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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Revenue

DEPARTMENT

G.O. No. *1105 Revenue*
B.P. No.

Press.
Mis.

Dated *20th July 1878*

197

folded or roughly handled

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GOVERN
REVEN

20th

Read the following paper:—

No. 207. From Lieutenant-Colonel
to C. G. MASTER, Esq.
ment, dated Ootacamund

Referring to paragraph 4 of
honor to inform you that I do not
employed than on the selection
In most districts there is still a
close reserves should be formed
these reserves are properly developed
constantly going on.

2. The Forest Act would
of opinion that it can be carried out
Forests are concerned, and in
forest most important for the
as year by year forests are reserved
become more and more benefited
carry out the work in a systematic
have been far easier if it
further delayed the results in

3. Alienations have occurred
ought not to have been allowed
anxious to reserve, such as the
&c., being the first to go; and the
country, is going on in Wynad

4. A Forest Act would
tion the reservation and proper
Government, and without the
tory issue. The deforesting
already, I believe, caused damage
this be allowed to go on with
believe, be most serious.

5. The reservation of a
a certain portion of the common
with reference to private forests, but I have not a doubt myself that both are
necessary to the welfare of the country, and that they must be taken in hand before
long, whereas every year's delay will only add to the opposition and difficulties in
more ways than one. I also feel certain that any well-considered system of close
reserves from which fire and cattle can be excluded could not be in force many
years without its beneficial results being apparent to every one.

MADRAS.

DEPARTMENT.

L.105.

HEDDOME, Conservator of Forests,
to Government, Revenue Department,
1878, No. 274.

727, of the 10th instant, I have the
Captain C. Walker could be better
on of reserves district by district.
of Government Forests out of which
and other considerations, and until
red to be such alienation must be

When work of this nature, but I am
carried out, as far as Government
delay is dangerous as the tracts of
usually the first to be alienated, and
and cultivation the question will
and opposition; it is not yet too late to
or almost all districts, but it would
ated with Railways, and if now much

girls in many directions where they
lands that I should have been most
Coonoor slopes, the Kartery Valley,
opposed to the general welfare of the

Walker also to take into consideration
private forest lands as well as those of
ever be brought to a really satisfac-
not belonging to Government has
ly, Madura, and North Arcot, and if
a few years more the results will, I

sts will probably be unpopular with
and there will be still more opposition
I have not a doubt myself that both are
that they must be taken in hand before
to the opposition and difficulties in
any well-considered system of close
excluded could not be in force many
years without its beneficial results being apparent to every one.

6. A demarcation or survey mentioned by the Government of India, parts of Northern India, Burma, &c. India should be asked for fuller particulars; in Bengal, I believe, a senior and that he has several assistants. Captain Walker would require them at first, and we have none to spare which he proceeds could be associated with him to a certain extent; one of them should accompany him and be detailed to him. He should be employed in his district. The Department should be permanently employed persons will also be required, as they are strong enough to be able to spare their duties.

7. Captain Walker should in both fire and cattle are to be excluded, and also forests and jungle. The whole should be clearly laid down and should work under the orders of the district he may be in, but his report.

8. North Arcot and Madura a

* Proceedings of the Board of Revenue, No. 688, dated 14th March 1878.

district the necessary reservation for various purposes they are intended for completion without much extra assistance only rendered possible by the Collector supporting it, and by more than usual forest officer; it would not, however, of North Arcot and Madura except in the way I now propose.

No. 208.

ORDER THEREON

Forests, No. 12.

ing and demarcating tracts of Government

2. The importance of this work

* Paragraph 9, G.O., 19th November 1878, No. 1,662-A.

probably be attained through the operations appear to have been undertaken by the Conservator having found himself unable to give the time necessary for the work.

3. Under these circumstances, the Government resolves to depute Captain Walker to take the place of the Conservator in these District Committees. Captain Walker will invariably place himself in communication with the Collector of the district in which he is about to work, and the joint proposals of these officers will be forwarded to the Conservator who will submit them to Government through the Board of Revenue. Existing communal privileges and future requirements must be carefully considered and the extension of cultivation provided for.

No. 1105.

department has been sanctioned. The time in play in different parts of the Government of India, at the head of this branch of the Survey Department. I do not think that other officers at all events should be employed in each district to work and be able to go about the country. However, certainly as long as Captain Walker is subordinate of the Survey Department, a writer, and two or three assistants are not, as a rule, of any detriment to current duties.

close reserves from which in which grazing will be permitted (timber and fuel), and 400 yards to the inch; he and the Collector of the district should go through this office.

It should, I think, be first discussed of my last South Arcot, now before Government, what is required; in that case, the forests and jungles for the Surveyor, but this was not put in a fair way to be put in the work and supported on the part of the Conservator in the heavily worked districts. A separate forest officer should be appointed.

No. 1,105.

Government approve the Commission that Captain Walker should be employed in select tracts and demarcating tracts of Government.

ed, and in their Order the Conservator head of the Government. The best results would be obtained. No systematic work with this suggestion, the Conservator in his extensive districts.

Government resolves to depute Captain Walker to take the place of the Conservator in these District Committees. Captain Walker will invariably place himself in communication with the Collector of the district in which he is about to work, and the joint proposals of these officers will be forwarded to the Conservator who will submit them to Government through the Board of Revenue. Existing communal privileges and future requirements must be carefully considered and the extension of cultivation provided for.

4. The Conservator proposed to be taken up," but looking to the systematic conservancy and protection of the forests, no portion being a close reserve, the Government should first engage Captain Walker to proceed to Coimbatore. No other officers should be employed in the Annamallays, which is always short of officers.

† G.O., 30th March 1876, No. 443.
" 3rd July 1878, No. 1,019.

5. The Government proposed

† G.O., 4th December 1876, No. 1,019.
and in this and all similar cases boundaries of all Government forests exist, as well as those over which Captain Walker, and also those reserves for a definite period.

6. The Board will insist on assistance, and to give earnest work in their several districts.

Arcot and Madura should be "first present experienced in the way of the Annamallay Range owing to the Council considers that these forests. That officer will accordingly forthwith proceed to Coimbatore. No other officers should be employed in the Annamallays, which is always short of officers. The question as to reserves near Mettapolliem might next be considered, and afterwards requirements of the Madura and Arcot Districts.

up of the Annamallay forests referred to the Conservator in his Inspection of August 1876 is now completed, and the Survey maps are available, the in which communal rights do not exist, and will be clearly marked by it is proposed to constitute close reserves.

to render Captain Walker cordial attention to the completion of the work.

(t.)

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

To the Conservator of Forests,
" Board of Revenue.
" Captain C. Walker.
" the Accountant-General.

Exd. C. Howarth.

Have now the honor to submit
Report which is divided into
Chapters dealing with the Past
Present and the Future

I have the honor to be

Sir

Your Most Obedt Servt

Hauptheimwacker Captain

Dy. Comm. of Forts

1105
1106
Report

Nigeria Government Christiana
Plantations

Captain Campbell Walker Madras Staff Corps

Printed at the Phoenix Press Colombo

1878

Chapter I. Past History of

Introduction

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Chapter I

Past History of the Plantations

Introduction

1. The history of the introduction of the Chinchoros into India, and their establishment on the Nilgiris and elsewhere, is written in numerous Blue Books, dating from 1852 and voluminous Government Records. I shall therefore confine myself strictly to the most salient points or stages which mark the progress of the experiment from its earliest conception up to the present time, when it may be said to have emerged from the experimental state and become an established fact. I restrict my attention also to the history of the Nilgiri Government Plantations under report.

2. Mr. Royle appears to have suggested the introduction of the Chinchoros into India as early as 1835, but no definite action seems to have been taken until seventeen years later, when we find Lord Dalhousie's Government writing to the Court of Directors on the subject, and suggesting that a qualified person should be sent to South America to collect seeds & plants. In 1856 Lord Canning, then Governor-General, wrote a minute to the same effect, which was forwarded to the Court of Directors. Plants were obtained from the Foreign Office from Mr. Maguire's Consul in South America some of which reached Calcutta, but those early attempts resulted in failure from one cause or another.

3. It was not until 1859 that the matter was taken up in earnest. In that year Mr. Clements Markham, then in the India Office, was sent to the forests of Peru and Bolivia, with which he was already acquainted, and collect seeds and plants of the several species. His knowledge of the Spanish and Quichua languages and acquaintance with the country and some of its people, men and land-owners, eminently qualified him for the office, and the difficulties which he overcame and eventual success of his mission fully justified his

lection which was approved by the Secretary of State on the 8th April 1859. To Mr. Markham's labors must be attributed the successful introduction of the Chincona into India, but the services of Messrs. Spruce, Cross and Pritchett, his assistants or coadjutors in the enterprise must not be lost sight of.

4 Mr. Markham arrived in South America Mr. Clements early in 1860, and returned to the Coast from his Markham in trip into the interior, during which he experienced South America great hardships and obstacles on the 1st June and India 18 that year, with 456 living plants chiefly of the C. Calisaya. These he conveyed to England, losing 40 per cent en route, and thence to the Kew gardens via Bombay, Calicut, and the Suez Canal. Mr. Markham arrived at Otstream on the 12th October 1860, when we find from his Report (No. 58, page 132, Vol. I of Blue Book) that "125 of these original plants were potted" all that remained alive apparently, and those in a weak state. Mr. W. J. Fox, then Superintendent of the Government Gardens who had been placed in immediate charge of the experiment, succeeded, failure of plants in obtaining 2000 cuttings which, at first, promised brought by Mr. Markham well, but eventually died off as did also apparently the 125 original plants. Mr. Markham records (in his letter No. 61 page 139 of Blue Book, Vol. I) that the last of the green cuttings died in November, but that eight of the 125 plants of wood cuttings remained alive on the 15th February 1861, although showing symptoms of decay, which precluded hopes of the ultimate

recovery of more than one (C. Calisaya) would be interesting to trace this sole remaining plant, but beyond the fact that it was still alive, but showing no signs of growth in the 30th March (Mr. Fox's Report, No. 66 in Blue Book) I find no record of its fate. On the above date another plant (C. Ovata now C. Pakudiana) was still living.

5 The other collectors engaged by Mr. Markham Messrs. Spruce had meanwhile not been idle, and Cross' ended April 1861, Mr. Cross arrived with 463 plants of C. Succisauba, (caused by introduction of Red and Yellow bark) himself and Mr. Spruce in South America) and six plants of C. Calisaya, which had been raised in Kew Gardens. Mr. Cross returned to South America and collected in the forests of Crown Barks by Loxa seeds of the C. officinalis or crown Barks which arrived in good order at Otstream on the 4th March 1862, a small packet having already been received from Mr. Markham on the 16th February.

Mr. Pritchett Previous to this, Mr. Pritchett, to whom Mr. Markham had entrusted the task of collecting the grey barks in the forests of Huancayo, he despatched plants and seeds to India. The plants all died after arriving in England, but the seeds were duly sown, and contrary to expectation, germinated freely. In December 1861, Mr. Anderson brought 318 plants from Java, but Mr. Fox reported that they were "all more or less affected with rot and fungi at the roots." Seed of the C. Pakudiana, then known as Ovata

is application of the mowing system as a means of harvesting and curing the bark will be referred to further on. At the time of the introduction of the Chinchona by Mr. Markham, Mr. McSon was Superintendent of the Government Botanical Gardens at Ootacamund, an appointment which he continued to hold in conjunction with the Chinchona plantations until 1870, when he was relieved of the former duty.

15. Mr. McSon, as Superintendent of the Gardens, was subordinate to the Conservator of Forests and, acted under Mr. Cleghorn's orders and advice in the selection of sites and arrangements generally. Shortly after Mr. Markham's arrival Mr. Cleghorn proceeded on leave and Captain (now Major General) Morgan acted as Conservator, and has been stated in para 9 protested against the abandonment of the Doddabetta site. The names of these officers should therefore not be lost sight of in a record of the introduction of the Chinchona on the Nilgiris.

16. In 1861 Mr. McSon was placed in direct communication with Government, and the Chinchona experiment ceased to be under the control of the Commissioner of the Nilgiris, who, however, was directed to "periodically report and report on his (Mr. McSon's) progress" (S. I. Blue Book, page 185) and accordingly we find reference to the subject

17.
Mr. McSon's death

in the Acting Conservator's Report for 1860-61 and 1862-63 after which it ceases, and, I presume therefore, that the Conservator was relieved of the somewhat onerous duty of inspecting and reporting on plantations over which, and the officer in charge, he had no authority. Mr. McSon continued in independent charge until 1862 when the fact of his being agent for and partner in various estates on the hills having been strongly represented, he was placed under the Commission of the Nilgiris, then just formed into a separate District.

Mr. McSon died on the 8th June 1876 and Government directed that pending further orders the management of each plantation should continue with its present Superintendent or Officer, under the control and supervision of the Commissioner (G.O. No. 1390 of September 1876) and subsequently declined to approve of a proposal of the Commissioner that Mr. Rowson (the Assistant Superintendent at Reddibattam) should act as Superintendent, and supervise all the plantations.

18. Mr. Rowson came out in 1869 and was just employed at Doddabetta but subsequently transferred to Reddibattam where he has done excellent service, and acquired a good practical knowledge of Chinchona Cultivation. The Head Officer in charge of the Doddabetta plantation, Narsaiahrao, Raide, has been connected with the undertaking from the outset. Mr. McSon reported highly of him as steady, painstaking and honest, but Mr. Cockfield records that he "has no faculty for organising labour."

19. Mr. Broughton's name is intimately connected with the history of Chinchona Cultivation on the Nilgiris. Mr. Markham after visiting the plantations in 1865 suggested the employment of a resident Zoologist,

which met with the approval of the Government of Madras and the Secretary of State. Mr. Broughton then Assistant to Mr. Frankland at the Royal Institution, London, was selected and his services engaged as Government Quinologist in 1866. Mr. Broughton arrived at Ootacamund in January 1867, having received every full instruction as to his duties from the Secretary of State (Page 2, Vol. III of Blue Book.) These are summarized by Mr. Broughton in his "Manual of Cinchona Cultivation in India" as follows:-

To discover by repeated analyses of bark from plants growing in different situations the conditions as regards elevation, climate, soil and exposure best calculated to produce the largest possible yield of Alkaloids; to ascertain the difference as regards yield and efficiency between green and dried barks; to analyse the leaves and flowers of the different species; to settle the best method of drying the bark; and finally, to enable Her Majesty's Government to arrive at a decision with respect to the best and cheapest method of preparing the febrifuge for use among the poor classes of the natives of India." Mr. Broughton laboured most assiduously and conscientiously towards the elucidation of the above points, and submitted many valuable reports. He established his laboratory at Ootacamund, and subsequently his Alkaloid Manufactory at Reddivattam where he produced the "Amorphous Quinine" of which so much has been written. Differences of opinion unfortunately occurred between him and Mr. Fors, arising mainly from the difficulty of defining where the duties of the one, as a Gardener or Agriculturist ceased and those of the other as a Chemist began. Continual clashing and contradictory statements and reports were the result, and as it appeared that the

of a Commission that the working of the factory was unsatisfactory and the manufacture of the Amorphous Quinine costly and wasteful, Government accepted Mr. Broughton's resignation then tendered (G. O. R. D. No 214 and 485, dated 11th February and 11th March 1875) and no successor has been appointed, the manufacture having been entirely discontinued.

20. Besides the above Executive Officers, the Commissioners of the Nilgiris, Messrs. Breck, Cockerell, Webster, and Cockerell, evinced much interest in the plantations, and Mr. MacCallum Webster, while Acting Commissioner, subsequent to Mr. Fors's death, devoted much time and attention to their management. Messrs. Cornish and Bidie have been employed by Government to submit reports on special points, especially with reference to the different views as to cultivation treatment &c., held by Messrs. Fors and Broughton. Mr. Howard, the eminent Quinologist, has been ever ready with information and practical suggestions, for which he has received the thanks of the Secretary of State, and with mention of his name, I close the list of those who have been directly or indirectly connected with the management of the enterprise up to the present time.

Cultivation
21. Mr. Fors has fully explained the methods adopted in propagating young plants and their subsequent treatment in his "Notes on the propagation and cultivation of medicinal Cinchonae" originally published in 1863 and of which a revised and enlarged edition appeared in 1865. He treated the young plants originally received under glass in order the better to modify the conditions of moisture, temperature, &c., at will. The seeds received were sown in

Propagation

nd. La is application of the mowing system as a
means of harvesting and securing the bark
less will be exposed to further on. At the time of
the introduction of the Chinchona by Dr. Mark-
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(Vol I, p. 135)

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connected with the history of Chinchona Cult-
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visiting the plantations in 1865 suggested

in boxes filled with carefully prepared soil. As soon as the original plants were fairly established, Mr. McJen proceeded to propagate from them by layering, cuttings and leaf buds, and when he had thus secured a sufficient supply of fairly grown plants, he planted out a number under varying conditions from the result of which he decided to plant out in open cleared ground instead of under shade or in comparatively small clearings in the virgin forest the method which had been adopted in Java.

Planting out

22. This proved entirely successful, and a few years later the Dutch adopted Mr. McJen's method and abandoned their own.

Mr. McJen's method adopted by the Dutch

23. In some cases the land on which the young trees were planted out was trenched, but, as a rule, pitting was the system adopted. The pits were 2' by 2' by 2' and the distances apart vary 12' by 12' to 3' by 3'.

Land trenched, pitted.

24. At the close of the official year 1873-74 the total number of trees reported to have been thus permanently established was as follows:—

Ns. of trees reported as permanently established in 1873-74 and area planted

	Number	Acreage	
		Surface	Base
Total of plants of all sort, on Reddivattam			
Plantations	494,740	455	371.24
do - do Kodabatta	245,980	378	287.25
do - do Pykara	104,484	336	243.00
do - do Mailkondalaband	65,254	75	40.28
Total	910,458	1244	941.77

representing an average of 142 trees per acre (surface measurement) on Reddivattam, 31 on Kodabatta and 906 on Pykara estates. The average height of the fruit-bearing branches being at this time given by Mr. McJen at 32 feet with a circumference of stem at base 20 inches.

25.

Weeding, Pruning

and of Officialis 2 1/2 feet by 18 inches. Subsequent to planting out little or no care was required beyond weeding, and a certain amount of pruning and removing of suckers which appears latterly to have been discontinued under Mr. McJen's order. In his Administration Report for 1874-75 Mr. McJen recorded that, owing to cultivation having been neglected since 1870, the plants put out subsequent to 1866 had not thriven so well as those planted prior to that year, but to this statement, Government took exception in para. 11 of their order (No 2273 dated 10th July 1877) as the funds at the Superintendent's disposal appeared to have been "hardly fully utilised." Experiments have also been made from time to time since 1868 on the application of various descriptions of manure, the results on the whole, especially in the case of farm yard manure and bone dust, proving satisfactory. Renovative pits in which the weeds, leaves, &c. are periodically buried have been dug in all the older plantations at Reddivattam.

Harvesting the Bark.

26

Mr. McJen turned his attention to the method to be adopted for taking the bark crop at a very early date in the history of the Nilgiri Plantations. The method generally pursued by the bank & factors on the several estates of South America where the Cinchona is indigenous is simply to fell the trees and strip off the bark. Mr. McJen had proposed to crop the plantations by topping, pruning, and thinning, and subsequently to plant the trees very closely together so as to admit of early thinning and yield of bark.

Mr. McJen first proposed topping & thinning

It is very noteworthy that in 1863 and 1864 we find him writing highly of the growth of

14
convinced that this will be our principle
source of revenue at least for many years to
come, especially as the system tried experimentally
of removing strips of bark from the stems of the
plants has been found to injure their growth,
and therefore cannot be profitably practiced"
(Blue Book Vol II page 48) and again that cop-
-piced trees put out good shoots if cut down
between March and August, but not if cut
down between September and February, except
Crown Bark, which "produced strong shoots at
any season".

28. I find the first reference to the snow-
-ing system as applicable to cropping the
Chinchona bark in Mr. Howard's Report on his
analysis of the third consignment of bark
from the Indian plantations (Blue Book Vol II
page 49). His words were "This large product of
alkaloids might probably be still further in-
-creased by surrounding the stem with snow
in the manner Mr. Wilson has so happily
suggested since Dr. De Grey found 8.407 percent
of alkaloids in a stem which had been so
treated".

