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MADRAS RECORD OFFICE

Government of Madras

Education Department

G.O. No. 851-51A Public

Dated 9-9-1892

NOT TO BE FOLDED OR ROUGHLY HANDLED

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following letter from M. A. LAWSON, Esq., Government Botanist and Director of Government Cinchona Plantations, &c., Nilgiris, to the Secretary to Government, Revenue Department, dated Ootacamund, 10th July 1891, No. 20:—

I have the honour to forward the annual report on the Government Cinchona Plantations, Nilgiris, for year ending 31st March 1891.

ADMINISTRATION REPORT OF THE GOVERNMENT CINCHONA DEPARTMENT, NILGIRIS, FOR THE YEAR 1890-91.

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I. SEASON AND RAINFALL.—The season for the past year was remarkable for its extreme quietness; there were no high winds, there was no hail, and the frost, with the exception of one night at Coonoor, was less severe than had been known for some years past. The south-west monsoon was unusually dry, the rainfall on the estates on the western side of the plateau being little more than half the average amount. Taking the season altogether, the climatic conditions were not unfavourable to the growth of cinchona, except to the very old trees and to the very young ones.

(a) *Dodabetta.*—The amount of rain registered on this estate was 48·13 inches, or 8·87 inches less than what was registered during the previous year and 5·96 inches less than the average for the last ten years.

(b) *Naduvatam.*—The amount of rain gauged at Naduvatam was 69·58 inches, or 38·45 inches less than that which was gauged last year. August, September, October and November, which are usually wet months, were this year exceptionally dry.

(c) *Pykara*—(1) *Hooker.*—The rainfall on this plantation was 60·79 inches as against 103·47 inches which fell during the year before.

(2) *Wood.*—At Wood 46·92 inches were registered, or only a little more than one-half of the amount recorded during the previous year, which was 83·70 inches. The remark under Naduvatam relative to the unusual dryness of the months of August, September, October and November apply equally to the two Pykara plantations.

II. FINANCIAL—(*a*) *Receipts.*—In G.O., No. 946 of 25th November 1889, Revenue, the budget estimate was passed by Government at *Rs. 40,000*, and in G.O., No. 886 of 7th November 1890, Revenue, the same figure of *Rs. 40,000* was accepted by Government as the revised estimate for the year. Compared with this anticipated income, the actual receipts aggregated only Rs. 28,875-13-9, or Rs. 11,124-2-3 less than the budget and revised estimates; but the sum of Rs. 28,875-13-9 does not include the value of 850 packets or 61 lb. of quinine supplied to Collectors of districts for distribution under G.O., No. 733 of 15th September 1890, Revenue, nor the 1,000 packets, or 72 lb. in stock with the Government Quinologist, nor the 1,500 lb. of quinine and 1,200 lb. of febrifuge in stock at the end of the year, nor the value of bark which was supplied to Messrs. Kemp and Co., Bombay. If credit could have been taken in the accounts for the above items, the receipts would have been Rs. 73,555-4-3 detailed thus:—

		RS.	A.	P.
(1) Money actually realized—				
Value of sulphate of quinine supplied to the Medical Stores, Madras, Bombay and Ceylon		24,735	0	10
Value of febrifuge sold to the Madras Medical Stores ...		2,800	0	0
Bark sold to the Medical Stores of Madras and Bombay ...		615	5	0
Do. to private parties and to the Mysore Durbar ...		220	8	10
Miscellaneous—				
Sale of seed and percentage of fees of Government Quinologist, &c.		504	15	1
	Total ...	28,875	13	9
(2) Quinine and bark issued during the past year but the value of which was not realized before its close—				
(*a*) Eight hundred and fifty packets of quinine issued to Collectors at Rs. 1-8-0 per packet		1,275	0	0
(*b*) One thousand six hundred lb. of red bark sold to Messrs. Kemp and Co., Bombay		377	13	6
	Total ...	1,652	13	6
(3) In stock at the close of the year—				
(*a*) One thousand five hundred lb. of sulphate of quinine issued subsequently to the Medical Stores, Madras, Bombay and Ceylon, @ Rs. 16-7-9		24,726	9	0
(*b*) One thousand two hundred lb. of cinchona febrifuge issued in part subsequently to the Medical Stores, Madras and Bombay, @ Rs. 14		16,800	0	0
(*c*) One thousand packets of sulphate of quinine with the Government Quinologist		1,500	0	0
	Total ...	43,026	9	0
	Grand Total ...	73,555	4	3

(*b*) *Expenditure.*—The budget estimate of expenditure for the year, as sanctioned in G.O., No. 946 of 25th November 1889, Revenue, was Rs. 75,300 and in G.O., No. 886 of 7th November 1890, Revenue, the sum was reduced to Rs. 75,000. The actual expenditure was *Rs. 74,914-0-9*. This was *Rs. 385-15-3* less than the budget estimate, *Rs. 85-15-3* less than the revised estimate, and *Rs. 6,733-8-7* more than what had been spent the year before. This increase was due to the payment during the year for the fusel oil, which should properly have been paid for in the previous year

but which was not—*vide* II (*b*) of the last year's report, and also to a larger outlay having been found necessary for the purchase of more machinery and chemicals required for the manufacture of quinine and febrifuge in the factory at Naduvatam.

The charges connected with the Quinologist's department amounted to *Rupees 18,368-5-6*, and if this sum be deducted from the total expenditure for the year, there is left *Rs. 56,545-11-3*, which represents the cost of maintaining the general establishment and upkeep of the several estates.

III. PERMANENT PLANTATION—(*a*) *Dodabetta.*—Although the season, as has been remarked above, was a very dry one, the trees on this estate are looking extremely well. The trees on 5 acres of plot No. IX were uprooted; and another portion of the same plot, the trees on which had been uprooted the year before, was replanted with 8,462 plants; of this number there were failures to the extent of about 15 per cent., and this loss was due almost entirely to the ravages of grub. Thirty-two and a quarter acres on the estate were trenched and manured.

(*b*) *Naduvatam.*—Owing to the extreme drought which prevailed during the year, many of the trees on the oldest parts of the estate showed manifest signs of dying, and these were either uprooted or coppiced. Eighteen thousand one hundred and seventy-five plants were put down in various parts of the estate to replace failures.

Plot XI and that portion of plot III which was uprooted last year were replanted with 21,250 plants, but of this number nearly one half succumbed on account of the dryness of the autumn and winter months. The failures will be made good so soon as the weather is sufficiently favourable for planting. Seventy-three acres were trenched and manured. Taking this estate as a whole, the condition of the trees upon it have materially improved during the past season.

(*c*) *Pykara*—(1) *Hooker.*—Many trees on various plots were coppiced owing to their exhibiting signs of decay. The failures in the plantings of the two previous years were made good. The plantation generally is in good order, and the trees upon it are looking well.

(2) *Wood.*—The succirubras on a small portion of this plantation were coppiced for the second time; they are growing upon a piece of swampy ground which will eventually be abandoned. The rest of the plantation is looking well. The box trees which some years ago were planted for experimental purposes are growing most vigorously, and in twenty or thirty years' time ought to yield wood of sufficient size to be useful in the engraver's art.

IV. UPKEEP.—The buildings, roads, drains, bridges, &c., on all the estates have been maintained as usual in good order.

V. MANURE.—Fifteen hundred and ninety-three cart-loads of stable and cattle manure were put out during the year on 72 acres of the Dodabetta estate. On the Naduvatam estate 2,600 cart-loads of old cattle manure were applied to 58½ acres, being given chiefly to trees which it is intended to bark next year. At Pykara, on the Hooker plantation, 500 cart-loads of cattle manure were put into the plantation.

VI. NURSERIES.—The nurseries are well stocked with seedlings and balled plants. Considerable mortality occurred among the plants which had been put into balls of earth and moss on all of the estates. The mortality was due, in the first instance, to the young plants having been buried above the collar, and, in the second instance, to their having been kept too damp and under too deep shade. All plants, after having been balled, should, after they have become established, be kept as dry as possible, as, under these circumstances, a greater amount of root growth is made, the stems and leaves, too, become more hardened, and so the plants are better able to withstand the shock of transplanting when put into the field. Plants of nine inches in height, balled in October, become fifteen inches in height by the beginning of May, when in ordinary seasons they may be safely transferred to the field; and by planting at this early date, owing to the warmth of the soil, they become well-rooted before the monsoon bursts upon them, and so get the advantage of having two growing seasons before the commencement of the dry months of winter and spring. During the year no plants were sold to the public and only 7 lb. and 5 oz. of seed.

VII. CROP.—The crop harvested during the past year amounted to 133,351 lb. of bark, apportioned thus.

	LB.	LB.
Dodabetta.		
Crown bark	...	62,342
Naduvatam.		
Red bark	51,230	
Crown bark	3,530	
		54,760
Pykara.		
Crown bark	10,166	
Red bark	6,083	
		16,249
		133,351

At the close of last year there remained in stock in the godowns 477,744 lb., thus making a total of 611,095 lb.; of this, 100,400 lb. were disposed of during the year thus:—

	LB.
Used in the manufacture of quinine and febrifuge	96,200
Sold to the Medical Stores Department {Madras	1,000
{Bombay	800
Do. to the Mysore Durbar and Messrs. Kemp and Co.	2,400
Total ...	100,400

There remained, therefore, in store at the close of the year 510,695 lb. of bark. The estimate for the year was 150,000 lb.—*vide* G.O., No. 886 of 7th November 1890, Revenue, so that the crop harvested was 16,649 lb. below the estimate. This reduced output was due to the difficulty there would have been found in storing the full amount.

It will be observed that, while the crop taken during the past year was less than that taken the year before, the harvesting of it has nevertheless been more costly; it will be well, therefore, to explain that the extra expense was incurred partly on account of a larger quantity of bark having been taken under the stripping process, and partly on account of a considerable portion of the Naduvatam bark having been taken from young trees.

VIII. BUILDINGS.—The repairs and additions to the several buildings on the various estates were carried out at a cost of Rs. 1,703-4-5, apportioned thus—

	RS.	A.	P.
Head office	199	1	10
Dodabetta	180	2	9
Naduvatam	1,251	2	7
Pykara	72	13	3
Total ...	1,703	4	5

The verandah of the store-rooms at the Naduvatam estate was walled up to increase the space available for accommodating the last year's harvest of bark.

IX. FACTORY.—The past year, so far as the work in the factory was concerned, has been a very busy and a somewhat anxious one; 2,928 lb. of sulphate of quinine and 1,050 lb. of febrifuge were turned out. In the early part of the year all work was stopped owing to the outburst of influenza, which although the epidemic was not bad amongst the workmen, yet the accounts of it so frightened them that they left the hills for their own country, and a fresh set had to be trained to the business. Two of the new vats and the second still were sent in such a bad condition that they had to be almost remade before they became serviceable; the consequence being that full and continuous working was delayed till late in the year; since then, however, the manufacture of alkaloids has been pushed on almost without intermission and to the fullest extent that the machinery admitted of. A slight extension of the vats and steam pans is desirable, as it would allow of the output to be almost doubled. It would also prevent the necessity of working at such high pressure as has been done during the past few months; and this latter point is one of much consideration, for working at too great a rate necessarily means waste in the use of bark and of chemicals. It also puts too great a strain on the machinery, the whole of which has

to be worked continuously, leaving no time for its been cleaned and kept in proper order.

Many additions have been made during the year; the grinding room has been separated entirely from the boiling and crystallizing room. The macerating vats and stills have been lodged in a separate building, and a second drying room has been erected, which is heated by steam. A second boiler for heating the stills was also purchased during the year. This boiler might be made available for several other purposes, such as pumping water, driving a saw mill, and driving the whirl spindles of the macerating vats. To do this, however, would require extra machinery, which would cost a good deal of money, but which in the long run would prove economical. A well 9 feet in diameter and 25 feet deep has been made, and a reservoir 20 feet above the well has been put up. This supplies the whole factory with water, and will effect a considerable saving in labour, as heretofore all the water used in the factory had to be carried from a distant spring. It will also give the command throughout the whole year of an unlimited quantity of perfectly pure water. Now that sufficient machinery has been put up for immediate requirements, the next thing to be done is to ensure a constant and never-failing supply of the necessary chemicals. This at present has not been accomplished. Owing to the long time which has to pass between the sending in of an indent and the receipt of the things asked for, the work in the factory has either to be suspended or the chemicals have to be bought in the Indian markets at considerably enhanced rates. This delay in receiving goods from England is much to be regretted, as in addition to the above loss, it causes the locking up of money, a matter especially brought to the notice of this department as one to be avoided on all possible occasions —*vide* G.O., No. 990, dated the 15th November 1886, Revenue, paragraph 3.

The following are extracts from an indent submitted to Government on the 6th December last—*vide* G.O., No. 4 of 5th January 1891, Revenue:—

"Fusel oil.	"Charcoal.
"Caustic soda.	"Filtering paper.
"Sulphuric acid.	

"*Paragraph* 3.—With respect to the fusel oil, I have to request that this commodity may be furnished to me of the same quality as that which is sent to the Bengal Government; and also that, as in that case, it may be sent out in casks instead of in drums, as the charge for the drums alone amounted on the last occasion to over £40.

"*Paragraph* 5.—I am at present buying caustic soda, sulphuric acid, and charcoal in the local markets; and as the rates for these are higher than the English rates, I shall be obliged if Government will urge upon the Secretary of State the desirability of complying with this portion of the indent as soon as possible. With respect to the fusel oil, I shall be content if I receive it in batches of 5,000 pounds each, the first to be received not later than the 1st April next."

Of this indent, the filtering paper and charcoal have alone been received up to date, viz., 26th June 1891. With regard to such common chemicals as sulphuric acid and caustic soda, there must surely have been unnecessary delay in complying with the indent. A private firm in Madras have asserted that they would have obtained the goods within four months of their writing for them.

The special attention of Government is drawn to the above facts in the hope that some remedy may be found in the future.

From the 2,928 lb. 2 oz. of sulphate of quinine manufactured at the factory during the year, the following indents were complied with:—

	LB.	OZ.
Madras Medical Stores	20	0
Bombay do.	400	0
Ceylon do.	800	0
Mysore Government	50	0
Scinde	21	10
Paper packets and minor sales	64	8
Total ...	1,356	2
	2	

and there remained at the close of the year 1,572 lb. in stock, all of which and more has been already indented for by the various Indian Medical Departments—*vide* my letter, No. 18, dated 17th June 1891.

There were 350 lb. of febrifuge in stock at the end of last year, and 1,050 lb. were made during the year, making a total of 1,400 lb.; of this 200 lb. were issued to the Madras Medical Stores and 1,200 lb. remained in stock at the close of the year. The greater portion of this has subsequently been issued on indents to the Medical Stores Department of Madras and Bombay.

X. MR. HOOPER'S REPORT.—This report, though not so long as that of last year, contains several points of special interest.

XI. MISCELLANEOUS—(*a*) *Increase in the consumption of quinine.*—Owing partly to the great reduction in the price of quinine and partly to the outburst of the influenza epidemic, which is supposed to be malarial in its nature, the consumption of the drug is said to have been enormously increased during the last two years in Europe and America. This increase in the use of quinine will no doubt, before long, have an effect upon the market; so that barks, which are now sent home under cost price, may be expected eventually again to pay. Nevertheless it is desirable to point out that the better class of barks, such as the Condamineas, Condamined hybrids, and Caliasayas only should be grown.

(*b*) *Trenching.*—The greater part of the renovations carried out on the Dodabetta and Naduvatam estates was done by trenching instead of by pitting. The trenches were dug between every other row of trees, and were made one foot wide by two feet deep. Each cooly on the grass lands dug from 25 to 30 yards a day. The advantages of trenching over pitting are as follows:—

(1) All the long whip-like roots on one side of the trees are cut through within a couple of feet of the stems. From the cut ends of these roots thousands of feeding fibres shoot out, which in the course of a few months find their way to the bottom of the trench and eventually almost fill it; by digging trenches two feet deep, the new roots get well out of the hot surface soil, and it has before been pointed out that the great heating of the roots during the dry season, when kept on the surface, is one of the chief causes of the so-called canker in cinchona.

(2) The cost of trenching is less than one half of that of pitting.

(*c*) *Issue of quinine in paper packets.*—In February 1890 it was suggested that sulphate of quinine should be packed in papers containing powders of five grains each and sent in packets containing 100 of such to the Collectors of the several districts for distribution among the poorest class of the ryots. The matter was referred to the Surgeon-General for an opinion, and on his supporting the proposal, in G.O., No. 733 of 15th September 1890, Revenue, it was directed by Government that 200 packets or 20,000 powders should be sent to each of the Collectors of Ganjam, Vizagapatam, Cuddapah, Kurnool, Madura, Coimbatore, Canara and Nilgiris in lots of 25 each. This was done, and on more powders being reported available for distribution in G.O., No. 860 of 31st October 1890, Revenue, it was ordered that 500 packets or 50,000 powders should be distributed among the remaining Collectorates of the Madras Presidency, and this was also done. In addition to the above, the Collector of Cuddapah had another 100 packets, and the Collector of Kistna had 50.

At the close of the year there were in stock with the Government Quinologist 1,000 packets ready for distribution.

The number of packets sold up to date has been smaller than was anticipated, but it would be unreasonable to expect that the introduction of a drug so unpleasant to the palate as quinine should meet with much success, until the people of the country should have become convinced of its therapeutic value. Annexed is an interesting memorandum by the Collector of Salem, which gives in a clear and forcible manner the various causes why more of the packets have not been sold in his district:—

"Memorandum, dated 13th June 1891, No. 1200.

"With the object of benefiting the poorest classes of the suffering population, the Government, in their order, No. 733, Revenue, dated 15th September 1890, directed the Government Botanist to supply all Collectors with parcels of sulphate of quinine manufactured at the Government factory at Naduvatam for distribution to Postmasters, Revenue officials and

heads of villages, that they may sell these parcels at a price which will bring the medicine within the reach of the poorest classes.

"2. The price of each packet containing 5 grains of quinine has been fixed at 3 pies, and the price of each parcel containing 100 packets of the above description at Rs. 1-8-0. The sale of each parcel at the rate fixed above will give the seller a commission of one anna on each parcel, or one anna on each Rs. 1-8-0, or a little over 4 per cent. on the total value of the parcel. The above commission is to be retained by the official selling the medicine.

"3. Accordingly, with his letter, No. 750, dated 13th December 1890, the Government Botanist forwarded 25 parcels of 100 packets each to Salem, and these parcels have been ordered to be distributed in Memorandum Reference No. 3732-Eng., dated 17th December 1890, to the several Tahsildars as noted in the margin, and a notice as to how these packets should be disposed of has been published at page 18 of the District Gazette dated 5th January 1891. In the above notice the Tahsildars were also directed to report one month after the distribution or soon after the sale has been effected whether the medicine has found a ready market.

Tahsildar of Salem	..	4
Do. of Hosur	..	3
Do. of Dharmapuri	..	3
Do. of Krishnagiri	..	3
Do. of Tirupatúr	..	3
Do. of Uttankarai	..	3
Do. of Námakal	..	2
Do. of Tiruchengód	..	2
Do. of Atur	..	2
Total	..	25

"4. With a view to see what has been the result of the endeavours of the Tahsildars in this respect, they were directed to report in Memorandum Reference No. 3732-Eng., dated 7th April 1891, the number of packets for which they found sale. The following are the replies of the Tahsildars to the above reference:—

"Tahsildar of Salem,	No. 554,	dated	20th	May 1891.
Do. of Námakal,	„ 902,	„	3rd	„ „
Do. of Tiruchengód,	„ 603,	„	11th	April „
Do. of Atur,	„ 234,	„	2nd	May „
Do. of Tirupatúr,	„ 793,	„	30th	„ „
Do. of Hosur,	„ 543,	„	11th	April „
Do. of Dharmapuri,	„ 969,	„	9th	May „
Do. of Krishnagiri,	„ 267,	„	17th	April „
Do. of Uttankarai	„ 707,	„	15th	May „

"5. From the above papers it will be observed that the Tahsildars of Hosur and Dharmapuri sold all the three parcels of quinine supplied to each of them. This is creditable.

