Days with rain.	Days without rain.
	7 A.M.	2 P.M.	6 P.M.	Daily mean.	7 A.M.	2 P.M.		Inches.	Cents.		
	7 A.M.	2 P.M.	6 P.M.	Daily mean.	7 A.M.	2 P.M.		Inches.	Cents.		
April 1870	56.03	73.25	62.05	63.77	49.29	61.50	75.82	1	74	6	24
May	57.52	70.78	61.09	63.33	53.46	62.72	73.33	4	43	14	17
June	55.91	65.43	55.91	59.08	54.21	61.82	68.82	7	23	25	5
July	54.93	61.74	55.77	57.8	54.00	59.38	65.16	...	95	9	22
August	53.77	63.12	55.03	57.0	52.96	60.29	66.74	2	58	9	22
September	55.46	63.00	55.71	58.05	53.50	59.96	65.50	1	04	4	26
October	54.78	63.00	56.28	58.02	53.35	60.42	68.35	11	73	10	21
November	51.48	62.82	54.20	56.6	47.27	57.72	68.62	3	00	10	21
December	51.44	65.96	53.79	57.06	43.89	53.86	70.48	1	50	4	27
January 1871	54.47	65.53	56.53	58.84	49.53	58.31	70.90	3	39	8	23
February	54.26	69.26	62.96	62.16	49.11	59.81	72.81	1	13	2	26
March	59.04	69.93	63.04	64.00	50.71	58.18	75.43	1	88	6	25
Total...	...	...	...	...	...	...	...	40	60	107	258
Annual Mean...	54.92	66.15	57.70	59.59	50.94	59.50	70.16	...	...	...	...

OOTACAMUND,
1st April 1871.

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

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15th March 1872.

Statement showing the expenditure on each of the Cinchona Plantations on the Nilgiris.

Particulars.	SUPERINTENDENT AND OFFICE ESTABLISHMENT.		PROPAGATION AND NURSERY DEPARTMENT.		DODABETTA PLANTATION.		NEDDIVUTTUM PLANTATION.		PYKARA PLANTATION.		MALAKOONDAH PLANTATION.		Total.
	1860 to 1870.	RS.	1861 to 1870.	RS.	1860 to 1870.	RS.	1861 to 1870.	RS.	1862 to 1870.	RS.	1863 to 1870.	RS.	
	1860 to 1870.	RS.	1861 to 1870.	RS.	1860 to 1870.	RS.	1861 to 1870.	RS.	1862 to 1870.	RS.	1863 to 1870.	RS.	
Establishment including salaries	65,057	8,120	35,760	2,49	38,376	2,49	79,274	2,672	11,746	813	9,005	480	2,56,249
Buildings	...	...	13,849	...	20,281	...	22,445	420	3,163	295	3,083	55	64,075
Tool and Store-rooms	...	...	...	...	660	...	1,554	40	885	...	320	...	3,459
Coolies' quarters	...	...	...	...	1,545	...	3,959	160	2,140	80	375	170	8,477
Felling	...	...	...	...	4,568	...	9,227	...	7,536	...	4,952	...	26,283
Clearing and weeding	...	...	...	...	14,038	...	24,782	2,520	16,007	1,240	10,549	495	72,731
Pitting	...	...	...	...	9,070	...	14,975	240	6,247	205	4,568	55	35,580
Carriage of plants	...	...	...	...	3,315	...	4,869	105	1,664	25	781	5	10,829
Planting and shading	...	...	...	...	6,359	...	6,485	690	1,835	180	1,089	28	17,021
Trenching	...	...	...	...	3,759	...	6,467	...	2,065	...	575	...	13,041
Fencing	...	...	...	...	5,337	...	7,109	85	1,823	20	1,080	...	13,362
Road-making	...	...	...	...	7,109	...	5,727	30	3,421	20	2,371	...	18,698
Tools	...	...	...	...	4,984	...	5,798	29	3,800	...	1,931	...	17,093
Contingencies	...	...	...	...	5,596	...	7,610	158	1,814	19	1,066	38	19,560
Excavating	...	...	...	...	1,094	...	1,195	...	...	...	...	...	2,289
Clothing	...	...	...	...	250	...	339	22	158	...	85	...	1,175
Various	...	...	...	...	2,210	...	2,576	86	390	70	293	8	6,037
Collection and carriage of bark.	...	...	...	...	...	...	...	1,230	...	...	...	...	1,230
Total...	65,860	8,197	54,498	2,836	1,28,546	5,609	2,01,924	8,487	64,696	2,967	42,175	1,334	5,87,189

OOTACAMUND,
1st April 1871.