29. In May 1865 specimens of both snowed and
renewed bark appeared to have been sent to
Mr. Howard for analysis and in sending them
Mr. Wilson stated that "the system of removing
strips of bark from the stems of the plant can
be practiced without injury, provided the wound
is instantly covered with damp moss". In the
Annual Administration Report for 1864-65 the
snowing system is described at length and spoken
of as the best. It appeared that a similar pro-
-cess had sometimes been adopted on a small

First reference to
snowing system

Applian-
Patent

30

scale by the collection of the bark of South
America.
Mr. Wilson subsequently applied for a
patent for the snowing system which was ap-
-proved by Parliament for various reasons, and
their decision was approved of by the Secretary
of State, who remarked "Mr. Wilson deserves
great credit for the intelligent way in which
he has applied a well known principle in
agriculture to Chinchona cultivation and for
his suggestion that the application of snow to
the bark might have a beneficial effect on
the yield of Guirague alkaloids; and I shall
readily sanction any special remuneration
which you may see fit to grant him on ac-
-count of the benefit derived by the Public
from his intelligent labors."

31
Mr. Wilson finally
abandoned the
snowing process

In the Report for 1865-66 Mr. Wilson formally
announced his previous recommendation of
pruning & and adopted the snowing process of
which he wrote in the strongest terms of approbation.
He states that his attention was first directed to it
by the fact that "the deposit of alkaloids was
invariably most abundant in the bark covered
with clumps of moss which, in striking the young
plants (a method adopted at the outset to protect
them from the effects of the high winds) we had
placed between the trees and the bark to prevent
chafing." This was a very interesting fact led to
close observation and suggested many experiments
to test the manner in which the alkaloids were
formed or deposited. The result of these observations
is stated to have been the establishment of two
points of vital importance in Chinchona cultiva-
-tion, viz "first that there is a constant and ever-
-creasing genuine producing power going on in

the leaves of the plants, whilst second, "as if they-
ing a natural law to counter-balance the cause of
production, there is a continual waste on the surface
of the bark".

32. The advantage claimed for the mowing
process are that by the exclusion of light "the pro-
cess of oxidation & waste is arrested and the alkali-
oids increased from $2\frac{1}{2}$ to 25 per cent." and that it
more than doubles the bulk of bark, thus making
the direct yield of alkaloid per acre fully thirty
times the quantity that can be produced under
any other system. (Mr. McSorn Report for 1865-66 para.
12 and 13, G. O. R. No. 145, dated 15th January 1867) It
appears unnecessary here to follow further the ar-
guments for and against the mowing process, which
will be further dealt with in Chapter II, suffice it
that it has been mainly adopted in the plantations
on the Nilgiris, and so far as we can judge, with best
results.

33. By G. O. R. No. 426 of 19th February 1869
Government sanctioned the mowing process being
applied to 7000 trees, viz., 1000 Red Bark planted
in 1862, 3000 Red Bark planted in 1864, and 3000
Crown Bark planted in 1864, and in August 1871,
3000 lbs of bark mainly from the trees which had
been mowed, were despatched to England for sale.
The sales realised were favorable, and in 1873 and
1874 Government sanctioned further harvesting and
consignments of bark to the Home market under the
mowing system. The bark is now regularly shipped
for sale toward the close of each year, and the
consignments of 1876-77 realised £34000 in round
numbers for 80,700 lbs of dry bark of the various
descriptions, the highest sale being 15s. 8d per ton,
realised for unweaved Crown from the Vodalabla
plantation. Besides the above, 252 lbs were supplied

Advantages claim-
ed for the mowing
process

Mowing and har-
vesting commenced

Quantity & amount
realized for 1876-77

to the Bombay Government Medical Depart-
ment, valued at Rs 1904.

34
Coppicing ex-
periments on a limit-
ed scale.
Experiment of 1865.

Experiment of 1871

The experiments of harvesting under the
coppicing system have throughout been on a
limited scale. In December 1865 (G. O. No. 3102)
Mr. McSorn was ordered to cut down three acres
of plants and in May 1867 he sent 4 chests of
bark "obtained by felling a number of trees"
presumably in accordance with the order above
quoted. The number felled was not stated
but they yielded only 300 lbs of dry bark which
was sent home and realised prices then considered
satisfactory. It would appear that these trees
were not felled in a block, as Government
were evidently intended and in 1873 Mr. Bidie was
unable to find them all, but reported that
those which he saw "had not done well". In
May 1871, 240 trees were cut down viz., 200 in the
plantation of 1862 on the western side of the valley
and 40 in the plantation of 1864 on the eastern side.
In the former case the suckers were left when
the main stem was cut, and it is now impossible
to determine which were suckers originally, and
which are real coppice shoots from the stool, - be-
sides which two or three shoots or suckers have
been in several cases left growing. These now
average 20 feet in height by about 10 inches in
circumference at $4\frac{1}{2}$ feet from the ground but
from the reasons just stated it is impossible to
regard this in the light of a regular coppicing
experiment at all. The 40 trees felled in 1864
plantation were in a single row the suckers would
appear to have been left, and the trees were not
cut over close to the ground, neither were all the

I came in a two removed
 main alive but poor and
 not to be wondered at consid-
 ering dense shade. In 1873 three
 coppicing were made viz
 in May, and another of 54 trees
 in 1862 plantation at Kuddavatt
 60 trees (crown barks) at God-
 abet. In the case of the 58 trees of
 were left, one has died, the
 averaging 17 feet by 9 1/2 inches
 height since last measured
 by Mr. Rowson at 104 inches, b-
 impossible to see which are
 great coppice shoots. The 54 trees
 were cut out as close to the
 ground and all suckers removed, 2
 and the remainder, average
 3. The stools in this experiment
 left in a very rough sh-
 apes the cause of so large a
 and failing to throw shoots.
 trees felled in the Godabete
 1873, 43 have sprung up
 the suckers, if any existed,
 moved when the trees were
 coppice shoots have unfail-
 ingly growing, some stools
 otherwise we should have
 consigning trees to a Chapter III,
 numbers description of
 realised plants

Twenty-six trees
 indly, which is
 ing that they are
 small experiments
 of 58 trees in
 in October in the
 and one on
 etta in June.
 high the suckers.
 remainder are healthy
 the increase in
 1874 being given
 here again it is
 kers and which
 felled in October
 and as possible,
 one failed to shoot
 1 1/2 feet by 6 inches
 not rounded off
 which was doubt-
 less the 50 C. Officinalis
 plantation in
 from the stool
 ing all been re-
 lled. All the
 tely been left
 as many as 18 or 20
 had come really
 suggested what
 case of the the
 case of the the

Experiments of 1873

Experiment of 1875

Experiments to ex-
amine state of the
wood in 1876

trees yielded pounds 202 stem bark and leaves
 17 branch bark. They were planted in 1863,
 (Sub-division No. II. 1863 B.) and were therefore
 just 10 years old when felled. A further
 experimental coppicing of 115 trees C. Laccubra
 took place at Kuddavattam in June 1875.
 under orders of the Commissioner. The trees
 were situated in the 1862 plantation (Sub-
 division No. II. 1862 B.) and yielded 248 lbs. of
 green bark; of these trees 86 have sent up
 coppice shoots which exhibit an indifferent
 growth, both the situation, and trees selected,
 having been considerably unfavourable and poor.
 On the second June 1876 seven trees were felled
 by order, and in presence of his grace
 the Governor, in order to examine the state
 of the wood. These trees, (C. Laccubra), were
 10 years old (Sub-division No. XIV, 1866 B.) and
 had been barked and mossed three times.
 Three have sprouted from the stool, but one
 died off, and the shoots of the other two exhibit
 a poor growth of some 3 or 4 feet with a sickly
 appearance, the other four threw up no shoots.
 About a week later 12 trees (C. Laccubra)
 were felled in presence of Captain Almyer,
 A.D.C. They were 12 years old (Sub-division
 No. VII 1864 E.) and unbarked. Eleven have sprung
 very freely from the stool, and each has several
 fine healthy shoots. The remaining one has at
 present no shoot but is quite green and healthy
 and appears to have sent up a shoot which
 has died back or been broken off in weeding.

Most successful coppicing experiment I have
 seen in the Government Plantations.

above comprise all the coffee experiments in the Government plantations. I shall indeed show in Chapter II to compare the respective merits of the mashing and coffeeing systems but fully agree with Dr. Bickie, who wrote in 1874: "So far we may be said to have had no experience whatever of this method of harvesting the bark as the few experiments which have been made have been on too small a scale and not conducted in a manner likely to throw much light on the subject." The same is true in 1878.

Drying the Bark

35. This was one of the points to which Mr. Broughton's attention was specially called by the Secretary of State, and in February 1870 (H.C. R.D., No 268) he reported the results of experiments conducted at various times during the preceding two years. He found that it was preferable to deal with the bark in its green state "the labour of drying and powdering preparatory to the extraction of the alkaloids is avoided, and in addition to this from the softness of the tissues, the alkaloids are obtained in a state of solution with greater ease and less expenditure of acid." He estimated the saving from the latter cause at "rather more than one-fourth." It being however clearly impossible to get the bark to England in its green state he proceeded to consider the best means of drying the bark, so as to preserve, as far as is consistent with economy, the contained alkaloids from alteration.

Little of our experience of the coffeeing method of harvesting

general conditions to be fulfilled.

Bark should not be collected during the monsoon

At what season bark should be dried by natural means only.

34

36. He prescribes the general conditions to be fulfilled in drying the bark, as indicated in the results as follows: "to dry it at a low temperature, - as quickly as possible, - and without prolonged exposure." He corroborates the opinion of M. Pasteur that "the drying of Chinchona bark in the sun is injurious" but qualifies it by the statement that the injurious action of the sun-light is comparatively slow, whilst the bark dries rapidly under the fierce sun and dry enlivened air of the Belgians. As bearing immediately on the subject, he proceeds to show that bark should not be taken during the South West monsoon when there is a marked decrease in the quantity of alkaloids obtainable which is greatest in May and October just before and just after the monsoon months. On this point he is very strong, stating that "it will always be a loss to collect bark in any quantity during the monsoon." He recommends "that the bark of the Government plantations should be dried by natural means only," and considers that, "if due care be taken, the bark may be thus dried and prepared for export without appreciably deteriorating from the quality it possessed in its fresh state. The main obstacle to this is clearly the fact that, under the strip-ping and mashing system of harvesting, the bark is best removed during the monsoon months when it separates freely from the tree, and during most part of these months drying any quantity

Natural means in the climate of Kaddanattor...
 at any rate is quite out of the question, whilst,
 Mr. Broughton tells us that keeping it in an un-
 dried or partially dried state, impairs its effec-
 tiveness, and hence its common use and the
 fact that it yields a smaller amount, although in
 this respect he found by experiment after 3 and
 6 weeks that the deterioration was not so great
 as he had expected. It appears to me however that
 he has rather begged the question of how to conse-
 lute the retention of the stripping and mowing system,
 which must be carried on during the monsoon, with
 the fact that the percentage of alkaloids was then
 at its lowest, and that the bark could not be
 dried except under cover, and by the aid of
 artificial heat. In any case the Superintendent Mr. Broughton
 and Commissioner appear to have disregarded his advice as to the season of harvesting and
 means to be adopted for drying, for the bark
 is now taken almost entirely during the mon-
 soon months, and dried in sheds artificially
 heated. My suggestions on this point will be
 found in Chapter III.

Analysis and Comparative Richness of
 Various Species.
 The barks of the Chinchona yield chiefly Quinine, Cinchonidine, and Cinchonine, and are valuable mainly in proportion to their yield of the just mentioned, which alone has a fully recognized medicinal value. It is not sufficient that the bark should contain a certain percentage of anti-febrile alkaloids, but these

especially the grainier, must be present in such form as renders them readily capable of being converted into crystallized salts. It has been therefore matter of primary importance to ascertain how far the bark of the Chinchona, acclimatized on the Pitagui, con- formed to the above conditions, and how it was affected by the system of cultivation and har- vesting, and much attention has accordingly been devoted to this point, the result being a mass of recorded results rather difficult to analyse and condense.

Besides Mr. Broughton's analyses, which were very complete and constant specimens of all des- ceptions of bark natural, mowed, and renewed have been periodically sent home to Messrs. Howard and De Vere for analyses and report. A comparison of these analyses leaves us in con- siderable doubt and uncertainty as to the result of the mowing system on the yield of alkaloids, for we find those of one apparently contradicted by those of another, so much doubtless depending on the condition of the tree and period at which the samples were removed.

On the whole, however, the analyses re- vealed bark of the C. succi- nifera has been found to yield a larger a- mount of alkaloids than natural bark from trees of the same age, and a larger proportion of sulphate of quinine. Mr. Howard was however disappointed in his expectation that this species might have been led to form quinine instead of cinchonidine. In crown barks (C. officinalis)

at any rate is quite out of the question, whilst, in the Mr. Broughton tells us that he has dried or partially dried state, but, certain extent, its yield of alkaloids, although in 1874, this respect, he found by experiment after 3 and 6 weeks that the deterioration was not so great as he had expected. It appears to me however that the retention of the stripping and mowing system, which must be carried on during the monsoon, with the fact that the percentage of alkaloids was then at its lowest, and that the bark could not be dried except under cover, and by the aid of artificial heat. For any case, the Superintendent Mr. Broughton and Commissioner appear to have disregarded his advice as to the season of harvesting and means to be adopted for drying, for the bark is now taken almost entirely during the monsoon months, and dried in sheds artificially heated. My suggestions on this point will be found in Chapter III.

Analysis and Comparative Richness of the Various Species.
38. The barks of the Chinchona yield chiefly Chinchonidine, Quinidine, and Cinchonine, and are valuable mainly in proportion to their yield of the just mentioned medicinal value. It is not sufficient that the bark should contain a certain percentage of ante-fibrile alkaloid, but the

Analyses

especially the guanine, must be present in such form as renders them readily capable of being converted into crystallized salts. It has been therefore matter of primary importance to ascertain how far the bark of the Chinchona, acclimatized on the Putzuri, conformed to the above conditions, and how it was affected by the system of cultivation and harvesting, and much attention has accordingly been devoted to this point, the result being a mass of recorded results rather difficult to analyse and condense.
39. Besides Mr. Broughton's analyses, which were very complete and constant specimens of all descriptions of bark, natural, mowed, and renewed have been periodically sent home to Quirós. Howard and De Vries. In analyses and report. A comparison of those analyses leaves us in considerable doubt and uncertainty as to the result of the mowing system on the yield of alkaloids, for we find those of one apparently contradicted by those of another, is much doubtless depending on the condition of the tree and period at which the samples were removed.

40. On the whole, however, the analyses are generally favorable. The renewed bark of the C. Lucci-cuba has been found to yield a larger amount of alkaloids than natural bark from trees of the same age, and a larger proportion of sulphate of quinine. Mr. Howard was, however, disappointed in his expectation that this species might have been led to form guanine instead of chinchonidine. In crown barks (C. officinalis) the results appeared even more favorable and

constant, but bark renewed without
 moss also improved the result in the short period
 of 10 months, being reported as follows: Guild
 of crystallized sulphate of guanine in natural
 bark 1.78; Guild in renewed but unmossed
 bark 10 months old 2.20. There appeared a
 marked tendency throughout to develop chinch-
 onide rather than guanine, which was mainly
 ascribed to the effect of sunlight both Messrs
 Howard and Vebrig having recorded the opinion
 with special reference to some Ceylon bark, that
 "the yield of guanine is greater in bark grown in
 the shade than when the trees were exposed." These
 experimental analyses have been continued at inter-
 vals up to the present time and Government have
 recently ordered (G.O. P.D. 274 dated 20th Feb.
 1908) a complete set of specimens being
 sent home for analyses.

41. I have before me the last analyses of
 barks of the *C. Officinalis* from all the Govern-
 ment Plantations made by Dr. Paul in February.
 Last the result of which is not altogether favor-
 able to the mossed and renewed barks but it is
 gratifying to observe that the older the tree the
 better the yield both of total alkaloids and crys-
 tallized sulphate of guanine, that from a 13 year
 old tree natural bark being respectively 5.13 and
 4.11 per cent, whilst from 9 and 10 year old trees
 the yield is 3.47 and 2.90 per cent. Still, as I have
 said, so much depends on local circumstances
 under which the tree is grown that I do
 not think we can arrive at any satisfactory
 conclusions from the individual specimens.

Marked tendency
 to develop chinch-
 onide.

Latest analyses not
 altogether favorable
 to mossed and re-
 newed barks.

No satisfactory con-
 -clusions can be
 -reached at present
 of value in select

of specimens. hitherto sent home and even the commercial
 value valued, exhibited by the account sales
 received, is somewhat vague and perplexing.
 This unsatisfactory state of things is doubtless due
 to want of sufficient care in the selection and
 description of specimens from trees of known and
 equal age, grown under similar circumstances
 and inaccurate classification both here and at
 home, and too much care cannot be taken in
 future to obviate such discrepancies, and arrive
 at accurate data as to the real yield of trees of
 known ages subjected to different conditions
 and treatment.

There is
 much in-
 formation
 to be obtained

Relative value
 of well known
 species

I have been
 in the mean-
 time success-
 fully growing
 the various
 kinds of bark
 and have been
 asked to report on the
 results.

42. So far as well known species are concerned
 the Nilgiri Crown bark (*C. Officinalis*) carry off the
 palm, but even here there is considerable uncer-
 -tainty, as we have not only several known
 varieties of these but many apparently new or
 -varieties or hybrids, the barks of which are all
 classed with the Crown Barks. I shall presently
 allude to the two most valuable which have
 come under review. Of distinct species the Yellow
 bark (*C. Calisaya*) come next in order, but these
 have never hitherto thriven on the Nilgiris and
 at the present time, are fast dying out. Then
 comes the Linn bark or Red bark with a com-
 -paratively poor yield of alkaloid, but of a
 robust habit thriving well at low elevations
 and last the Micrantha or Grey bark which
 have also not done well and are more or less
 dying out or assuming a stunted and shrubby
 form. The Pitagensis needs a variety of

gosa is described as valuable, but has
not been cultivated to a very limited extent in
our plantations, whilst *C. Pakudiana*, a variety
of the same species, which came to us from
Java has been condemned as worthless.

In September 1868 Mr. Broughton first
directed attention to a valuable variety, a perhaps
a species of *Chinchona* whose bark surpassed
in quality that of any kind previously known
and in April 1869 (*Q. R. J.*, No 1740 of 19th June
1869) he reports the results of a micro-analyses
of its bark. These exhibit a yield of as
much as 11.50 per cent total alkaloids and
10.13 per cent of Crystallized Sulphate of Quinine
compared with 4.50 and 1.50 per cent respectively
in adjoining trees of *C. Officinalis*. These re-
sults were confirmed on analysis by Mr. How-
ard and this valuable description has been
named *C. Angustifolia*, and is now being ex-
tensively propagated at Doda-betta, though
it would appear not to have received the
attention and development which it deserved.
In 1873 Mr. McGon appears to have sent to
Mr. Howard specimens of bark from a Hybrid
since called *C. Pubescens*, which on analysis
was found to yield the extraordinary high
percentage of 12.20 total alkaloids, and in
1874 in noticing the analysis of a further con-
signment, (23 strips) Mr. Howard writes "it is
clear that you have an extraordinary bark
and one which with its other good qualities
throug the *C. Mirabilis* (*Angustifolia*) quite

Mr. Broughton
discovers
C. Angustifolia

Mr. McGon dis-
covers the Hybrid
C. Pubescens

into the shade." "other good qualities" re-
ferred to are doubtless its robust habit more
closely resembling the *Succubra* than any
other, although it is believed to be a cross be-
tween the *C. L.* and strong growing
variety (2a? *U.* *unga*). If *C. Officinalis*,
Little would a-
ward the pro-
of this valuable
heard much of
varieties of *C. L.*
hear from Mr. B.
ies, but it appe-
-folia and *P.*
description de-
That there are
we know but
-tations, I have
identification
within the scope
this section. wh-
or nothing appea-
Late Superintendent
-tipis hybridizing
I find mention
reports but little
Doubtless, Mr. Mc-
-state notes, but
available, and
and make

Little of no scientific
hybridization has been
carried on

Then from the
point I took
up on our
Sept 20/74

other good qualities" re-
ferred to are doubtless its robust habit more
closely resembling the *Succubra* than any
other, although it is believed to be a cross be-
tween the *C. L.* and strong growing
variety (2a? *U.* *unga*). If *C. Officinalis*,
Little would a-
ward the pro-
of this valuable
heard much of
varieties of *C. L.*
hear from Mr. B.
ies, but it appe-
-folia and *P.*
description de-
That there are
we know but
-tations, I have
identification
within the scope
this section. wh-
or nothing appea-
Late Superintendent
-tipis hybridizing
I find mention
reports but little
Doubtless, Mr. Mc-
-state notes, but
available, and
and make
it remains for us to ascertain
the descriptions which pro-

... is valuable but has
 been kept under the ²⁸ varying conditions of
 altitude, temperature, and soil without the
 advantage of his great experience and spe-
 cial knowledge of the subject. The results
 obtained by private planters on the hills in
 the Wymond, Quektonney Valley, &c. which
 would doubtless prove of great interest and
 be readily placed at the disposal of govern-
 ment if required in the interest of the
 public, appear hitherto not to have secured
 the attention they deserve.