"The Tahsildars of Uttankarai, Salem, and Tirupatur sold 53, 33 and 14 packets respectively. The Tahsildar of Uttankarai reports that he can get greater sale at the fever season, that the ignorant classes in villages are generally unfavourably disposed to the use of quinine for checking fever; and that such of those as can be induced to take the medicine prefer to get quinine powders from the dispensary without payment. He should inform the villagers during his tours that the medicine is sold at a very small price purposely to place it within the reach of the poorest classes in the village itself.

"The Tahsildar of Tirupatur, owing to some mistake in his office, was able to distribute the quinine packets only recently and hopes to get a sale for them. The Tahsildar of Salem should be able to sell more.

"7. The Tahsildars of Atur and Krishnagiri have not been able to sell the 2 and 3 parcels of quinine supplied to them respectively. The former gives no reason for his apathy in this matter, while the latter states that he could not sell the packets, as people go to the dispensary to get the medicine gratis. The Tahsildar of Krishnagiri apparently has not taken the trouble of distributing the packets among the village heads, which, if he had done, the Collector is sure the people in out-of-the-way villages are likely to prefer purchasing the medicine at a cost of 3 pies in their villages, instead of undergoing the trouble of walking all the way to the kasba town to take a dose of quinine from the dispensary gratis.

"The Atur Tahsildar's neglect in this respect needs explanation. He should report at once if he had distributed the packets to the village heads, and, if so, why he has not been able to get a sale for them.

"8. The remaining two Tahsildars, Námakal and Tiruchengód, are altogether ignorant of the orders on the subject. They simply received the parcels sent to them and never questioned as to why they were supplied; nor have they taken the trouble of reading the District Gazette, which would have put them on guard as to what was wanted of them. These two Tahsildars are directed to take measures at once to secure a sale for the quinine already supplied to them.

"9. As the Government, with the object of minimizing the cost of carriage of the medicine, direct that no indent for the medicine should be for less than 50 parcels at a time, no indent will be sent until the whole stock already supplied is sold. Meanwhile, however, the Tahsildars of Hosúr and Dharmapuri, who have now no stock in hand, will be supplied with one parcel each from the quantity supplied to the Krishnagiri and Tiruchengód Tahsildars, respectively, and these should arrange to send the parcels at as small a cost as possible.

"10. A copy of the above memo. will be sent to the Government Botanist, Ootacamund, in reply to his letter, No. 119, dated the 16th May 1891, requesting to know the result of the distribution of quinine packets.

"(Signed) G. STOKES,
"Collector."

(*d*) *Issue of purgative powders with quinine.*—In December last the Collector of Tinnevelly having suggested that directions for the administration of the quinine should be furnished for distribution among those entrusted with the sale of the packets, Surgeon-Major North was addressed on the subject, and he kindly compiled a memo. of directions. This was sent to Government with the proposal that it should be printed and circulated with every packet, the jalap required for the purgatives being supplied by these gardens. Since writing the above, however, the jalap crop has been lifted, and the outturn disappointing, and so it had to be intimated that the jalap required would have to be supplied by the Medical Stores Department. This proposal was approved of by Government in G.O., No. 419, dated 11th May 1891, Revenue. The Surgeon-General was addressed on the matter, and he has ordered 10,000 purgative powders to be made by the Medical Stores Department, and on these being received, they will be issued with printed copies of Surgeon-Major North's instructions. It seems very desirable that efforts should be made to induce the natives generally to buy quinine while the drug remains so cheap.

(*e*) *Condition of the quinine first sent out.*—In July last, on the first quarterly batch of 200 lb. of sulphate of quinine being sent to the Medical Stores Department, Ceylon the Medical Superintendent, Civil Medical Stores, Colombo, wrote word as follows:—

"The appearance of the quinine is very much against it, and I hope that future supplies will be better crystallized. Unless this point is attended to, it can never compete with Howard and Sons, or other well known quinine."

The crystallization really was very good; and the bad appearance of the quinine was due to its having been partially dried by pressure instead of by absorption, and so the crystals became broken up. On receipt of the Medical Superintendent's letter, an offer was made to take all the quinine back and to send in its place an equal amount of better looking stuff, but the Medical Superintendent said he would not do this, only he hoped that for the future a better looking sort of quinine would be sent, and this it is believed has been done for since his remonstrance no further complaint on the matter has been received.

(*f*) *New method of extracting the sulphate of quinine from cinchonidine.*—In a letter, dated 17th June 1890, No. 13, embodied in G.O., No. 503 of 30th June 1890, Revenue, giving an account of the manner in which the sulphate of quinine was manufactured at Naduvatam, it was asked if any information could be obtained either through the Government of India, or the India Office, as to how the cinchonidine could be easily and cheaply got rid of when working on red barks or hybrids. The reply was that no other method than that already adopted was known. Since then, however, Mr. Hooper has been working out the acid sulphate process used in Germany and Holland by which, on the second crystallization, nearly the whole of the cinchonidine is eliminated from the quinine. A few experiments in this line have already been made, and the acid sulphate process of extracting the quinine will probably before long be adopted when working upon red and hybrid cinchona barks.

(*g*) *Service books.*—All the service books of the establishment have been kept duly written up.

OOTACAMUND,
10th July 1891.

(Signed) M. A. LAWSON,
Government Botanist and Director.

ENCLOSURES.

No. 1.

STATEMENT showing the rainfall at the several Government Cinchona Plantations, Nilgiris, during the official year 1890-91.

Months.	Dodabetta.				Naduvatam.			
	For 1889-90.		For 1890-91.		For 1889-90.		For 1890-91.	
	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.
1	2	3	4	5	6	7	8	9
April 1890	3·89	8	6·00	13	5 28	11	8·26	12
May "	4·95	10	4·77	13	5·83	13	5·34	14
June "	3·95	22	4·66	24	17·36	29	14·45	23
July "	8·55	27	4·35	17	18·58	29	17·06	25
August "	6·37	23	8·22	24	24·07	30	9·82	23
September "	9·59	22	2·67	11	13·21	24	5·84	21
October "	8·10	17	9·89	16	14·01	17	5·52	16
November "	3·92	9	3·57	9	2·95	5	1·49	8
December "	3·50	6	1·50	3	3·50	7	0·51	3
January 1891	0·65	2	0·25	2	0·02	1	0·10	2
February "	1·10	2	1·62	4	0·10	1	1·19	4
March "	2·43	5	0·63	3	3·12	7	0·00	..
Total ..	57·00	153	48·13	139	108·03	174	69·58	151

Months.	Hooker.				Wood.			
	For 1889-90.		For 1890-91.		For 1889-90.		For 1890-91.	
	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.
	10	11	12	13	14	15	16	17
April 1890	8·40	12	6·93	18	5·17	12	4·67	16
May "	8·37	13	5·44	16	7·30	13	4·35	15
June "	13·63	25	11·23	22	10·44	26	7·66	23
July "	21·28	29	12·29	22	15·59	29	9·32	22
August "	19·68	29	9·15	22	13·51	29	7·18	21
September "	10·85	22	6·01	17	11·07	23	4·31	16
October "	13·25	17	5·88	13	11·17	16	5·95	13
November "	2·41	6	1·54	7	2·54	6	2·03	9
December "	2·96	6	0·74	3	3·50	6	0·66	2
January 1891	·36	2	0·16	2	0·71	2	0·17	1
February "	·18	2	1·40	5	0·05	1	0·59	6
March "	2·70	11	0·02	1	2·65	9	0 03	1
Total ..	103·47	174	60·79	148	83·70	172	46·92	145

No. 2.

STATEMENT showing the Receipts on account of the Government Cinchona Plantations, Nilgiris, for the official year 1890-91.

Particulars.	Sanctioned budget estimate for 1890-91.	Revised budget estimate for 1890-91.	Actuals for 1890-91.
	RS.	RS.	RS. A. P.
Sulphate of quinine	33,400	33,400	24,735 0 10
Febrifuge	5,000	5,000	2,800 0 0
Bark to Madras Medical Department	500	425	255 0 0
Do. to Bombay do.	500	500	360 5 0
Do. to private parties and Mysore Durbar	..	75	220 8 10
Sale of seed and plants	200	200	29 4 0
Percentage of the fees of Government Quinologist	100	100	37 3 5
Miscellaneous	300	300	438 7 8
Total ..	40,000	40,000	28,875 13 9

No. 3.

STATEMENT showing the expenditure in detail on account of the Government Cinchona Plantations, Nilgiris, for the official year 1890-91.

Name of Plantation.	SALARIES.			NURSERIES.			WORKING CHARGES.			MANURE.		
	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.
1	2	3	4	5	6	7	8	9	10	11	12	13
	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.
Head office and General	12,021	12,021	12,021 0 0	..	..	..	..	..	..	..	..	..
Dodabetta	3,025	3,025	3,025 0 0	400	400	321 14 9	5,979	5,864	5,039 4 5	2,220	2,514	2,764 1 1
Naduvatam	3,545	3,545	3,246 14 11	420	420	515 13 6	8,354	9,492	9,575 15 9	3,082	2,872	2,458 12 3
Pykara	3,153	3,153	3,153 0 0	550	550	515 11 6	6,460	5,339	4,617 10 10	870	870	696 13 9
Quinologist's Department	6,133	6,133	6,723 8 0	..	..	..	..	..	..	..	..	..
Total ..	27,877	27,877	28,169 6 11	1,370	1,370	1,353 7 9	20,793	20,695	19,232 15 0	6,172	6,256	5,919 11 1

Name of Plantation.	CROP.			NEW WORKS.			REPAIRS.		
	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.
	14	15	16	17	18	19	20	21	22
	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.
Head office and General	..	..	..	..	..	..	300	200	199 1 10
Dodabetta	3,000	3,000	2,591 14 10	..	..	..	100	200	189 2 9
Naduvatam	1,870	1,800	1,542 8 5	400	420	429 9 5	600	800	1,251 2 7
Pykara	275	250	79 3 4	..	..	..	380	380	72 13 3
Quinologist's Department	..	..	..	..	..	..	..	..	..
Total ..	5,145	5,050	4,213 10 7	400	420	429 9 5	1,380	1,580	1,703 4 5

Statement showing the expenditure in detail on account of the Government Cinchona Plantations, Nilgiris, for the official year 1890-91—*cont.*

Name of Plantation.	CONTINGENCIES.			PRINTING CHARGES.			PEONS' CLOTHING.		
	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.
	23	24	25	26	27	28	29	30	31
	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.
Head office and General	800	700	699 13 1	20	40	35 5 0	12	12	12 0 0
Dodabetta	..	..	..	..	..	..	..	..	..
Naduvatam	..	..	..	..	..	..	..	..	..
Pykara	..	..	..	..	..	..	..	..	..
Quinologist's Department	9,000	8,900	11,044 13 6	..	..	..	..	..	..
Total ..	9,800	9,600	11,744 10 7	20	40	35 5 0	12	12	12 0 0

Name of Plantation.	TRAVELLING ALLOWANCE.			HOUSE-RENT.			TOTAL.		
	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.
	32	33	34	35	36	37	38	39	40
	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.
Head office and General	1,500	1,500	1,500 0 0	..	..	..	14,653	14,473	14,467 3 11
Dodabetta	..	..	..	..	..	..	14,724	15,003	13,922 5 10
Naduvatam	..	..	..	..	..	..	18,271	19,349	19,020 12 10
Pykara	..	..	..	..	..	..	11,688	10,542	9,135 4 8
Quinologist's Department	..	..	..	831	600	600 0 0	15,964	15,633	18,368 5 6
Total ..	1,500	1,500	1,500 0 0	831	600	600 0 0	75,300	75,000	74,914 0 9

No. 4.

STATEMENT showing the Receipts and Expenditure of the Government Cinchona Plantations, Nilgiris, for the official year 1890-91.

Classification.	Revised estimate.	Up to the end of the year.
RECEIPTS.		
	Rs.	Rs. A. P.
Sulphate of quinine	35,400	24,735 0 10
Febrifuge to Madras Medical Department	6,000	2,500 0 0
Bark to Madras Medical Department	425	213 5 0
Do. to Bombay do.	500	250 8 10
Do. to private parties and Mysore Durbar	75	29 4 6
Sale of seed and plants	200	37 3 8
Percentage of the fees of Government Quinologist	100	43 7 9
Miscellaneous	300	28,873 13 9
Total ..	40,000	

Classification.	A. Conservancy.		B. Establishment.	Total.	
	Revised estimate.	Up to the end of the year.	Revised estimate.	Up to the end of the year.	Revised estimate.	Up to the end of the year.
EXPENDITURE.						
	Rs.	Rs. A. P.	Rs.	Rs. A. P.	Rs.	Rs. A. P.
Head office and General ..	2,452	2,416 3 11	12,021	12,021 0 0	14,473	14,437 3 11
Quinologist's Department ..	9,500	11,614 13 6	6,133	6,733 8 0	15,634	18,368 5 6
Dodabetta	11,978	10,807 5 10	3,023	3,023 0 0	15,003	13,929 12 10
Naduvatam	15,804	15,773 13 11	3,515	3,216 14 11	19,319	19,019 4 8
Pykara	7,389	5,992 4 8	3,153	2,153 0 0	10,542	9,155 4 9
Total ..	47,123	46,744 9 10	27,877	28,169 6 11	75,000	74,911 0 9

No. 5.

STATEMENT showing the quantity of Seed and Plants sold to the public during the official year 1890-91.

Particulars.	Seed.	Plants.
	LB. CS.	
Cinchona Condaminea ..	5 1	..
Do. Magnifolia ..	1 12	..
Do. Succirubra ..	0 8	..
Total ..	7 5	..

No. 6.

A.—Statement showing the total yield of the Government Cinchona Plantations, Nilgiris, for the official year 1890-91.

Name of Plantation.	Species of produce.	Bark: Under stripping and mossing system. Number of plots.	Number of trees decorticated.	Outturn of green bark.	Up-rooting. Number of plots.	Number of trees decorticated.	Outturn of green bark.	Coppicing. Number of plots.	Number of trees decorticated.	Outturn of green bark.	Scraping. Number of plots.	Number of trees decorticated.	Outturn of green bark.	Total number of trees decorticated.	Total quantity of green bark collected.	Quantity when dry.	Seed.	Propogation. Plants.	Seedlings.	Rooted cuttings.
																	LB.			
Dodabetta ..	Crown bark ..	10	25,765	80,170	3	5,624	62,827	25	2,983	17,983	..	..	..	34,372	160,980	62,342	7 1/16	..	..	..
	Magnifolia ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3 1/4	..	..	..
Naduvatam ..	Crown bark ..	..	..	..	..	..	..	5	2,275	10,593	..	..	..	2,275	10,593	3,530	..	..	..	..
	Red bark	..	..	..	1	1,453	46,607	3	5,333	107,085	..	..	..	6,786	153,692	51,230	1/8	..	..	..
	Magnifolia ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2 3/8	..	..	..
Pykara ..	Crown bark ..	..	..	..	1	321	7,537	..	..	1,522	1	..	21,442	321	30,501	10,166	..	..	..	..
	Red bark	..	..	..	..	..	..	2	505	18,250	..	..	..	505	18,250	6,083	..	..	..	..
	Add the balance on 31st March 1890.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	133,351	..	..	..	..	
		..	..	..	..	..	..	..	..	..	..	..	..	..	..	477,744	..	..	..	..	
	Total ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	611,095	..	..	..	..

B.—Statement showing the disposal of bark and other produce collected in the Government Cinchona Plantations, Nilgiris, for the official year 1890-91.

Name of Plantation.	Species of produce.	Bark: Used for febrifuge and quinine. Bales.	Quantity.	Sold in the country. Bales.	Quantity.	Supplied to Medical departments. Bales.	Quantity.	Total. Bales.	Quantity.	Seed: Sold to the public.	Used for nurseries.	Total.	Propagated plants and seedlings. Plants: Sold to the public.	Permanently put up in the plantation.	Seedlings: Sold to the public.	Rooted cuttings: Transplanted.	Remarks.
		NO.	LB.	NO.	LB.	NO.	LB.	NO.	LB.	LB.	LB.	LB.					
Dodabetta ..	Crown bark ..	492 3/4	49,272	..	..	8	800	500 3/4	50,072	5 1/16	..	5 1/16	..	8,462	..	..	
	Magnifolia ..	..	..	..	..	..	..	..	..	1 1/4	1 1/2	3 1/4	..	..	..	..	
Naduvatam ..	Crown bark ..	274 3/4	27,486	..	..	..	..	274 3/4	27,486	..	2	2	..	39,425	..	..	
	Red bark ..	..	..	24	2,400	10	1,000	34	3,400	1/2	..	1/2	..	..	..	..	
	Magnifolia ..	..	..	..	..	..	..	..	..	..	2 3/8	2 3/8	..	..	..	..	
Pykara ..	Crown bark ..	194	19,442	..	..	..	..	194	19,442	..	..	..	..	9,600	..	..	
	Magnifolia ..	..	..	..	..	..	..	..	..	..	..	..	..	11,900	..	..	
	Red bark	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
	Add the balance on 31st March 1891.	..	..	..	..	..	..	..	100,400	..	..	..	..	..	..	..	
		..	..	..	..	..	..	..	510,695	..	..	..	..	..	..	..	
	Total ..	..	..	..	..	..	..	..	611,095	..	..	..	..	..	..	..	

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No. 7.

STATEMENT showing the approximate number of plants in permanent plantations, Nilgiris, on 31st March 1891.

Species.	DODABETTA.			NADUVATAM.			HOOKER.			WOOD.				Grand total.
	Plants last year.	Coppiced or up-rooted.	Plants in this year.	Total.	Plants in last year.	Coppiced or up-rooted.	Planted in this year.	Total.	Plants in last year.	Coppiced or up-rooted.	Planted in this year.	Total.		
C. Succirubra	..	6,607	8,462	647,223	386,189	9,061	39,425	416,553	635,608	826	21,500	656,232	41,583	1,761,686
C. Officinalis	683,336			555,191	55,388	6,786	..	48,602	3,568	505	9,600	371,449	45	51,665
C. Calisaya var. Ledger ..	130			130	60,009	2,275	39,425	97,169	362,170	321				1,053,799
Do. other varieties.	..	..	..	..	..	..	..	..	..	..	..	..	..	130
C. Micrantha	26			26	143			143						143
C. Pitayensis	43			43	..	..	..	..						26
C. Lanceolata	..	..	..	18	5	..	..	5	50	..	..	50		43
C. Carthagena	18			9	716	..	..	716						5
C. Santa Fé	9			61,806	3	..	..	3	269,820	..	..	269,820	45	829
C. Hybrid and others ..	61,806				269,925	..	..	269,925						12
Total ..	645,368	6,607	8,462	647,223	386,189	9,061	39,425	416,553	635,608	826	21,500	656,232	41,583	1,761,686

No. 8.

COMPARATIVE statement showing the quantity of bark of all sorts in store at the commencement of the year 1890-91, collected and disposed of during the year and remaining in store at its close.