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

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15th March 1872.*

No. 183.

ORDER THEREON, 15th March 1872, No. 456.

Miscellaneous.

THE above paper has been, in great measure, incorporated in the General Administration Report for the Presi-

dency. The Government will briefly note the leading points in it. During the year 1870-71, the Superintendent of the Government Cinchona Plantations and his staff were principally occupied with the conservancy of the existing plantations, which require a moderate annual outlay in clearing and weeding, etc. The only extension made was on the Dodabetta Estate, where three thousand five hundred plants of the new varieties of *C. Calisaya* were planted out on two acres of fresh land.

2. The total expenditure of the year appears, from the tabular statement in the Appendix, to have been Rs. 29,490 against Rs. 45,106 in 1869-70, in which year considerable additions were made to the plantations. The largest share of expenditure was incurred at Neddivuttum.

3. All the plantations, except that at Mailkoondah, are in a thriving condition. The older plants of the *C. officinalis* variety have assumed a tree-like form, and some of the finer plants of *C. Succirubra* are 30 feet high, with a circumference of stem of from 18 to 21 inches.

4. During the year 51,352 lbs. of fresh bark were supplied to Mr. Broughton. The bark is now being taken from the plants, which were subjected to the mossing process, in order to test the value of that experiment.

5. A large portion of the Report is devoted to an examination of the worth of Cinchona planting as an investment of private capital. The conclusion drawn by Mr. McIvor is, that although Indian grown bark competes under great disadvantages in the market with the indigenous American bark, success may be reasonably looked for in the cultivation of Cinchona in this country, if it is confined to the growth of the barks of higher quality.

(True Extract.)

(Signed)

W. HUDLESTON,

Officiating Chief Secretary.

To the Commissioner of the Nilgiris.
,, the Government Quinologist.

Commissioner's office
Coimbatore 9th June 1871

No. 47

From.

A. W. Brakes Esqr.
Commissioner
Nilgiris

To

The Secretary to Government
Revenue Department
Madras.

Sir,

I have the honor to submit
the Report on the Government Cinchona
Plantations for 1870-71.

2. Two acres of the new varieties of
C. Calisayo were planted during the
year and this was the only extension
made. The other planting operations were
confined to filling up vacancies, planting
the edges of roads and spaces by the side
of ravines. 602 plants and 4500 lbs. of
seeds were distributed to the public. 5,352
lbs of fresh bark were supplied to the
Government Quinologist for the manu-
-facture of his "Amorphous Quinine".

3. The superintendent reports that
the trees manured with Guano Sulphate
of Ammonia and stable manure in 1870,
have not yet shown any marked improvement
in growth.

Govt. of 1872-73

REVENUE.

THE COMMISSIONER OF THE

NILGIRIS.

Ac., &c., &c.

Dated March 15th.

Recd.

Encl.

G. O., 15th March 1872, No. 456.

MARCH.

Nos. 182-183.

Cinchona cultivation.—Report submitted
by the Commissioner of the Nilgiris for 1870-71,
revised.

4. The Superintendent's calculation of the yield in the 8th year of an acre of Chinchona holds out a favorable prospect to Chinchona growers on the Neilgherries. There is however much force in his remarks on the length of time the grower has to wait for a return for his outlay - 8 or 9 years with Red Barks and 12 or 14 with Orion Barks. This seems to me to tell with great force in favor of the Corle System of land tenure if Government is desirous to see its waste land taken up for Chinchona cultivation. In connection with this I take leave to refer to my letter to the Board dated 26 Oct. 89 No. 149.

5. I need not here discuss the proposed and existing processes alluded to in paras 10, 11, 12, 13, & 14 of Mr. Mc. Ivor's report. As stated in my letter of the 15th March last No. 20, the value of mixed as compared with unmixed Barks and the best mode of harvesting the bark are now being tested.