Effects of the Application of Manure.
 44 For consequence of a suggestion of Mr.
 Broughton, several experiments in manuring
 were made in 1864 with stable manure and
 with Ammoniac Sulphate ~~and~~ and Guano in
 1869, and the results were reported by Mr. Brough-
 ton in 1872 (G. O. R. O., 10th April 1872, No 584).
 The application of stable manure to C. officinalis
 although no improvement in growth was appa-
 rent, exercised a most marked influence on the yield of alkaloids, the total
 yield being found in 1872 to be 4.49, com-
 pared with 4.68 in unmanured trees, whilst
 there was 7.15 of pure guanine in the manured
 against 2.40 in the unmanured trees, an
 increase of 4.75 per cent of pure guanine,
 sufficient to double the value of the bark
 in the English market. It must further
 be noted that the per cent of pure guanine
 total alkaloids 7.15 out of total of 7.49

Experiments made
 consequence of
 Mr. Broughton sug-
 gestion.

Effect of stable
 manure.

Ammoniac Sul-
 phate and
 Guano

Was the increased
 due to increasing
 age of the trees
 or to manure.
 There may be
 falling bark

Alkaloids not
 retained constituent
 in life & growth of
 plant

renders the bark sufficiently pure for use
 without the expensive process of separating the
 sulphate of Quinine from the Chinoidine.
 The results of the application of the Ammoniac
 Sulphate and Guano to the C. succubus,
 were less satisfactory, and Mr. Broughton re-
 -cords his opinion that "as the gain in the
 most successful case consists mainly of alkaloids
 other than quinine, it will not be profitable
 to manure this species". In the case of C. officinalis
 - his however the gain from the application of
 Ammoniac Sulphate (to 3/4) was 1.22 of total
 alkaloids, of which 0.54 was quinine and of
 Guano (to 1) 2.53 per cent of which 2.01 was
 quinine, the latter thus increasing the value
 of the bark by 15-6d. per lb., whilst the cost
 of the Guano was not more than 2-6d. per
 lb.

45 The application of these nitrogenous
 manures, causes no apparent increase in the
 luxuriance of growth and the improvement
 in the bark was only apparent on analysis.
 Mr. Broughton has long been of opinion that
 the alkaloids in the bark of the trees are not
 especially active constituents in the processes
 connected with the life and growth of the
 plant, and this supposition is supported
 by the circumstance that the increased
 amount of alkaloids produced by the
 manure causes no change in the appearance

rate of growth of the tree. This has an important bearing on the stopping and raising process, for, if the directions be correct, they will be on the extraordinary fact of the cultivation of the trees as are interfered with their condition.

6. On receipt of Mr. Broughton's report, Government ordered further the autogenous manures, but their having been carried out that ordinary farmers have a competitive to manure has subsequently shown results. At Kodaion caused the bark to be found impossible to and Mr. Rowson is in favor of application. At Kodabetta in 1869 and 1870 were manured, last year with good results and a similar number will be manured this year. Mr. Broughton remarked, the action of manures from which the cultivation of the chunchona alkaloids can be still further improved.

Objects of Government in Undertaking and Retaining the Plantations

7. Much has been written at various times regarding the retention of the plantations by

Mr. Broughton's de-
ar to account
that the repeated
is so far not to
with and healthy
Further experi-
ments ordered
I find no acci-
out. They also or-
d manure should
This description
been applied with
vattam its appli-
tees which it had
more, to left freely
of its general
1000 trees planted
ed with stable
results and a
used this year.
thus appears that
is a new direction
the chunchona al-
improved.

Objections can

Objects of Govern-
ment not mini-
cal to private
enterprise

Government after the establishment of Chunchona on the Nilgiris had become an accomplished fact. They have been accused of interfering with private industry, and even threatened with legal proceedings for sending the bark to England for sale. It appears therefore advisable to refer briefly to past correspondence on this point. Government have, throughout, disclaimed any intention of interfering or competing with private enterprise, their sole object being, on the contrary, to establish and increase the production of so valuable a tree, and, by careful experiments, conducted over a series of years, to arrive at definite conclusions as to the descriptions most likely to produce good results under various circumstances of elevation, soil, and climate. The first part of the programme has been successfully carried out, but it is matter for much regret that the late Superintendent did not do more towards furthering the matter, or at least kept the results of his experiments and observations so much to himself that the public in 1848, sixteen years after the opening of the first plantations, are still quite in the dark as to what to grow, and where to grow it.

The Secretary of State indicated the principles which should guide Government in the undertaking. He wrote "the two first objects of the experiment are the provision of an abundant and certain supply of bark

48. In 1862 the Secretary of State indicated the principles which should guide Government in the undertaking. He wrote "the two first objects of the experiment are the provision of an abundant and certain supply of bark

the use of hospitals and troops and the
 need of the cultivation throughout the hill
 districts, in order to bring the remedy within
 the reach of frequenters of jungles and of the
 native population generally. "The commercial
 advantage to be derived from it were to be
 quite a secondary consideration, although,
 of course, a return for the outlay, and the
 spread of Chinchona cultivation by private
 enterprise are very desirable in themselves."
 (Page 255 para 4 Vol I of the Book).

49. Government in 1871 considered the
 advisability of selling the Pykara and Mail-
 koonda Estates but, in the Commissioner re-
 -porting that he saw no probability of dispo-
 -sing of them at a fair price, and that the
 total extent had been mis-estimated, orders were
 issued for retaining the former abandoning
 only the upper portion of the latter portion as
 -tation and retaining the lower portion as
 a wild Chinchona wood and an experiment. This
 did not succeed and the abandonment of this
 (the Mailkoonda) estate was sanctioned in 1874.
 as already stated (para 13). The other estate, the
 Government considered "should certainly be retain-
 -ed" and wrote accordingly to the Secretary of
 State, giving their reasons which may be epitom-
 -ized in the fact that although "Chinchona
 planting in India was a proved success, it
 had not altogether lost the character of an
 experiment which it would be unsafe to en-

Government then
 of selling Pykara
 & Mailkoonda
 1871.

Despatch of Se-
 cretary of State
 stating reasons
 for retaining the
 plantations

Mr. McJannet
 agrees on this
 point

entrust to private hands." The same was true
 at the present day. These views were in ac-
 -cordance with those of the Commissioner and
 Mr. Boughton, but Mr. McJannet appears to have
 been in favour of disposing of the plantation
 which writing in August 1871 he thought would
 be best effected "in three or four years hence". I find
 by a subsequent unpublished report written in 1875
 that he materially qualifies this opinion, for he
 requests that he and his department should be
 left unperturbed and independent, and that govern-
 -ment should decide on "a clear and definite
 plan of administration" and only in the event
 of Government considering this "inconvenient or un-
 -desirable" does he consider that "it may prove
 greatly to the advantage of the State and the
 community at large for the Government to retire
 from the cultivation, and leave it to develop
 -ment to private enterprise." Aut Caesar aut
 Nullus! either Mr. McJannet as Superintendent of
 the Government Chinchona Plantations was to be
 left entirely independent, a Government should
 abandon the enterprise!

50
 Secretary of State
 states views of
 address Government
 to retention of
 plantation

The First Secretary of State in reply to the com-
 -munication from the Madras Government, con-
 -sented fully in their views. He remarked
 "I incline to the opinion that a portion of the
 plantations should remain permanently under
 Government Superintendence". He proceeds, "it
 should be clearly understood that the intention
 of Government in sending their surplus bark to
 England for sale in the open market is not

2. ter into permanent com-
 ation with pri-
 ate growers, whose success
 would be secured
 by Government with great
 satisfaction but
 rather to act as their pioneers
 and to establish
 the reputation of Indian
 own bark for their
 advantage. At the same time the Government
 the sale of bark
 will do rightly in continuing
 upon the introduction
 until the outlay attendant
 is repaid. And
 and cultivation of the plants
 is repaid. And
 again, writing in 1873 (G.O. No. 286, dated 27
 March 1874) the means of supplying the
 Chinchona in a cheap
 quantity, is a question
 which must always be con-
 sidered as paramount.
 The object is
 which must supply
 the manufacture from
 for some years to
 the Jilgore factory
 in Europe, for
 generally in
 up to the present
 tution, and espe-
 cially cheap alkaloid
 with the red bark
 secured the atten-

Local Manufacture
 - Jilgore

51. After repeated experi-
 ments in the manu-
 facture of a "cheap Jilgore"

Chinchona
 alkaloid of more
 attention...

Mr Broughton's
 Amorphous
 Quinine

in 1870 decided on the preparation of
 - quantity named Amorphous Quinine by
 Inspector General Indian Medical Department,
 Madras. The process followed in its manu-
 - facture was described at length by Mr. Broughton
 - ton in a Report dated December 1873 (G.O. No. 286, dated 27
 1st April 1874 No. 48.) It consisted in "precipitating
 the alkaloids in an insoluble state and sub-
 - sequently separating them from the mass of im-
 - purities with which they were mixed by solution
 in alcohol" and Mr. Broughton claimed for the
 method that "the very cheapest materials are used
 and the greatest economy is practicable". The
 only material of which the consumption is large
 being wood fuel. The process was first tried in
 the small laboratory at Botasamund, and sub-
 - sequently on an extended scale with the ap-
 - proval of Government at Reddihattam.
 The results of the medical trial are given in
 a Report by the Inspector General, Indian Medical
 Department recorded in G.O. No. 29 of 11th Jan-
 - uary 1881, who states the testimony of several
 Medical men as to its efficacy and suggests
 its extended use which was approved of by
 Government.

Fast results
 favorable.

Quantity pro-
 - duced

Dr. King tells us in his Manual page 53
 up to the end of the financial year 1872-73
 600 lbs of Amorphous Chinchona alkaloid, have
 been produced at the Jilgore factory.

Committee
 appointed to
 investigate - matter connected

52. Doubts as to the economy of the manufacture
 having arisen, the Government appointed a com-
 - mittee consisting of Mr. Conish and the Com-

Missioner (Mr. Cockrell) to investigate the
 subject (G. O. R. O. No 759 dated 22 June 1874
 with special reference to (1) the cost, and (2)
 the medicinal value of the product. The
 report of these gentlemen recorded with G. O.
 R. O. No 217 of 11th February 1875 forms a valuable
 contribution to the literature of Chinchona ex-
 periment. They showed that "on the most fa-
 vorable calculation Government are paying
 twice as much for the Amorphous Quinine as
 it is worth" and that "the drug as prepared
 and issued, is of uncertain composition. Some-
 times it is rich in quinine; at others Chin-
 chonidine, and Chinchonine predominate."
 Under these circumstances the Government deci-
 ded on abandoning the manufacture, stating
 that similar attempts had failed in Java
 and America, and that should circumstances
 hereafter render it desirable to revive the at-
 tempt to manufacture, it could easily be done.
 Mr. Boughton resigned his appointment early
 in 1875 and as stated in para 19, no successor
 has since been appointed on the manufacture
 issued.

3. It appears unnecessary to enter further
 into the various questions which have from time
 to time, presented themselves in the past history
 of the plantation which are fully detailed
 in Mr. King's excellent "Manual of Chinchona
 cultivation in India" already referred to

Financial Statement of the Plantation
 54 I have prepared a statement of re-
 cepts and expenditure for the plantation from
 the commencement up to the close of the financial
 year 1875-76, including interest on annual
 balance of charges at the rate fixed by the
 Government of India viz 4 1/2 per cent. The
 statement is based on the figures supplied
 by the Accountant General but excludes all
 charges and receipts on account of Mr. Boughton's
 manufacturing. The quantities of bark de-
 livered to him for manufacture, their quantities
 and consequently the proper rate at which they
 should be charged, are still to a great extent
 unsettled. It is therefore deemed best to ex-
 clude them altogether as well as the value
 of buildings originally erected for the Quini-
 logist's department and since transferred &
 made use of by the Superintendent of the
 Plantation.

The statement also contains no charge on
 account of rent or purchase of land. As it
 was all Government waste and unproductive
 partly forest and partly grass, it would be al-
 most impossible to assess it fairly. Private
 planters must ever take this item into ac-
 count in framing estimates for their own gui-
 dance.

Existing rates for Government waste lands on the Nilgiris
 Existing rates for Government lands on the Nilgiris
 The rates of assessment on Government

CAPITAL ACCOUNT.

Statement of Receipts and Expenditure on account of the Chinchona Plantations from the commencement up to the close of 1875-76 compiled from the Accountant General's Books, returns of sale from India Office, and other sources.

Years.	Sale of Plants, Seeds, &c.	Value of Bark sent to Eng- land and sup- plied to other Governments or Depts.	CHARGES.										REMARKS.					
			Total.		Establishment including Superinten- dent's salary.		Buildings and Plant.		Working charges.		Value of Convict labor.			Interest on balance of charges.		Total.		
			R.	a. p.	R.	a. p.	R.	a. p.	R.	a. p.	R.	a. p.	R.	a. p.	R.	a. p.	R.	a. p.
1861-62			12,726	14 7	3,700	0 0	58,123	9 21	6,614	11 0	10,697	6 3	98,724	9 21	216	15 4	48,667	14 8
1862-63			26,444	14 0	3,025	0 0	62,682	0 0	15,440	7 1	16,887	7 6	148,267	11 7	28,181	14 8	49,667	14 4
1863-64			28,808	9 10	2,600	0 0	43,295	14 4	19,666	10 8	19,666	10 8	140,387	11 7				
1864-65	2,450	0 0	257	8 0	96,087	3 1	3,600	0 0	48,666	10 8	27,179	7 8	134,793	11 2				
1865-66	287	8 0	1,680	0 0	25,671	7 10	2,030	0 0	30,685	1 0	48,666	10 8						
1866-67	1,680	0 0	25,671	7 10	2,030	0 0	19,183	0 0	33,769	2 2	80,396	7 7						
1867-68			25,783	5 4	3,000	0 0	6,143	0 0	37,885	9 6	67,568	14 9						
1868-69	323	14 0	28,730	5 4	860	0 0	13,160	4 9	40,411	2 8	71,678	12 9						
1869-70			8,479	3 6	4,615	3 5	12,724	0 0	550	0 0	16,441	0 0						
1870-71			4,388	2 1	36,717	16 3	12,574	0 0	553	0 0	15,091	14 0						
1871-72	227	1 4	273	4 0	16,406	8 0	1,700	0 0	17,417	0 0	48,274	9 8						
1872-73	300	9 0	62,404	7 11	17,284	0 0	28,978	0 0	62,038	3 1	98,240	3 1						
1873-74	273	4 0																
1874-75	273	4 0																
1875-76	2,000	0 0																
Total	7,254	12 4	104,976	11 9	112,231	8 1	268,793	2 3	16,983	0 0	490,807	0 7	146,000	0 0	356,797	4 0	1,304,360	610

* For the Financial
year of 11 months.

Balance of charges or Capital Account 1,192,123 14 9 or Rs. 1,406 per acre (excluding Nurseries)

NET RESULT.
Total charges Rs. 1,304,360 6 10
Total Receipts " 112,231 8 1

* For the Financial year of 11 months.

lands on the Nilgiris are at present Rs 2 for forest and Rs 8 for grass land per acre per annum, after 5 years occupancy plus cost of demarcation and survey and any further sum to which the land may be run up to when exposed to auction.

Land may be acquired in fee simple at 25 years purchase. More favorable rules for the acquisition of waste lands are under the consideration of government.

56. The close of the official year 1875-76 has been considered appropriate for closing the capital account of the existing plantations. All extensions had then ceased, the regular yield of bark had commenced and the Superintendent who had inaugurated and conducted operations up to that time died very shortly afterwards.

The 31st March 1876 therefore suggests itself in every way as closing a marked epoch in the past history of Government Chinchona Cultivation on the Nilgiris.

57. The statement of capital account is as follows.

on the species as I have not had the advantage

Chapter II

Present Condition of the plantations

Preliminary.

Intent and
scope of the inquiry

I turn, with pleasure, from a
review, of the somewhat vague, and
often conflicting, records of the past,
to the present condition and prospects
of the plantations, which is matter
on which I can write from
my own knowledge and observation.
My inquiry, although somewhat
monotonous and wearying, so
far as the mere enumeration was
concerned, has become daily of
greater interest as I have
gradually arrived at some
idea of the great importance
of the subject, and the many
and the varied aspects in which
it should be considered. I do
not claim to have made
myself thoroughly conversant
with these during the comparatively
short time I have been employed
on the special duty, especially
as I have not had the advantage

of anyone as a guide, who could possess a thorough knowledge of the several plantations, and their past management. This knowledge the late Superintendent alone possessed, and much of it died with him, or is left on record in private memoranda to which we have not access. I have thus been obliged, in a great measure, to presume and draw conclusions for myself without knowing why a particular course was adopted, or a certain result ensued.

2 I may premise my statement touching state of the existing state of things by an expression of opinion that they are generally satisfactory on the whole, satisfactory. Although the number of trees falls far short of what was represented, and ought to have been found on the estates, they stand, as a rule, close enough together;— Although the cultivation is not so good, and ought to have been had for the money, what there is is generally good, considering the difficulties which have been experienced as to labor supply;— and although it is a matter for question whether anyone, in the late Superintendent's position, should

Want of accurate information as to the past

Mr. McIvor left no records

should have been left so long virtually uncontrolled, the scope and free scope thus enjoyed have not been without advantage;— affording a greater latitude in petty expenditure which had a hard and fast rule been laid down as must have been the case had the plantations formed part of any department, might have proved inimical to the success of the undertaking at any stage. This, doubtless, induced Government to place Mr. McIvor in the specially independent position he enjoyed.

The Enumeration

Commenced on
Doddabatta plantation.

3 Immediately on arrival I commenced on this, the immediate duty for which I was detailed, and, in consultation with Mr. Webster, decided to commence with the Doddabatta plantations, with the intention of reading up the records in the Commissioners' office during spare hours. This I soon found to be impossible as, after seven or eight hours spent in enumerating the preparation of a daily return

from

from my notes was all that could be accomplished.

44 I saw at once that it ^{more accurate than} would be necessary to subdivide ^{series and sub-series} the plantations ^{found necessary} into blocks of convenient size, which would prove of permanent advantage, by facilitating separate management and supervision.

Besides this I found the boundaries of each year's planting very imperfectly laid down, either on the ground or plans, and it was found quite impossible, in some instances, to ascertain them either by marks, or the growth of the trees. I therefore proceeded to lay them down afresh, being guided as much as possible by the owners' knowledge, the apparent age of the trees, and whatever boundary marks were found on the ground or plan. The year's plantings were then subdivided into blocks by natural features and plantation roads being made the boundaries or dividing lines, wherever practicable. The whole of these new boundary lines have been surveyed and entered.

Plotted Survey and Plans

entered on the plans by Mr. Reynsford Russell, whose services, in the absence of a Government Surveyor, I was authorized to employ (L.O. No. 309, dated 26th February 1878). New plans showing the subdivisions and area of each are now being struck off by the Revenue Survey, and will accompany this report, with which a skeleton or key map is bound up for facility of reference. Each subdivision is now being clearly marked on the ground by means of stones bearing a consecutive number, corresponding with tabular statement in Appendix. This was sanctioned by L.O. P.D. No. 621, dated 25th April 1871.