Description of bark.	1889-90. Quantity in store at the commencement of the year.						Collected during the year.	Total.	Disposed of during the year.	
	Crop of 1883-84.	Crop of 1885-86.	Crop of 1886-87.	Crop of 1887-88.	Crop of 1888-89.	Total.			Crop of 1883-84.	Crop of 1885-86.
1	2	3	4	5	6	7	8	9	10	11
Crown bark ..	..	974	49,952	53,813	82,233	183,972	74,058	261,030	..	974
Red do. ..	..	51,525	28,981	35,056	26,009	141,571	68,568	210,139	..	10,812
Magnifolia ..	1,100	340	..	3,877	1,920	7,237	17,600	24,837	200	..
Total ..	1,100	52,839	78,933	92,746	110,162	335,780	160,226	496,006	200	11,786

Description of bark.	1889-90—*cont.* Disposed of during the year—*cont.*		Balance at the close of the year.						
	Crop of 1886-87.	Total.	Crop of 1883-84	Crop of 1885-86.	Crop of 1886-87.	Crop of 1887-88.	Crop of 1888-89.	Crop of 1889-90.	Total.
	12	13	14	15	16	17	18	19	20
Crown bark	6,276	7,250	..	..	43,676	53,813	82,233	74,058	253,780
Red do.	..	10,812	..	40,713	28,981	35,056	26,009	68,568	199,327
Magnifolia	..	200	900	340	..	3,877	1,920	17,600	24,637
Total ..	6,276	18,262	900	41,053	72,657	92,746	110,162	160,226	477,744

Description bark.	1890-91. Quantity in store at the commencement of the year.							Collected during the year.	Total.
	Crop of 1883-84.	Crop of 1885-86.	Crop of 1886-87.	Crop of 1887-88.	Crop of 1888-89.	Crop of 1889-90.	Total.		
	21	22	23	24	25	26	27	28	29
Crown bark ..	..	..	43,676	53,813	82,233	74,058	253,780	76,038	329,818
Red do. ..	..	40,713	28,981	35,056	26,009	68,568	199,327	57,313	256,640
Magnifolia ..	900	340	..	3,877	1,920	17,600	24,637	..	24,637
Total ..	900	41,053	72,657	92,746	110,162	160,226	477,744	133,351	611,095

Comparative statement showing the quantity of bark of all sorts in store, &c.—*cont.*

Description of bark.	1890-91—*cont.*											
	Disposed of during the year.				Balance at the close of the year.							
	Crop of 1885-86.	Crop of 1886-87.	Crop of 1887-88.	Total.	Crop of 1883-84.	Crop of 1885-86.	Crop of 1886-87.	Crop of 1887-88.	Crop of 1888-89.	Crop of 1889-90.	Crop of 1890-91.	Total.
	30	31	32	33	34	35	36	37	38	39	40	41
Crown bark.	..	43,676	53,324	97,000	..	..	..	489	82,233	74,058	76,038	232,818
Red bark	3,400	..	..	3,400	..	37,313	28,981	35,056	26,009	68,568	57,313	253,240
Magnifolia.	..	..	..	..	900	340	..	3,877	1,920	17,600	..	24,637
Total ..	3,400	43,676	53,324	100,400	900	37,653	28,981	39,422	110,162	160,226	133,351	510,695

No. 9.

STATEMENT showing the particulars of Cinchona bark disposed of during the year 1890-91.

Particulars.	PRODUCT OF 1885-86.		PRODUCT OF 1886-87.		PRODUCT OF 1887-88.		TOTAL.	
	Pounds.	Value realized.	Pounds.	Value realized.	Pounds.	Value realized.	Pounds.	Value realized.
		RS. A. P.		RS. A. P.		RS. A. P.		RS. A. P.
Cinchona bark used for the manufacture of solid febrifuge and sulphate of quinine	..	..	42,876	..	53,324	..	*96,200	..
Cinchona bark supplied to Madras Medical Department	1,000	255 0 0	..	..	..	..	1,000	255 0 0
Cinchona bark supplied to Bombay Medical Department	..	..	800	360 5 0	..	..	800	360 5 0
Cinchona bark supplied to Mysore Durbar and private parties	2,400	220 8 10	..	..	..	..	2,400	220 8 10
Total ..	3,400	475 8 10	43,676	360 5 0	53,324	..	100,400	835 13 10

	RS.	A.	P.
* Value of 2,928 lb. 2 ozs. of sulphate of quinine at Rs. 16-7-9	48,268	5	0
Do. 1,050 lb. of febrifuge at Rs. 14-0-0	14,700	0	0
Total ..	62,968	5	0

No. 10.

STATEMENT showing the particulars of Cinchona Febrifuge and Sulphate of Quinine manufactured and disposed of during the year 1890-91.

Particulars.	Quantity in store at the commencement of the year.	Manufactured during the year.	Total.	DISPOSED OF DURING THE YEAR.					Leakage and dryage during transit.	Balance at the close of the year including paper packets.
				To Madras Medical Department.	To Bombay Medical Department.	To Mysore Durbar, private parties and paper packets to Collectors.	To Colombo.	Total.		
	LB.	LB. OZ.	LB. OZ.	LB.	LB.	LB. OZ.	LB.	LB. OZ.		LB.
Solid febrifuge ..	350	1,050 0	1,400 0	200	..	..	..	200 0	..	1,200
Sulphate of quinine ..	..	2,928 2	2,928 2	20	400	136 2	800	1,356 2	..	1,572

OOTACAMUND,
10th July 1891.

(Signed) M. A. LAWSON,
Government Botanist and Director.

From D. HOOPER, Esq., Government Quinologist, to the Government Botanist and Director of Cinchona Plantations, Nilgiris, dated Ootacamund, 27th June 1891.

I have the honour to report on the analytical work conducted in the laboratory during the year ending 31st March 1891.

The cinchona bark and the chemicals used in the manufacture of quinine at Naduvatam have been analysed from time to time, and the products of the factory have been constantly tested as to their purity. The sulphate of quinine has been well up to the standard of the British Pharmacopœia, and the febrifuge has been of uniform composition. A recent analysis of the febrifuge is appended, and it is shown to contain more than half of its weight of the alkaloids—quinine and cinchonidine:—

Quinine	11·35
Cinchonidine	40·43
Cinchonine	30·88
Amorphous alkaloids	8·13
Moisture	4·57
Colouring matter, &c.	4·64
Total ...	100·00

Carthagena bark. The Carthagena bark trees at Naduvatam have been examined, and, as mentioned in the two previous annual reports, were found to contain no quinine whatever. A few trees planted in the Dodabetta plantations and taken from the plants brought by Mr. Cross from South America in 1880 were thought to be the Magdalena plants belonging to a better variety than those raised at Naduvatam, but I am sorry to say that the analysis reveals a similar result to that previously recorded; there was a total absence of quinine in the bark. We are therefore compelled to come to the conclusion that the introduction of Carthagena cinchona into the Nilgiris has not been attended with success, and the same conclusion has been arrived at in Bengal and Ceylon. The following are the analyses referred to:—

	Dodabetta "Carthagena."	Naduvatam "Carthagena."
Quinine	...	...
Cinchonidine	·89	1·10
Cinchonine	·60	·85
Amorphous	1·40	1·85
Total ...	2·89	3·80

Morada and Verde barks.—In 1883 some seeds of the "Morada" and "Verde" varieties of the Cinchona Calisaya were purchased through the Secretary of State, and seedlings were raised on the Nilgiris and on the Bengal Government Plantations near Darjeeling. The seeds were procured from Bolivia and were said to be taken from trees affording some of the best yellow bark of commerce, and to be equal, if not superior, to the well known Ledger bark. The Nilgiris proved too elevated a situation for these species, but they have done well in the

Wynaad at 3,000 feet, and in British Sikkim at and below 2,000 feet. About five years ago, I observed in an estate in the Wynaad a plot of Moradas and Verdes of about two years of age planted near a plot of Ledgers of the same age. The Moradas and Verdes had a greater girth of stem and thicker bark, and were taller than the neighbouring Ledger plants. They had been analysed a few months before and had a somewhat similar alkaloidal value. A satisfactory growth has been made since then, and last year, when the trees were six years of age, some bark was taken from the Verdes and gave an analysis of 7 per cent. of sulphate of quinine, and sold for a good price in the London market. This year I received from the same estate some more bark and found it to contain 7·80 per cent. of sulphate of quinine and 8·32 per cent. of total alkaloids; and some bark taken at the same time from Ledger trees of the same age yielded 6·81 per cent. of sulphate of quinine and 7·27 per cent. of total alkaloids. It is apparent from these and other experiments that these varieties of Calisaya are well worth cultivating, especially at a time when richer barks are preferred by manufacturers and appreciated in the home markets.

Nux Vomica leaves.—Mr. J. Cameron, Bangalore, last November, inquired if fresh nux vomica leaves were poisonous, informing me at the same time that a gentleman residing near him had lost three horses from, it was supposed, their eating the leaves of this tree. Another case was that of a cow belonging to Sir Oliver St. John dying under suspicious circumstances, and nux vomica trees were growing in the compound where she was in the habit of grazing. "The cow had convulsions, bled at the mouth and nostrils, and only lived for a short time from the commencement of the attack." The poisonous nature of the leaves has never, to my knowledge, been investigated, so I considered this a sufficient reason for prosecuting an inquiry into the subject. An analysis of the leaves resulted in the separation of an alkaloid having the properties of brucine, and amounting to 0·35 per cent. Brucine is associated with strychnine in the seeds of the nux vomica, and in the wood and bark, and has the same physiological effects as strychnine in inducing well-marked tetanic symptoms. The leaves of the nux vomica, therefore, taken in sufficient quantity, would produce poisonous results, and precautions should be taken in keeping cattle from feeding upon them.

Nux Vomica parasites.—An interesting question has been investigated regarding the poisonous nature of the vegetable parasites growing on the nux vomica. It is recorded in the *Pharmacopœia of India* that species of Viscum and Loranthus growing on this tree become just as poisonous as the tree itself, and that in the leaves of one species the *Viscum monoicum* the two alkaloids, strychine and brucine, were detected. These statements have been copied into other works without experimental confirmation, so I was desirous of ascertaining if these alkaloids were really present in the parasite, and, if so, whether they were in the same proportion as they are found in the *Strychnos Nux vomica*. The Forest officer of Ganjam, a district where the strychnos grows so plentifully, sent, at my request, a supply of a species of Viscum which was identified as *V. articulatum*. The sample was a small one, but it was sufficient to determine by analysis that the trace of alkaloid present was neither strychnine nor brucine. The leaves contained a peculiar tannic acid similar to that found in other mistletoes, and a resin soluble in ether and alcohol, striking a blood-red colour with strong sulphuric acid. The chemical constituents are altogether different to those found in the leaves of nux vomica, and this fact goes far to disprove the theory that parasites partake of the properties of their hosts. In confirmation of this, M. A. Chatin has recently contributed to the Paris Academy of Sciences a note on the biology of parasites, in which he asserts that the tannin of the mistletoe is not identical with that of the oak on which it grows; that the Loranthus on the *Strychnos Nux vomica* does not contain a trace of either strychnine or brucine; and that the Balanophora parasitic on *Cinchona Calisaya* does not contain any of the alkaloids of cinchona barks. It is evident, therefore, that the sap absorbed from the host plant must be modified by the parasite to form its own peculiar products.

Vinca pusilla.—While on the subject of poisonous plants, I would draw attention to the report on the *Vinca pusilla* sent to the Board of Revenue. This plant is allied to the British Periwinkle, and is called in Tamil *Mulakapoondoo*. It is the *Kupaveela* of Rheede, and is used on the Western Coast as an external remedy for lumbago, and the ryots of South Arcot say that if cattle graze upon it they become giddy and die. A sample was forwarded for analysis by the Board, and I found that the poisonous property of the herb was an alkaloid distinguished by giving a carmine-red colour with pure nitric acid. *Vincine* is proposed as the name for this new alkaloid.

Indian Gutta percha.—An abundance of gutta percha milk has been yielded during the past dry weather in the Wynaad by the *Panchotee tree* (Dichopsis elliptica, *Dals*) and some planters have been asking for information on the subject and inquiring whether it could be made into a commercial article. The milk has been known for some years to afford what was called Indian gutta percha or Pala-gum, and has been used as an adulterant of Singapore gutta. General Cullen brought it to notice about 35 years ago, and Dr. Cleghorn published a memorandum on the subject at the time. It was reported upon by experts in London, who found that it was unfit for water-proofing purposes, as its solution in coal-tar and turpentine dry up to such a brittle consistence that the fabric is quite useless. It could be used as a birdlime or cement and keeps well under water, as a cable insulator, especially if mixed with

some genuine gutta. By boiling the milk of the Panchotee tree, a white mass separates, which can be kneaded by the fingers, but which becomes hard and brittle when cold. The brittle character of this substance I find is due to a large proportion of a crystalline substance found in the true gutta and called crystalban or alban. Crystalban, according to Payen, occurs to the extent of from 14 to 19 per cent. in the best kinds of gutta percha, but I have extracted as much as 69·2 per cent. of crystalban from the secretion obtained from the Wynaad. The presence of a large quantity of crystals in this gum, of course, would interfere with its utility, but crystalban is easily removed by boiling alcohol, and the residue consists of a very good and pure gutta percha. I cannot see why this process could not be used to purify the Indian gutta percha and so obtain an article similar to the Malayan gum.

Jalap and Ipecacuanha.—The jalap tubers cultivated on the Dodabetta plantations have been supplied to the Madras Medical Store Department, and I should like to point out to Government the richness of these tubers in the resinous active principle compared with those obtained from Mexico. The Nilgiris are eminently adapted for the cultivation of the jalap, and it is surprising that no private planters have taken up the propogation of a drug which would lead to a profitable industry.

Another important article of Materia Medica (the Ipecacuanha root) is growing well in the Wynaad. I recently analysed a sample of the root from a plant only two years old and found it to contain as much emetine as is found in the commercial drug.

Eugenia tea.—A native gentleman in Mysore sent a sample of prepared tea made from the leaves of a kind of jumbal for examination and opinion as to its effect if used constantly as a beverage. The leaves were identified by Mr. Lawson as those of *Eugenia caryophlæa*, a myrtaceous shrub. They contained a little tannic and gallic acids, colouring matter, essential oil and ash, but no stimulating constituent, such as the alkaloid caffeine found in tea and coffee. The beverage would be an innocent one, and not likely to effect the system either in health or disease.

Ceropegia tubers.—These nutritious little tubers have been analysed. They are used as food by natives where they grow. On the Nilgiris the tubers of *Ceropegia pusilla* are called Chutlan-kilangu, and are eaten both raw and cooked. When young they are sweet and succulent, and when older they become bitter, but still very palatable. The bitterness is due to an alkaloid, which is removed by boiling water in the process of cooking. The shepherds in the Punjab and Mooltan eat the tubers of *Ceropegia bulbosa*, which they consider to be tonic and digestive. The following is an analysis of the last named tuber:—

Moisture	5·25
Fat	3·30
Sugar, gum, &c.	23·40
Albuminoids	3·48
Starch	42·50
Crude fibre	12·64
Ash	9·43
Total	100·00

ORDER—dated 9th September 1891, No. 851, Revenue.

Miscellaneous.

Mr. Lawson submits his report on the working of the Government Cinchona Plantations during the year 1890–91 and the report of the analytical work conducted during the same period by the Government Quinologist.

2. *Season.*—The season was remarkable for its light rainfall, the deficiency as compared with former years being especially noticeable on the west of the plateau in the months of August, September, October and November. The rainfall registered on the Naduvatam, Hooker and Wood estates during these four months for the past two years is shown below:—

Estates.	1889-90. INCHES.	1890-91. INCHES.
Naduvatam	54	23
Hooker	46	22
Wood	38	19

The Director, however, reports that the estates have not materially suffered on this account, although there appears to have been some mortality amongst the very oldest and also amongst the youngest trees.

3. *Working.*—The total number of trees standing on the Government estates at the close of the year under review was 1,761,686, or 52,893 more than the total of 1889–90. The principal planting operations of the year were performed at Naduvatam, where over 39,000 plants of the officinalis species were put down chiefly with the object of replacing the trees uprooted during 1889–90. It is to be regretted that a large portion of these young trees have proved to be failures on account of the dryness of the season.

4. The quantity of bark remaining in stock at the close of the last five years is shown in the subjoined statement:—

		LB.
On 31st March	1886–87	158,222
	1887–88	243,968
	1888–89	335,780
	1889–90	477,744
	1890–91	510,695

From this it will be seen that the stock of bark in hand has been steadily accumulating during recent years. It was observed in last year's review that the storing of so large a quantity of bark must in itself be a matter of some difficulty, and Mr. Lawson now reports that the yield for 1890–91 had to be kept down on this account. In his letter read in G.O., No. 826, Revenue, dated 20th October 1890, the Director stated that he would be enabled to use the whole of this enormous stock for the manufacture of quinine during the next few years. His Excellency the Governor in Council trusts that Mr. Lawson's anticipations will prove correct, but the work at the quinine factory does not seem to be progressing so rapidly as was expected. In his letter just quoted Mr. Lawson assured the Government that the output of quinine would approximate to the revised estimate of 4,000 lb. for the year under review, but the actual outturn was only 2,928 lb. or more than 1,000 lb. short of this forecast. Unless work is now pushed on more speedily, it will in future years be impossible to harvest any fresh bark until more room is made available in the storehouses, and the only plan will then be to sell the bark as it stands—a course to which, it is observed that, Mr. Lawson is himself opposed.

5. The causes for the short outturn of quinine during 1890–91 are said to be threefold—

(i) the influenza epidemic which prevailed at the commencement of the year;

(ii) the insufficiency of the present machinery and the unsatisfactory state in which it was received from England; and

(iii) the tardy supply of chemicals necessary for the manufacture of quinine.

As regards the first point, it is observed that new workmen were obtained to replace those who ran away through fear of being attacked, and that there was no severe outbreak of the disease at the factory.

A separate and full report should be submitted at an early date on the subject of No. (ii). The annual administration report is not the place for the discussion of such matters, and Mr. Lawson's complaints regarding some of the machinery furnished to him are too vague to warrant any definite action being taken thereon. Moreover the Government is not prepared to sanction additions to the existing vats and steam pans unless the proposals are accompanied by the usual plans and estimates and the necessity for further extension is clearly demonstrated.

The third cause detailed above is no doubt a serious obstacle to speedy and extensive work. In the letter forwarding Mr. Lawson's indent of December 1890 to the India office, the Assistant Under Secretary of State was requested to take special measures to avoid delay in arranging for the supply of the articles in question. This letter was dated 5th January 1891, No. 5, Revenue, and the Director reports that up to 26th June 1891, only a portion of the indent had been complied with. It is believed that the remaining chemicals have since then been received, and the delay appears to have been caused by the difficulty experienced in obtaining the fusel oil. The Director-General of Stores reported in his letter, dated 17th April 1891, that a contract for 20,000 lb. of oil had been entered into at Hamburg and this supply should now be on its way to India. For the future, however, Mr. Lawson should be careful to send in all indents for submission to the Secretary of State at least six months before

the articles are required. It would, moreover, be well to indent for larger quantities of such chemicals as are constantly utilised in the manufacture of quinine, in order that frequent references on the subject and consequent delays may be avoided.