6. During the year under review Mr. Mc. Ivor with the sanction of Government paid a visit to the Bengal Plantations and has submitted an interesting report on their condition. I would suggest here that he be permitted in like manner

to pay a visit to the Luvu Plantations at a time of year when his services can be spared in order to make himself acquainted with the system of Chinchona cultivation in force and the result obtained there.

7. I have visited the various Neilgherrie Plantations several times in the year under report and am well pleased with all I have seen. Except at Malkondah, regarding which plantation the Government are in possession of my opinion. I regret that Mr. Dawson has left the Department, his practical knowledge of the state of our Plantations and of the various experiments that were being carried on rendered his services of especial value in the absence of Mr. Mc. Ivor.

8. In the course of a month or so I hope to be able to submit to Government detailed survey plans of all the Government Chinchona estates.

I have the honor to be
Sir
Your most obedt. servant.

S. G. D.

Calcutta
Commissioner
Chinchona

ADMINISTRATION REPORT

OF THE

GOVERNMENT CINCHONA PLANTATIONS AND BOTANICAL GARDENS OF OOTACAMUND,

FOR THE YEAR 1870-71.

I HAVE the honour to submit the report on the Government Cinchona plantations for 1870-71.

2. Two acres of the new varieties of *C. Calisaya* were planted during the year, and this was the only extension made. The other planting-operations were confined to filling up vacancies, planting the edges of roads and spaces by the side of ravines. 602 plants and 45 oz. of seeds were distributed to the public. 51,352 lbs. of fresh bark were supplied to the Government Quinologist for the manufacture of his "Amorphous quinine."

3. The Superintendent reports that the trees manured with guano, sulphate of ammonia, and stable-manure in 1870 have not yet shown any marked improvement in growth.

4. The Superintendent's calculation of the yield in the eighth year of an acre of Cinchona holds out a favourable prospect to Cinchona growers on the Nilgiris. There is, however, much force in his remarks on the length of time the grower has to wait for a return for his outlay—eight or nine years with red barks, and twelve or fourteen with crown barks. This seems to me to tell with great force in favour of the cowle-system of land-tenure, if Government is desirous to see its waste land taken up for Cinchona cultivation. In connection with this I take leave to refer to my letter to the Board, dated 26th October 1869, No. 149.

5. I need not here discuss the mossing and coppicing processes alluded to in paragraphs 10, 11, 12, 13, and 14 of Mr. McIvor's report. As stated in my letter of the 15th March last, No. 20, the value of mossed as compared with unmossed barks and the best mode of harvesting the bark are now being tested.

6. During the year under review Mr. McIvor, with the sanction of Government, paid a visit to the Bengal plantations, and has submitted an interesting report on their condition. I would suggest here that he be permitted in like manner to pay a visit to the Java plantations at a time of year when his services can be spared, in order to make himself acquainted with the system of Cinchona cultivation in force and the result obtained there.

7. I have visited the various Nilgiri plantations several times in the year under report, and am well pleased with all I have seen, except at Mailkoondah,

29 March 1872. E.H.

1882

Recd = 1871. Oct 15

from

The Comptroller

Nilgiris

of

the Secretary to Government

General Department

Madras

Date of

Receipt 12th June 71

Godal 156-158 March 1872

Enclosure last

Subject

Report

Cinchona

Submitting T. No. 1870-71

regarding which plantation the Government are in possession of my opinion. I regret that Mr. Dawson has left the department; his practical knowledge of the state of our plantations and of the various experiments that were being carried on rendered his services of especial value in the absence of Mr. McIvor.

8. In the course of a month or so I hope to be able to submit to Government detailed survey-plans of all the Government Cinchona estates.

REPORT ON THE GOVERNMENT CINCHONA PLANTATIONS, OOTACAMUND,
NILGIRIS, FOR THE OFFICIAL YEAR 1870-71.

The growth of the Cinchona plants during the past year has been very satisfactory. The older plants of the different varieties of *Cinchona officinalis* have formed fine leading shoots, and entirely thrown off the shrubby habit, and assumed a tree-like appearance. The largest plants of *C. officinalis* vary from 22 to 23 feet in height, with a circumference of stem of from 18 to 21 inches. The finest plants of *C. Succirubra* are now 30 feet high, with a circumference of stem of 3 feet.