Subdivisions defined on the ground by stones

Methods pursued in enumeration

5 As to the method pursued in enumeration - as it was impossible, owing to irregularity of planting, and the mixture of species, to arrive at anything like accuracy by merely counting out selected areas of limited extent, - I found that

that, where the lines were pretty straight, and trees of the same species planted together, I could make most progress, consistent with sufficient accuracy, by placing four or six sharp coolies in the line, and making them count them up and down, the Overseer or Assistant Superintendent being at one end and myself at the other. In this way I found I could get through as many as 25,000 a day; but, where the lines were crooked, or species mixed together I had to adopt much slower methods: viz., subdividing by ropes into very small portions, and setting one or two men to count each species, under close supervision and check by the Overseer and myself; or by having a tape tied to each individual tree, and then collected, species by species, and counted by me. This last, a native plan, suggested to me by Sir William Robinson, ensures great accuracy, but is very tedious.

By these methods, shading pursued, the enumeration of the trees in all the plantations has been

been effected in about $2\frac{1}{2}$ months, or rather less if we allow for Sundays, holidays &c, whilst Mr. Bruce estimated in 1871, that it would take six months; Major Hecsey put it as many years; and the late Superintendent at "a life time"!

Results

7 Every living tree, or young plant likely to grow into a tree, has been counted, the result being a total of 569,031, as compared with 1,190,458, estimated by the late Superintendent, namely:—

Plantation	Number of trees estimated by the late Superintendent	Number of trees actually found on enumeration	Remarks
Dodabatta	345,980	224,936	+ A few hundred red trees remain in the Mailkonda plantation, chiefly Red barks, but so overgrown that it would probably cost more than they are worth to clear away the brambles. I have therefore entered it as blank.
Keddwallan	474,740	208,780	
Wood	304,184	145,758	
Hooker		87,557	
Mailkonda	65,254	"	
Total	1,190,458	569,031	

Of this number, however I consider that fully one-fifth, or 20 per cent, being

being either suppliers or stunted trees, should be destroyed and that Government would be unwise to consider that they have more than 450,000 fully established healthy trees in the plantations which is certainly not a sufficient crop for the area under cultivation, being an average of only 530 trees per acre.

Classification

8. This may be considered as twofold, viz. first, according to species, and second according to age and growth. With regard to the former, I have not attempted to classify according to varieties, as such would have taken too much time, and necessitated my examining almost every individual tree, and seeing it in flower, but have confined myself to the main classification of Red, Crown, Yellow, and Grey Barks, and other species. Under this system, we certainly lose sight of hybrids, which are incorrectly classed with the parent

whose

whose growth they most resemble, and of varieties of the *Officinalis*, *Calicaya*, and *Microantha*, some of which are much more valuable than others, but all this can form subject of future enquiry and record in the ordinary working of the plantations, and will be greatly facilitated by the subdivision of the blocks, and knowledge of the total number of trees in each.

Results

9. According to the above classification, we have the following compared with the late Superintendent's statement:-

Descriptions	Numbers given by the late Superintendent	Numbers actually found by this Classification	Remarks
Red bark	579,938	260,837	
Crown Bark	531,282	305,432	
Yellow	36,250	552	
Grey	28,759	18,744	
Other Species	16,229	336	
Total	1,192,458	569,031	

from which it appears that both the yellow and grey barks are fast dying out as already reported.

There

There may be a few more still -
 missing, but not many, as I
 carefully noted these species. As
 regards trees called under "Other
 species" which includes *C. Patensiana*
Pitayensis &c, the return is not
 strictly accurate, for, as explained
 above, hybrids and varieties, which
 were doubtless originally classed
 under "Other species" when planted
 out are now temporarily classed
 either with red or crown barks.

10. To arrive at the second classification
 according to age and growth.
 Classification, according to age
 and growth, I have measured
 30 or 40 average trees in each sub-
 division, and struck an average
 for the year's planting, the growth
 measurement being taken at
 breast high, or about 4 1/2 feet,
 and not at foot of stem as was
 Mr. Mc Broo plan. Where trees
 of more than one description occurred,
 in any quantity, in a subdivision
 the average measurements of each
 were taken.

Results. 11 The results are as follows:-

Years planting	Average height in feet					Average girth in inches at 4 1/2 feet				
	Red Barks	Crown Barks	Yellow Barks	Grey Barks	Other Species	Red Barks	Crown Barks	Yellow Barks	Grey Barks	Other Species
1862	24	18 2/3	"	"	"	17	11	"	"	"
1863	14 1/2	16 1/3	"	"	"	10 5/8	11 1/2	"	"	"
1864	12 1/2	15 2/3	"	"	"	10 3/4	9 2/3	"	"	"
1865	19 2/3	14	"	30 1/3	"	11 2/3	8 1/2	"	8	"
1866	17 3/4	10 1/2	"	"	"	11 1/3	6 1/2	"	"	"
1867	12 2/3	9 2/3	"	"	"	8	7 1/4	"	"	"
1868	14 2/3	11	"	"	"	8	7	"	"	"
1869	12	8 1/4	"	15 1/2	"	7	4 1/2	"	6 2/3	"
1870	9 2/3	7 1/2	"	"	"	6 1/4	4 1/2	"	"	"
1871	"	"	"	"	"	"	"	"	"	"
1872	"	5	"	"	"	"	2 1/2	"	"	"
1873	"	9	"	"	"	"	3 1/2	"	"	"

The above statement is
 compiled by taking the averages of
 the several subdivisions in all
 the plantations in each year
 planting, and finding the mean.
 The averages vary greatly in
 separate subdivisions, even of
 the same year, according to
 conditions of soil, exposure &c,
 but the statement shows the
 maximum average growth
 both of *ducumbra* and *officinalis*
 to be in the oldest planting

1862 (Maddawattam only) that of
 1865 (Maddawattam, Dodabetta and
 Wood Estates) Conning must, whilst
 the measurements of the plantings
 of 1872 (Dodabetta only) are the
 lowest. The highest individual
 trees which I measured were
 Succinbra, $37\frac{1}{2}$ feet, in the 1862
 planting at Maddawattam, and
 Officinalis, $26\frac{1}{2}$ feet, in the 1863
 planting at Dodabetta, and the
 greatest girths; at $4\frac{1}{2}$ feet from
 the ground, 28 inches for Succinbra
 and $23\frac{3}{4}$ for Officinalis both at
 Maddawattam. The 1865 measurements
 of C. Microantha were taken on the
 Wood, and the 1869 measurements
 on the Hooker Estate; they compare
 favorably with those of Succinbra
 and Officinalis of the same age.
 No measurements of C. Calaya
 were taken as in the only
 subdivision in which they occur
 in any number, (No. XXIX 1870
 at Maddawattam) they are sickly
 and fast dying out. Full
 details as to the average height
 and girth in each subdivision are
 given in the remarks column of statement B
 appended.

51
Particulars of Enumeration
and Classification and
Comparison with Mr. McIvor's
Estimates.

Full particulars of 12. Full particulars as to
 enumeration and classification the enumeration and classification
 in tabular statements are appended in tabular statements
 A B and C. The detailed statement
 of each subdivision is intended
 mainly for the future guidance
 of the Superintendent and Overseers,
 who it is hoped, will thus have a
 guide towards what is required
 in each, and be in a better
 position to check labor and yield
 of bark &c.

Comparison with 13. Mr. McIvor's last statement
 (of 10 July 1877. No. 2273) gave the
 numbers planted out at 1190, 458,
 from which he claimed a deduction
 of 30 per cent (357, 137, trees) for failures.
 To this I add 6,525,4 stated to have
 been planted out in the Mailkoon
 plantation of which, for reasons
 stated, I have taken no account
 making 422,391 trees well to be
 devoted, which ought to have
 been 768,067 in the Dodabetta,
 Maddawattam

and P. Kara plantations instead of only 569,031 as now shown. I do not, however, believe that 1200000 plants could ever have been planted out in the plantations which, even according to Mr. McIvor's estimate of surface measurement, had an area of only 1244 acres; (including Mailkoonda); for this would have given an average of nearly 1000 trees per acre, or 6½ feet apart over all, whereas a very small proportion is planted at this distance; many being at 7 feet (848 to acre), 8 feet by 9 feet (605 to acre), 9 feet (537 to acre), and some even 12 feet (302 to acre) apart. I should not therefore have been surprised at the comparatively small number of trees found on accurate enumeration, were it not for the number of supplies or renewals made from time to time, especially on the Doda Betta plantation, which should have brought the number of existing trees above five hundred and sixty-nine thousand, or, as I have stated, nearly four hundred and fifty

fifty thousand healthy living trees

Mr. McIvor's return 14
showed 2,640,000 plants
dispropagated

It must further be borne in mind that the late Superintendent's returns showed 2640,000 plants as having been propagated, of which number rather less than 200000 were supplied to the public. Thus 2400000 or allowing for loss in transplanting 2000000, would appear to have been planted out from time to time in the Government plantations, of which less than one quarter survive. In para 13 of their order No. 7273 of 10th July 1877, Government called for an explanation regarding the 1200000 plants (2640000 - 1200000 - 200000 = 1200000) which appeared "to have perished or been otherwise disposed of," but I am not aware that any has been furnished. With these facts before me, I cannot refrain from an expression of regret that we have no record of the disposal of so large a number of valuable plants.

No record of the
disposal of 1200,000

15. A further subject for ^{small number} ^{of yellow and} ^{grey barks} ^{remaining} regret, to my mind, is the comparatively few trees of the yellow and grey barks remaining alive in the plantations, compared with Mr. Mc Ivor's estimates (552 and 1874 versus 34,250 and 28,759 respectively), and the apparent dying out of the former valuable species, without any adequate steps having been taken to ascertain the real causes, and by experiments, by cuttings, and seed-sowing, to acclimatize it in more congenial soil and climate.

16. Again, although I have no ^{Hybridization appears} ^{the result of accident} ^{and also sufficient} ^{record found.} doubt that the numbers classed under "Other Species" should be largely increased by the addition of Hybrids, partly self sown and partly planted out, I can find no record of either to justify Mr. Mc Ivor's returns. I find mention in almost every annual report of the number of Hybrids propagated, but neither the Assistant Superintendent at Reddickham, nor the Superintendent at Rodabilla know anything of them, and I am reluctantly led to the belief that

that the Hybrids we have are for the most part at all events, the result of accident and not of careful hybridization, such as Mr. Mc Ivor's reports would lead one to believe has been carried on which accounts for our finding them for the most part intermixed amongst the other species all over the plantations, and not planted out separately, save in the small extension (Subdivision No. XIII, Appendix A. Hooker), on the Hooker estate, where they have almost all perished, or show little or no analogy to the species or variety to which they were said to belong.

Existing Circumstances of each Plantation.

17. I proceed to a description of the existing circumstances of each plantation commencing with propagation.

18. There are two propagating houses for Rodabilla, situated in the Government gardens, and capable of containing about 40,000 plants; when I visited

them

Propagation

5-6.

there were rough of 44000, viz.,
 35000 *C. Augustifolia*, 7000 *C.*
Pitayusias, 1000 *C. Calisaya* and
 1000 *C. Succintra*, but a good many
 of those best established had
 to be kept outside. The young
 plants, whether raised from
 cuttings or seed are in earthenware
 saucers filled with a prepared
 soil of loam, sand, and brick dust,
 and kept in a temper atore -
 heated by artificial means until
 the roots are well struck. The
 plants of *C. Augustifolia* were
 from cuttings, and of those *C. Calisaya*
 and *Succintra* from seed received
 from Reddivattam; all looked
 very healthy. Orders have only
 been registered for 100 of *C. Calisaya*
 by General Morgan, the remaining
 plants being available for
 Government Estate purposes
 or general distribution. Until now
 there has been no regular propa-
 gating house at Reddivattam,
 but Mr. Rowson has recently
 built one in which he estimates
 he can rear 50000 seedlings or 20000
 cuttings at a time. The estimated
 cost was \$1000, but it will cost a

Nurseries.

5-7

a little more owing to great wastage
 in converting the teakwood received
 from the Government Depot at
 Ootac aimed. The building is very
 cheap, and will supply a great
 want. There are no propagating
 houses on the Wood or Hooker Estate.
 19. The nursery at Dodabatta
 near the old jail is 2.11 acres in
 extent and contained 350000 plants
 when I inspected it in April.
 These were all *C. officinalis*, with
 the exception of 3 beds, containing about
 3000 Hybrids. 300000 plants are
 kept on hand for private planters,
 and 50000 reserved for supplies in
 the Dodabatta plantations.
 The nursery requires a little working
 up as the soil appeared soon in
 and baked in some places, but
 this was after long drought.
 The area of nurseries at Reddivattam
 is 1.26 acres; they contain 300000
 plants of which all are *C. Succintra*
 except 1 bed of 3000 obtained from
 the propagating house at Dodabatta
 and said to be *C. Augustifolia* and
C. Pitayusias (the latter certain).
 Orders are registered for all the plants

which

which were ready for delivery in January, but planters object to removing them before the monsoon has well set in, i.e. in June. The planters are well grown and appear very healthy. The nurseries on the Wood & Hooker Estates are 0.80 acres in extent viz., Wood 0.40 acres, Hooker 0.40 acres. They contained about 150 plants when I inspected them in March. The plants were almost all *C. Saccintra*, and are all kept in private planters. The nurseries appeared well situated and carefully managed.

20 The total area under cultivation by the revised survey is now 848.47 acres, viz:-

Dodabatta	320.47
Maddurattam	301.63
Wood	72.18
Hooker	54.19

The original survey in 1872 made the area, excluding Mailkonda and deducting 5.04 acres under tea 863.39 acres. I am quite unable to trace the source where Dr.

McEvoy got his areas on which Budget estimates have been framed

framed but which vary almost every year. In his statement recorded with S.O. No. 2273 of 10th July 1877, he makes the total area 941.77 and surface 1244 acres. The figures I give below are exactly those of the original Revenue Survey maps viz:-

Dodabatta (excluding tea)	307.31
Maddurattam	340.10
Wood	69.54
Hooker	146.41
Mailkonda	30.91
Base area	894.30

to which, even if we add 11 per cent for a slope of one in two overall, it makes only acres 992.67 and not 1244. I have omitted Mailkonda altogether as there remain only a few hundred trees, chiefly *C. Saccintra*, in the lower portion, which is so overgrown with brambles and scrub that it is impossible to enter it, and clearing it would, I fear, cost as much as the value of the trees. The upper portion of a grass hill at Maddurattam (Subdivision No. XXXIII Appendix A) is also now struck out from the cultivated area,

area, as the planting has failed, and it is proposed to replant with acacia for firewood supply. Small extensions have been made in the (Dodabilla and Hooker plantations, and a small portion of 1864 and 1867 planting, which was somehow omitted in the survey of the Wood Estate is now included. Plantation roads, which were included, and in cultivation in original survey are now taken out in calculating the actual area.

Dodabilla.

21 The Dodabilla plantation elevation and is situated at an elevation of from 7500 to upwards of 8000 feet above the sea; the surface mould in the ravines is rich and often two feet deep, the substratum being gneiss with here & there decomposed felspar and hornblende; on the upper portions of the grass hills there is but little surface soil over the rock which crops out frequently. The portion first taken up for planting contained

According

According to Mr. Markham "Osbeckia holly, wild cinnamon, Drickelias, Vaccinium, Sapota &c, with an undergrowth of Lobelia, Acanthus, and fern, and minor species of Chinchona across shrubs". The average rainfall is 144 inches per annum, and Dr. King states that observations, calculated on the returns for four years, show that there are no fewer than 218 dry days in the year. The mean temperature in the shade may be taken at 60 degrees and the maximum at 70 degrees Fahrenheit whilst, during the months of December, January, and February, there is often sharp frost at night, which does considerable damage to the Chinchona trees in the low lying portions of the plantation.

I divided the plantation

Sub-division & Enumeration

22

into 39 subdivisions, some of which are of small extent, owing to the configuration of the ground, the plantation roads &c. My enumeration gives 226,936 trees in the 320.47

Acres

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 and it is proposed to replant with
 acacia for firewood supply.
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 in the ravines is rich and often
 two feet deep, the substratum
 being gneiss with here & there
 decomposed felspar and hornblende,
 on the upper portions of the grass
 hills there is but little surface
 soil over the rock which crops
 out frequently. The portion forest
 set aside for planting contained
 according

According to Mr. Markham
 "Osbeckia as holly, wild cinnamon
 Dracopis, Vaccinium, Sapota &c,
 with an undergrowth of Lobelia,
 Acanthus, and fern, and other
 species of Chinchona across shrubs".
 The average rainfall is 144 inches
 per annum, and Dr. King states
 that observations, calculated on
 the returns for four years, show that
 there are no fewer than 218 dry
 days in the year. The mean
 temperature in the shade may
 be taken at 60 degrees and the
 maximum at 70 degrees Fahrenheit
 whilst, during the months of
 December, January, and February
 there is often sharp frost at night
 which does considerable damage
 to the Chinchona trees in the low
 lying portions of the plantation.

Rainfall and
 temperature

Sub-divisions &
 enumeration

22 I divided the plantation
 into 39 subdivisions, some of
 which are of small extent, owing
 to the configuration of the ground,
 the plantation roads &c. My enumer-
 ation gives 226,936 trees in the 320.47
 Acres

acres cultivated, of which by
for the greater number (226.647) are *Pinus edulis*
Coffiniana var *Candamini*, of trees
Bomplandiana and *Crispa*.
There are many varieties and Hybrid
plants which require careful
observation and study to define
the species to which they belong.

23 The cultivation appears to have been very good, the whole
plantation being weeded, and
soil well worked by the "mamoti"
(Indian people) several times each
year. There has been no death
of trees here as at Muddwa and
D. P. P. The trees are, on the
whole, very healthy, but the
percentage of renewals over the
has been very great, reaching
to 50 per cent in some subdivisions
(e.g. Nos XXX, XXXI and XXXII. Appendix
A, Dodabilla) and the renewals
would appear in many cases
to have been repeated several
times. The hill sides are, as a rule,
very steep, and the wash during the
monsoon must be very great;
Catch drains have been made

Northwards
exposed but

7 63
to a certain extent, but I do not
think there are enough, or of sufficient
breadth and depth, to carry off
the surface water. The woods are
buried for most part in mounds
between the trees. All descriptions
appear to grow best on a northerly
exposure, and as Lt. M. J. has
placed this record, I was astonished
to find that he had planted some
with a south-westerly exposure.
This is marked by the case with
the younger plantations (subdivisions
XXXIV, XXXV and XXXVIII in Appendix
A, Dodabilla) with the low lying
portion below the old jail where
the growth, especially of Crown Bark,
is poorest and most irregular. The
cause of the southerly exposure
being unsuitable cannot far be
seen. The sun during the hottest
and driest months of the year is in
the south, and the Chin chowas on hill
sides facing the south are exposed
to the full force of his rays, mitigated,
as a rule, by clouds. The effect,
especially on trees barked late in the
year

year, is very marked; they are
literally burnt up on the exposed side.
I observed that Mr. Broughton found
that exposures to the sun - light, decreased
the amount of alkaloids in the bark.
Because this they are exposed to the
full force of the south west monsoon.

24 Besides the experiments *Harvesting*
carried out by Mr. Broughton in 1867
and 1869, and a small experiment
on 355 trees with patent manure
from Melbourne in 1873, cattle
manure is applied to 20000 trees each
year with good results; and this same
has been done during the present

year -
25 Harvesting has been carried *Harvesting*
out entirely under the morning sun - *the bark*
with the exception of 50 trees *C.*
officinale coppiced as an experiment
in 1873. Almost all the trees in the
older plantations have been barked
3 times, and even in the plantations
of later date most of the trees
have been already barked once
if not twice, perhaps somewhat
prematurely; - 55435 trees in all
have been barked. The bark
appears

appears to renew well, and I
observed no trees which had failed
to renew altogether, and comparatively
few which had failed partially.
Owing to the majority of the trees
being *C. officinale*, and the
growth generally slow at so
high an altitude, the yield per
tree or acre is less than that of the
Nesowattam or Nysara plantations
but it has been generally supposed
that the bark had a higher
market value being found richer
in alkaloids. Recent sales
however do not bear out this theory.

26 The yield last year was as follows:-

Natural Crown Bark.	lbs 17478½
Mossed - do	" 10066
Renewed - do	" 5401½
Branch + do	" 5855½
Total 38801½	

and that for the current year is
estimated at lbs 40000 of 84 bark weight.