6. The outturn of 2,968 lb. of quinine was utilised to meet indents amounting to 1,356 lb. received during the year and the remainder has been since disposed of. In his letter, dated 17th June 1891, read in G.O., Mis. No. 3870, dated 6th July 1891, Mr. Lawson reported that since the close of 1890–91, indents for quinine, aggregating Rs. 60,000, had been received and that more were expected. To meet this demand Rs. 36,000, worth of the drug had within the date of the above letter been supplied. It is not clear how these figures are obtained, for the price of quinine is noted in the same letter to have fallen from Rs. 16–7–9 to Rs. 14–11–3 per lb., and it is presumed that the latter rate is adopted. On this calculation, Rs. 36,000 worth of quinine represents nearly 2,500 lb. of the drug and Rs. 60,000 somewhat over 4,000 lb. From these figures it would appear that the requisitions upon the Naduvatam factory are increasing, and His Excellency in Council must again impress upon Mr. Lawson the importance of making the manufacture keep pace with the demand. The Director gives no estimate of the amount of quinine which he expects to turn out during the current year, but it is evident that at least 4,000 lb. will be required.

7. The manufacture of the solid febrifuge was continued during the year, and although some 1,200 lb. of this drug remained in stock at its close, the greater portion has since been issued to the Medical departments of Madras and Bombay.

8. *Distribution of quinine to Collectors.*—The issue of quinine to Collectors for distribution and sale in the feverish parts of their districts is dealt with by the Director in paragraph IX (*c*) of his report. Packets of the drug, together with purgative powders to be taken before the quinine, have been supplied to the Collectors of all districts except Madras, and the following table shows the amounts already sold according to reports recently received:—

Districts.	Packets issued.*	Sold.	
		Packets.*	Powders.
Canara, South	46	22	..
Coimbatore	47	6	24
Cuddapah	47	11	40
Ganjam	47	21	..
Kurnool	47	22	58
Nilgiris	47	3	69
Vizagapatam	47	23	50

* One packet=100 powders of 5 grains each.

No information has been received from the Collectors of other districts regarding the progress made with the sale of quinine.

9. It is as yet too early to decide whether this experiment is meeting with general success. The Collectors of Vizagapatam, Kurnool and South Canara are of opinion that a ready market for the quinine may be anticipated, and the manner in which the powders and packets have already been bought by the people of those districts argues that they are alive to the value of the drug. In the remaining districts, from which reports have been received, the results are so far disappointing. The memorandum from the Collector of Salem, embodied in the Director's report, shows that the taluk officials are in some cases apathetic in the matter, and unless some trouble is taken by these officers to explain to the people the therapeutic properties of the medicine, it is not likely that it will be extensively purchased. It is but natural that amongst the poorer classes, whose education is imperfect, there should be a rooted objection to any payment, however small, for a foreign medicine of which the effects are comparatively unknown, but is to be hoped that by patient and persistent efforts on the part of Government officers and by the gradual spread of the knowledge of the effects of quinine in preventing and curing fever, any existing scruples may be overcome.

10. The Government Cinchona plantations have now been in existence for over 30 years, and it has been shown that it is possible to produce in India a febrifuge of excellent quality at a low cost. One of the main objects with which the plantations were opened has thus been realized, but its practical effect will to a great extent be nullified if no local market is available for the medicine. His Excellency in Council regards it as a matter of the highest importance that the medicinal value and the low cost of quinine should be widely known, and believes that publicity is the chief thing wanted in order to obtain for it a ready sale. The general use of quinine amongst the people of Southern India is a result most earnestly to be desired. The natives themselves would reap the chief benefit by enjoying the advantages of a new remedy for a disease which prevails in one form or another almost everywhere throughout the country and is productive of greater mortality than any other, whilst the planters of Cinchona would likewise profit by the rise in prices, which would naturally follow any large increase in the demand for bark.

11. *Financial.*—The statements appended to this review show the receipts and disbursements for 1890–91 and for previous years. The actual receipts amounted to Rs. 28,876 as against a revised estimate of Rs. 40,000. If credit be taken for the quinine and bark issued during the year, of which the value was not realised before its close, the receipts are raised to Rs. 30,529, and if the value of the stock in hand at the end of the year be also included at the rates prevailing during the year, the figure comes to Rs. 73,555. These rates have since been reduced to Rs. 14–11–3 per lb. for quinine and to Rs. 10 per lb. for Cinchona febrifuge, but Mr. Lawson hopes during the current year to be able, notwithstanding this reduction, to realize enough to cover his expenditure.

The charges amounted to Rs. 74,914, or to Rs. 6,734 more than in the previous year. The increase is said to be due to the payment during the year for fusel oil, which should properly have come upon the accounts of 1889–90, and to the additional charges incurred at the Naduvatam factory. The expenditure in the Quinologist's department alone was Rs. 18,368 as against Rs. 14,605 in the previous year. Statement No. II shows a deficit on the year's operations of Rs. 4,832–6–9.

12. The analytical report submitted by Mr. Hooper has been read by the Government with much interest.

(True Extract.)

(Signed) C. A. GALTON,
Secretary to Government.

To the Government Botanist.
" the Commissioners of Land Revenue.
" the Commissioner of Revenue Settlement, Land Records and Agriculture.
" the Military Department.
" the Public Department.
" the Financial Department.
" the Surgeon-General with the Government of Madras, through Public Department.
" the Accountant-General.

Copy to the Honorary Secretary, Agri-Horticultural Society.
" " Chamber of Commerce.
" " Government of Bengal.

No. 851A.

Copy to the Government of India, Revenue and Agricultural Department.

(Signed) C. A. GALTON,
Secretary to Government.

APPENDICES.

No. I.

STATEMENT showing the Capital and Revenue Account of the Government Cinchona Plantations, Nilgiris, from the commencement up to the official year 1890-91.

Year.	Charges.									
	Establishment including Superintendent's salary.		Building and plant.		Working charges.				Total.	Total outlay to end of year.	Simple interest at 4½ per cent. on outlay to end of previous year *plus* half outlay during the year.	Total of columns 6 and 8.
					Departmental labour.		Convict labour.					
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	2			3			4			5			6	7	8	9
1860–61							4,821	15	0	4,821 15 0	108 7 11	4,930 6 11
1861–62							22,914	15	4	22,914 15 4	732 9 2	23,647 8 6
1862–63							48,390	0	0	48,390 0 0	2,336 15 0	50,726 15 0
1863–64							53,173	9	2	53,173 9 2	4,908 7 7	70,808 15 4
1864–65							59,666	12	0	59,666 12 0	8,283 11 9	92,395 0 8
1865–66							58,887	5	0	58,887 5 0	12,157 1 4	1,00,194 4 4
1866–67							62,632	0	0	62,632 0 0	17,020 12 6	1,45,148 1 0
1867–68							43,295	14	4	43,295 14 4	22,618 3 6	1,43,267 15 7
1868–69							30,636	1	0	30,636 1 0	27,740 7 8	1,34,744 11 2
1869–70							19,163	0	0	19,163 0 0	31,279 6 2	81,560 1 2
1870–71							6,143	0	0	6,143 0 0	33,089 9 8	63,202 15 0
1871–72							13,160	4	9	13,160 4 9	34,623 12 5	68,091 6 6
1872–73							16,441	0	0	16,441 0 0	33,947 10 2	65,662 10 2
1873–74							15,091	14	0	15,091 14 0	37,300 12 2	67,724 10 2
1874–75							17,417	0	0	17,417 0 0	38,784 9 2	74,303 1 2
1875–76							27,423	0	0	27,423 0 0	40,623 8 3	86,830 8 3
1876–77							44,850	3	0	44,850 3 0	43,004 13 6	1,02,634 14 9
1877–78							56,241	10	3	56,241 10 3	46,916 6 3	1,15,688 3 6
1878–79							53,954	10	8	53,954 10 8	49,144 1 10	1,22,826 13 3
1879–80							63,005	0	3	63,005 0 3	52,595 12 [illegible]	1,32,330 1 4
1880–81							72,858	15	3	72,858 15 3	56,551 14 [illegible]	1,62,656 15 6
1881–82							90,921	2	1	90,921 2 1	61,269 11 11	1,74,545 1 3
1882–83							60,049	11	5	60,049 11 5	56,219 0 3	1,72,611 5 2
1883–84							69,128	8	6	69,128 8 6	71,415 7 4	1,95,976 5 8
1884–85							60,190	8	7	60,190 8 7	76,171 10 0	1,62,996 0 4
1885–86							60,629	13	10	60,629 13 10	79,933 11 2	1,60,312 6 1
1886–87							48,720	11	2	48,720 11 2	83,637 5 8	1,67,865 10 2
1887–88							38,973	13	10	38,973 13 10	87,156 1 11	1,59,317 5 0
1888–89							40,082	3	1	40,082 3 1	90,343 5 8	1,59,837 3 7
1889–90							28,460	7	1	28,460 7 1	93,441 0 6	1,61,621 8 8
1890–91							30,719	12	6	30,719 12 6	96,660 10 7	1,71,574 11 4
Total ..	5,74,997	10	0	1,67,339	2	3	12,97,134	14	0	1,46,000 0 0	14,00,917 2 3	35,86,388 12 6

Statement showing the Capital and Revenue Account of the Government Cinchona Plantations, Nilgiris, &c.—*cont.*

Year.	Receipts.						Net revenue (difference between columns 9 and 13).	Deficit.
	Value of bark supplied to Quinologist, or for experimental purposes and the value of quinine and febrifuge sold.	Value of bark sent to England, sold or supplied to other Governments or departments.	Sale of plants, seeds, &c.	Total.	Surplus.			
	10	11	12	13	14		15	
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.		Rs. A. P.	
1860–61	...	...	...	...	...		4,930 6 11	
1861–62	...	...	...	...	...		23,647 8 6	
1862–63	...	...	...	...	...		50,726 15 0	
1863–64	...	...	...	...	...		70,808 15 4	
1864–65	...	...	...	...	...		92,395 0 8	
1865–66	...	...	...	...	...		1,00,194 4 4	
1866–67	...	...	2,450 0 0	2,450 0 0	...		1,42,698 1 0	
1867–68	...	...	...	287 8 0	...		1,42,980 7 7	
1868–69	...	...	1,680 0 0	1,680 0 0	...		1,33,064 11 2	
1869–70	...	...	...	1,612 6 4	...		80,047 10 10	
1870–71	...	...	323 14 0	4,688 12 8	...		56,574 2 4	
1871–72	...	...	...	13,022 0 2	...		55,069 6 4	
1872–73	...	...	2,450 0 0	21,422 3 1	...		44,240 7 1	
1873–74	...	...	227 1 4	57,854 6 3	...		9,870 3 11	
1874–75	...	...	300 9 0	8,849 4 0	...		65,468 13 2	
1875–76	...	...	1,680 0 0	62,404 9 11	...		24,426 0 4	
1876–77	...	...	273 4 0	4,688 12 8	...		...	
1877–78	...	...	2,300 0 0	13,022 0 2	7,822 9 1		...	
1878–79	...	...	2,679 3 10	1,10,497 7 10	2,41,526 13 2		...	
1879–80	...	...	5,469 0 2	3,57,215 0 8	2,77,527 6 0		...	
1880–81	...	...	8,136 9 2	4,00,354 3 3	3,07,466 7 8		...	
1881–82	...	...	15,462 12 4	4,39,786 9 0	1,93,813 6 5		...	
1882–83	...	...	13,175 4 8	3,40,470 5 11	3,97,044 5 5		...	
1883–84	...	...	7,653 2 9	5,71,859 6 8	4,13,737 12 9		...	
1884–85	...	...	4,345 7 10	5,86,319 1 11	...		1,10,895 8 6	
1885–86	...	...	4,561 2 8	85,080 13 2	...		77,166 12 11	
1886–87	...	...	1,543 13 5	85,829 3 5	...		56,203 11 1	
1887–88	...	...	589 10 4	1,04,108 11 0	...		96,075 15 9	
1888–89	...	...	1,595 4 9	71,789 10 5	...		1,55,376 3 1	
1889–90	...	...	763 1 11	3,941 1 11	...		1,56,235 7 9	
1890–91	...	...	1,047 11 10	3,601 11 10	...		1,66,181 0 1	
	...	...	599 12 4	6,440 8 7	...		1,42,698 13 7	
	...	...	504 15 1	28,875 13 9	...		...	
Total ..	1,01,339 1 4	31,98,739 15 0	75,381 13 5	33,75,360 13 9	..		2,11,027 14 9	

No. II.

Statement showing the receipts and charges on account of the Government Cinchona Plantations for the year 1890-91, prepared in accordance with the instructions issued in the Secretary of State's despatch, No. 3, dated 11th February 1886.

Disbursements.				Amount.			Receipts.				Amount.		
To value of stock on 31st March 1890 (477,744 lb.) as under—				Rs.	A.	P.	By value of stock on 31st March 1891 (510,695 lb.) as under—				Rs.	A.	P.
			A.	P.					A.	P.			
900 lb.	of 1883–84 at ..	..	8	2·402	461	4 2	900 lb.	of 1883–84 at ..	8	2·402	461	4	2
41,053 ,,	of 1885–86 ,,	..	11	4·132	29,107	6 10	37,653 ,,	of 1885–86 ,, ..	11	4·132	26,696	12	2
72,657 ,,	of 1886–87 ,,	..	10	10·069	49,220	15 3	28,981 ,,	of 1886–87 ,, ..	10	10·069	19,632	15	5
92,746 ,,	of 1887–88 ,,	..	12	5·385	72,161	3 1	39,422 ,,	of 1887–88 ,, ..	12	5·385	30,672	2	7
110,162 ,,	of 1888–89 ,,	..	10	1·120	69,493	13 11	110,162 ,,	of 1888–89 ,, ..	10	1·120	69,493	13	11
160,226 ,,	of 1889–90 ,,	..	6	9·701	68,180	8 2	160,226 ,,	of 1889–90 ,, ..	6	9·701	68,180	8	2
				Total ..	2,88,625	3 5	133,351 ,,	of 1890–91 ,, ..	8	11·862	74,914	0	9
										Total ..	2,90,051	9	2
To establishment and working charges ..					74,914	0 9							
To value of febrifuge in stock at the beginning of the year					4,900	0 0	By value of sulphate of quinine supplied to the Medical Stores of Madras, Bombay and Ceylon				24,735	0	10
							By value of febrifuge sold to the Madras Medical Stores				2,800	0	0
							By value of bark sold to the Madras Medical Stores				255	0	0
							By value of bark sold to the Bombay Medical Stores				360	5	0
							By value of bark sold to the private parties and Mysore darbar				220	8	10
							By value of sale of seeds and plants ..				29	4	0
							By value of the percentage of the fees of the Government Quinologist				37	3	5
							Miscellaneous				438	7	8
										Total ..	28,875	13	9
							By value of quinine issued to Collectors, but not credited				1,275	0	0
							By value of bark sold to Messrs. Kemp and Co., Bombay, but not credited				377	13	6
							By value of quinine and febrifuge in stock on 31st March 1891				43,026	9	0
								Total of all receipts ..			3,63,606	13	5
								Net deficit on operations ..			4,832	6	9
Grand Total ..					3,68,439	4 2		Grand Total ..			3,68,439	4	2

Exd. S. J. Pereira.

150 Copies.

Govt. of {1891} Madras.

REVENUE.

Issued

Recd. Encl.

G.O., 9th September 1891,
Nos. 851, 851A.

SEPTEMBER.

Government Cinchona Plantations.

Report on the working of the — during the year 1890-91 and the report of the analytical work conducted during the same period by the Government Quinologist, reviewed.

3

Administration. Report of the Government Cinchona Department, Nilgiris, for the year 1890-91.

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I Season and Rainfall. — The season for the past year was remarkable for its extreme quietness, there were no high winds, there was no hail, and the frost with the exception of one night at Coonoor was less severe than had been known for some years past. The South West Monsoon was unusually dry, the rainfall on the Estates on the western side of the plateau being little more than half the average amount. Taking the season altogether the climatic conditions were not unfavourable to the growth of Cinchona, except to the very old trees and to the very young ones.

(a) Dodabetta. — The amount of rain registered on this Estate was 48·13 inches, or 8·87 inches less than what was registered during the previous year; and 5·96 inches less than the average for the last ten years.

Kadewatam

(b) Nadiwatam.— The amount of rain guaged at Nadiwatam was 69.58 inches or 38.45 inches less than that which was guaged last year. August, September, October and November, which are usually wet months, were this year exceptionally dry.

(c) Pykara (1) Hooker.— The rainfall on this Plantation was 60.79 inches as against 103.47 inches, which fell during the year before.

(2) Wood.— At Wood 46.92 inches were registered or only a little more than one half of the amount recorded during the previous year, which was 83.70 inches. The remark under Nadiwatam relative to the unusual dryness of the months of August, September, October and November apply equally to the two Pykara Plantations.

II. Financial (a) Receipts.— In G.O. No. 946 of 25th November 1889 - Revenue - the Budget Estimate was passed by Government at Rs 40,000 and in G.O. No. 886 of 7th November 1890 - Revenue -

Revenue - the same figure of Rs 40,000 was accepted by Government as the Revised Estimate for the year. Compared with this anticipated income the actual receipts aggregated only Rs 28875-13-9 or Rs 11,124-2-3 less than the Budget and Revised Estimates, but, the sum of Rs 28875-13-9 does not include the value of 850 packets or 61 lbs of quinine supplied to Collectors of Districts for distribution under G.O. No. 733 of 15th September 1890 - Revenue - nor the 1000 packets, or 72 lbs in stock with the Government Quinologist, nor the 1505 lbs of quinine, and 1200 lbs of febrifuge in stock at the end of the year, nor the value of bark which was supplied to Messrs Kemp & Co Bombay. If credit could have been taken in the accounts for the above items the receipts would

have

have been Rs. 73,555-4-3, detailed thus:-

1. Money actually realized

Value of sulphate of quinine supplied to the Medical Stores, Madras, Bombay and Ceylon	24,735-0-10
Value of febrifuge sold to the Madras Medical Stores	2800-0-0
Bark sold to the Medical Stores of Madras and Bombay	615-5-0
Bark sold to private parties and to the Mysore Darbar	220-8-10
Miscellaneous.	
Sale of seed and percentage of fees of Government Quinologist, &c.	504-15-1
	28,875-13-9

2. Quinine and bark issued during the past year but the value of which was not realized before its close.

(a) 850 packets of quinine issued to Collectors at Rs 1-0-0 per packet	1275-0-0
(b) 1600 lbs of red bark sold to Messrs Kemp & C, Bombay	377-13-6
	1,652 13 6

3. In stock at the close of the year.

(a) 1500 lbs of Sulphate of quinine issued subsequently to the Medical Stores Madras, Bombay, and Ceylon @Rs 14-7-9	24726-9-0
(b) 1200 lbs of Cinchona febrifuge issued in part subsequently to the Medical Stores Madras and Bombay @Rs 14	16800-0-0
(c) 1050 packets of Sulphate of quinine with the Government Quinologist	1500-0-0
	43,026-9-0
Grand Total	73,555-4-3

(b) Expenditure.—The Budget Estimate of 33
expenditure for the year, as sanctioned in G.O. No. 946 of 25th November 1889 Revenue was Rs 75,300, and in G.O. No. 886 of 7th November 1890 Revenue, the sum was reduced to Rs 75,000. The actual expenditure was Rs 74,914-0-9. This was Rs 385-15-3 less than the Budget Estimate, Rs 85-15-3 less than the Revised Estimate, and Rs 6733-8-7 more than what had been spent the year before. This increase was due to the payment, during the year, for the fiscal of, which should properly have been paid for in the previous year, but which was not vide II b of the last year's report; and also to a larger outlay having been found necessary for the purchase of more machinery and chemicals, required for the manufacture of quinine and febrifuge in the factory at Nadiwatam.

The charges connected with the Quinologists Department, amounted to Rs 18368-5-6

and

and if this sum be deducted from the total expenditure for the year there is left Rs 56,545-11.3 which represents the cost of maintaining the general establishment and upkeep of the several Estates.