2. Three thousand five hundred plants of the new varieties of *C. Calisaya* have been permanently planted out on new land. These have been planted close, and will cover about two acres of land. This is the only extension made to our permanent plantations; our operations having been confined to filling up failures, planting along the edges of the roads and spaces by the sides of ravines.

3. The number of plants of the new species propagated during the year is 16,379 against 17,000, the result of last year's propagation. Only 662 plants have been distributed to the public, and 45 ounces of seed have been gratuitously issued to planters in various parts of India.

4. Among the new species recently introduced some of the varieties of Pitayo bark promise to be hardy and well suited to this climate. The total number of plants of new and recently introduced varieties are as follow:—

<i>Cinchona lancifolia</i> (from Java)	...	...	279
" <i>officinalis</i> (lanceolate-leaved variety)	...	...	2,140
" <i>Pitayensis</i>	...	...	1,779
" <i>Calisaya</i> , new varieties	...	...	54,881
			59,079

5. The new varieties of *C. Calisaya* having been sufficiently propagated to meet the extensions desired by Government, the propagation of these sorts has

been discontinued. The imported plants of *C. Pitayensis*, received on the 6th December 1870, are being increased, as this imported variety is stated by Mr. Cross to be of very great value, and it may differ in quality from the seedlings raised from the imported seeds; it is therefore considered desirable to continue the

propagation of this kind. The *C. lancifolia*, received from Java, makes slow growth in this climate, and consequently has not been extensively propagated.

There are in all seven varieties of the lanceolate-leaved *Cinchona officinalis*. These differ slightly in appearance one from another, and also in the quality of bark. Nos. 1 to 3 having been found to yield the greatest quantity of quinine, these numbers only are now propagated.

6. During the year 51,352 lbs. of fresh bark has been supplied to Mr. Broughton, the Government Quinologist, for the manufacture of amorphous quinine.

7. The Cinchona trees which were manured in 1870 with guano, sulphate of Ammonia, and stable-manure, do not show any marked difference in their growth, and probably the manure will have little or no effect upon the secretion of the alkaloids.

8. The bark is now being taken from the 4,000 plants of *C. Succirubra* and 2,000 of *C. officinalis* (Condamenia), which were mossed during last year, in order "to test the value of my mossing process when applied on a large scale." The results will hereafter be reported in a separate communication. I would, however, observe that from 1,000 unselected eight-year old plants of *C. Succirubra*, 1,060 lbs. weight of dry bark has been taken; these plants will yield in October and November of this year 1,500 lbs. more of dry bark; in all 2,560 lbs. during the year, or an average of over 2½ lbs. of bark per tree. This bark will realize in the home-market from 2s. 8d. to 3s. per lb., from which, deducting 8d. per lb. as cost of collection, carriage, etc., and calculating 350 trees to the acre, a clear profit of at least Rupee 1 per lb., or Rs. 875 per acre will remain. Supposing the cost of Cinchona cultivation at the eighth year to be Rs. 1,000 per acre, the above return will make Cinchona cultivation a very good investment, especially as the yield in the ninth year will be almost equal in value to that obtained in the eighth. In the tenth and each succeeding year the yield will, in all probability, increase with the growth of the trees and in consequence of the quality of the bark improving with each renewal. I make the above observations, as at the present moment there is a strong conviction that Cinchona cultivation will not prove profitable. This conviction has caused private individuals, who have invested in the cultivation as a speculation, to withhold expenditure; consequently, private estates on the Nilgiris are generally in a neglected or abandoned condition.

Collection of bark from mossed trees.

Yield and value per acre.

Impression that Cinchona cultivation will not pay.

Money withdrawn and plantations neglected.

withhold expenditure; consequently, private estates on the Nilgiris are generally in a neglected or abandoned condition.