Natural	20000
Mossed	10000
Renewed	6000
Quill, or branch	4000

which, if the season prove favorable
will be harvested. No record of the

number of trees barked in each working season as hitherto been kept, but this will be done this year.

27 The supply of moss is obtained from the whole town (Dorabell) and cost

Snowdon, and the neighbourhood, and is ample, there being private plantations in the vicinity, although some so, it has now to be gathered eight and ten miles away. The Head Overseer estimates the cost per bundle of the 100 at annas 8, and the average cost of stripping and mossing 25 trees at Rs 1.13 viz:-

Rs 200 of moss as above	Rs 1.0.0
fibre	0.0.6
1 barker	0.4.6
2 mossers, at 4 annas each	0.8.0
Total	Rs 1.13.0.

25 trees of the *C. officinalis* yield, on an average, the 50 green bark, equal to, say, the 18 dry; according to this estimate each pound of dry bark costs annas $1\frac{7}{8}$ for collection and mossing the tree. In the Administration Report for 1876-77 (recorded with S.O. R @ 20 February

1878 No 274) Mr Webster estimated the average cost of collection and mossing at Rs 1.10.10 per pound of dry bark, but this estimate was arrived at by merely dividing the total expenditure, classed under "mossing and collection of bark", by the total yield which included branch bark topping &c. The estimate cannot therefore lay any claim to accuracy, but corresponds very nearly with my calculations which show Rs 1.10.8 as the average cost for all the plantations.

Drying

28.

As the bark is collected, by the barker's to the drying shed, formerly the old jail, where it is dried on stages which can hold about the 1500 green bark at a time; six coolies at Rs 4 each are employed in drying and packing. They can get through on an average the 1500 per diem, which makes the cost of their labor Rs $1\frac{7}{8}$ per the 100. Previous to last year it was dried in the sun, but hot air flush and

how

now been introduced. The bark loses about $\frac{2}{3}$ of its weight in drying. It is then packed in bales of 100 nets, the covering being waterproof packing bags, supplied from Bimlipatan by Messrs. Arbuthnot & Co. at a cost of Rs. 1.3.0 each including delivery. The bales are then despatched to the store, formerly Mr. Brown's Laboratory. Two coolies can carry four bales of the 100 daily, their wages being Rs. 4 each per diem. This makes the cost of this carriage Rs. 2 per 100. When a sufficient quantity of bark is ready in store, it is forwarded to Muttupolliem in carts, each cart taking 10 bales, Rs. 10.00 for Rs. 6.00 or rather less than Rs. 10.00 per 100.

29 Thus the Dodabatta bark cost of collection and carriage costs about Rs. 12.1.8 per 100 or Rs. 271.2.13 per ton for stripping, mossing, (which I am obliged to include as the same three men strip and moss) packing, and carriage

carriage to the Railway at Muttupolliem, viz:-

Cost of Collection & mossing per 100 - Rs.	10.1.13
Drying and packing	0.1.7 1/2
Packing bags and carriage to store	1.5.0
Cartage to Muttupolliem	0.9.7 1/2
Miscellaneous e.g. packing on carts and Railway trucks, from Datta, &c.	0.4.0 1/2
	<hr/> 12.1.8

Including share of supervision, cost of buildings &c. Hence the cost of carriage to Madras & London is, of course, the same for the bark from all the plantations, viz:- Rs. 8.11.6 1/2 per 100 or Rs. 195.6.3 1/25 per ton making a total charge of Rs. 20.13.2 1/2 per 100 on Dodabatta bark. Subsequent to this there are brokers' charges, deductions, &c. which appear every day, and require looking into, in order to arrive at the actual cost to Government of placing its bark in the London market.

30

The actual Expenditure incurred for on the Dodabatta Plantation including pay of establishment, new buildings, &c. was Rs. 14,246.0.1 for the official year 1877-78.

Actual
Expenditure for
1877-78

Establishment	Rs. 2074.0.0
Working charges	511.3.9
Buildings	1488.2.6
Nurseries	464.13.0
Manure	400.5.6
Collection of crop	4589.14.10
Contingencies &c.	117.8.6

The accounts as received in the Commissioners Office do not show the amounts realized for the bark from each plantation separately. Besides which the amounts received for previous crop, are as a rule, not credited till the following official year has commenced, a point pointed out by Mr. Webster. As it is all but impossible to arrive at the net result of any particular year's working by placing the receipts and expenditure in juxtaposition.

Neddawattam

Elevation Soil
&c.

Neddawattam

31

The Neddawattam plantation situated 18 miles from Potaacund varies in elevation from 5000 to 6000 feet above the sea, the lower portions extending to the verge of the steep descent to Gudaloor, and the Wyznad tableland. The superstratum is a very rich and deep vegetable mould, its bases being according to Mr. Markham, "a mixture of Syenite and laterite, curiously combined in strata." Dr. McPherson described the superstratum as a "marl" and the substratum has granite and trap in process of disintegration, but Capt. Morgan and Mr. Macpherson both objected to this description, stating that there is no marl, properly so called on the hills and the former suggesting "a compound of mica and felspar." As more probable. Mr. Markham found in the original forest *Agave odontophora* (called *Chinchona excelsa* by Roxburgh) wild Yam, an *Andromeda* wild Yam, cinnamon, pepper, coffee, wild figs,

An *osbeckia* with purple flowers,
and numerous ferns and orchids.
The prevailing undergrowth was
Acanthus, *Melestomaceae*, &c. and,
According to Dr. McPherson, "the
most common small fern which covered
the plants imported by Mr. Markham".
The average rainfall is 105 inches, Rainfall and
which, according to Dr. King — temperature

Statement based on the returns
for fifty years, falls on 125 days
of the year, leaving no less than 240
days on which no rain falls.
The mean temperature in the shade
may be stated as 60° with a
maximum of 80° and minimum of
54° Fahrenheit. From November
to May the sky is generally clear
and sun's rays very powerful
but, from May to November, there
are generally clouds, and when
rain does not fall the air is cool
and moist.

32 I divided the plantations Subdivision and
into 29 subdivisions, of which — enumeration
however one is blank — The area
by previous survey is 301.63 acres Similar description
and the number of trees 208,780, of which
which 164,456 are *C. succinebra*

43,694 *Coffinella*, 193 *C. micrantha*,
421 *C. Calceaya*, and 16 other species.
Here also there are many varieties,
or Hybrids the most frequent
being *C. Anglica* (?) *C. pubescens*,
and what is locally known as the
broad-leaved *Condoumenia* /
"Writusung?"

Cultivation

33 The cultivation is, on the
whole, similar to that of
Dodabatta, but has suffered from
the difficulty of getting and retaining
sufficient labor owing to there
being no *Badagas* available as
at Dodabatta, and great com-
petition for the *Canavese* in the
large planting District of the
Mynand and Bahtertong Valley,
which are in the vicinity of the
plantations. Weeding has, for
this reason been but superficial.
In some years the soil has been
not so much worked as at
Dodabatta, where, however it
is more required, being, as a rule,
much poorer and not half the
depth. The general condition of the
plantations

plantations and trees bears however nothing to be desired, and there is a marked absence of the frequent renewals or supplies which appear to have been found necessary at Dodabetta. There are, on the other hand, many more self-sown trees coming up between the roads especially in the vicinity of water channels, whereas at Dodabetta there are scarcely any; doubtless due to the greater working or digging in the latter. The hills are not so steep as at Dodabetta or Pykara and the greater portions of the Growth of the *C. Succumbra* gives the appearance of being much further advanced, and the ground better covered than any of the others. The growth of the *Succumbra* in the older plantations is very fine, the average height and girth being 24 feet by 18 $\frac{2}{3}$ inches as shown in para 11 of this Chapter. The best results with this species are obtained in the ravines, formerly covered with forest trees, and attempts to grow them on the upper slopes and grass hills have

Brown Laks

have not been very successful. The *C. officinalis* on the other hand appears to prefer a comparatively high elevation and is not so common in the open grass hills. Some of the latest planting (1869 and 1870) which is chiefly of this species, in the higher portion of the plantation where the upper Road leads to the Ossington Estate, promises to be as successful as that of the Red Barks near the Assistant Superintendent's Bungalow. Trees of the *C. Calisaya* have been planted in various parts of the Estate with varying conditions of soil and aspect, but none have done well. After the first few years they assume a shrubby appearance, with numerous stems, none of which obtained any size; afterwards they become sickly, and but few live beyond the third or fourth year of growth. The cause of this is difficult to ascertain. I was inclined to ascribe it

at want of drainage, and over
much moisture at the roots, but have
convinced myself it is not so,
as the soil in which they were planted
even in the lower portions of the Estate,
has a subsoil composed of small
gravel affording excellent drainage
and their roots, on being dug up,
exhibit no signs of rust or decay.
The causes must therefore be sought
for elsewhere, and I confess

I am not at present in a position
to offer a decided opinion. It has
been suggested to me that the rain fall
of Madagascare is too great for them,
but after perusal of Mr. Markham's
descriptions of the climate of the
forests of Carabaya (Peru) where
they are indigenous, I do not think
this can be the case; much more
probable is Mr. Metro's opinion,
which has Mr. Howard's concurrence,
that it is the four or five months
drought which is inimical to this
species, which probably requires
a moderately moist climate
during the whole year. It is very

22/10

note worthy that neither the
Calsaya nor Inerantha both
from Carabaya, have done
well anywhere on the hillsides,
whereas the Succubra and all
varieties of Opuntia which come
from Equador 10 degrees further north,
have succeeded.

Manuring

34. In 1869 Mr. Broughton
applied nitrogenous manure to some
of the trees in the plantation with
no apparent influence on their growth,
but with good result on the yield of
alkaloids as described in Chapter I
para 45. Subsequently stable manure
has been applied in various portions
of the plantation, exercising
apparently a favorable effect on the
health of the trees, as evinced in the
case of 6000 Cucurbita trees, manured
in January 1877, by the bark stripping
much more freely during the succeeding
barking season. In all the older
planting Mr. Rowson has also
deep renovation pits between the
trees

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 dug renovation pits between the
 trees

trees in which the weeds and leaves which fall from the trees are buried. When decayed and mixed with the earth this forms a very fine description of leaf mould as manure.

35. With the exception of the harvesting the few limited experiments in coppicing recorded in Chapter I Para 34, the bark has been harvested by the stripping and mowing process. Roughly speaking two thirds of the trees have been so treated since the commencement.

Mr Rowson has furnished me with statements of the subdivisions in which trees were barked in 1877-78 and in which he proposes barking during the current year. The former is too vague to be of use as it contains such entries as "all trees of size in subdivision" and on working out the totals as accurately as possible the numbers are far in excess of those given in his annual report of 1860 versus 58500. I therefore reject it altogether.

According

Number of trees to be barked in current year.

According to his statement Mr Rowson proposes roughly speaking, to bark 157444 trees in the current year, of which 121146 are red 46096 crown, 168889 and 34 yellow barked. but I am scarcely in a guess that he will get through some say, representing three quarters of the whole estate; nor does the estimated yield coincide. Where there time to refer he would probably qualify his statement by the remark "all trees of size". The older trees have all been barked three or four times and those known as the 1000 experimental trees - C. succintha in subdivision I 1862 A, no less than six times, having yielded the 14327 of dry bark in all and the 3200 or an average of the 3.2 per tree on last barking. (1877-78). These are the trees referred to in para D of Government order R.D. No 274 dated 20 February 1878. The bark is everywhere renewing freely and the trees show no outward signs of deterioration from being subjected to the stripping process para

1000 experimental trees barked six times

36. The yield of dry bark is as follows:-

Natural Crown	Rs 9400.
Mossed - do	9669 1/2
Renewed - do	2962
Natural yellow	1045 1/2
Natural grey	150
Natural Red	11748
Mossed - do	16407
Renewed - do	14090
Dust - do	58
Mixed	181

Total Rs 68511

And that for the current year is estimated at Rs 76000 viz:-

Natural Crown	Rs 4000
Mossed - do	8000
Renewed - do	1200
Natural Red	20000
Mossed - do	8000
Renewed - do	24000

A record of the number of trees barked to obtain this amount will be kept.

37. The moss supply is derived from Government Sholas at the head of the Oachintouy Valley and toward Pykara Bungalow. The Assistant Superintendent is apprehensive of its running short.

And it certainly appears very advisable to reserve the supply in all reserved Sholas for the use of the Government estate. The attention of Government has already been called to this subject. (G.O. R.R. No 120 dated 23rd January 1898). Mr Rowson estimates the cost of collection barking and mossing at Annas 1-7-86 per lb of dry bark, of which the collection cost is Rs 1.06 and the labor of stripping and mossing 7.80 pie. The total cost per lb is therefore very similar to that at Dodabatta (Annas par 1-7-8) and may be accepted as correct.

38. The bark is dried in the drying and packing shed which is fitted with stages and hot air flues. The building is in a very satisfactory condition, and the roof is also considerably during the monsoon. Plans and estimates have been framed and submitted for the erection of a new drying and storing shed to cost Rs 55,730. The matter is under consideration of the Government.

some of the box to Comba to be to be said in accordance with 10.

Hogs dated 18 January 1898, meanwhile the old building has been patched up and the roof covered with tarpaulins which cost including carriage about Rs 1200. I state my opinion as to this point in Chapter III.

39. I have not the details of cost of collection. But I provide in drying and packing and carriage the bark as for Dodabetta, and do not delay the report to get them, suffice it that the total cost of collection and moving drying and packing (including bag) and carriage to Muttupolliam amounts to Rs 144.15.6 $\frac{2}{5}$ per 100 or Rs 335.5.7 per ton. The extra cost compared with the Dodabetta bark is of course due to cartage from Muttupolliam to Coimbatore. The Muttupolliam ^{bark} costs according to the above estimates Rs 23.11.12 $\frac{2}{5}$ per 100 delivered in Coimbatore.

40. The actual expenditure on the Muttupolliam plantation including the 1897-98 pay of establishment to new buildings &c was

12 was Rs 257.90.2.8. as detailed below:-

Establishment	Rs 4725.0.0
Nursery	1610.8.3
Working charges	5734.1.11
Buildings (repairs)	3476.8.4
Do (new works)	1121.10.10
Collection of crop	9014.3.4
Miscellaneous	108.2.0

The reasons for the year cannot be stated as explained in para 30.

Pyzkara

Situation of Wood 41 and Hooker Estate

There are two separate plantations at Pyzkara situated on different sides of the Pyzkara River viz:- the Hooker Estate on the right and the Cultivated Estate on the left bank. The area of the former is 12.18 acres and of the latter 154.19 acres. The circumstances of both being very similar I shall consider them together. The highest elevation is 6200 feet at top of what is known as "The Abacus" in the wood, and the upper portion (sub division No VI Appendix A) of the Hooker Estate, and the lower somewhat below 5000 feet in the Wood

Wood Estate. The upper soil
 humous and a dark brown
 loam of rich description, with a
 subsoil of fairly retentive clay
 composed of decomposed felspar.
 The indigenous flora closely
 resembles that of Reddwattam.
 I have no data as to the rainfall. Rainfall
 and mean temperature, but and temperature
 there must be almost identical
 with those of Reddwattam, for
 which the Hooker Estate is distant
 only 3 miles, and the Wood Estate
 5 miles as the crow flies.

42. I divided the Wood Estate into nine and the Hooker Estate into thirteen subdivisions. The
 Subdivisions
 Enumeration
 into thirteen subdivisions. The
 Enumerational & Classification
 of trees gave the following results:
 Wood Estate 45758 trees of which 37779 are *Clusia* and 7979 *Micrantha*. Hooker Estate of trees
 27557 trees of which 27909 *Clusia* and 8548 *Micrantha*. Hybrid and
 varieties are in a rule classed
 with species which they most
 nearly resemble as in the other
 plantations.

Cultivation

43.

The cultivation of these
 plantations has I consider
 not being so careful and
 systematic as that of either
 Dodabetta or Reddwattam. This is
 doubtless due in great measure
 to their not having been so much
 under the immediate eye of the
 Superintendent and Assistant
 Superintendent, and to frequent
 changes in the overseer in charge,
 the Estate being some times
 without any reliable person
 to supervise labor. In the case
 of the Wood Estate, the Pykara
 river becomes unfordable in the
 monsoon, and it is necessary to order
 a coach to go from Reddwattam to go
 round by Pykara Bungalow
 and bridge, making the distance
 at least 10 miles. A wire for the
 transport of the bark has been
 stretched across the river at the
 plantation ford, over which I
 believe Cookis once times cross, but
 the want of a foot bridge is much
 felt. A separate overseer, under the
 Assistant

Assistant Superintendent, for each plantation has recently been auctioned, and I have no doubt the result in improved cultivation will soon be apparent.

This system is similar to that pursued at heodivattam. The growth in the "Avenue" on the Wood Estate is generally very good, although from the situation being fully exposed to the south West monsoon, the trees present a somewhat weather-beaten appearance being more or less covered with lichen. In the lower portion of this Estate, the trees, especially the crown barks, exhibit a poor growth, due, apparently, to the southerly exposure, and ill drained soil. The elevation of this portion, from 5500 to 5000 feet, is also not favorable to the growth of *C. officinalis*. The patches of *Micrantha* in the lower *Micrantha* portion of the avenue exhibit a good but somewhat shrubby growth, each tree having several stems. This is probably the natural habit of the tree. This species recently have shown signs of general decay, chiefly attributed to moisture at the roots.

Growth

Crown barks

roots caused by leaking from a water channel above. The red barks on the upper portions of the Rubber Estate have done very badly, but the Crown barks, which on the open grass hills, exhibit a good and healthy growth. In the lower portions this is reversed, and some of the red barks, e.g. in subdivision I and II are excellent specimens. A clearing of 25 acres was made in 1873 for extension; the avowed intention being to plant new and valuable descriptions in rows, alternately with red barks. Only about one acre appears to have been planted and the rest allowed to revert to jungle, and the planted portion has not done at all well, a large proportion of the trees, especially of the new varieties have died.

Extension

Manuring

444 So far as I am aware no experiments in manuring have ever been carried on in the Ophara plantations. The application of manure would doubtless exercise a most beneficial effect in the poorer

poorer

poorer portions to which I have alluded.

45 The harvesting has all been effected by the stripping and mowing system. The oldest plantings in each estate appear to have been barked three times, but there is little data to go on. Mr Rowson's statement for 1877-78 shows a total of 70,103 (red barks 46,694 Crown Barks 23,409) barked in the two plantations during the year, but I suspect this is considerably over the market. His estimate for the current year is 16,381 trees all Crown Barks, of which 6463 are in the wood and 9918 in the Hooker Estate. The barking some portions of both estates appear not to be renewing so well as one could wish, but in the case of the red barks on Hooker, it was explained to me that the trees were barked very late season.

46. The yield last year for both estates was as follows:-

natural Crown	5979.
mossed — do —	4944
Renewed — do —	1,640
Natural red	5328
mossed — do —	8985
Renewed — do —	4093
Grey Bark	527
	<u>31,495</u>

and

and that for the current year is estimated at the 24,000 of dry bark viz:-

Natural Crown	3000
mossed — do —	5000
Renewed — do —	4000
Natural red	3000
mossed — do —	6000
Renewed — do —	
	<u>Total 24,000</u>

The number and description of trees barked in each estate will be noted this season.

Moss supply and cost.

47 Moss is obtained from the Sholaks within the plantation boundary, and towards Dunsandel for the wood estate and chiefly from those between the plantation on the Orington property for the Hooker. The supply is sufficient, but cost of collection, according to Mr. Rowson's returns this higher here than elsewhere, being annexed 14.03 per pound of dry bark collected as compared with as 1-0.06 at Redwater and, if we include the barking and mowing the trees, as 2-3-05 as compared with as 1-7-00 at Redwater and as 1-7-33 at

Dunsandel

Dodabatta.