III Permanent Plantation (a) Dodabetta.—

Although the season as has been remarked above, was a very dry one, the trees on this Estate are looking extremely well. The trees on five acres of Plot No IX were uprooted, and another portion of the same plot, the trees on which had been uprooted the year before, was replanted with 8462 plants. Of this number there were failures to the extent of about 15 per cent, and this loss was due almost entirely to the ravages of grub. Thirty two and a quarter acres on the Estate were trenched and manured.

(b) Nadivattam.— Owing to the extreme drought which prevailed during the year, many of the trees on the oldest parts of the Estate showed manifest signs of dying, and these were either uprooted or coppiced. 18,175 plants were put down in various parts of the Estate to replace failures.

Plot

Plot XI and that portion of plot III which was uprooted last year, were replanted with 21250 plants, but of this number nearly one half succumbed on account of the dryness of the Autumn and Winter months. The failures will be made good so soon as the weather is sufficiently favourable for planting. Seventy three acres were trenched and manured. Taking this Estate as a whole, the condition of the trees upon it have materially improved during the the past season.

(c) Pykara. (1) Hooker.— Many trees on various plots were coppiced, owing to their exhibiting signs of decay. The failures in the plantings of the two previous years were made good. The plantation generally is in good order, and the trees upon it are looking well.

2 Wood.— The Succinibras on a small portion of this plantation were coppiced for the second time, they are growing upon a piece of swampy ground, which will eventually be abandoned. The rest of the plantation is looking well. The box trees which some years ago were planted for

experimental

experimental purposes, are growing most vigorously; and in twenty or thirty years time ought to yield wood of sufficient size to be useful in the engraver's art.

IV Upkeep.— The buildings, roads, drains, bridges &c, on all the Estates have been maintained as usual in good order.

V Manure.— Fifteen hundred and ninety three cartloads of stable and cattle manure were put out during the year, on seventy two acres of the Dodabetta Estate. On the Nadewatam Estate, 2600 cart loads of old cattle manure were applied to 58½ acres, being given chiefly to trees, which it is intended to bark next year. At Pykara, on the Hooker plantation, 500 cart loads of cattle manure were put into the plantation.

VI Nurseries.— The nurseries are well stocked with seedlings and balled plants. Considerable mortality occurred among the plants, which had been put into balls of earth and

and moss, on all of the Estates. The mortality was due, in the first instance to the young plants having been buried above the collar, and in the second instance to their having been kept too damp and under too deep shade. All plants, after having been balled, should, after they have become established, be kept as dry as possible; as under these circumstances a greater amount of root growth is made, the stems and leaves, too, become more hardened, and so the plants are better able to withstand the shock of transplanting when put into the field. Plants of nine inches in height, balled in October, become fifteen inches in height by the beginning of May, when in ordinary seasons they may be safely transferred to the field. and by planting at this early date, owing to the warmth of the soil, they become well rooted before the monsoon bursts upon them; and

so

so get the advantage of having two growing seasons, before the commencement of the dry months of Winter and Spring. During the year no plants were sold to the public and only 7 pounds and 5 oz of seed.

VII Crop. — The crop harvested during the past year amounted to 133,351 pounds of bark, apportioned thus:—

Dodabetta

Crown bark		62,342 lbs
Nadivataw		
Red bark	57,230 lbs	
Crown bark	3530	54,760
Pykara		
Crown bark	10,166	
Red bark	6083	16,249
		133351

At the close of last year, there remained in stock in the go-downs 477,744 pounds, thus making a total of 611095 pounds; of this 100,400 pounds were disposed of during the year—thus:—

Used in the manufacture of	
Quinine and febrifuge —	96,200 lbs
Sold to the Medical Stores Department — Madras —	1000
Sold to the Medical Stores Department — Bombay —	800
Sold to the Mysor Durbar and Messrs Kemp & C —	2400
	100,400

There remained therefore in store at the close of the year 510,695 pounds of bark. The Estimate for the year was 150,000 pounds vide G.O. No. 886 of 7 November 1890 - Revenue - so that the crop harvested was 16,649 pounds below the Estimate. This reduced output was due to the difficulty there would have been found in storing the full amount.

It will be observed that while the crop taken during the past year was less than that taken the year before, the harvesting of it has nevertheless been more costly; it will be well therefore to explain that the extra expense was incurred partly

partly on account of a larger quantity of bark having been taken under the Stripping process; and partly on account of a considerable portion of the Nadiwatam bark having been taken from young trees.

VIII Buildings—The repairs and additions to the several buildings on the various Estates were carried out at a cost of Rs 1703-4-5 apportioned thus:—

Head office—	Rs 199-1-10
Dodabetta	" 180-2-9
Nadiwatam	" 1251-2-7
Pykara	" 72-13-3
	1703-4-5

The verandah of the store rooms at the Nadiwatam Estate, was walled up, to increase the space available for accommodating the last years harvest of bark.

IX Factory—The past year, so far as the work in the Factory was concerned has been

a very busy and a some what anxious one, 2928 pounds of Sulphate of Quinine and 1050 pounds of febrifuge were turned out. In the early part of the year all work was stopped owing to the outburst of Influenza, which, although the epidemic was not bad amongst the workmen, yet the accounts of it so frightened them, that they left the hills for their own country and a fresh set had to be trained to the business. Two of the new vats and the second still were put in such a bad condition, that they had to be almost remade before they became serviceable; the consequence being that full and continuous working was delayed till late in the year; since then however, the manufacture of alkaloids has been pushed on almost without intermission and to the fullest extent that the machinery admitted of. A slight extension of the vats and steam pans is desirable, as it would allow of the output to

to be almost doubled. It would also prevent the necessity of working at such high pressure, as has been done during the past few months, and this latter point is one of much consideration, for working at too great a rate necessarily means waste in the use of bark and of chemicals. It also puts too great a strain on the machinery, the whole of which has to be worked continuously, leaving no time for it to be cleaned and kept in proper order.

Many additions have been made during the year; the grinding room has been separated entirely from the boiling and Crystallising room. The macerating vats and stills have been lodged in a separate building, and a second drying room has been erected, which is heated by steam. A second boiler for heating the stills was also purchased during the year. This boiler might be made

available

available for several other purposes, such as pumping water, driving a saw mill, and driving the pivot-spindles of the macerating vats. To do this, however, would require extra machinery, which would cost a good deal of money, but which in the long run, would prove economical. A well nine feet in diameter and 25 feet deep has been made, and a reservoir 20 feet above the well has been put up. This supplies the whole factory with water, and will effect a considerable saving in labour, as heretofore all the water used in the Factory had to be carried from a distant Spring. It will also give the Command throughout the whole year, of an unlimited quantity of perfectly pure water. Now that sufficient machinery has been put up for immediate requirements, the next thing to be done is to ensure a Constant and never failing supply of the necessary chemicals. This at

present

present has not been accomplished.

Owing to the long time, which has to pass between the sending in of an Indent and the receipt of the things asked for, the work in the factory has either to be suspended, or the chemicals have to be bought in the Indian Markets at considerable enhanced rates. This delay in receiving goods from England is much to be regretted as in addition to the above loss it causes the locking up of money, a matter especially brought to the notice of this Department, as one to be avoided on all possible occasions, vide G. O. № 990 dated the 15th November 1886 Revenue para 3.

The following are extracts from an Indent submitted to Government on the 6th December last, vide G. O. № 7 of 5th January 1891 Revenue.

" Fusel oil "
" Caustic Soda "
" Sulphuric acid "
" Charcoal "
" Filtering paper. "

Para 3 "With respect to the Fusel oil "
45
" I have to request that this Commodity "
" may be furnished to me of the same "
" quality as that which is sent to the Bengal "
" Government, and also that as in that "
" case, it may be sent out in casks instead "
" of in drums, as the charge for the drums "
" alone amounted on the last occasion "
" to over £40. "

Para 5. " I am at present buying caustic "
" soda, sulphuric acid, and charcoal in the "
" local markets, and as the rates for these are "
" higher than the English rates, I shall be obliged "
" if Government will urge upon the Secretary "
" of State the desirability of complying with "
" this portion of the indent as soon as possible. "
" With respect to the fusel oil, I shall be content "
" if I receive it in batches of 5000 pounds each, "
" the first to be received not later than the "
" 1st April next". Of this Indent the filtering paper

paper and charcoal have alone been received up to date viz

With regard to such common chemicals as Sulphuric acid and Caustic Soda, there must surely have been unnecessary delay in complying with the Indent. A private firm in Madras have asserted that they would have obtained the goods within four months of their writing for them.

The special attention of Government is drawn to the above facts, in the hope that some remedy may be found in the future.

From the 2928 tb – 2 oz of sulphate of quinine manufactured at the factory during the year the following Indents were complied with:—

	tbs	oz
Madras Medical Stores	20	"
Bombay Medical Stores	400	"
Ceylon Medical Stores	800	"
Mysore Government	50	"
Scinde	21	10
Paper packets and Minor Sales	64	8
	1356	2

and there remained at the close of the year 1,072 pounds in stock, all of which and more has been already indented for by the various Indian Medical Departments, vide my letter No 18 dated 17th June 1891.

There were 350 pounds of febrifuge in stock at the end of last year, and 1050 tb were made during the year, making a total of 1400 tb, of this 200 tb were issued to the Madras Medical Stores, and 1200 tb remained in stock at the close of the year. The greater portion of this has subsequently been issued on Indents to the Medical Stores Department of Madras and Bombay.

X Mr. Hooper's Report.— This report though not so long as that of last year, contains several points of special interest

XI Miscellaneous (a) Increase in the Consumption of quinine.— Owing partly to the great reduction in the price of quinine and

and partly to the outburst of the Influenza epidemic, which is supposed to be malarial in its nature, the consumption of the drug is said to have been enormously increased during the last two years in Europe and America. This increase in the use of quinine will no doubt, before long have an effect upon the market; so that barks, which are now sent home under cost price, may be expected eventually again to pay. Nevertheless it is desirable to point out that the better class of barks, such as the Condamineas, Condaminea-hybrids and Calisayas only should be grown.

(b) Trenching.—The greater part of the renovations carried out on the Dodabetta and Nadiuttam Estates, was done by trenching instead of by pitting. The trenches were dug between every

every other row of trees, and were made one foot wide by two feet deep. Each coolly on the grass lands dug from 25 to 30 yards a day. The advantages of trenching over pitting are as follows:-

(1) All the long whip like roots on one side of the trees are cut through within a couple of feet of the stems. From the cut ends of these roots thousands of feeding fibres shoot out, which in the course of a few months, find their way to the bottom of the trench and eventually almost fill it; by digging trenches two feet deep, the new roots get well out of the hot surface soil, and it has been before pointed out that the great heating of the roots during the dry season, when kept on the surface, is one of the chief causes of the so called

called Cankey in Cinchona.

(2) The cost of trenching is less than one half of that of pitting.

(c) Issue of Quinine in paper packets.—

In February 1890 it was suggested that Sulphate of quinine should be packed in papers containing powders of five grains each, and sent in packets containing 100 of such to the Collectors of the several Districts for distribution among the poorest class of the ryots. The matter was referred to the Surgeon General for an opinion, and on his supporting the proposal, in G.O No. 733 of 15 September 1890 — Revenue — it was directed by Government that 200 packets or 20,000 powders should be sent to each of the Collectors of Ganjam, Vizagapatam, Cuddapah, Kurnool, Madura, Coimbatore, Canara and Nilgiris in lots of 25 each.

This

was done, and on more powders being reported available for distribution, in G.O No 866 of 31st October 1890 Revenue it was ordered that 5,00 packets or 50,000 powders should be distributed among the remaining Collectorates of the Madras Presidency, and this was also done. In addition to the above, the Collector of Cuddapah had another 100 packets, and the Collector of Kistna had 50.

At the close of the year there were in stock with the Government Quinologist 1000 packets ready for distribution.

The number of packets sold up to date has been smaller than was anticipated, but it would be unreasonable to expect that the introduction of a drug so unpleasant to the palate as quinine should meet with much success until

until the people of the Country should
have become convinced of its therapeutic
value—Annexed is an interesting Memo
by the Collector of Salem, which gives in a
clear and forcible manner the various
causes why more of the packets have
not been sold in his District:—

Memo— No. 1200 dated 13-6-91.

"With the object of benefiting the poorest
"classes of the suffering population, the
"Government in their order No. 733-Revenue,
"dated 15th September 1890 directed the Govt.
"Botanist to supply all Collectors with
"parcels of Sulphate of quinine manufactured
"at the Government Factory at Nadiwattam
"for distribution to Post-Masters, Revenue
"officials and heads of villages, that they
"may sell these parcels at a price which will
"bring the medicine within the reach of the poorest classes.
"2 "The price of each packet containing
"5 grains of quinine has been fixed at
"3 pies and the price of each parcel containing
"100 packets of the above description at Rs 1-8-0
"The sale of each parcel at the rate fixed
"above will give the seller a commission
"of one anna on each parcel or one anna
"on each Rs 1-8-0, or a little over 4 per cent
"on the total value of the parcel. The
"above commission is to be retained
"by the official selling the medicine."
"3 "Accordingly, with his letter No. 753
"dated 13th December 1890, the Govt. Botanist
"forwarded 25 parcels of 100 packets each
"to Salem, and these parcels have been
"ordered to be distributed in Memo Reference

Tahsildar of Salem	4
" Hosur	3
" Dharmapuri	3
" Krishnagiri	3
" Tirupatur	3
" Uttamkari	3
" Namakal	2
" Tiruchengode	2
" Attur	2
Total	25

"No. 3732 dated 17th
Emp.
"December 1890, to the several
"Tahsildars, as noted in
"the margin, and a
notice

"notice as to how these packets should be"
"disposed of has been published at"
"page 18 of the District Gazette dated 5th"
"January 1891. In the above notice the"
"Tahsildars were also directed to report"
"one month after the distribution or soon"
"after the sale has been effected whether"
"the medicine has found a ready market."

"4. "With a view to see what has been"
"the result of the endeavours of the Tahsil-"
"dars in this respect, they were directed"
"to report in Memo Reference No. 3732/Engr. dated"
"7th April 1891, the numbers of packets for"
"which they found sale. The following are"
"the replies of the Tahsildars to the above"
"reference:—"

"Tahsildar of Salem—No. 534 dated 20th May 1891"
" " Namakkal—No. 902 dated 3rd May 1891
" " Tiruchengodu—No. 603 dated 11 April 1891
" " Attur—No. 234 dated 2nd May 1891
" " Tirupatur—No. 793 dated 30th May 1891
" " Hosur—No. 543 dated 11 April 1891
" " Dharmapuri—No. 969 dated 9th May 1891
" " Krishnagiri—No. 267 dated 17 April 1891
" " Uttamkarai—No. 707 dated 15th May 1891

"5. "From the above papers it will be" 55
"observed that the Tahsildar of Hosur and"
"Dharmapuri sold all the three parcels of"
"quinine supplied to each of them. This"
"is creditable."

"The Tahsildar of Uttamkarai, Salem"
"and Tirupatur sold 53, 33 and 14 packets"
"respectively. The Tahsildar of Uttamkarai"
"reports that he can get greater sale at"
"the finer season, that the ignorant"
"classes in villages are generally unfour-"
"ably disposed to the use of quinine for"
"checking fever, and that such of those as"
"can be induced to take the medicine"
"prefer to get quinine powders from the"
"dispensary without payment. He should"
"inform the villagers during his tours,"
"that the medicine is sold at a very"
"small price purposely to place it within"
"the reach of the poorest classes in the village"
"itself."

"The Tahsildar of Tirupatur, owing to"
some

"some mistake in his office, was able to"
"distribute the quinine packets only"
"recently and hopes to get a sale for"
"them. The Tahsildar of Salem should be"
"able to sell more".

7 "The Tahsildar of Attur and Krishna-"
"giri have not been able to sell the 2 and"
"3 parcels of quinine supplied to them"
"respectively. The former gives no reason"
"for his apathy in this matter, while"
"the latter states that he could not sell"
"the packets, as people go to the dispen-"
"sary to get the medicine gratis. The"
"Tahsildar of Krishnagiri apparently"
"has not taken the trouble of distri-"
"buting the packets among the village-heads,"
"which, if he had done, the Collector is sure,"
"the people in out-of-the-way villages are"
"likely to prefer purchasing the medicine"
"at a cost of three pies in their villages,"
"instead"

"instead of undergoing the trouble of"
"walking all the way to the Kasba-town"
"to take a dose of quinine from the dispen-"
"sary gratis".

"The Attur Tahsildar's neglect in this"
"respect needs explanation. He should"
"report at once if he had distributed the"
"packets to the village-heads, and if so,"
"why he has not been able to get a sale"
"for them".

8 "The remaining two Tahsildars —"
"Namakal and Tiruchengod — are altogether"
"ignorant of the orders on the subject. They"
"simply received the parcels sent to them,"
"and never questioned as to why they were"
"supplied, nor have they taken the trouble"
"of reading the District Gazette, which would"
"have put them on guard, as to what was"
"wanted of them. These two Tahsildars are"
"directed to take measures, at once, to secure"
"a sale for the quinine already supplied"
to

"to them."

9 "Is the Government, with the object"
"of minimizing the cost of Carriage of the"
"medicine, direct that no Indent for the"
"medicine should be for less than 50 par-"
"cels at a time, no indent will be sent"
"until the whole stock already supplied"
"is sold. Meanwhile however, the"
"Tahsildars of Hosur and Dharmapuri,"
"who have now no stock in hand, will"
"be supplied with one parcel each, from"
"the quantity supplied to the Kristnagiri"
"and Trichengod Tahsildars respectively,"
"and these should arrange to send the"
"parcels at as small a cost as possible."

10 "A copy of the above memo will"
"be sent to the Government Botanist Cotacamund,"
"in reply to his letter No. 119 dated the 16th"
"May 1891, requesting to know the result of"
"the distribution of quinine packets."

"Sd. G. Stokes"
"Collector"

(d) Issue of Purgative powders with quinine

In December last the Collector of Tinnevelly, having suggested that directions for the administration of the quinine, should be furnished for distribution among those entrusted with the sale of the packets, Surgeon Major North was addressed on the subject and he kindly compiled a Memo of directions. This was sent to Government with the proposal that it should be printed and circulated with every packet, the Jalap required for the purgatives, being supplied by these gardens. Since writing the above, however, the Jalap crop has been lifted, and the out turn disappointing, and so it had to be intimated that the Jalap required would have to be supplied by the Medical Stores Department.

This proposal was approved of by Government in

in G.O. No. 219 dated 11th May 1891. Rennie the Surgeon General was addressed on the matter, and he has ordered 10,000 purgative powders to be made by the Medical Stores Department, and on these being received they will be issued with printed copies of Surgeon Major North's instructions. It seems very desirable that efforts should be made to induce the natives generally to buy quinine, while the drug remains so cheap.

(c) Condition of the quinine first sent out. — In July last, on the first quarterly batch of 200 lbs of Sulphate of quinine being sent to the Medical Stores Department, Ceylon, the Medical Superintendent Civil Medical Stores, Colombo, wrote word as follows: —

"The appearance of the quinine is very much

"against it, and I hope that"
"future supplies will be better crystallized,"
"Unless this point is attended to, it can"
"never compete with Howard and Sons'"
"or other well known quinine."

The crystallization really was very good; and the bad appearance of the quinine was due to its having been partially dried by pressure, instead of by absorption, and so the crystals to become broken up. On receipt of the Medical Superintendent's letter, an offer was made to take all the quinine back, and to send in its place an equal amount of better looking stuff, but the Medical Superintendent said he would not do this, but he hoped for the future a better looking sort of quinine would be sent; and this it is believed has been done, for

for since his remonstrance, no further complaint on the matter has been received.