9. The above yield of bark is higher than could be expected from the average of private plantations in the eighth year. Such plantations would probably not yield more than half the quantity of bark given above, as the trees from which this bark was taken were planted in October 1862 on the Government plantations, and from the first were well cared for. * The land was thoroughly prepared and trenched before the plants were placed in it, and from that time to the present date the plants had every attention and care; consequently their growth has been much above the average development of trees on private plantations, where a smaller expenditure of money and care has been considered sufficient.

10. There exists, however, serious difficulties to be encountered by speculators in Cinchona cultivation. With red bark it is necessary to wait eight to nine years, and with crown bark twelve to fourteen years, before a profitable crop can be obtained. It is few who can be so long out of their money, and at the same time maintain an expensive cultivation. Apart from this it is difficult to enter into successful competition with American grown bark. In America Cinchona bark is a wild product, and its growth costs nothing. Here, in India, as a cultivated plant, the cost of production forms the heaviest item of charge. From the quantity of bark brought into the home-market, it appears that the supply from America, instead of decreasing as was anticipated, is yearly becoming more abundant, so that the supply from this source keeps pace with the increasing demand. It is therefore evident that, with a low quality of bark, we can never hope successfully to compete in the home-market with American bark of like quality; but with higher quality barks I believe that a successful and profitable competition can be established. The mossing-process is indispensable to obtain a bark of high quality, as by each successive renewal of bark its value increases; and this will, no doubt, continue until red bark will yield from 10 to 12 per cent. of crystallizable alkaloids, and of this from 6 to 8 per cent. of quinine sufficiently pure to pass the commercial tests. From crown barks a like quantity of crystallizable alkaloids will probably be procured, of which from 8 to 10 per cent. will be commercial quinine. Bark of this quality would defy competition, as no such bark could be procured from America. The freedom with which these high qualities of bark are worked greatly enhances their value, while the cost of collection, preparation, and shipment would be the same as for an inferior bark. It appears therefore to be an object of importance to aim at producing only the highest quality of bark.

11. The bark from loppings and prunings, such as we have during last year supplied to Mr. Broughton for the manufacture of amorphous quinine, if sent into the London market, would scarcely pay the cost of collection and carriage. The coppicing-system has the disadvantage

Yield of bark from eight-year old trees in Government plantations higher than could be obtained from private plantations.

Difficulties encountered by speculators in Cinchona cultivation.

The growth of American bark costs nothing.

In India production of bark forms a heavy charge.

Supply of bark from America abundant.

High quality of bark required to compete successfully with American bark.

Advantages of mossing-process.

Bark from small branches would not pay cost of collection and carriage.

Coppicing-system.

of always producing a bark of ordinary quality and only giving a crop every eighth year.

12. In Mr. Broughton's letter of the 31st August 1870, recorded in Proceedings of Government of the 7th February 1871, that gentleman estimates the yield of an unmossed tree at eight years of age to contain 7.55 per cent. * of alkaloids in the trunk bark and 3.2 per cent. in the branch bark, or an average of 5.375 per cent. Mr. Broughton does not say how much of this is crystallizable, or how much is quinine. When the bark is to be sold, this would be important, although it is not so when the bark is made into "amorphous quinine." In paragraph 11 Mr. Broughton says, "I assume that after a tree, aged eight years, has been cut down, that the shoots, after a lapse of eight years, will produce as much bark as the original tree—an assumption that will not, under any circumstances, entail a great error." In Appendix at paragraph 1 the yield of dry bark from a tree of eight years' growth is given at a little less than 1 lb. 5 oz. of dry trunk bark worth from 2s. 8d. to 3s. per lb. in the home-market, and 1 lb. 6 oz. of branch bark worth from 1s. to 1s. 4d. per lb., or a total value of Rs. 2-10-0 per tree. These trees being cut down every eight years will entail the cost of keeping the land clean, otherwise weeds will spring up and choke the young shoots. This would cause considerable additional expense, perhaps equal to that of mossing and removing the bark annually from mossed trees. The commercial value of Cinchona depends on the quantity of crystallizable sulphates it contains, not on the total alkaloids.