48 The bark of the Wood Estate is dried and packed in a small shed erected for the purpose near the house on the lower portion of the plantation. It has hitherto been dried in the sun, but arrangements for artificial heating have been made this year. The bark is despatched direct to Ootacamund by Cart. The Hooker bark has hitherto been taken to Reddwattam to be dried and packed and has as a matter of fact been mixed up with the bark of the latter estate, though certain bales have been marked separately as Pykara bark. An estimate for the erection of a drying shed on the estate has been framed, amounting to Rs 3000 without internal fitting or heating, appliances vide Chapter III on this subject. I have no information as to detail of expenditure in drying the bark on these two estates, nor of the carriage expenditure which must vary considerably, as the Hooker bark has to be taken to Reddwattam, and then carted to Ootacamund,

Cost of collection and carriage 49

The total cost of collection the drying, packing and carriage of the Pykara bark is given by Mr. Rowson at Rs 2.9.09 per 100 of dry bark. On this estimate it costs Rs 17.13.4 $\frac{1}{2}$ per 100 or Rs 399.7.10 $\frac{2}{25}$ per ton at Muthapokim Railway Station. The estimated cost per 100 lbs delivered in London would be Rs 26.8.11 as compared with Dodabatta Rs 20.13.2 $\frac{4}{5}$ and Reddwattam Rs 23.11.1 $\frac{1}{5}$. To facilitate comparison I recapitulate in tabular form, the cost of collection and mossing, and of collection, mossing, drying, packing and carriage to railway per 100 of dry bark.

Plantation	Cost of collection per 100 lbs of dry bark	Cost of Collection mossing, drying, packing and carriage to Muthapokim per 100 lbs of dry bark	Remarks.
Dodabatta	Rs. 1-7-33	Rs. 12-1-8	Exclusive of all charges for supervision, office, buildings &c.
Reddwattam	" 1-7-86	" 14-15-6 $\frac{2}{5}$	
Pykara (Wood & Hooker)	" 2-3-05	" 17-13-4 $\frac{1}{5}$	

Expenditure 50

The actual Expenditure on the Pykara plantation for 1877-78 was Rs 10761.11.1 classed as follows:—

Establishment. At 840.00
 Working Charges — 4104 9.0
 Buildings (Repairs) — 434.09
 — (new works) — 100.00
 Wire rope and Cradle — 235.24
 Collection of crop — 5047.15.0

General Condition of the Plantations.

51. The trees in the plantations are, on the whole, very healthy, and there is an entire absence of regular diseases, such as Canker. In the lower portion of the Wood Estate (Mykara) I observed a good many trees, Crown barked, both barked and unbarked, sickly and dying, and on digging them up by the roots found rust and a tendency to Canker in its incipient form. I ascribe this to the situation being too low, subsoil unsuitable being a stiff clay saturated with moisture and requiring deep narrow drains, and in some instances a southerly exposure. A comparatively small number of trees were found attacked by

by a species of borers, but I imagine they were sickly before they were attacked.

Large percentage of renewals in Dodabetta Plantation

52. The detailed statement of Immuration (Appendix A) exhibits also a large percentage of renewals (chiefly in Dodabetta plantations) and failures. The worst subdivisions are in the lower portion of Dodabetta near the old fail; and some of the upper portions, Grass hills, at Reddewattam; in the Hooker Estate; and in the lower portion of the Wood Estate. A large portion is apparently due to the original plants having died down or been nipped by frost and lambs, and existing only in the shape of a shrubby growth from root, suckers ^{very} likely to grow into trees insufficient working of the soil, and the effects of a southern exposure appear to me the other causes of failure or poor growth, and these are easily guarded against for the future.

Establishment	At 840.0 0
Working Charge	" 4104 9.0
Buildings (Repairs)	" 434 0 9
Do (new works)	" 100 0 0
Wire rope and Cradle	" 235 2 4
Collection of crop	" 5047 15 0

General Condition of the Plantations.

51. The trees in the plantations are, on the whole, very healthy, and there is an entire absence of regular diseases, such as Canker. In the lower portion of the Wood Estate (N. Kara) I observed a good many trees, Crown barks, both barked and unbarked, sickly and dying, and on digging them up by the roots found rust and a tendency to Canker in its incipient form. I ascribe this to the situation being too low, subsoil unsuitable being a stiff clay saturated with moisture and requiring deep narrow drains, and in some instances a southerly exposure. A comparatively small number of trees were found attacked by

These generally healthy

by a species of borers, but I imagine they were sickly before they were attacked.

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53

Causes of decay
in the C. Calisaya
at Calisaya

In the case of the C. Calisaya on the wood estate I believe they suffer from too much moisture at the roots, caused to some extent by the leakage from the water channel above, and insufficient drainage. The Chinchorra are it is well known, singularly impatient of damp at the roots. - On the other hand, I am inclined to agree with the late superintendent that the cause of non-success with the C. Calisaya at Reddowattam is the want of superficial moisture or rainfall all the year round. It is not worthy that the Micrantha and Calisaya, when healthy assume almost invariably a shrubby form with numerous stems as compared with the officinalis and succumbra. This habit is probably peculiar to them even in their indigenous state. The results of present sales, even over the topplings of the Calisaya show that this species is well worth renewed careful attempts at acclimatization.

54

I consider 6 feet in the maximum distance apart at which the trees of all descriptions should be planted.

planted out. They appear to grow better when closely planted, and are less liable to be damaged by Wind and Sun besides it is easy to thin out and uproot if the trees become too crowded.

Plantation Roads

55

The plantations are very well supplied with roads, which greatly facilitates their subdivision and working. They are throughout in excellent condition, water courses being, as usual provided with culverts and streams with wooden bridges. A good system of roads and paths is of great importance in plantations, and in this respect, there is no thing to wish for in the Nilgiri Government Chinchorra plantations.

Buildings

The buildings, consisting of the Assistant Superintendent's bungalow at Reddowattam, drying houses, coolies, &c. appear generally in good repair. New ones were being built at Reddowattam and Doddabetta which are doubtless completed ere this. I have already referred (para 18 ch. II) to the new propagating house at Reddowattam.

Redd wattam, besides which a
 grain store was under construction
 by M. H. D. The building formerly
 occupied by Mr. Broughton the
 Botanical Garden has been
 handed over to the Superintendent
 of the Government Botanical
 Garden, and Mr. McEvoy's bungalow
 is occupied by the Private Secretary
 to His Excellency the Governor. Mr.
 Broughton's bungalow at Reddwa-
 ttam is now used as coolies' lines, the
 situation is said to be unhealthy, and
 it is in an indifferent state of repair.
 The old pile at Redd wattam
 and Doddabatta form the drying
 houses. The former is in very bad
 repair, but the latter appears in a
 good state. The laboratory adjoining
 the Government Gardens at Ottaseen
 is used as a store for the bark previous
 to its despatch to Muttupet.
 The overseers bungalows and on the
 Wood and Hooker Estates have
 been allowed to fall into complete
 disrepair, which is I think to be
 regretted. The condition and
 requirements of each plantation
 is detailed as follows in the remarks

in statement of detailed enumeration,
 and in Chapter III, that no further
 general remarks appear necessary.

Superintendent and Books.

Office Estab.
 Establishment & Books

57 No superintendent has been
 appointed since Mr. McEvoy's death, and
 the plantations are under the
 immediate charge of the Commissioner
 of the Nilgiris, whose office our clerk,
 styled "manager," and 22 persons form the
 Chinchow office Establishment.
 The manager receives daily reports of
 labor from the assistant superintendents
 and Head overseers which he forwards in
 the Daily Journal. Early in each
 month he receives the monthly journals
 and checks entries with those on the
 Daily Journal. The above refers to
 labor alone. Expenditure is checked
 and adjusted on receipt of vouchers
 for payment, except in the case of
 labor for which the journals are
 accepted as vouchers.
 The present manager (Mr. Hillier) keeps
 a Cash Book in which he enters all
 monies received and paid and a
 book showing all expenditure incurred
 under each budget heading for each
 plantation.

plantation but this is nowhere
 prescribed. So far as I can gather
 no monthly accounts are now
 submitted to Government or the
 Accountant General; merely an
 annual budget estimate and account
 of expenditure by the Commissioner.
 Monies for sale of seeds and plants
 are received by the Assistant Superintendent
 at Reddwallam and Head overseer
 at Dodabilla and paid into the Treasury
 by them either direct or through the
 manager. The Assistant Superintendent
 has a permanent advance of \$2500
 and the Head overseer of \$1300, but
 the permanent advance system is
 not clearly understood by either,
 and inconvenience frequently
 occurs from their expending the
 whole amount, and waiting for more
 funds until the monthly journals
 are submitted and checked & the
 amounts refunded to them. Mr. Whaler
 appears to have submitted to the
 Accountant General in June 1877 a set
 of new forms of account in accordance
 with G.O.R.D. No 1454 dated 17 April 1877
 which that officer has recently
 submitted to Government for
 approval

Executive
 Officers books
 & returns

Half yearly
 reports including

approval pending which they have
 been adopted to the extent just stated.
 The Assistant Superintendent
 in charge of Reddwallam & P. Kar a
 Estates and Head overseer in charge of
 Dodabilla Estates keep the following
 books: 1 Checkroll and labor account
 books. 2 Daily journal 3 Daily report 4.
 Monthly journal - They submit early
 each month a copy of the monthly
 journal, with vouchers for payments
 and a short Progress report showing
 state of the weather rainfall and
 works carried on for the previous month
 but no further account of expenditure
 and receipts nor statement of cash in
 hand, advances outstanding. The
 Assistant Superintendent receives a daily
 report from the overseer in charge of
 the Wood and Hokers Estates. No plantation
 books, nor record of operations appear
 at any time to have been kept. The
 Assistant Superintendent and Head
 Overseer submit half yearly reports
 of growth of certain standard trees in
 the plantations and annual reports
 on the plantations generally, but the
 figures in statements in each appear
 until quite recently to have been
 systematically altered in the head office

So much has thus been the custom that I feel bound to recommend Government broadly to dismiss from their minds, in considering the subject, almost all that has been hitherto reported, resting satisfied with the certain and satisfactory results of the past two or three years, and the facts as to number and classification of trees, their condition &c. recorded in this Report. The statements in which I have endeavored, by every means in my power, to make thoroughly reliable so far as they go.

59. The Assistant Superintendent of Asst Supt. Head Oversee & Office Manager and Head Oversee, Mr Rowson and Karami sawing hands appear well qualified for their respective posts and to possess a good practical knowledge of their duties. Mr Barrow the Paphra overseer seems hardworking and steady. The present official manager Mr Hillier is intelligent and willing and has acquired a fair knowledge of the history management and requirements of the plantation which is very useful. He has however had but little experience, and so one to guide him in official routine and appears therefore wanting in method in the disposal and record of business.

The overseer at Reddaway gives Mr Rowson satisfaction and the Assistant Overseer at Doddabetta is well conversant with his duties and qualified for promotion if he would keep steady.

Existing establishments

60

The following is a statement of existing sanctioned establishments as they stood on the 31st March 1878

Name	Designation	Pay	
<u>Office Establishments</u>			
Mr H. Hillier	Manager	80	" "
Kingah	Over	8	" "
Chinnah	Do	8	" "
<u>Reddaway</u>			
Mr W. Rowson	Asst. Supt. & Paphra Pate	300	" "
Mr W. Wharton	Temp. overseer Reddaway	50	" "
Mr J. Bonjou	Assessing Overseer Do	20	" "
2 others	Do	16	" "
<u>Paphra</u>			
Mr G. Barrow	Head Overseer	70	" "
<u>Doddabetta</u>			
Mr Karami sawing hands	Head Overseer	100	" " including 3000
Mr. A. W. Donald	Asst. Do	50	" " personal allowance
Kempah	Propagator	10	" "
Inulcoohy	Do	10	" "

There was also a clerk attached to the office on 15 per month but as his appointment was not sanctioned by Government & his pay not from working charges, he has been omitted in the above.

Comparison of the Mossing and Coppicing methods
of harvesting 102

61 Inconsidering this important ^{Limited extent}
question and comparing the results of ^{of Coppicing}
of harvesting under the stripping and ^{Experiments}
mossing, and coppicing systems
the first point which presents itself
is the limited extent on which the
latter has been carried on as compared
with the former. 5052 trees in all
have been subjected to the Coppicing
system whilst at least 200,000
have been stripped & mossed.
The circumstances under which the
trees were coppiced ^{must} ~~must~~ ^{be borne} ~~under~~ ^{circumstances}
induced The superintendent in charge ^{Experiments}
and Commissioner (Mr. Cockerell) were, ^{carried out}
I may say, enthusiasts in favor of
of the mossing system, and it is only
natural to suppose that they would
not go out of their way to establish
the fallacy of their own views. Mr. Broughton
as a chemist, was thus, it appears to me
placated at a disadvantage in his
advocacy of experimental coppicing
as a method of harvesting the
bark. No professional ^{forester} ~~question~~ or
Arboriculturist has hitherto been
^{consulted} ~~consulted~~ in the matter, and
Mr. Broughton had therefore no
professional

7 professional opinion to guide him
with regard to the trees to be selected their
situation or mode of coppicing most
likely to prove successful. I visited
the Reddewattam plantation with
Mr. Cockerell in 1875, and was shown
the coppicing experiments. I was
then acting Inspector of Forests and
as I had not been officially
consulted, refrained from expressing
any opinion merely remarking
to Mr. Cockerell that no forester, who
knew his business, would have coppiced
trees in such a manner. I now reiterate
that opinion officially. The stools showed
that the trees had been carelessly felled
with the axe. They were not trimmed
by the adze, a similar instrument
so as to present a rounded surface
close to the ground, and were, as a rule,
left in such a manner as was likely
to retain ^{much} ~~part~~ of the rain in the
hollows and so rot off; and suffer
from the powerful rays of the sun
in the dry months. Suckers or root shoots
were left standing which, from a forester's
point of view, should never have
been allowed there at all, and forty of
the trees, felled in a single row, were

This was a striking
opinion when I saw
the coppiced trees
in 1875.

109
so much dense shade that it was
more or less able to expect any good
Coppice growth. Again in case
appeared to have been taken with the
Coppice shoots after they had commenced
to grow. All were left instead of
only one or at most two, the most
healthy - and it says volumes for
the healthy growth of a tree, and
its adaptability to the Coppice
system, when the stools can support
a dozen or twenty Coppice shoots as
in the Crown-bark experiment at
Dodabatta. The Coppice growth
on Mr. Robt's Estate (Balasore) I think
on Mr. Liddell's & Mr. Briggs at Odessa
and even in the Government plantations
at Dodabatta furnish abundant
proof of my contention that the
Chinese tree if fairly treated will
spring very freely from the stool
at different elevations on the hills.
I merely submit these views as a foetus
as bearing immediately on the non-
or only partial success of the Coppice
experiments in the Government
plantations. I have no doubt that
they were carried out, according to
Mr. Broughton's wishes, but he was
not a forester and, so far as I am
aware

108
aware, laid claim to no special
knowledge of arboriculture. So much
for the purely professional point of
how the trees were, as I ought to have
been copied
Out turn of bark 62
(1st Crop) Next as to the outturn of bark
argued that this was much less
under the Coppicing than the mowing
system. I confess I cannot follow
him in this. Were it the case the bark
would be greater than the whole, for he
affirms that, whereas the yield under the
Coppicing system was 2 1/2 lbs of dry
re-bark, that of mowed trees in two
crops (1st & 2d strips) was 8.72 lbs per tree
of 12 years old - now, under the Coppicing
system, the whole bark of the tree
is harvested whole, under the mowing,
only a portion, say on an average
12 feet up the stem, is taken and, although
the 2d strips of bark may have increased
slightly in bulk owing to the application
of manure for a year or thereabouts, I
cannot believe that this would not
only counterbalance the fact of the
much smaller surface barked,
but give an increased yield in forest
crops such as stated above

1. unmossed (natural) bark last at
 2. $1/2$ to $1/9$. Turning to the latest analyses
 3. of crown barks by Dr. Paul, we find
 4. Natural bark from Dodabett a tree
 5. of 13 years old yielding 4.11 of crystallized
 6. Quinine Sulphate, and that of 9 & 10 year
 7. old trees 2.90 whilst mossed bark
 8. from 10 & 11 year old trees yields 3.98 and
 9. renewed bark from trees of same age
 10. 4.77 of Crystallized Quinine Sulphate.
 11. whilst unmossed crown from Reddwallam
 12. yielded 4.24 and renewed crown only
 13. 3.99 but, as pointed out by Government
 14. (F.O.R.D. No. 415 dated 8th May 1878) —
 15. Particulars as to the age of the trees; in the
 16. latter cases, are not given.

Latest Analysis of Crown bark

He need not be afraid of deducting from his bark what is lost in the process of being cut off.

Results varying & uncertain

The above remarks show the varying and uncertain nature of the results hitherto obtained which render it almost impossible to arrive at any thing approaching accurate conclusions on the subject.

Dr. Bidie has suggested that the increased yield of alkaloids in renewed bark, when it occurs, may be obtained at the expense of the original bark remaining on the tree, and Dr. Broughton's analyses supported this view which was however disputed by Dr. M. Brov. Much depends

depends upon the case with which the experiments were conducted and whether the bark was really taken at equal heights and under similar conditions as to age situation &c from mossed and unmossed trees.

Regarding this I find great difference of opinion. Dr. M. Brov, in his unpublished report (1875) already alluded to, contends that as the second strips under moss ~~and~~ ^{contain} rather a larger per centage of Alkaloids than unmossed bark the renewal cannot be effected at the expense of the natural bark remaining on the tree, and that when they (the second strips) have been removed there remains no natural mature bark to compare with that of unmossed trees but this is hard on the question which is whether the bark on the upper portion of the mossed tree remains unimpaired, and equal to that of an equal age and height of a tree never subjected to the mousing process, the second strips to which Dr. M. Brov alludes have been under moss for several months, and cannot therefore be fairly compared with unmossed bark.

A repetition of the experiments would settle the question at last.

The advantages claimed for the mossing system are (1) that a larger harvest of bark can be obtained in a given time (2) that the bark so obtained is of a better quality. I think there is no doubt on the first point. A larger harvest can be obtained as abundantly proved in the case of the 1000 experimental trees (Cecropia) at Hedwortham which have yielded 14,327 lbs of dry bark in 7 years, a yield which I do not think could be reached under any circumstances by the coppicing system. On the second point it will be gathered from what I have already written, that I do not consider to be arguement in a position to judge, although so far the results are favorable to an affirmative answer. Mr Broughton did not consider that the gain in the case of the red barks compensated for the labor and expense of mossing, and Mr. Howard was disappointed with the results in this species. In 1873 Mr Broughton wrote highly of the results of mossing in the case of the Crown Barks which had also Mr. Howard's support in 1872.

Advantages claimed for the barking & mossing system

Mr Broughton somewhat modified his opinion but in view of the reference to time required for renewal, and consequent bulk of crops than the quality of the mossed or renewed Crown bark. On the other hand Mr Markham with whom I have been in correspondence, considers, "that the red bark certainly ought not to be treated by coppicing, but by renewing," but that "this does not apply to all other species".

Effects of barking & mossing on growth

Immediately affecting both points under consideration is the question whether the barking can be carried on without detriment to the tree as a plant. It would naturally be supposed that repeated decortication would materially affect its health and growth and soon result in death. I have given this point most careful attention and compared barked and unbarked trees of all ages and in all situations, and so far as external appearances go, can find no signs of decay or want of health vigor in the barked trees of either species (Red & Crown). In the oldest plantations (Sub-divisions I 1862 A) at Hedwortham

no external signs of decay or want of health

there are three barked and unbarked trees growing side by side apparently equally healthy & robust. I have not thought it necessary to fell any trees to examine the wood, but have carefully examined sections of the barked trees felled in presence of His Grace the Governor in 1876, and compared them with those of the unbarked trees felled later in the same year in the presence of Capt. Aylmer. The former were planted in 1866 (Sub-division XIV Appendix A Redwater) and the latter in 1864 (Sub-division VII). Some of the former sections do exhibit decay in the wood due apparently to careless barking and consequent damage to the Cambium layer. This was also Dr. Bidie's opinion when he submitted his report in 1873. When the bark has been carefully removed and complete renewal has followed the old wood shows no symptoms of decay, nor is there any apparent arrest in the development of new wood. The sections of unbarked trees, the dimensions of which are much smaller though taken from a plantation two years older, exhibit in some instances signs of heart or ring shake, and their wood does not appear more healthy

Comparison of sections of barked and unbarked trees

Renewal of the bark.

healthier than that of the stripped and mossed trees with the exception noted above.