(f). New method of extracting the Sulphate of quinine from Cinchonidine.—

In a letter dated 17 June 1890, No. 13, embodied in G.O. No. 503 of 30 June 1890- Revenue- giving an account of the manner in which the Sulphate of quinine was manufactured at Nadiwattam, it was asked if any information could be obtained either through the Government of India, or the India office, as to how the Cinchonidine could be easily and cheaply got rid of, when working on Red barks or hybrids. The reply was that no other method than that already adopted was known. Since then, however, Mr Hooper has been

working out the acid Sulphate process used in Germany and Holland by which, on the second crystallization, nearly the whole of the Cinchonidine is eliminated from the quinine. A few experiments in this line have already been made, and the acid Sulphate process of extracting the quinine will probably before long be adopted when working up on Red and Hybrid Cinchona barks.

(g). Service Books.— All the service books of the establishment have been kept duly written up.

W. A. Talbot

Director's office, Ootacamund, 10th July 1891.

Govt Botanist and Director

No. I

From Colonel H. Little, Acting Secretary to the Govt. Botanic Garden Ootacamund

Abstract of the Government Cinchona Plantations to the Secretary to Government Bengal

No. 20 dated 10th July 1891

No. 1

Statement Showing the Rainfall at the several Government Cinchona Plantations Nilgiris, during the official year 1890-91

Months	Dodabetta				Nedivatam				Hooker				Wood			
	For 1889-90		For 1890-91		For 1889-90		For 1890-91		For 1889-90		For 1890-91		For 1889-90		For 1890-91	
	Rainfall	Number wet days	Rainfall	Number wet days	Rainfall	Number wet days	Rainfall	Number wet days	Rainfall	Number wet days	Rainfall	Number wet days	Rainfall	Number wet days	Rainfall	Number wet days
April 1890	3.89	8	6.00	13	5.28	11	8.26	12	8.40	12	6.93	18	5.17	12	4.67	16
May ..	4.95	10	4.77	13	5.83	13	5.34	14	8.37	13	5.44	16	7.30	13	4.35	15
June ..	3.95	22	4.66	24	17.36	29	14.45	23	13.63	25	11.23	22	10.44	26	7.66	23
July ..	8.55	27	4.35	17	18.58	29	17.06	25	21.28	29	12.29	22	15.59	29	9.32	22
August ..	6.37	23	8.22	24	24.07	30	9.82	23	19.08	29	9.15	22	13.51	29	7.18	21
September ..	9.59	22	2.67	11	13.21	24	5.84	21	10.85	22	6.01	17	11.07	23	4.31	16
October ..	8.10	17	9.89	16	14.01	17	5.52	16	13.25	17	5.88	13	11.17	16	5.95	13
November ..	3.92	9	3.57	9	2.95	5	1.49	8	2.41	6	1.54	7	2.54	6	2.03	9
December ..	3.50	6	1.50	3	3.50	7	0.51	3	2.96	6	0.74	3	3.50	6	0.66	2
January 1891	0.65	2	0.25	2	0.02	1	0.10	2	.36	2	0.16	2	0.71	2	0.17	1
February ..	1.10	2	1.62	4	0.10	1	1.19	4	.18	2	1.40	5	0.05	1	0.59	6
March ..	2.43	5	0.63	3	3.12	7	0.00	..	2.70	11	0.02	1	2.65	9	0.03	1
Total	57.00	153	48.13	139	108.03	174	69.58	151	103.47	174	60.79	148	83.70	172	46.92	145

Ootacamund
10th July 1891

H. C. Lawson
Govt. Botanist & Director

No 2.

Enclosure to Letter from the Govt Botanist and Superintendent Cinchona Plantations Nilgiris to the Govt Cinchona Plantation Officer Nilgiris to the Secretary to Government Revenue Department Board's Proceedings No 20 of 10th July 1891.

No 2.

Statement showing the Receipts on account of the Government Cinchona Plantations Nilgiris for the Official year 1890-91

Particulars	Sanctioned Budget Estimate for 1890-91	Revised Budget Estimate for 1890-91	Actuals for 1890-91		
Sulphate of Quinine	33,400	33,400	24,735	..	10
Febrifuge	5,000	5,000	2,800	..	..
Bark to Madras Medical Dept.	500	425	255	..	..
do . Bombay do do	500	500	360	5	..
do . Private parties & Mysore Durbar	..	75	220	8	10
Sale of Seed & plants	200	200	29	4	..
Percentage of the fees of Govt Analyst	100	100	37	3	5
Miscellaneous	300	300	438	7	8
Total	40,000	40,000	28875	13	9

Ootacamund
10th July 1891.

N. A. Lewton
Govt. Botanist & Director

2-8

No 3.

Statement showing the Expenditure in detail on account of the Government Cinchona Plantations, Nilgiris, for the Official year 1890-91

Name of Plantation	Salaries					Nurseries					Working Charges					Manure					Crop					New works					Repairs				
	Budget Estimate		Revised Estimate		actuals	Budget Estimate		Revised Estimate		actuals	Budget Estimate		Revised Estimate		actuals	Budget Estimate		Revised Estimate		actuals	Budget Estimate		Revised Estimate		actuals	Budget Estimate		Revised Estimate		actuals	Budget Estimate		Revised Estimate		actuals
Head office and General	12021		12021																											300		200		199
Doddabetta	3025		3025			400		400		321 14 9	5979		5864		5039 4 5	2220		2514		2764 1 1	3000		3000		2591 14 10						100		200		180
Nedivatam	3545		3545		3246 14 11	420		420		515 13 6	8354		9492		9575 15 9	3082		2872		2458 12 3	1870		1800		1542 8 5	400		420		429 9 5	600		800		1251
Pykara	3153		3153		3153	550		550		515 11 6	6460		5339		4617 10 10	870		870		696 13 9	275		250		79 3 4						380		380		72
Anthropological Department	6133		6133		6723 8																												
Total	27877		27877		28169 6 11	1370		1370		1353 7 9	20793		20695		19232 15	6172		6256		5919 11 1	5145		5050		4213 10 7	400		420		429 9 5	1380		1580		1703

(continued)

Statement showing the Expenditure in detail on account of the Government Cinchona Plantations, Nilgiris for the official year 1890-91 (continued)

Name of Plantation	Contingencies					Printing Charges					Peons clothing					Travelling allowance					House Rent					Total				
	Budget Estimate		Revised Estimate		Actuals	Budget Estimate		Revised Estimate		Actuals	Budget Estimate		Revised Estimate		Actuals	Budget Estimate		Revised Estimate		Actuals	Budget Estimate		Revised Estimate		Actuals	Budget Estimate		Revised Estimate		Actuals	
Head office	800		700		699 13 1	20		40		35 5 -	12		12		12	1500		1500		1500 .. -	..		..		.. .. -	14653		14473		14467 3 11
Dodabetta	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	14724		15003		13922 5 10
Nedivattam	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	18271		19349		19020 12 10
Pykara	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	11688		10542		9135 4 8
Quinologist Deptt	9000		8900		11044 13 6	..		..		.. .. ..	..		..		.. .. ..	..		..		.. .. ..	831		600		600	15964		15633		18368 5 6
Total	9800		9600		11744 10 7	20		40		35 5 -	12		12		12	1500		1500		1500	831		600		600	75300		75000		74914 .. 9

Ootacamund
10th July 1891

W. A. Lawson
Govt. Botanist & Director

No 14

Forwarding No letter from the Govt. of Bombay dated the 5th Instant Enclosing Statement of the Receipts & Disbursements of the Nilgiri Cinchona Plantations

Secretary to Government Bombay

Revenue Department

No 20 of 10 July 1891

No 4.

Statement Showing the Receipts and Expenditure of the Government Cinchona Plantations Nilgiris for the official year 1890-91

Receipts

Classification	Revised Estimate	upto the end of the year
Sulphate of Quinine	33.400	24,735 .. 10
Febrifuge to Madras Medical Deptt	5000	2800 .. ..
Bark to Madras Medical Deptt	425	255 .. ..
Do. to Bombay Medical Deptt	500	360 5 -
Do to Private parties & Mysore Durbar	75	220 8 10
Sale of Seed and plants	200	29 4 -
Percentage of the fees of Govt. Quinologist	100	37 3 5
Miscellaneous	300	438 7 8
	40,000	28875 13 9

Expenditure

Classification	A. Conservancy		B. Establishment		Total	
	Revised Estimate	upto the end of the year	Revised Estimate	upto the end of the year	Revised Estimate	upto the end of the year
Head office & General	2452	2446 3 11	12021	12021	14473	14467 3 11
Quinologist &c. Department	9500	11644 13 6	6133	6723 8	15633	18368 5 6
Dodabetta	11978	10897 5 10	3025	3025	15003	13922 5 10
Nedivattom	15,804	15773 13 11	3545	3246 14 11	19349	19020 12 10
Pykara	7389	5982 4 8	3153	3153	10542	9135 4 8
	47,123	46744 9 10	27877	28169 6 11	75000	74914 - 9

Ootacamund
10th July 1891

M. A. Lawson
Govt. Botanist & Director

No 67

Enclosure to letter from
the Govt. Botanist and
Director of Govt. Cinchona
Plantations Nilgiris
to the Secretary to Govt.
Revenue Department
dated 20th July 1891

Statement showing the quantity of seed and plants sold to the Public during the Official year 1890-91

No 5

Particulars	Seed lbs.	Seed oz.	Plants.
Cinchona Condaminea	5	1	"
do Magnifolia	1	12	"
do Succirubra	"	8	"
Total	7	5	"

Ootacamund
10th July 1891

M. A. Lawson
Govt. Botanist & Director

Received 24 July 91

Chinchona Plantations
Nilgiris
For the Official year 1890-91

No 6

Enclosure to Letter from the
Govt Botanist, and Superintendent
Govt Cinchona Plantations Nilgiris
to the Secretary to
Nilgiris, to the Revenue
Government Board &c &c &c
dated Ootacamund
the 20th July 1891

No 6.

A. Statement showing the total yield of the Government Cinchona Plantations, Nilgiris, for the official year 1890-91

Name of Plantation	Species of Produce	Bark: under Stripping & mossing System: Number of plots	Bark: under Stripping & mossing System: Number of trees decorticated	Bark: under Stripping & mossing System: Out turn of green bark	Bark: Uprooting: Number of plots	Bark: Uprooting: Number of trees uprooted	Bark: Uprooting: Out turn of green bark	Bark: Coppicing: Number of plots	Bark: Coppicing: Number of trees coppiced	Bark: Coppicing: Out turn of green bark	Bark: Scraping: Number of plots	Bark: Scraping: Number of trees scraped	Bark: Scraping: Out turn of green bark	Total number of trees decorticated	Total quantity of green bark collected	Quantity when dry	Propagation: Seed lbs	Propagation: Plants	Propagation: Seedlings	Propagation: Rooted cuttings
Doddabetta	brown bark	10	25765	80170	3	5624	62827	25	2983	17983	..	..	..	34372	160,980	62342	7 1/16	..	..	..
	Magnifolia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3/4	..	..	..	
Nedivattam	brown bark	..	..	..	..	..	..	5	2275	10593	..	..	..	2275	10593	3530	..	..	..	..
	Red ..	..	..	..	1	1453	46607	3	5333	107085	..	..	..	6786	153692	51230	1/2	..	..	..
	Magnifolia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2 5/8	..	..	..
Pykara	brown bark	..	..	..	1	321	7537	..	..	1522	1	..	21442	321	30501	10,166				
	Red bark	..	..	..	..	..	..	2	505	18250	..	..	..	505	18250	6083				
																133351				
Add the balance on 31st March 1890																477744				
	Total															611095				

Ootacamund
10th July 1891

M. C. Lawson
Govt. Botanist & Director

No 44

Enclosure to Letter from the Govt Botanist and Director of Public Gardens & Plantations Nilgiris to Planters Association Nilgiris forwarding the Secretary to Government's Review upon Report and Accounts for the year 1890-91

Ootacamund 10th July 1891.

Statement showing the disposal of Bark and other produce collected in the Government Cinchona Plantations, Nilgiris, for the official year 1890-91

No 6.

Name of Plantation	Species of Produce	Bark: Used for febrifuge & Sulphate quinine — Bales No	Bark: Used for febrifuge & Sulphate quinine — Quantity lbs	Bark: Sold in the country — Bales No	Bark: Sold in the country — Quantity lbs	Bark: Supplied to Medical Department — Bales No	Bark: Supplied to Medical Department — Quantity lbs	Bark: Total — Bales No	Bark: Total — Quantity lbs	Seed: Sold to the Public lbs	Seed: Used for nurseries lbs	Seed: Total lbs	Propagated Plants & Seedlings: Plants: Sold to the Public	Plants: Permanently put in the Plantation	Seedlings: Sold to the public	Rooted cuttings: Transplanted	Remarks
Doddabetta	brown bark	492 3/4	49272	..	..	8	800	500 3/4	50072	5 7/16	..	5 7/16	..	8462	..	..	
	Magnifolia Do	..	..	..	..	..	..	..	..	1 3/4	1 1/2	3 1/4	..	..	..	..	
Neduvatam	brown Do	274 3/4	27486					274 3/4	27486	..	2	2	..	39425	..	..	
	Red Do	..	..	24	2400	10	1000	34	3400	1/2	..	1/2	..	..	..	..	
	Magnifolia	..	..	..	..	..	..	..	..	..	2 7/8	2 5/8	..	..	..	..	
Pykara	brown	194	19442	..	..	..	..	194	19442	..	..	..	..	9600			
	Magnifolia	..	..	..	..	..	..	..	..	..	..	..	..	11900			
	Red.																
Add the balance on 31 March 1891									100400 / 510695								
	Total								611095								

Ootacamund
10th July 1891

W. A. Lawson
Govt. Botanist & Director

No 7 B

Enclosure to letter from the Govt Botanist Nuwara Eliya
to Government Entomologist
Peradeniya Mycologist
the Secretary to Government
Revenue Survey & Agriculture
Observatory Nº 20 of 10 July 1891

No 7

Statement showing the approximate number of plants in Permanent Plantations, Ceylon,
on 31 March 1891

Species	Dodalletta				Nedunestum				Hooker				Wood				Grand Total
	Plants last year	coppices or uprooted	Plants in this year	Total	Plants in last year	coppices or uprooted	Plants in this year	Total	Plants in last year	coppices or uprooted	plants in this year	Total	Plants in last year	coppices or uprooted	Plants in this year	Total	
b. Succirubra	..	..	..	..	55388	6786	..	48602	3568	505	..	3063	..	..	..	..	51,665
b. Officinalis	583336	6607	8462	585191	60009	2275	39425	97159	362170	321	9600	371449	..	..	..	..	10,53,799
b. Calisaya Var Ledger	130	..	..	130	..	..	..	..	..	..	..	..	..	..	..	..	130
b. do other varieties	..	..	..	..	143	..	..	143	..	..	..	..	..	..	..	..	143
b. Micrantha	26	..	..	26	..	..	..	..	..	..	..	..	..	..	..	..	26
b. Pitayensis	43	..	..	43	..	..	..	..	..	..	..	..	..	..	..	..	43
b. Lanceolata	..	..	..	..	5	..	..	5	..	..	..	..	..	..	..	..	5
b. Carthagena	18	..	..	18	716	..	..	716	50	..	..	50	45	..	..	45	829
b. Santa Fé	9	..	..	9	3	..	..	3	..	..	..	..	..	..	..	..	12
b. Hybrid & others	61806	..	..	61806	269925	..	..	269925	269820	..	11900	281720	41583	..	..	41583	655,034
Total	645368	6607	8462	647223	386189	9061	39425	416553	635608	826	21500	656282	41628	..	..	41628	17,61,686

Peradeniya Museum
the Assistant Superintendent
the Assistant Superintendent
other Broadleaf Parks and Gardens
in the Govt Cinchona
Plantations Nuwara Eliya for
the official year 1890-91

Nº 2030

Peradeniya
10th July 1891

H. A. Lawson
Govt. Botanist & Director

No 8.

Comparative Statement showing the quantity of bark of all sorts in store at the commencement of the year 1890-91, collected and disposed of during the year and remaining in store at its close

Description of bark	1889-90																			
	Quantity in store at the commencement of the year						Collected during the year	Total	Disposed of during the year				Balance at the close of the year							
	crop of 1883-84	crop of 1884-85	crop of 1885-86	crop of 1886-87	crop of 1887-88	Total			crop of 1883-84	crop of 1885-86	crop of 1886-87	Total	crop of 1883-84	crop of 1884-85	crop of 1885-86	crop of 1886-87	crop of 1887-88	crop of 1888-89	crop of 1889-90	Total
Brown bark	..	974	49952	53813	82233	186972	74058	261030	..	974	6276	7250	..	..	43676	53813	82233	74058		253780
Red bark	..	51525	28981	35056	26009	141571	68568	210139	..	10812	..	10812	..	40713	28981	35056	26009	68568		199327
Magnifolia	1100	340	..	3877	1920	7237	17600	24837	200	..	..	200	900	340	..	3877	1920	17600		24637
	1100	52839	78933	92746	110162	335780	160226	496006	200	11786	6276	18262	900	41053	72657	92746	110162	160226		477744

(continued)

Comparative statement showing the quantity of bark of all sorts in store at the commencement of the year 1890-91, collected and disposed of during the year and remaining in store at its close (continued)

Description of bark	1890-91																			
	Quantity in store at the commencement of the year							Collected during the year	Total	Disposed of during the year				Balance at the close of the year						
	crop of 1883-84	crop of 1885-86	crop of 1886-87	crop of 1887-88	crop of 1888-89	crop of 1889-90	Total			crop of 1886-86	crop of 1886-87	crop of 1887-88	Total	crop of 1883-84	crop of 1885-86	crop of 1886-87	crop of 1887-88	crop of 1888-89	crop of 1889-90	crop of 1890-91	Total
Braunbark	..	..	43676	53813	82,233	74058	253780	76038	329818	..	43676	53324	97000	..	..	..	489	82233	74058	76038	232818
Red bark	..	40,713	28981	35056	26009	68568	199327	57313	256640	3400	..	..	3400	..	37,313	28981	35056	26009	68568	57313	253240
Magnifolia bark	900	340	..	3877	1920	17600	24637	..	24637	..	..	..	..	900	340	..	3877	1920	17600	..	24637
	900	41053	72657	92746	110,162	160226	477744	133351	611095	3400	43676	53,324	100,400	900	37653	28981	39,422	110,162	160226	133351	510695

Calcutta
10th July 1891

N. L. Lawson
Agent. Botanist & Director

No. 9

Enclosure to letter from the Govt. Botanist and Director of the Govt. Cinchona Plantations to the Govt. Secretary to Religious & the Special Commissioner Revenue Department No. 20 dated Ootacamund 10th July 1891.

No. 9

Statement Showing the particulars of cinchona bark disposed of during the year 1890-91

Particulars	Product of 1885-86 Pounds	Value realized	Product of 1886-87 Pounds	Value realized	Product of 1887-88 Pounds	Value realized	Total Pounds	Value realized	Remarks
		Rs. A. P.		Rs. A. P.		Rs. A. P.		Rs. A. P.	
Cinchona bark used for the manufacture of solid febrifuge and S. quinine	..	.. ..	42876	.. .. ..	53324		96200	*	
Cinchona bark supplied to the Madras Medical Department	1000	255	..	.. .. ..	..	.. .. ..	1000	255	
Cinchona bark supplied to Bombay Medical Department	..	.. .. ..	800	360 5 ..	..	.. .. ..	800	360 5 ..	
Cinchona bark supplied to Mysore Durbar and Private parties	2400	220 8 10	..	.. .. ..	..	.. .. ..	2400	220 8 10	
	3400	475 8 10	43676	360 5 ..	53324	.. .. ..	100400	835 13 10	

Ootacamund 10 July 1891

*Value of 2928 lbs 2 ozs. of Sulphate of quinine @ Rs 16-7-9- Rs 48,268-5-..
Value of 1050 lbs of Febrifuge ... @ Rs 14-..-.. 14700-..-..
62,968-5-..