13. Mr. Howard found the first crop of renewed red bark of 1 year and 5 months' growth from a plant of 3 years and 5 months old to give 5 per cent. of crystallized sulphates and 7.70 per cent. of total alkaloids.† The second crop of renewed bark of 17½ months' growth gave of crystallizable sulphates 8.45 per cent., and total alkaloids 9.79 per cent.‡ The application of moss to red bark trees does not act materially till after twelve or fourteen months in increasing the crystallizable alkaloids. In the red barks it is between the twelfth and the eighteenth month of the growth of the bark that the crystallizable alkaloids rapidly increases; therefore a harvest of bark of high value can only be obtained from mossed trees of this species every eighteen months, namely, one-half of the bark being taken in May, and the other half in October in each succeeding year; these being the best seasons for the removal of mossed bark.

14. The total quantity of alkaloids in mossed bark is as great at twelve months' growth as at eighteen, and for the manufacture of "Amorphous quinine" the harvest of bark could be obtained annually, thus

Quality of bark and estimation of value from unmossed trees.

Crystallizable alkaloids increase with each renewal of bark, and are greatest in bark of 18 months' growth.

Total alkaloids greatest in renewed bark of 12 months' growth.

* Appendix paragraph 1.
† Report of an analysis of the fourth remittance of bark from India, from J. E. Howard, Esq., F.L.S., to the Under-Secretary of State for India, August 1, 1865.
‡ Report of an analysis of the fifth remittance of bark from India by J. E. Howard, Esq., F.L.S., to the Under-Secretary of State for India, February 4, 1867.

Mr. Howard in the first renewal of bark of 1 year's growth from a plant of 3 years and 5 months' old found of crystallizable sulphates 2.72 per cent., of alkaloids soluble in alcohol 7.00 per cent., or a total of 9.72 per cent.* of alkaloids. The third harvest of renewed bark of 12 months' growth from a tree of 7 years' old gave 6.15 per cent. of salts of quinine, and 11.20 per cent. of total alkaloids.† From the above results it appears that the total alkaloids are greatest about the twelfth month, and increase with each renewal of bark, and that the crystallizable alkaloids reach their maximum about the eighteenth month of the growth of the bark, but to fix this definitely, and to insure the bark being taken at the best time for the preparation of crystallizable sulphates and for amorphous quinine, a few further experiments are necessary.

15. The high system of cultivation hitherto maintained on our plantations has not been carried out during the past year, the expenses having been reduced to the lowest point possible. The result, however, of last year's cultivation makes it evident that, to secure the greatest possible benefit from our Cinchona plantations, it is necessary and economical to maintain a liberal system of cultivation.

16. The establishment in the Cinchona Department has been very materially reduced. Mr. Jamieson, the Deputy-Superintendent, was removed at the end of the year from the department, and placed in sole charge of the Botanical Gardens. Mr. Dawson, the Assistant Superintendent of Neddivuttum plantation, has left the department, and accepted employment in the Ouchterloney Valley.

17. No new buildings have been erected during the year, the principal work performed being weeding the plantations, maintaining roads, cutting drains, and filling up failures.

18. The Tea plantation has not been further extended, and a considerable number of the rooted tea-cuttings in the nursery at the end of autumn died during last dry weather.

19. The acclimatization of the European fresh-water fish, introduced in December 1867, has proved most successful. The Trout, Rudd, Carp, Tench, Gold and Silver fish are increasing rapidly. The Tench especially are most prolific, and grow to a large size in one year; a dozen of these fish bred here were caught, and weighed from 1½ to 2 lbs. each.

20. Appended are the meteorological tables, and table of expenditure from 1860 to 31st March 1871.

OOTACAMUND,
31st May 1871.

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

* Report of an analysis of the fourth remittance of bark from India, from J. E. Howard, Esq., F.L.S., to the Under-Secretary of State for India, August 1, 1865.

† Report of an analysis of the eighth remittance of bark from India by J. E. Howard, Esq., F.L.S., to the Under-Secretary of State for India, September 1st, 1868.

Meteorological observations from 1st April 1870 to 31st March 1871 made on the Government Cinchona Plantations at Neddivuttum.