It was in the former subdivision by Dr. Bidie and Mr. Broughton XIV. Dr. Bidie and Mr. Broughton stated that they respectively found 85 and 83 per cent of the trees had failed to renew. I have examined a great number of trees, especially in this subdivision and can state that, in no instance did I find a tree which has entirely failed to renew although now and then there was a partial failure evidently increases where the Cambium had been damaged by careless or unskilled barking. Since Dr. Broughton wrote Mr. Rowson has taken 37,000 lb of green bark from this subdivision and expects to get 18,000 lb more this season. Dr. Bidie reported that the unbarked trees of both subdivisions exhibited a much more vigorous and healthy growth than those which had been stripped & mossed and that the latter were producing an undue quantity of seed. I have stated that I fail to observe any difference in the outward appearance of the barked and unbarked trees and Dr. Bidie's measurements show the

showeth that the actual growth was about the same. All the trees whether barked or unbarked, and including ~~the trees~~ ^{the trees} freely and prematurely which does not give promise of a long life for them but I cannot say I observed this more in the former than the latter especially as Mr Howard found in 1864 only among a section of a tree treated in this manner that "not only is the woody portion less developed than would normally have been the case, but the wood itself is also partially deprived of its vitality and ^{tending} towards decay". The renewal of the bark without the application of moss or some substitute I consider too uncertain to be adopted even in a tentative manner.

Renewal of bark without moss uncertain

68. The objections to the mossing system as fully stated by Dr King at Page 43 of his Manual are briefly

Objections to the barking & mossing system

- (1) the necessity of great care and employment of skilled labor to prevent damage to the Cambium & consequent failure to renew the bark
- (2) thickness of the renewed bark when richest in alkaloids rendering it necessary to allow it to remain for 2 or 3 years till it thickens; (3) diminution in health and vigor in the barked trees; and danger of their premature death
- (4) that the

where there is much moisture in the air (i.e. during the monsoon months) when it is almost impossible to dry it by natural means, and when the bark contains its minimum of alkaloids and (5) that even, if the difficulty of drying can be got over by local manufacture into green state, the supplies will be formed into the factory during a limited season of the year only.

69. As regards the first objection in their consideration my observations convince me that our natives can readily be taught to bark without damaging the Cambium. As regards the second the thickness of bark, if it be proved is abundantly compensated by the increased yield of alkaloids, and two crops in every three years can be harvested (i.e. if the first strips be taken this year the second strips will be taken next and then a year of rest allowed); third I see no signs of "diminution in health or vigor" in the trees which have been repeatedly subjected to decortication. The fourth and fifth objections appear to me the most serious, for Broughton has found by experiment that the bark, if dried at all is best dried by natural means and that the yield in alkaloids is lowest in the monsoon months (i.e. Chap I par as 36.37) The drying difficulty

There is a more powerful argument than I myself see - by own failure that the bark is not so good as the bark that has been dried by natural means for two years.

there difficulty may be got over by local
 trees manufacture from the bark into green
 equ (vide chap I para 35.) and undraining
 not system of harvesting (i.e. Coppicing)
 and the bark would probably come in at
 has a certain season and not all the
 of the year round, but the low yield of
 this Alkaloids during the winter months
 Com which must be the season of harvesting
 tree under the stripping & mossing system
 in remains, and is likely to remain a
 for permanent drawback to this method
 of harvesting. So far as our knowledge
 extends, however there are equal and
 even greater drawbacks to any other
 system of harvesting as yet suggested.

70 To sum up I consider that
 the stripping and mossing system
 has, so far, proved eminently successful,
 and that, at the present time, there is
 no sign of its having proved
 detrimental to the health and growth
 of the trees of this description; as regards
 the comparative value of the barks
 taken under the two systems, mossing
 and Coppicing results are in favor
 of the former, but I consider further
 careful experiments in Coppicing and
 analyses and scale of the barks
 very necessary. I allude to the
 conditions

Conditions in ser which there should
 be carried on in Chapter III.

Financial Results

Early estimates 71 It has been already
 Sir William Dunsin's stated in Chap I para 11 that
 in 1862 Sir William Dunsin's estimate
 the outlay and financial results
 of the Plantations placing the
 former at £100 per acre (including
 interest) in the tenth year and at
 £1000 per acre in the fortieth year
 when he considered the trees "might
 arrive at their full growth". He estimated
 that an acre would then yield 40000
 of bark which he valued at £16000.

The Madras Govt Previous to this the Madras Government
 in their order No 81 dated September
 1861. (Vol I page 182 of Bluebook) had
 estimated the Capital outlay at
 £3100 per 160 acres containing 650
 trees per acre. They placed the annual
 charges at £1300 and the yield after
 10 years at £3000 per acre, equivalent
 at a low rate of 6^d per pound, to £75
 per acre or £12000 per annum in all.

From what has been already
 written it will be seen that it is
 impossible to frame returns having
 yield per acre at 72.
 Known

Any claim to accuracy of the yield or return per acre up to the present time. We do not know the number of trees or acres from which bark has been taken annually, nor can we trace its cost till placed in the London market, or prices realised separately for each plantation. All we do know is that the plantations, with a total cultivated area of 852.64 x Plantations, 848.47
acres have cost including interest on annual balance of charges - 4.17
Rs. 1192128.14 up to the 31st March 1876 the date of closing the Capital Cost
account and that the receipts for 1876 on after deducting cost of estate payments, working charges and interest on Capital at 4 1/2 per cent exhibit a balance of -
Rs. 312282.12 in favor of the Return
Plantations representing a further return of upwards of 26% or fully 30% in all.

73 The Revenue account for 1876-77 is as follows:-
Receipts:-
Value of bark sent home & supplied to the Government & departments Rs. 433746.9.4
Amount realised by sale of plants & waste 3058.56
Total Rs. 436804.14.10
Charges:-
Estate payments 124677.2
Bark charges 584087.10
Interest on Capital at 4 1/2 per cent 5360512.10
Balance in favor of the plantations representing a further return of 26 1/5 per cent on Capital 312282.12
Total Rs. 436804.14.10

Revenue account for 1877-78 not available

Comparison of annual receipts and expenditure impossible

The output of bark is not known. It cannot be ascertained under the present system. It is estimated that the output will be within 100,000 lbs. per annum. Estimate of annual yield and value per acre

The balance to Credit of the year may be applied in reduction of Capital account or as Government may direct. In dealing with the existing circumstances of each plantation I have given the expenditure for 1877-78 but as these amounts have not been finally audited and passed by the Accountant General and I cannot state the actual result of bark sales credited during the past official year I do not attempt to exhibit its actual financial results. In the administration report for 1876-77 (S.O. R.D. No 274 dated 20th February 1878) Mr Webster endeavored to compare the Revenue and expenditure of the year, but as the receipts are mainly for the crop of the former year, and the expenditure includes no charges for interest on Capital it was clearly impossible to do so. This unsatisfactory state of things will continue until we can arrange for the proceeds of the years crop being credited within the year and until we have accurate returns kept of the number of acres or trees from which bark is taken in each plantation.

I think it advisable to submit an estimate of the annual yield and value per acre at present

prices based on the supposition that the trees are 10 years old on the average - the oldest are 15 and the youngest a very small proportion 5 - and that we have 450,000 healthy trees standing on 848 acres or about 530 to the acre - of these were in any class 250,000 or 471 acres as the more valuable species viz. Crown and yellow barks, and 200,000 or 377 acres as the less valuable viz. Red and grey barks. The former yield $\frac{3}{4}$ of dry bark per tree two years out of three or $\frac{1}{3}$ annually which has recently realized an average price of $7\frac{1}{2}$ per lb. making the value per acre $530 \times 3\frac{1}{4} = £99.10.5$ or close upon £100 per acre per annum. The red and grey barks being larger trees yield $\frac{2}{3}$ of dry bark for the two years out of three or $\frac{1}{3}$ per annum which were a very low value at $2\frac{1}{2}$ per pound making the value per acre of these species $530 \times 3\frac{1}{4} = £88.8.4$ per annum.

This would make the annual yield and Revenue derivable from the plantations as follows -

The Crown and yellow barks are worth $7\frac{1}{2}$ per lb. and the red and grey barks are worth $2\frac{1}{2}$ per lb. making the value per acre of the former $£99.10.5$ and of the latter $£88.8.4$.

The latter is more expensive to grow than the former and the yield is less.

Net annual Surplus

From this amount pay of establishments, working charges, carriage, freight, insurance and ^{home} charges would of course have to be deducted. On such a crop there would not fall far short of £20,000 leaving a net annual surplus of £60,000.

I do not say that the plantations could at present yield nearly ~~£40,000~~ £40,000 of dry bark per annum, even if we had the labor to collect it, but on the other hand were the area planted up to an average of 800 trees to the acre which it could well carry, the yield would be proportionately greater, without any corresponding increase in charges. The above estimate may therefore be accepted as showing the valuable property which Government possess in their Chinchona plantations. On how profitable a field this cultivation on the Milgros offers to private enterprise & capital.

Comparison with early estimates

The results so far obtained compare favorably with the estimates of 1861 and 1862 although the circumstances connected with Chinchona cultivation, prices have altered so materially that it is almost impossible to institute comparisons. Sir William Osbourne's estimate of cost £500 per acre in the 10th year, has proved fairly accurate; the yield per acre under the strip

and moving system of harvesting failed
 price short of the Madras Government -
 the estimates especially as the area under
 the cultivation is not fully stocked, but
 as the enhanced prices obtained more
 than counterbalance the deficiency
 in quantity on the annual yield
 appears so far likely to prove
 permanent, or at least to so much
 over a number of years.

76. Seed and plant are an order the
 orders of Government supplied
 to the Public at rates representing
 the cost of collection or rearing. The
 existing rate for seed is 4 per
 cent. and for plants Rs 10 per 1000.
 Government have recently ruled
 (G.O. R.O. No. 274) that this principle
 should be maintained; provided
 always that more important work
 should not be interfered with in order to
 collect seed or rear plants for sale.
 The existing rate for seed of seed
 appears fully to cover the cost of collection
 and packing, but I fear that for
 plants will have to be raised as
 Mr. Rowland informed that existing
 rates although they appear to be
 altered according to size of plants do not
 cover cost of propagation.

Seed & plants
 supplied to the
 Public at cost
 price

If we rear the more valuable species
 and varieties only for sale to the Public
 we shall pay much higher rates for
 well established plants.

Amounts realized Rs 7254.2.4 have been realized by
 sale of plants and seed and miscellaneous
 receipts from the commencement of the
 plantations up to date of closing
 the Capital Account. What is
 Rs 3058.5.6 are credited under this
 head in 1876/77, the first year under
 the new regime.

Labor

77. Intimately connected with
 financial results is the labor
 supply which is certainly short
 at Madhavaram & P. Kama. The
 Government rate of wage and general
 treatment of the laborers, compare, I
 think, favorably with those common
 in the adjoining planting districts.
 I am informed that much good
 labor was lost some years back owing
 to large reductions in working
 charges. Such are doubtless the
 many respects although sometimes
 unavoidable in all Government
 undertakings owing to general
 financial pressure. Permanent

Permanency of employment,
 good living and fair pay and
 treatment will I think always
 secure a sufficient supply of labor
 under existing circumstances in
 this Country and I consider
 all these are now guaranteed
 on the Government Chinook and
 Estates. Special bounties or rice
 money may of course be —
 necessary during periods of —
 scarcity.

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 1105
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Chapter III

Future management of the Plantations
Consideration of course open to Government

1. As regards the future management of these valuable estates, with regard to which, I am called on to submit an opinion there are the principal three courses open to Government viz:- 1st to dispose of them and trust to private enterprise for the further development of the Cinchona Industry in India. 2nd to retain them, as at present, without any special officer in charge, having time or qualifications to carry on experiments, and record results for the information of Government and the Public; resting satisfied with the undoubted fact of the acclimatization of known species and ultimate success of Cinchona cultivation financially and commercially on the Nilgiris; or, 3rd to pursue the enterprise as an Imperial undertaking, under the best agency available, with a view of carrying out the second part of the original programme, viz:- arriving at definite conclusions as to the descriptions most likely to produce good results under various

Disposal

Retention under present system

Further development of the enterprise

various

various circumstances of elevation, soil and climate and by promulgating the results, including the cultivation and so bringing the remedy or antidote against fever within reach of frequents of jungle and of the native population generally.

2. The first course is eminently a matter for the consideration of the local Government and the Secretary of State alone, but I must be permitted to record my opinion decidedly against it at the present time. I consider the Chinchorro experiment on the Nilgiris as still quite in its infancy. Still we have introduced and established the tree or at least two species, *Eucalyptus* and *Acacia*, on these hills, and demonstrated the fact that they can be profitably propagated and grown, the latter even on the bare grass hills with comparatively poor soil at high elevations, but even this we have only established by the expenditure of Imperial funds beyond the means of most private enterprises in India. The resources of the best scientific explorers and collectors available such as Clement Markham; the services of

consideration of each case

experiment against the introduction of the tree

perhaps the best gardener who ever came to India, the late Mr Graham, Mr Innes, and the advice of Lumsden, like Messrs Broad and Dr. Thry. Reliable data as to the best descriptions to grow, where and how to propagate and grow them, the best and most economical means of harvesting and drying the bark, and the preparation for preparation of a really good and reliable cheap febrifuge are still entirely wanting. Well may Mr Broad (style the Editor of the Government of India) that some of the Government of India should be supplied native druggists shops should be supplied with a febrifuge as much at the cost of Rs 1/6 per ounce as a magnificent conception; but how is it to be brought about? Certainly not by Government abandoning the experiment in its present stage to private enterprise. My bias is altogether in favor of private versus Government in such things as a rule, but twenty years of Indian experience teaches me that such undertakings like this cannot in this country be left to private enterprise, which will rest satisfied with the results already obtained, or from the absence of

of competition take advantage of any special knowledge or discoveries to enhance the price of the product whether in its raw or manufactured state. This is clearly not the intention of Government in introducing and promoting Chinchona Cultivation in India. Again I fail to see any force in the argument that, having been successful so far, Government ought to abandon the experiment as otherwise it will compete with private planters. Government, it is almost needless to state, has never evinced any desire to compete, still less to monopolize, the market for Indian Chinchonas or any other article.

It sells the bark produced on the Estates through brokers in the open market in the ordinary manner, and by so doing doubtless greatly enhances the value of Indian grown Chinchona generally. The Indian Government have furthered many industries and developed many resources of the country, too frequently at a heavy apparent loss. To argue that in this instance, because the undertaking appears

Arguments
against retreat
under existing
system.

likely to prove financially a success, Government are bound to retire from it, having the most important questions and objects of their programme unsettled, seems to me unreasonable in the extreme. The arguments which I have just ventured to adduce in favor of the Government retaining the Chinchona Plantation dispose also of the second course to which I have referred viz. - their retreat under existing circumstances, as regards management and development of information. The conduct and record of careful experiments as to the best species or varieties to grow, the most favorable conditions under which they may be grown, the most economical means of harvesting the bark and its subsequent treatment, &c., and the promulgation of the results and dissemination of knowledge on the subject must, I consider, be the justification or argument for the Government continuing the enterprise, and it can scarcely be maintained that they will be advised at short of the third course which I have endeavored to define.

Adoption of
third course
recommended.

System recommended

3. I shall therefore confine my remarks to the means by which it may most efficaciously be carried out. The late Acting Commissioner, Mr McCallum Webster on para 16 c of his Administration Report for 1876-77 (G.O. P.D. No 274 dated 20 February 1878) states that the present arrangement is hazardous as the plantations are not all under one trained Superintendent and it is possible that serious damage may result from any defective system of culture and harvesting. He considered that it was not at all necessary to appoint a successor to the late Mr McCallum but that Mr Pearson should be entrusted with the general superintendence of all the plantations with the title of "Superintendent". This had been already proposed by Mr Lockhart but not approved of by Government (G.O. P.D. No 703 dated 17 Nov 1876). He further suggested that it "would be well if the Conservator of Forests were directed to annually inspect and report upon the health of the trees

Mr Webster recommends

in the plantations and bring to notice any defects in cultivation & husbandry. I fully agree with Mr Webster that the present arrangement for the management of the Plantations is hazardous, but do not consider that the measures he proposes are adequate. I have recorded my opinion regarding Mr Pearson which is favorable, but I cannot consider him qualified for the post of Superintendent at this juncture. He is active, zealous, steady, fairly educated, and conversant with the vernacular, but he lays claim to no special knowledge of Chinchorro cultivation beyond what he has acquired during the 10 or 12 years he has been employed on the plantations, still less to any scientific or general knowledge of arboriculture or gardening in its highest sense. The Dodabatch Head-browner - a native - is, I consider, quite as well qualified as regards practical knowledge and has the advantage of a much longer and more intimate connection with the propagation and cultivation of Chinchorro in which he has been employed from the

the commencement of operations on these hills. I do not wish by these remarks in any way to disparage Mr. Rowson's abilities or services - far from it - but I am bound to record my opinion that he is not at present qualified for the post of Superintendent who should, I consider, be the best man the Government can get on order to do justice to the plantations. Mr. Markham wrote in 1860 that the Dutch in Java appoint 1200 a year with the rank of a Resident, equivalent to our Collector to the Superintendent of these Plantations, (Blue Book Vol I page 67) assuming thereby their some of the qualifications required for the office, its arduous duties and responsibilities. We have now arrived at a stage in the undertaking when the greatest care and forethought is required to maintain and improve the plantations and, owing to the premature death of the late Superintendent before he had recorded the results of his labours in hybridization we have to begin the task of re-permeating and

Qualified
Superintendent
of the office

and recording results almost at once. I consider therefore that a Special Officer is required for some years to come, who shall be entirely responsible for the management of the plantations. He may be placed under the orders of the Commissioner or the Conservator of Forests. I consider that the plantations should in any case soon or later be transferred to the charge of the Forest Department and that after a few years, when they have been planted up and got into really good order, major questions as to cultivation, harvesting and hybridization settled, and the recording of data bearing on minor questions systematized, they should be amalgamated with the Nilgiri Forest Division under the orders of the Deputy Conservator in charge. Mr. Rowson might then, with propriety and advantage, be placed in immediate charge with a position similar to that of an Assistant Conservator of Forests. I cannot concur with Mr. Webster in his suggestion regarding a mere annual inspection & report by the Com. of Forests made to the

Plantations
to be transferred
to the Forest Dept
to be in charge

These annual
inspections & reports
by the Com. of Forests
made to the

inspector
development

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inspection and report by the Conservator of
Forests. Any such course would I think
place that officer in an invidious position
and lead to no good result. If the
Plantations are placed under the Forest
Department, it will of course be the
duty of the Conservator to inspect and
report on them as in the case of any other
forest or plantation, but the officer in
charge will be his subordinate and
subject to his orders and the Conservator
will be responsible to Government and
no one else. But if the Plantations and
officer in charge remain under the
Commissioner, which, for some reasons it
may be deemed advisable, they should be for
some time longer; the Conservator would
be inspecting and reporting where he had
no control or authority or responsibility,
the result being too probably, ^{rather} that he
would perform the duty in a perfunctory
manner, or, if he pointed out mistakes
or shortcomings, would find himself
at variance with the Commissioner and
officer in special charge. I do not think
Government

Government would wish to place an officer
of the Conservator's standing in such a
position. The arrangement was tried in
the case of the Forest Department, when
Collectors were made ex-officio Conservators,
and the Conservator an Inspector and
Advisor. The result was exactly what I
have predicted above which caused Govern-
ment to cancel their orders and revert to
the old system.

Duties of the Superintendent
4. Presuming then that Government
appoint a special officer, under the orders
of the Commissioner or Conservator, it appears
advisable to consider how his services can
be utilized to the best advantage. I take
it for granted that the object of Govern-
ment will still be to further the more
general introduction and acclimatization
of *Chinchona* in India, and the production
of a cheap and efficacious febrifuge, whether
manufactured in India or Europe, rather
than a mere direct financial profit on the
Government Plantations. This must, however,
be the first consideration steadily held
in view, but the economical working and
development

development of the plantations to the best advantage from a purely monetary point, as an inducement to private enterprise to embark in the undertaking on a large scale, must none the less, not be lost sight of. It forms in nothing more an important means towards the end contemplated. We have now 848 acres (exclusive of nurseries) under cultivation.

Of this area 72 acres containing 45,758 trees are on the Wood Estate.