M. C. Lawson
Govt. Botanist & Director

Conservative Statement showing the Quantity of all sorts of Cinchona bark at the Commencement & the Close of the Years 1890-91 collected & purchased during the year & issued from time to time for the manufacture of Sulphate of quinine & Febrifuge.

32

No 10

Enclosure to letter from
The Govt Botanist and Director
The Govt Cinchona Plantations
To the Govt Chemical Examiner to
Govt Nilgiris to the Secretary to
Nilgiris to the Revenue &
Government Opium Department
No 20 dated 10 July 1891

No 10.

Statement showing the particulars of Cinchona Febrifuge and Sulphate of quinine manufactured and disposed of during the year 1890-91

Particulars	Quantity in store at the commencement of the year	Manufactured during the year	Total	Disposed of during the year: To Madras Medical Department	To Bombay Medical Department	To Mysore Burmese private parties & Patty packs to Collectors	To Calcutta	Total	Leakage and drying during transit	Balance at the close of the year including paper packets	
Solid Febrifuge	350	1050	1400	200	"	"	"	200	"	1200	
Sulphate of quinine	"	2928-2	2928-2	20	400	136-2	800	1356-2	"	1572	
10 #	5	5	4	4	4	4	4	4	4	4	

Ootacamund
10 July 1891

M. A. Lawson
Govt. Botanist & Director

No 11

Enclosure to letter from the Govt Botanist and Director of Govt Cinchona Plantations Nilgiris to the Secretary to Government Revenue Department Ootacamund No 20 dated 10 July 1891

Statement showing the particulars of Cinchona febrifuge and Sulphate of quinine manufactured and disposed of during the year 1890-91

11
No 5 761 91

Ootacamund 91/34
June 27th 1891

From

D. Hooper Esquire,
Government Quinologist

To

M. A. Lawson Esquire,
Government Botanist and director
Cinchona Plantations
Nilgiris.

Sir,

I have the honor to report on the analytical work conducted in the laboratory during the year ending March 31st 1891.

The cinchona bark and the chemicals used in the manufacture of quinine at Naduvatam have been analysed from time to time, and the products of the factory have been constantly tested as to their purity. The sulphate of quinine has been well up to the standard of the British Pharmacopoeia, and the febrifuge has been uniform in composition. A recent analysis of the febrifuge is appended, and it is shown to contain more than half of its weight of the alkaloids,

quinine

quinine and cinchonidine.

Quinine	11·35
Cinchonidine	40·43
Cinchonine	30·88
Amorphous alkaloids	8·13
Moisture	4·57
Coloring matter &c.	4·64
	100·00

Carthagena Bark. The Carthagena bark trees at Naduvatam have been examined, and as mentioned in the two previous annual reports, were found to contain no quinine whatever. A few trees planted in the Dodabetta Plantations, and taken from the plants brought by Mr. Cross from South America in 1880, were thought to be the Magdalena plants, belonging to a better variety than those raised at Naduvatam, but I am sorry to say that the analysis reveals a similar result to that previously recorded; there was a total absence of quinine in the bark. We are therefore compelled to come to the conclusion that the introduction of Carthagena Cinchona into the Nilgiris has not been attended with

with success, and the same conclusion has been arrived at in Bengal and Ceylon. The following are the analyses referred to:-

	Dodabetta "Carthagena"	Naduvatam "Carthagena"
Quinine	none	none
Cinchonidine	·89	1·10
Cinchonine	·60	·85
Amorphous	1·40	1·85
	2·89	3·80

Morada and Verde Barks. In 1883 some seeds of the "Morada" and "Verde" varieties of the Cinchona Calisaya were purchased through the Secretary of State, and seedlings were raised on the Nilgiris, and on the Bengal Government Plantations near Darjeeling. The seeds were procured from Bolivia and were said to be taken from trees affording some of the best yellow bark of commerce, and to be equal, if not superior to the well known Ledger bark. The Nilgiris proved too elevated a situation for these species, but they have done well on the Wynaad at 3000 ft. and

in

in British Sikkim at and below 2000 ft.
About five years ago, I observed in an estate
in the Wynaad a plot of Moradas and
Verdes of about two years of age planted
near a plot of Ledgers of the same age.
The Moradas and Verdes had a greater
girth of stem, and thicker bark, and
were taller than the neighbouring Ledger
plants. They had been analysed a
few months before and had a some-
what similar alkaloidal value. A
satisfactory growth has been made
since then, and last year, when the
trees were six years of age, some bark
was taken from the Verdes, and gave
an analysis of 7 per cent of sulphate
of quinine, and sold for a good price
in the London market. This year
I received from the same estate some
more bark, and found it to contain
7·80 per cent. of Sulphate of quinine
and 8·32 per cent. of total alkaloids,
and some bark taken at the same
time from Ledger trees of the same
age, yielded 6·81 per cent of sulphate
of

of quinine and 7·27 per cent of total
alkaloids. It is apparent from these
and other experiments, that these varieties
of Calisaya are well worth cultivating,
especially at a time when richer
barks are preferred by manufacturers,
and appreciated in the home markets.

Nux Vomica Leaves — Mr J. Cameron, Banga-
lore, last November,
enquired if fresh Nux Vomica leaves
were poisonous, informing me at
the same time that a gentlemen
residing near him had lost three
horses, it was supposed, from
the leaves of this tree. Another case
was that of a cow, belonging to
Sir Oliver St John, dying under
suspicious circumstances, and nux
vomica trees were growing in the
compound where she was in the
habit of grazing. "The cow had
convulsions, bled at the mouth
and nostrils, and only lived for a
short time from the commencement
of

of the attack". The poisonous nature of the leaves has never, to my knowledge, been investigated, so I considered this a sufficient reason for prosecuting an enquiry into the subject. An analysis of the leaves resulted in the separation of an alkaloid having the properties of brucine, and amounting to 0.35 per cent. Brucine is associated with strychnine in the seeds of the Nux-vomica, and in the wood and bark, and has the same physiological effects as strychnine in inducing well-marked tetanic symptoms. The leaves of the nux vomica, therefore, taken in sufficient quantity, would produce poisonous results, and precautions should be taken in keeping cattle from feeding upon them.

Nux Vomica parasites. An interesting question has been investigated regarding the poisonous nature of the vegetable parasites growing on

on the Nux Vomica. It is recorded in the Pharmacopoeia of India that species of Viscum and Loranthus, growing on this tree, become just as poisonous as the tree itself, and that in the leaves of one species, the Viscum monoicum, the two alkaloids strychine and brucine were detected. These statements have been copied into other works, without experimental confirmation, so I was desirous of ascertaining if these alkaloids were really present in the parasite, and if so, whether they were in the same proportion as they are found in the Strychnos Nux Vomica. The forest officer of Ganjam, a district where the Strychnos grows so plentifully, sent at my request a supply of a species of Viscum, which was identified as V. articulatum. The sample was a small one, but it was sufficient to determine by analysis that the trace of alkaloid present was neither strychnine nor brucine. The leaves contained a peculiar tannic acid similar to that found in other mistletoes

mistletoes, and a resin soluble in ether and alcohol, striking a blood-red colour with strong sulphuric acid. The chemical constituents are altogether different to those found in the leaves of Nux vomica, and this fact goes far to disprove the theory that parasites partake of the properties of their hosts. In confirmation of this, M. A. Chatin has recently contributed to the Paris Academy of Sciences a note on the biology of parasites, in which he asserts that the tannin of the mistletoe is not identical with that of the oak on which it grows; that the Loranthus on the Strychnos Nux Vomica does not contain a trace of either strychnine or brucine, and that the Balanophora parasitic on Cinchona Calisaya does not contain any of the alkaloids of cinchona barks. It is evident, therefore, that the sap absorbed from the host plant must

must be modified by the parasite to form its own peculiar products.

Vinca pusilla While on the subject of poisonous plants, I would draw attention to the report on the Vinca pusilla sent to the Board of Revenue This plant is allied to the British Periwinkle, and is called in Tamil Milakaipoondoo. It is the Kupameela of Rheede, and is used on the Western Coast as an external remedy for lumbago, and the ryots of South Arcot say that if cattle graze upon it they become giddy and die. A sample was forwarded for analysis by the Board, and I found that the poisonous property of the herb was an alkaloid, distinguished by giving a carmine red colour with pure nitric acid. Vincine is proposed as the name for this new alkaloid.

Indian Gutta percha An abundance of gutta percha milk ha

has been yielded during the past dry weather in the Wynaad by the Panchotee tree (Dichopsis elliptica, Dalz.) and some planters have been asking for information on the subject, and enquiring whether it could be made into a commercial article. The milk has been known for some years to afford what was called Indian Gutta percha or Palaquin, and has been used as an adulterant of Singapore gutta. General Cullen brought it to notice about 35 years ago, and Dr. Bleghorn published a memorandum on the subject at the time. It was reported upon by experts in London, who found that it was unfit for water proofing purposes, as its solution in coal tar and turpentine dries up to such a brittle consistence, that the fabric is quite useless. It could be used as a birdlime, or cement, and keeps well under

water, as a cable insulator, especially if mixed with some genuine gutta. By boiling the milk of the Panchotee tree, a white mass separates, which can be kneaded by the fingers, but which becomes hard and brittle when cold. The brittle character of this substance I find is due to a large proportion of a crystalline substance found in the true gutta, and called crystalban or albain. Crystalban, according to Payen, occurs to the extent of from 14 to 19 per cent. in the best kinds of Gutta-percha, but I have extracted as much as 69.2 per cent of crystalban from the secretion obtained from the Wynaad. The presence of a large quantity of crystals in the gum of course would interfere with its utility, but crystalban is easily removed by boiling alcohol, and the residue consists of a very good and pure gutta percha. I cannot see why this process could

could not be used to purify the Indian gutta percha, and so obtain an article similar to the Malayan gum.

Jalap and Specacuanha — The Jalap tubers cultivated on the Doddabetta Plantations have been supplied to the Madras Medical Store Department, and I should like to point out to Government the richness of these tubers in the resinous active principle compared with those obtained from Mexico. The Nilgiris are eminently adapted for the cultivation of the Jalap, and it is surprising that no private planters have taken up the propagation of a drug which would lead to a profitable industry.

Another important article of Materia Medica (the Specacuanha root) is growing well in the Wynaad. I recently analysed a sample of the root from a plant only 2 years old, and found it to contain as much emetine as is found in the commercial drug.

Eugenia tea — A native gentleman in Mysore sent a sample of prepared tea made from the leaves of a kind of Jumbal for examination and opinion as to its effect, if used constantly as a beverage. The leaves were identified by Mr. Lawson as those of Eugenia caryophllaea, a myrtaceous shrub. They contained a little tannic and gallic acids, colouring matter, essential oil and ash, but no stimulating constituent, such as the alkaloid Caffeine, found in tea and coffee. This beverage would be an innocent one, and not likely to effect the system, either in health or disease.

Geospegia tubers. These nutritious little tubers have been analysed

analysed. They are used as food by natives where they grow. On the Nilgiris the tubers of Ceropegia pusilla are called Chittan Kilangu, and are eaten both raw and Cooked. When young they are sweet and succulent, and when older they become bitter, but still very palatable. The bitterness is due to an alkaloid, which is removed by boiling water in the process of cooking. The shepherds in the Punjab and Mooltan eat the tubers of Ceropegia bulbosa, which they consider to be tonic and digestive. The following is an analysis of the last named tuber:-

Moisture	5.25
Fat	3.30
Sugar, gum &c.	23.40
albuminoids	3.48
Starch	42.50
Crude fibre	12.64
Ash	9.43
	100.00

I have the honor to be,
Sir
Your Most Obedient Servant.
D. Hooper.
Government Chemologist

№ 12

Enclosure to letter from the Govt. Botanist + Director of the Government Cinchona Plantations Nilgiris to the Secretary to Government Revenue Department Ootacamund № 20 dated 10 July 1891

12/Rev 5861/91

Mineralogist Report for 1890-91.

NO. 20 107 1

DIRECTOR'S OFFICE.

OOTACAMUND, 10 July 1891.

From

M. A. LAWSON, ESQ.,

GOVERNMENT BOTANIST AND DIRECTOR OF

GOVERNMENT CINCHONA PLANTATIONS, &c.,

Nilgiris.

To

The Secretary to Government

Revenue Department

Ootacamund

SIR,

I have the honor to forward the Annual Report on the Government Cinchona Plantations, Nilgiris, for Year ending 31st March 1891.

I have the honor to be
Sir
Your most obedient servant
M. A. Lawson
Govt. Botanist & Director

Dept

REVENUE {1891.} ~~CINCH~~ONA.

Circuit number 5361

From

M. A. LAWSON, Esq.,

Government Botanist and Director of

Government Cinchona Plantations,

Nilgiris,

To *The Secretary to Government*
Revenue Department
Ootacamund

No. 20

Dated 10
Despd. 10 } July 1891.
Recd. 10

Enclosure

Subject

GOVERNMENT OF MADRAS
10 JUL 91
REVENUE DEPARTMENT

Government Cinchona
Plantations, Nilgiris.
Submits the annual
Administration Report
on the —— for the official
year 1890-91.

G.O. 851 9.9.91

Read G. No 5361 of 91

2

111

Issue copy of Draft

Order dt 9 Sept 1891. no: 851.

Mr. Lawson submits his report on the working of the Govt. Cinchona Plantations during the year 1890-91 and the report of the Analytical work conducted during the same period by the Govt. Quinologist.

2. **Season** - The season was remarkable for its light rainfall, the deficiency as compared with former years being especially noticeable on the west of the plateau in the months of August, September, October and November. The rainfall registered on the Naduvatam, Hooker and Wood Estates during these four months for the past two years is shown below:-

JHL 8/9/91

Hes 8 Sep

Estates	1889-90	1890-91
	inches	inches
Naduvatam	54	23
Hooker	46	22
Wood	38	19

The Director, however, reports that the

the estates have not materially suffered on this account although there appears to have been some mortality amongst the very oldest and also amongst the youngest trees.

3. Working:- The total number of trees standing on the Govt. estates at the close of the year under review was 1,761,686, or 52,893 more than the total of 1889-90. The principal planting operations of the year were performed at Nadgatam, where over 39,000 plants of the Officinalis Species were put down chiefly with the object of replacing the trees uprooted during 1889-90. It is to be regretted that a large portion of these young trees have proved to be failures on account of the dryness of the season

4. The quantity of bark remaining in stock at the close of the last five years is shown in the subjoined statement:-

		lbs
On 31st March	1886-87	158,222
"	1887-88	243,968
"	1888-89	335,780
"	1889-90	477,744
"	1890-91	510,695

From this it will be seen that the stock of bark in hand have been steadily accumulating during recent years. It was observed in last years review that the storing of so large a quantity of bark must in itself be a matter of some difficulty, and Mr Lawson now reports that the yield for 1890-91 has to be kept down on this account. In his letter read in Go. 826 Rev: dt 20th Oct: 1890 the Director stated that he would be enabled to use the whole of this enormous stock for the manufacture of quinine during the next few years. H.E. the Governor in Council trusts that Mr. Lawson's anticipations will prove correct, but the work at the Quinine factory does not seem to be progressing so rapidly as was expected. In his letter just quoted Mr Lawson assured the

Govt.

Govt. that the output of quinine would approximate to the revised estimate of 4000 lbs for the year under review, but the actual outturn was only 2928 lbs, or more than 1000 lbs short of this forecast. Unless work is now pushed on more speedily, it will in future years be impossible to harvest any fresh bark until more room is made available in the Store-houses, and the only plan will then be to sell the bark as it stands, a course to which, it is observed that, Mr. Lawson is himself opposed.

5. The causes for the short outturn of quinine during 1890-91 are said to be threefold:

(i) the influenza epidimic which prevailed at the commencement of the year,

(ii) the insufficiency of the present machinery and the unsatisfactory state in which it was received from England, and

(iii) the tardy supply of chemicals necessary for the manufacture of quinine.

As regards the first point, it is observed that new workmen

were obtained to replace those who ran away through fear of being attacked, and that there was no severe outbreak of the disease at the Factory.

A separate and full report should be submitted at an early date on the subject of No(ii). The annual Administration Report is not for the discussion of the place where such matters should primarily be dealt with, and here. Regarding Lawson's complaints against some of the machinery furnished to him are too vague to warrant any definite action being taken thereon. Moreover the Govt is not prepared to sanction additions to the existing vats and steam-pans, unless the proposals are accompanied by the usual plans and estimates and the necessity for further extension is clearly demonstrated.

The third cause detailed above is no doubt a powerful deterrent to speedy and extensive work. In the letter forwarding Mr. Lawson's report of Dec: 1890, to the India Office the Asst. Under Secretary of State was requested to take special measures to avoid delay

delay in arranging for the supply of the articles in question. This letter was dated 5th January 1891. Nos 5 Rev, and the Director reports that up to June 26, 1891, only a portion of the indent had been complied with. It is believed that the remaining chemicals have since then been received, and the delay appears to have been caused by the difficulty experienced in obtaining the fusel oil. The Director General of Stores reported in his letter of April 17, 1891, that a contract for 20,000 lbs of oil had been entered into at Hamburg and this supply should now be on its way to India. For the future, however, Mr Lawson should be careful to send in all indents for submission to the Secretary of State at least six months before the articles are required. It would, moreover, be well to indent for larger quantities of such chemicals as are constantly utilised in the manufacture of quinine, in order that frequent references on the subject, and consequent delays, may be avoided.

6. The outturn of 2968 lbs of quinine was utilised to meet

indents

× This has been ascertained from the Cinchona Officer - Ootacamund

indents amounting to 1356 lbs received during the year and the remainder has been since disposed of. In his letter of 17th June 1891, read in G.O. Misc. No 3870 of 6th July 1891, Mr Lawson reported that, since the close of 1890-91, indents for quinine aggregating Rs 60,000 had been received and that more were expected. To meet this demand Rs 36,000 worth of quinine the drug had within the date of the above letter been supplied. It is not clear how these figures are obtained, for the price of quinine is noted in the same letter to have fallen from Rs 16-7-9 to Rs 14-11-3 per lb and it is presumed that the latter rate is adopted. On this calculation Rs. 36,000 worth of quinine represents nearly 2500 lbs of the drug and Rs 60,000 somewhat over 4,000 lbs. From these figures it would appear that the requisitions upon the Nadivatam Factory are increasing, and H.E. in Council must again impress upon Mr Lawson the importance of making the manufacture keep pace with the demand. The Director

Gives

fnels no estimate of the amount of quinine which he expects to turn out during the current year, but it is evident that at least 4000 lbs will be required.

7. The manufacture of the solid febrifuge was continued during the year and although some 1200 lbs of this drug remained in stock at its close, the greater portion has since been issued to the Medical Depts of Madras and Bombay.

8. <u>Distribution of Quinine to Collectors.</u>— The issue of quinine to Collectors for distribution and sale in the fever-rish parts of their districts is dealt with by the Director in para IX (C) of his report. Packets of the drug, together with purgative powders to be taken before the quinine, have been supplied to the Collectors of all districts except Madras, and the following table shows the amounts already sold according to reports recently received.