Months.	DEY BULB.				WET BULB.				Minimum observed during the month.	RAIN-FALL.		Days with rain.	Days without rain.
	7 A.M.	2 P.M.	6 P.M.	Daily mean.	7 A.M.	2 P.M.	6 P.M.	Daily mean.		Inches.	Cents.		
April 1870	...	...	...	...	...	...	...	...	54.00	...	89	2	28
May	...	...	...	...	...	...	...	...	54.40	2	86	7	24
June	...	...	...	...	...	...	...	...	56.00	22	73	28	2
July	...	...	...	...	...	...	...	...	55.03	29	86	26	5
August	...	...	...	...	...	...	...	...	55.61	25	24	23	8
September	...	...	...	...	...	...	...	...	55.40	22	39	23	7
October	...	...	...	...	...	...	...	...	56.77	19	44	23	8
November	...	...	...	...	...	...	...	...	47.23	2	67	7	23
December	...	...	...	...	...	...	...	...	49.61	...	39	2	29
January 1871	...	...	...	...	...	...	...	...	56.06	...	35	1	30
February	...	...	...	...	...	...	...	...	55.46	...	65	8	25
March	...	...	...	...	...	...	...	...	53.68	...	74	3	28
Total...	...	...	...	...	...	...	...	...	...	128	21	148	217
Annual mean...	59.75	67.18	61.88	62.63	57.48	61.98	58.15	58.94	54.10	...	...	...	...

OOTACAMUND,
1st April 1871.

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

Meteorological observations made at the Botanical Gardens, Ootacamund, from April 1870 to March 1871.

Months.	DRY BULB.			Daily mean.	WET BULB.			Maximum in shade.	RAIN-FALL.		Days with rain.	Days without rain.	
	7 A.M.	2 P.M.	6 P.M.		7 A.M.	2 P.M.	6 P.M.		Inches.	Cents.			
April 1870 ..	56-03	73-25	62-05	63-77	49-29	61-50	56-40	55-73	75-82	1	74	6	24
May ..	57-52	70-78	61-09	63-13	53-46	62-72	57-52	57-90	73-83	4	43	14	17
June ..	55-91	65-43	55-91	59-08	54-21	61-82	54-91	56-98	68-82	7	23	25	5
July ..	54-93	61-74	55-77	57-48	54-00	59-38	55-45	56-27	65-16	...	95	9	22
August ..	53-77	63-12	55-03	57-30	52-96	60-29	53-29	55-51	66-74	2	58	9	22
September ..	55-46	63-00	55-71	58-05	53-50	59-96	54-28	55-91	65-50	1	04	4	26
October ..	54-78	63-00	56-28	58-02	53-35	60-42	54-92	56-23	68-35	11	73	10	21
November ..	51-48	62-82	54-20	56-16	47-27	57-72	51-34	52-11	68-62	3	00	10	21
December ..	51-44	65-96	55-79	57-06	43-89	53-86	48-82	48-85	70-48	1	50	4	27
January 1871 ...	54-47	65-53	56-53	58-84	49-53	58-31	52-41	53-41	70-90	3	39	8	23
February ..	54-26	69-26	62-96	62-16	49-11	59-81	56-67	55-20	72-81	1	13	2	26
March ..	59-04	69-93	62-04	64-00	50-71	58-18	55-43	54-78	75-43	1	88	6	25
Total...	...	...	...	...	...	...	...	...	...	40	60	107	258
Annual mean...	54-92	66-15	57-71	59-59	50-94	59-50	54-29	54-90	70-16	...	...	...	...

OOTACAMUND,
1st April 1871.

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

Statement showing the expenditure on each of the Cinchona Plantations on the Neilgherries.

Particulars.	SUPERINTENDENT AND OFFICE ESTABLISHMENT.		PROPAGATION AND NURSERY DEPARTMENT.		DODABETTA PLANTATION.		NEDDIWUTUM PLANTATION.		PYKARA PLANTATION.		MALAKOONDAH PLANTATION.		Total.
	1870-71.		1870-71.		1870-71.		1870-71.		1870-71.		1870-71.		
	1860 to 1870.	RS.	1861 to 1870.	RS.	1860 to 1870.	RS.	1861 to 1870.	RS.	1862 to 1870.	RS.	1863 to 1870.	RS.	
Establishment including salaries	65,057	8,120	35,760	2,502	38,376	2,449	79,274	2,672	11,746	813	9,005	480	2,56,249
Buildings	...	...	13,849	244	20,281	240	22,445	420	3,163	295	3,083	55	64,075
Tool and Store rooms	...	...	...	...	660	...	1,554	40	885	...	320	...	3,459
Coolies' quarters	...	...	...	...	1,545	48	3,959	160	2,140	80	375	170	8,477
Felling	...	...	...	...	4,668	...	9,227	...	7,536	...	4,952	...	26,283
Clearing and weeding	...	...	1,000	...	14,038	2,100	24,782	2,520	16,007	1,240	10,549	495	72,731
Pitting	...	...	...	...	9,070	220	14,975	240	6,247	205	4,568	55	35,580
Carriage of plants	...	...	...	...	3,315	65	4,869	105	1,664	25	781	5	10,829
Planting and shading	...	...	...	...	6,359	355	6,485	690	1,835	180	1,089	28	17,021
Trenching	...	...	...	...	3,759	...	6,612	...	2,065	...	575	...	13,041
Enclosing	...	...	548	...	5,337	...	4,467	...	1,825	20	1,080	...	18,362
Road-making	...	...	...	...	7,109	20	5,727	30	3,421	20	2,371	...	18,698
Tools	...	...	494	...	4,984	7	5,798	29	3,800	...	1,981	...	17,093
Contingencies	...	...	2,323	90	5,596	115	7,610	158	1,814	...	1,066	...	19,560
Excavating	...	...	...	...	1,094	...	1,195	...	...	...	...	...	2,289
Clothing	...	...	172	...	250	...	339	...	...	...	...	...	1,175
Various	...	...	352	...	2,210	50	2,576	...	...	...	...	...	6,037
Collection and carriage of bark.	...	...	...	...	...	...	...	1,230	...	...	...	...	1,230
Total...	65,860	8,197	54,498	2,836	1,28,546	5,669	2,01,924	8,487	64,096	2,967	42,175	1,334	5,87,189

OOTACAMUND,
1st April 1871.

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

Revenue Department.

No. 456

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the 15th March 1872

Read the following letter from the
Commissioner of the Nilgiris.

Submitting Report on Govt. } (H. O. 9th June 1871, No. 47)
Cinchona Plantations for 1870-71.

The above paper contains
a full and complete report
on the progress of the
Cinchona Plantations during
the year 1870-71. During the year
1870-71, the Supt of the Govt.
Cinchona Plantations and
his staff have been principally
occupied with the conserving
of the existing plantations,
which require a moderate
annual outlay in clearing
and weeding &c. The only
extension made was on
the Doddabetta Estate, where
three thousand, five hundred
plants of the new variety
of C. Calisaya were planted
out on two acres

of fresh land.

2. The total expenditure of the year appears, from the Tabular Statement in the appendix, to have been Rs 29,490 against Rs 45,106 in 1869-70 in which year, considerable additions were made to the plantations. The largest share of expenditure was incurred at Kaddi. - inuttum.

3. All the plantations except that at Mailkondak, are in a thriving condition. The older plants of the *C. officinalis* variety have assumed a tree-like form, and some of the finer plants of *C. succi. rubra* are 30 feet high, with a circumference of stem of from 18 to 21 inches.

4. During the year, 51,352 lbs of fresh bark were supplied to Mr. Broughton.

The bark is now being taken from the plants, which were subjected to the mashing process in order to test the value of that experiment.

5. A large portion of the Report is devoted to an examination of the worth of Cinchona planting as an investment of private capital. The conclusion drawn by Mr. McIvor is, that although Indian grown bark competes under great disadvantages in the market with the indigenous American bark, success may be reasonably looked for in the cultivation of Cinchona in this country, if it is confined to the growth of the barks of higher quality.

6. The Report contains hardly any mention of the Botanical

Botanical Gardens and
 the mission that has applied
 to the future of the gardens
 by the formal of the
 separate communication

LB

I think
 the gardens
 are now quite
 better at the
 same old old
 happy time

To The Commissioners of the Nigerian Desert March. Revised Copy
 of the Government Quinquennial
 of the last part of the
 J.C. Desiderius

4.0

182-183

40

Clinchona Report
for 18p. 182

Clinchona
Report
for 18p. 182