Districts	Packets@ issued	Sold	
		packets@	powders
Canara, South	46	22	..
Coimbatore	47	6	24
Cuddapah	47	11	40
Ganjam	47	15	..
Kurnool	47	22	58
Nellore	47	3	69
Vizagapatam	47	23	50

@ 1 packet = 100 powders of 5 grains each

No information has been received from the Collectors of other districts regarding the progress made with the sale of quinine.

9. It is as yet too early to decide whether this experiment is meeting with general success. The Collectors of Vizagapatam, Kurnool and S. Canara are of opinion that a ready market for the quinine may be anticipated, and the manner in which the powders and packets have already been bought by the people of those districts, argues that they are alive to the value of the drug. In the remaining districts, from which reports have been received, the results are so far disappointing. The Memorandum from

Vizag[apatam] also sent in a fourth report a day or two after the [illegible] figures entered Rm

from the Collector of Salem, embodied in the Directors report, shows that the taluq officials are in some cases apathetic in the matter, and unless some trouble is taken by these officers to explain to the people the therapeutic properties of the medicine, it is not likely that it will be extensively purchased. It is but natural that amongst the poorer classes, whose education is imperfect, there should be a rooted objection to any payment, however small, for a foreign medicine of which the effects are comparatively unknown and Govt. in Council will be prepared to consider the advisability of issuing the packets and powders free of charge for some time, if it can be shown that such a course would lend to give the drug a wider market in the future.

but it is to be hoped that by patient and persistent efforts on the part of Govt. officers, and by the gradual spread of the knowledge of the effects of quinine in preventing and curing fever, any existing scruples may be overcome.

I am very doubtful of the Govt. taking [illegible] a measure. For [illegible] any confidence & the same people [illegible] any suspicion if [illegible] are, the more suspicion they will [illegible] the [illegible] philanthropy & [illegible] in giving away quinine free of charge. By whom [illegible] the powders then to be [illegible] packets should be charged for & [illegible] there will be much [illegible] It is [illegible] undesirable that Govt. officers & agents employed [illegible] should be [illegible] by Govt. to do [illegible] the [illegible] Rs. 2000 - [illegible] the [illegible] charge [illegible] on price for [illegible] - such [illegible] system of charging [illegible] to expect to [illegible] the [illegible] compel it [illegible] to [illegible] them [illegible] through [illegible] sold. [illegible] to medical [illegible] on policy [illegible] to [illegible] the high [illegible] that [illegible] fixed charge & [illegible] the [illegible] - what is [illegible] system [illegible] - an [illegible] - what is [illegible] quite [illegible] to [illegible] [illegible] [illegible] [illegible] spread the [illegible] that the [illegible] people to [illegible] [illegible] [illegible] [illegible] Chemists [illegible] by giving the [illegible] [illegible] free of charge [illegible] [illegible] [illegible] [illegible]

amongst the poorer classes. In the meantime all District officers will use their best endeavours to further the sale of the medicine

11. **Financial** - The statements appended to this review show the receipts and disbursements for 1890-91 and for previous years. The actual receipts amounted to Rs 28,876 as against a Revised estimate of Rs 40000. If credit be taken for the quinine and bark issued during the year, of which the value was not realised before its close, the receipts are raised to Rs 30529, and if the value of the stock in hand at the end of the year be also included at the rates prevailing during the year, the figure comes to Rs 73,555. These rates have since been reduced to Rs 14-11-3 per lb for quinine and to Rs 10 per lb for Cinchona febrifuge, but Mr Lawson hopes during the current year to realize enough to cover his expenditure.

The charges amounted to Rs 74,914, or to Rs 6734 more than in the previous year. The increase is said to be due to the payment during the year for fusel oil, which should properly have come upon the accounts of 1889-90., and to the additional charges incurred at the Nadiwatam Factory. The Expenditure in the Quinologist's department alone was Rs 18,366 as against 14605 in the previous year. Statement no II shows a deficit on the year's operations of Rs 4832 .. 6 .. 9

12. The Analytical report submitted by Mr. Hooper has been read by the Govt with much interest.

Rev
28. Aug. 91.

CL
3/9

To

The Govt. Botanist
" Comrs of L.R
" Comrs C.S. &c.
" Mil[y] Dept
" Pub: Dept
" Financial Dept
" Surgeon General with the Govt. of Madras (thro Pub: Dept)
" Accountant General

Copy to the Hon[ble] Secy. Agri: Horti. Society
" Chamber of Commerce
copy to the Govt: of Bengal

wesp[d] 7/10/91

7/10/91 Secl[t] no: 857A

Copy to the Govt. of India Rev: and Agri: Dept

Rev
V

156/12

C.H. 28/9.

Draft Review

Cinchona Admn Report

for 1890-91

The Hon: the Garstin C.S.I.

The Hon: the Stokes C.S.I

G. C. dtd 9 Sept: 1891, no: 851

Parish see ltr dated 9/9

C 5/9

125

REVENUE DEPARTMENT.

Current No.

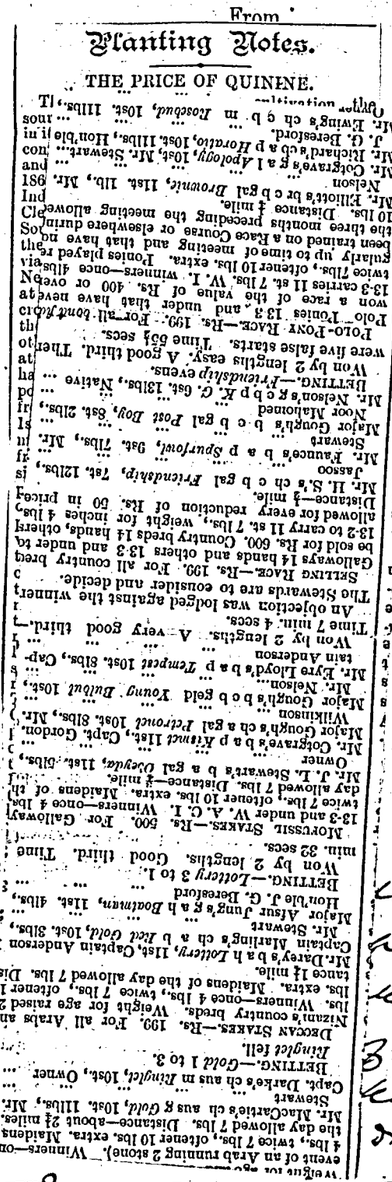
From

Dated 18 .

OR ORDERS.

a draft review on the Cinchona Dept for 1890-91 is circulated for approval.

Attention is invited to paras. 9 & 10. It is not known whether H.E. will approve of the idea therein put forward that it would possibly be advisable to distribute the packets & powders of Quinine free for a time, in order to make a demand amongst the poorer classes. The point is one for further consideration when it has been seen whether the packets now issued are readily sold, but from the few reports that



Planting Notes.

THE PRICE OF QUININE.

the Drand can not be sanctioned. I consider it to be undesirable to do so when applications are so abundantly put to us for exemption from charge from those who can afford to buy, & probably benefit by this is a middle

APPENDICES.

No. I.

STATEMENT showing the Capital and Revenue Account of the Government Cinchona Plantations, Nilgiris, from the commencement up to the official year 1890-91.

Year.	Charges.							
	Establishment including Superintendent's salary.	Building and plant.	Working charges.		Total.	Total outlay to end of year.	Simple interest at 4½ per cent. on outlay to end of previous year *plus* half outlay during the year.	Total of columns 6 and 8.
			Departmental labor.	Convict labor.				
1	2	3	4	5	6	7	8	9
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1860-61	..	..	4,821 15 0	..	4,821 15 0	4,821 15 0	108 7 11	4,930 6 11
1861-62	..	..	22,914 15 4	..	22,914 15 4	27,736 14 4	732 9 2	23,647 8 6
1862-63	..	..	48,390 0 0	..	48,390 0 0	76,126 14 4	2,336 15 0	50,726 15 0
1863-64	12,726 14 7	..	53,173 9 2	..	65,900 7 9	1,42,027 6 1	4,908 7 7	70,808 15 4
1864-65	24,444 8 11	..	59,666 12 0	..	84,111 4 11	2,26,138 11 0	8,283 11 9	92,395 0 8
1865-66	25,449 14 0	3,700 0 0	58,887 5 0	..	88,037 3 0	3,14,175 14 0	12,157 1 4	1,00,194 4 4
1866-67	23,803 9 10	3,025 0 0	52,632 0 0	48,666 10 8	1,28,127 4 6	4,42,303 2 6	17,020 12 6	1,45,148 1 0
1867-68	26,037 2 1	2,600 0 0	43,205 14 4	48,666 10 8	1,20,649 12 1	5,62,952 14 7	22,618 3 6	1,43,267 15 7
1868-69	25,671 7 10	2,030 0 0	30,636 1 0	48,666 10 8	1,07,004 3 6	6,69,957 2 1	27,740 7 8	1,34,744 11 2
1869-70	25,783 5 4	5,334 5 8	19,163 0 0	..	50,280 11 0	7,20,237 13 1	31,279 6 2	81,560 1 2
1870-71	23,730 5 4	300 0 0	6,143 0 0	..	30,173 5 4	7,50,411 2 5	33,089 9 8	63,262 15 0
1871-72	17,157 5 4	3,250 0 0	13,160 4 9	..	33,567 10 1	7,83,978 12 6	34,523 12 5	68,091 6 6
1872-73	12,724 0 0	550 0 0	16,441 0 0	..	29,715 0 0	8,13,693 12 6	35,947 10 2	65,662 10 2
1873-74	12,574 0 0	2,758 0 0	15,091 14 0	..	30,423 14 0	8,44,117 10 6	37,300 12 2	67,724 10 2
1874-75	16,406 8 0	1,700 0 0	17,417 0 0	..	35,523 8 0	8,79,641 2 6	38,784 9 2	74,308 1 2
1875-76	17,234 0 0	1,550 0 0	27,423 0 0	..	46,207 0 0	9,25,848 2 6	40,623 8 3	86,830 8 3
1876-77	8,064 5 4	6,715 8 11	44,850 3 0	..	59,630 1 3	9,85,478 3 9	43,004 13 6	1,02,634 14 9
1877-78	8,061 5 4	5,468 13 8	56,241 10 3	..	69,771 13 3	10,55,250 1 0	45,916 6 3	1,15,688 3 6
1878-79	9,637 2 8	10,090 14 1	53,954 10 8	..	73,682 11 5	11,28,932 12 5	49,144 1 10	1,22,826 13 3
1879-80	10,092 0 0	6,537 4 9	63,095 0 3	..	79,724 5 0	12,08,657 1 5	52,695 12 4	1,32,320 1 4
1880-81	11,879 1 0	11,367 0 4	72,858 15 3	..	96,105 0 7	13,04,762 2 0	56,551 14 11	1,52,656 15 6
1881-82	16,375 14 6	6,278 4 9	90,921 2 1	..	1,13,575 5 4	14,18,337 7 4	61,269 11 11	1,74,845 1 3
1882-83	15,094 14 1	32,247 11 5	50,049 11 5	..	1,06,392 4 11	15,24,729 12 3	56,219 0 3	1,72,611 5 2
1883-84	20,083 7 5	35,348 14 5	69,128 8 6	..	1,24,560 14 4	16,49,290 10 7	71,415 7 4	1,95,976 5 8
1884-85	20,413 3 4	6,220 10 5	60,190 8 7	..	86,824 6 4	17,36,115 0 11	76,171 10 0	1,62,996 0 4
1885-86	26,235 7 5	3,513 5 8	50,629 13 10	..	80,378 10 11	18,16,493 11 10	79,933 11 2	1,60,312 6 1
1886-87	27,581 14 3	7,925 11 1	48,720 11 2	..	84,228 4 6	19,00,722 0 4	83,637 5 8	1,67,865 10 2
1887-88	30,831 11 6	2,355 9 9	38,973 13 10	..	72,161 3 1	19,72,883 3 5	87,156 1 11	1,59,317 5 0
1888-89	26,686 14 3	2,724 12 7	40,082 3 1	..	69,493 13 11	20,42,377 1 4	90,343 5 8	1,59,837 3 7
1889-90	38,105 12 2	1,614 4 11	28,460 7 1	..	68,180 8 2	21,10,557 9 6	93,441 0 6	1,61,621 8 8
1890-91	~~5,02,936 0 6~~ 42,061-6-6	~~1,65,200 4 5~~ 2152-13-10	~~12,66,115 2 7~~ 30719-12-5	~~1,46,000 0 0~~	~~21,10,557 0 6~~ 74914-0-9	21,85471-10-3	~~13,01,250 7 6~~ 96660-10-7	~~34,11,811 1 2~~ 1.71.574-11-4
Total	574997-10-0	167339-2-3	12,97134-14-0	1,46000-0-0	21,85471-10-3	—	1400917-2-3	35,86388-12-6
Tie up discrepancies	Col 4, 25,22? 31,34 × 37 not in 3	12 222 not 2	7.10-15 +16					

Sept. 1890 — No. 706 — Revenue.

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Statement showing the Capital and Revenue Account of the Government Cinchona Plantations, Nilgiris, &c.—*cont.*

Year.	Receipts.				Net revenue (difference between columns 9 and 13).	
	Value of bark supplied to Quinologist, or for experimental purposes.	Value of bark sent to England, sold or supplied to other Governments or departments.	Sale of plants, seeds, &c.	Total.	Surplus.	Deficit.
	10	11	12	13	14	15
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1860-61	..	..	..	..	..	4,930 6 11
1861-62	..	..	..	..	..	23,647 8 6
1862-63	..	..	..	..	..	50,726 15 0
1863-64	..	..	..	..	..	70,808 15 4
1864-65	..	..	..	..	..	92,395 0 8
1865-66	..	..	..	..	..	1,00,194 4 4
1866-67	..	..	2,450 0 0	2,450 0 0	..	1,42,698 1 0
1867-68	..	287 8 0	..	287 8 0	..	1,42,980 7 7
1868-69	..	..	1,680 0 0	1,680 0 0	..	1,33,064 11 2
1869-70	1,512 6 4	..	..	1,512 6 4	..	80,047 10 10
1870-71	4,364 14 8	..	323 14 0	4,688 12 8	..	58,574 2 4
1871-72	9,542 12 8	3,479 3 6	..	13,022 0 2	..	55,069 6 4
1872-73	16,806 15 8	4,388 2 1	227 1 4	21,422 3 1	..	44,240 7 1
1873-74	21,136 7 0	36,417 6 3	300 9 0	57,854 6 3	..	9,870 3 11
1874-75	8,576 0 0	..	273 4 0	8,849 4 0	..	65,458 13 2
1875-76	..	60,404 7 11	2,000 0 0	62,404 9 11	..	24,426 0 4
1876-77	..	1,07,878 4 0	2,579 3 10	1,10,457 7 10	7,822 9 1	..
1877-78	..	3,51,746 0 6	5,469 0 2	3,57,215 0 8	2,41,526 13 2	..
1878-79	..	3,92,217 10 1	8,136 9 2	4,00,354 3 3	2,77,527 6 0	..
1879-80	..	4,24,323 12 8	15,462 12 4	4,39,786 9 0	3,07,466 7 8	..
1880-81	..	3,33,295 1 3	13,175 4 8	3,46,470 5 11	1,93,813 6 5	..
1881-82	..	5,64,236 3 11	7,653 2 9	5,71,889 6 8	3,97,044 5 5	..
1882-83	..	5,82,003 10 1	4,345 7 10	5,86,349 1 11	4,13,737 12 9	..
1883-84	..	80,519 10 6	4,561 2 8	85,080 13 2	..	1,10,895 8 6
1884-85	933 12 0	83,351 10 0	1,543 13 5	85,829 3 5	..	77,166 12 11
1885-86	1,418 0 8	1,02,101 0 0	589 10 4	1,04,108 11 0	..	56,203 11 1
1886-87	2,127 1 0	68,067 4 8	1,595 4 9	71,789 10 5	..	96,075 15 9
1887-88	1,203 0 0	1,975 0 0	763 1 11	3,941 1 11	..	1,55,376 3 1
1888-89	2,134 0 0	420 0 0	1,047 11 10	3,601 11 10	..	1,56,235 7 9
1889-90	4,048 10 6	792 1 9	599 12 4	5,440 8 7	..	1,56,181 0 1
1890-91	~~27535-0-10~~	~~31,97,001 1 8~~	~~71,171 11 1~~	~~32,10,105 0 9~~	..	~~30,020 1 2~~
	60,076 13 7	835-13-10	504 15 1	28,075-13-9		1,42,698-13-7
Total	101339-1-4	31987 39-15-0	75291-13-5	33,75360-13-9	..	211,024-14-9

† Includes value of febrifuge and quinine sold.

* Value of febrifuge sold.
† Includes value of quinine & febrifuge sold
‡ Value of febrifuge and quinine sold

(and the value of quinine and febrifuge sold = 7535-0-10)

Annual Statement, 1890, No. 7006—Revenue.

Statement
I

Statement
II

Statement

I

133.

Statement showing the Receipts and Charges on account of the Government Cinchona Plantations for the year 1890-91 prepared in accordance with the instructions issued in the Secy of State's despatch No 3 dated 11th February 1886

Disbursements	Amount Rs	as	P.	Receipts	Amount Rs	as	P.
To value of stock on 31st March 1890 (477,744 lbs) as under—				By value of stock on 31st March 1891 (510,695 lbs) as under—			
900 lbs of 1883-84 @ as 8 — pice 2·402	461	4	2	900 lbs of 1883-84 @ as 8 — P. 2·402	461	4	2
41,053 " 1885-86 " 11 — 4·132	29,107	6	10	37,653 " 1885-86 " 11 — 4·132	26,696	12	2
72,657 " 1886-87 " 10 — 10·069	49,220	15	3	28,981 " 1886-87 " 10 — 10·069	19,632	15	5
~~110,162~~ 92,746 " 1887-88 " 12 — 5·385	72,161	3	1	39,422 " 1887-88 " 12 — 5·385	30,672	2	7
~~160,226~~ 110,162 " 1888-89 " 10 — 1·120	69,493	13	11	110,162 " 1888-89 " 10 — 1·120	69,493	13	11
160,226 " 1889-90 " 6 — 9·701	68,180	8	2	160,226 " 1889-90 " 6 — 9·701	68,180	8	2
				133,351 " 1890-91 " 8 — 11·862	74,914	0	9
Total	288,625	3	5	Total	290,057	9	2
To establishment and working charges	74,914	0	9				
" value of febrifuge in stock at the beginning of the year	4,900	0	0	By value of sulphate of quinine supplied to the medical stores of Madras, Bombay and Ceylon	24,735	0	10
deduct loss.				By value of febrifuge sold to the Madras medical stores	2,800	0	0
" ~~Net Profit~~ on operations				By value of bark sold to the Madras Medical Stores	255	0	0
				do do Bombay "	360	5	0
				do Private Parties & Mysore Durbar	220	8	10
				do sale of seeds and plants	29	4	0
				do the percentage of the fees of the Govt Quinologist	37	3	5
				Miscellaneous	438	7	8
				Total	28,875	13	9
				By value of Quinine received to Collectors but not credited	1,275	0	0
				do of Bark sold to Messrs Kemp & Co, Bombay do	377	13	6
				By do of Quinine and febrifuge in stock at the close on 31st March 1891	43,026	9	
Grand Total	368,439	4	2	~~Grand~~ Total of all receipts	3,63,606	13	5
				deficit on operations.	4,832	6	9
				Grand Total	3,68,439	4	2