5. I am inclined to recommend that this estate be sold if a reasonable price can be obtained on terms that we may concentrate our attention more on the other plantations. It is situated on the wrong side of the Piffare river to be efficiently supervised by the Asst. Supt. at Neddavattam, as he is virtually cut off from it during the S. S. season. It is a straggling estate the distance from top of the "Dornie" to lowest planting being at least three miles, and being so near to Hoker and Neddavattam on a direct line and situated at a similar elevation, I do not think we are likely to gain any real

Sale of the Wood Estate to be considered

or special results other than on these estates. It would more the less, be a valuable small estate to a private proprietor and should readily find a purchaser at a price representing fifteen or twenty years purchase based on the estimated annual yield and value. This point being settled the Superintendent should define clearly the duties and responsibilities of the Asst. Supt and sources in immediate charge of plantations.

Asst. Supt. to be released from more detail work and must the Supt. on supervision & repairs on estate.

6. I should be inclined to release the Asst. Supt. from all detail work (such as mustering coolies) and accounts, so as to leave him free to supervise work on the Neddavattam and Hoker estates, and, most important of all to carry on experiments and carefully record results under the Superintendent's direction.

The existing plantations should be carefully gone over, sub-division by sub-division, number of trees of each species and variety counted, their condition, and how often barked with and arrangements made to plant up where required with well established plants from the nurseries. With this in view I have already suggested to Mr. Rowson the advisability of having an ample supply of well-rooted healthy

healthy plants of the rarer varieties and
 hybrids ready next year which I recommend
 should be a year of rest, so to speak, so far
 as harvesting is concerned on all the planta-
 tions in order to permit of their being gone
 over and worked up as suggested above. The
 supply of labor is not sufficient for this
 of a full crop of bark be harvested, nor
 could the necessary supervision be given to
 each operation. Next season is, as it happens,
 in any case a year of rest for almost all
 the Crown Barks at Addivattam and I should
 merely take a sufficient crop of Red bark
 there and Crown bark at Dodabetta to
 cover working expenses for the year and
 rely on a bumper crop in the following
 year, 1880, by which time the plantations
 should be divided into three divisions or
 working compartments of nearly similar
 area, harvesting in future to be conducted
 in two out of the three each year.

Besides the planting up or stocking
 fully the existing area under cultivation,
 it will be probably be found advisable to
 extend

1877-80
 on Addivattam

Extensive trial
 new varieties

extend cultivation on well selected places &
 estimate in order to test new varieties. Cultivation
 under partial shade, whether of rice long forest
 trees, or those specially planted for the
 purpose should have further attention, as Mr
 Broughton has demonstrated the detrimental
 effects of strong sun. light on the yield of
 Alkaloids. An important direction in which
 such efforts should be made has been suggested
 by Mr. Grace the Governor, viz. to endeavour
 to introduce and popularize the growth of
 acclimatized species at lower elevations such
 year. The Red bark grows well on the
 Wynad, might it not be tried at a
 still lower elevation? The hybrid *C. Pubescens*,
 with the robust habit of the *Succinifera*, and
 yielding a percentage of alkaloids equal if
 not superior to the *Officinalis* flourishes
 at Addivattam, might it not succeed
 in the Wynad, the Pichitlung Valley and
 similar elevations? With this important
 object in view I venture to recommend
 the experimental planting of *Chinchona*
 in other districts of this Presidency, such
 as the Pulney, upper and lower, in Madras;
 the

Experiments
 in other Districts
 recommended.

The Annamallays, Palampatty and Collegal hills
 in Coimbatore; the Shewangs and Denkerakotta
 hills in Salem &c &c, in short every where
 where we can command the necessary machinery
 in the shape of men or less trained forest officers
 to carry out experimental plantings under
 the advice and supervision of the Superintendent
 of Chunchona. No expensive arrangements are
 required or should be permitted; the rearing
 of Chunchona plants from seed is no difficult
 process as we have been led to believe, all it
 requires being care to keep the seed beds uniformly
 moist. Wherever there is a Forest Department
 nursery this could be done and the plants
 put out on the most favorable sites available
 by the forest establishments at but little
 cost; operations of this description even on
 a very limited scale would do more to
 popularize and spread the cultivation of
 Chunchona in India than any amount of
 extension and high cultivation however
 successfully confined to one locality. I am
 aware that experiments in Chunchona
 cultivation has been made in Coimbatore,
 Madras South Canara, Salem and Kurnool
 with

with varying results, but I submit that
 the agency employed are not calculated
 to ensure successful results. I do not advocate
 anything like extensive or costly Chunchona
 planting, merely the introduction and acclimatization
 of the tree wherever practical by
 the existing forest establishments. The
 forest officer should be furnished with seed and directions by the Supt.
 who should also periodically visit and report
 on all the experimental plantations

Propagation

8. As regards the propagation and
 rearing of plants from seed and cuttings
 I should not recommend any extension of
 existing nurseries and propagating houses
 which are more than ample for all
 estate purposes. I would discontinue the
 growing of Red and Grey barks for sale
 as they can be readily reared by anyone
 who chooses to take the trouble, seed being
 supplied freely from the Government
 plantations at cost price. Beyond a supply
 of Red barks for supplying experimental
 planting at low elevations, I would devote

our whole attention, and space at Supeia,
 to the rearing, from seed and cuttings
 of the most valuable varieties of Effimialis
 and Sabaia (especially the Ledgerianus
 with which the Dutch have attained such
 good results in in Java, and Sta L^a now
 to its way to us) and hybridization. C
Pubescens & C angustifolia should certainly
 be extensively propagated, both for the
 supply of the Government estates and
 sale to the public at cost price; care
 being taken that the plants are always
 what they are represented to be, in order
 that there may be no loss of faith in the
 reliability of the supply from Govt,
 nor subsequent confusion as to results obtained.
 An accurate record of all plants propagated,
 and hybridization experiments carried on
 should be kept, and the eventual disposal
 of the annual out-turn noted, whether
 the plants be distributed to the public
 or planted out on the Government plan-
 tations.

impossible to
 secure it in
 all cases
 from Govt

Cultivation and harvest

9. In the matter of cultivation a
 practice has apparently found favor with
 the late Superintendent of Exoring root suckers
 to grow alongside of the parent tree; the
 argument being that if the latter died
 from the effects of stripping and
 mousing the former would take its place.
 I think this view erroneous and the course
 pursued detrimental. Not only is there
 no sign of the original trees being to
 justify such a measure, but, the very method
 the precaution is likely to do more harm
 to the healthy growth of the tree than
 the evil against which it is supposed
 to be an insurance. Moreover I do not believe
 that root suckers could ever take the place
 of the parent stems, their bark, so far as
 can judge, being thin, deficient in cellular
 tissue and therefore not likely to yield an
 average percentage of valuable alkaloids. This
 is matter quite apart from the shrubby,
 or many-stemmed growth observable in some
 portions of the plantations with regard to which
 the Superintendent, if a forester, must
 take

our work

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take care not to be superficial and jump
 to the conclusion from a few preliminary points of view
 and it may be found that such a study
 with growth is favorable both as regards yield
 and quality of bark and the point should
 good therefore form subject of careful experiment
 to the said may be said with regard to pruning
 Pubes and lopping in general. We are not
 we are growing for timber or even firewood but
 supply for the maximum yield of bark of the
 sale to best quality

This leads me to the consideration of the
 treatment of Coppiced trees. I would
 certainly represent with the coppice
 that should already growing by removing all but
 leaving one or two from a tendency of the stock and
 not substituting the bark or stem separately
 an acc for analysis and sale. This will be
 and especially interesting in the case of the
 should experiment of October 1873 at Addis Ababa
 of the Pueraria and of the same year at
 the De Dabette / Spicaria as we know that
 these must all be coppice shoots no sowing
 having been left. The remaining coppice
 should be left for two more seasons

Further exposing
 experiments
 recommended

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in order to note the differences in results.
 as regards further coppicing experiments
 whilst convinced that they should take
 place I hesitate to recommend the
 exact form which they should
 assume my experience is indeed too
 limited to justify me in doing so. I think
 however that it will be found possible
 to carry them out, as well as the uprooting
 system practiced in Portugal, without
 any detriment to the plantations by our
 being prepared to report with themore
 valuable varieties as required. In this
 direction I think we may be ready to
 sacrifice, if necessary, all our Red barks
 We know that this species can be grown
 profitably at low elevations and that
 its production is an established fact;
 that it is deficient in Quinine but
 rich in Chinchonidine which appears
 to increase rather than diminish under
 the mowing system. Chinchonidine
 appears likely to play an important
 part as the febrifuge of the future
 but the area planted with Sucarcuba

Localities
 coppiced

in

in India and Ceylon is sufficient to justify our regarding its gradual disappearance from the Govt. Plantations on the Nilgiris without apprehension. Govt. have in short done their duty in introducing and establishing it on the hills and the Wynad and knowing by analysis and sale what it is worth. It may therefore well make way gradually for other species in their Nilgiri plantations.

As bearing on the comparative merits of the mowing and coppicing systems of harvesting, it must be borne in mind that the moss supply is precarious. It is matter for consideration whether it would be good and economical policy to reserve sholaks merely for the moss supply of the Govt. Plantations. I think it would certainly not be so.

The moss supply from sholaks reserved for climatic or other purposes may decrease or not suffice. It becomes therefore important to consider substitutes for

Did have trees may make way for others.

Improve in 2 years or 3 years to this extent. It is a very good thing to have a reserve of trees for the future.

Moss supply precarious

Substitutes to be tried

Standard trees for measurement to be selected and retained

for moss. I am informed that Capt. Bre has made use of leaves and grass with good results and General Morgan informs me that he is going to try core matting in rope. It appears only necessary here to direct attention to this point which should certainly not be lost sight of by the Superintendent.

Standard trees for measurement, and record of growth should be carefully marked and retained in the older Plantations. I have stated in Chapter II para that the original trees selected for this purpose have been changed and the half yearly reports thereof being robbed of their value in this respect. A sufficient number of unmarked trees fortunately still remain in the oldest Adilshah Plantations 1862, a dozen of which should be selected and retained for comparative periodical measurement with an equal number of stripped and mowed trees adjoining. The same would appear advisable at Broadbetta and Pottat.

In concluding my remarks on the subject of cultivation and harvesting, I would urge the necessity of the Dept opening plantation books in which the progress and operations carried on in each plantation should be carefully recorded, compiling periodical statistics of growth, yield & condition of trees of the several species and keeping himself fully acquainted with what is being done elsewhere and noting the tendency of the Home Markets, the supply of bark from the indigenous forests and from trees artificially grown. The Java plantations appear to be very extensive and to contain a large proportion of the most valuable varieties. It will probably be found advisable that the Dept should visit them ere long in order to compare and report on conditions & results. All the knowledge required and verified whether on the Govt Plantations or from abroad should I think be published periodically for the benefit of those interested in Simschona cultivation.

Private planters complain bitterly, and with apparent justice, of the absence of such reliable data from a Government source in the past. Such reticence should I submit be guarded against in future.

Accuracy of plantation books

Results obtained elsewhere & markets to be studied

The Coimbatore experiment

Relevant for location of drying shed & store at Riddivattam

Drying and Carriage of the bark to Trakret - 1

10 Government have ordered an experiment in sending green bark to Coimbatore to be dried. (G.O. R.O. No. 95 dated 18th January 1898). I am not sanguine of the success of this experiment. As a matter of expense we shall be carrying three times the weight; i.e. green instead of dry bark, during the most unfavorable time of year when the road between Riddivattam and Poteasamund is almost impassable for heavy laden carts. The delay in despatching and getting the bark to Coimbatore will be considerable and I fear that much of the bark will become muddled and valueless. It is, however, quite worth while making the experiment although conducted on a small scale it may mislead and cause eventual loss.

The estimate for the erection of a drying shed and store at Riddivattam is certainly heavy. In consultation with Mr. Rowin and the District Engineer I have managed to reduce it from Rs 35,000 to Rs 20,000 but this makes no provision for the drying of the Wood and Hooker bark and, if such an expenditure is necessary for Riddivattam similar provision on a smaller scale would appear advisable on the other estates. The question would be greatly simplified if we could have one central drying shed and store for all the bark, but this is quite out of the question. An ultimate saving might be effected in the

hooker back to Reddivattam were the
road made fit for carts and the mason-
-chi stream bridged but this would entail
considerable outlay. At present the proposal
is to erect a small drying shed on the
Hooker estate at a cost of Rs 3000 without
internal fittings and, if such a building
be sufficient this will probably be the best
plan - but the Hooker bark must still go to
Reddivattam when dry and thence to Ootaca-
-mund. I think that the cost of carriage
of the bark on all the plantations to drying
sheds and store might be materially reduced
by the introduction of some sort of trolley or
hand carts to be dragged by one or two men.
The existing plantation roads are as a rule
quite broad and good enough for this.

As regards the carriage to port of
shipment it has suggested itself to me that
a very large saving could be effected by
sending our bark to Beypoor or Calicut in-
stead of to Madras. The Reddivattam &
Hooker bark to go direct by road which
is the usual route adopted by planters in
the Ouchterlony Valley, Gudalur & the neighbour-
hood.

According to calculations which I have
made with Mr. Rhode the cost of carriage by
this route would be about Rs 40 to Rs 45 per
ton (weight) or still less if sent by backwater
from Ariacode to Calicut. And Ootacamund
& Mettupalayam to Madras the cost is at

laying shed
on the Hooker
estate

cost of carriage
on the plan to
be reduced

Carriage to
port of ship-
ment

least Rs 65 per ton weight.
There are objections to this direct route
especially the fact that the carts would
be travelling in the teeth of the S. W. Monsoon
- soon but I do not think that they are
unavoidable or sufficient to deter us
from further enquiry and experiment.
The bark from the Podabetta and Wood estates
(if the latter be retained) would of course go
by the Coonoor Ghaut as now but from Met-
tupalayam the rail charges to Beypoor would
be considerably less than to Madras the re-
- spective distances being 326 and 129 miles.
We now pay Rs 40 freight per ton of 50 Cubic
feet by P. & O. steamer from Madras to London
and Insurance at 1% on the declared value
of bark.

Freight for coffee from Calicut to London
is £ 3-10 to £ 3-15 by British India Steamers
I am informed that the rate of insurance is
somewhat higher than by P. & O. The carriage
shipping charges I could scarcely be higher than
in Madras where I calculate that they amount
to Rs 9-5-1 and I believe that if we get all
our bark to the coast, so as to go by one steam-
-er, the B. I. S. N. or other Canal Steamship Co.
would be willing to make special arrangements
and concede lower rates of freight. I consider the
point well worthy of further consideration and
enquiry of Government is to continue to send the
bark to England for manufacture.
Local Government Manufacture and

and appointment of a Zoologist.

12. Whilst engaged on this Report I have received the Secretary of State despatch and communication from the Government of India, recorded in G. O. No 830 dated 1st June 1878, regarding the employment of a Zoologist and assumption of local manufacture. The Madras Government have appointed a special Committee to consider these points but as my report is to be laid before it I conclude that an expression of my opinion is desired.

If a competent and trustworthy Superintendent be appointed I see no necessity for the appointment of a Zoologist and I am decidedly opposed to the idea of assuming local manufacture as a Government undertaking here, and equally so to sending our back to Bengal to be manufactured there.

The Superintendent can do all that is necessary as regards cultivation and care - fully recording and publishing results of which analyses by the best analytical chemists at home and prices realised at public sales will be the best criterion. Or comparative analyses could probably be undertaken by the Superintendent himself with sufficient accuracy.

Should Government, however decide to appoint another Zoologist his duties should be strictly confined to analysing and, if so decided, superintending the manufacture of the

Further evidence is necessary and advisable.

al Govt
manufacture
which is necessary
ful both
in Bengal.

back the Superintendent being charged and held responsible for the cultivation and cropping under such instructions as Government may from time to time issue for his guidance. The Zoologist's functions and laboratory should be altogether outside the plantations. As for local Government Manufacture I believe I am justified in assuming on the strength of Dr. Cornish and Mr. Chickrell's report that Mr. Broughton's operations were financially successful at all events, a complete failure resulting in a loss of from 20 to 40 per cent of the alkaloids in process of manufacture and from what I have recently read, Mr. Wood's Manufacture in Bengal is little if at all, superior in this respect although the Gubrifuge obtained may be better than the Amorphous Quinine without laying claim to any special knowledge of the subject. I confess I cannot bring myself to expect satisfactory results in the direction of the production of a cheap Gubrifuge containing the alkaloids in a mingled form through Government Agency in India. There are more mysteries in the craft of manufacturing chemist than perhaps any other could employ would probably be soon become ignorant of at least the latest of them.

Mr. Howard's opinion

Mr. Howard's opinion on this point may be quoted writing in 1875 "He says he has been supplied he says" It has been a loss that the adoption of a cheap process for the extraction and precipitation of the alkaloids in a mingled form would present an efficacious Gubrifuge.

at no longer a cost before the people of India that the object above referred to (viz "the means of combating fever by cultivating for themselves these precious trees") might in this manner be obtained. It happens however that the people of India can be supplied with febrifugal alkaloid of equal power and efficacy at about half the cost of the mere production of the above mentioned precipitate; so that even if the Government were to give the bark for nothing, they could not without further sacrifice, meet the competition of European Manufacturers. This eminent authority has written much more to the same effect, and I am personally convinced that by sending our bark to England for sale and purchasing sulphate of Quinine, Chinchonidine or other febrifuge in the open market we shall obtain far better results both from a financial and philanthropic point of view than by any attempt at local manufacture as a Government undertaking. As regards sending bark to Bengal, it would involve all the trouble and expense of drying, packing and carriage without affording any advantage compared with its despatch to England for sale and manufacture there.

Suggestions as to local manufacture as a private undertaking.

13. The arguments against local manufacture as a Government undertaking do not however apply to the establishment of a private manufactory under favorable conditions on these hills.

Proposed brand bark to Bengal condemned.

I would strongly advise the adoption of this course, if Mr. Howard or other joint class manufacturer chemist could be induced to undertake it, or send out some duly qualified person to do so as a private venture; and I see no reason why such should not succeed. Government would, according to my view, give land in a convenient situation for the erection of a Factory and afford every facility in its power; agree to give all its bark at average sale rates ruling in London less charges for drying, packing, carriage, insurance, brokerage &c. and to take from the factory or similar terms the Quinine and other alkaloids produced if found up to the average quality. Thus securing a supply of locally manufactured febrifuge the produce of their own and private plantations on the Ridge Hills, which would without doubt follow suit in sending their bark to the local factory, thereby saving the risk and expense of drying and shipping to England. The bark produced in Northern India would also probably find its way to the Kelgiri factory for manufacture and an important local industry be developed.

I have stated in Chapter I para 35 that Mr. Broughton found the manufacture from green bark far more satisfactory and economical than from dry. This would be in favor of the manufacture whilst the vexed questions as to the best methods of drying, packing and despatch of the bark would be set at rest and high freights both on the car-

look back to before the people of India
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Suggestions as to local manufacture
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The arguments against local manufac-
-ture as a Government undertaking do not however
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-facture under suitable conditions on these hills

Proposed to send
bark to Bengal
condemned

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-ing and despatch of the bark would be set
at rest and high freights both on the car-

product exported and gumme imported, in-
the clearance, brokerage &c avoided.

14. I am aware that private experiment
was tried in South America and was not
successful. I have no data as to cause of
failure but imagine it was greatly due to
unhealthy climate, and difficulty in obtain-
ing suitable labor. The climate here is ex-
cellent and the native labor of taught &
superior second, I believe to none in the
world, whilst the rate of wages is low compared
with that ruling in Europe. I am told that
the cost of importing the necessary chemicals
is heavy, but it cannot be compared with
that of the raw produce to England and
its return here in the shape of gumme and other
alkaloids.

I think the establishment of a local fac-
tory for the production of Chinchona alkaloids
under the auspices of some of the leading Eu-
ropean manufacturers well worthy of the atten-
tion of the Special Committee and Government.
As observed by the Committee of 1874, the pro-
duction of Chinchona Alkaloids for the
whole civilized world, is a monopoly in the
hands of about a dozen European firms. It
is understood but reasonable to suppose that
years of practice in this particular business
has given rise to improvements in method of
procedure which to a large extent determine
the question of profit or loss.

I have little doubt that Government could
induce one of the dozen European firms to esta-

Failure of South
American experiment
- must probably due
to unhealthy cli-
- mate & want of
labor.

establish a factory here with every chance
of success - whereas if it attempts manufacturing
itself, I predict nothing but failure.

I leave the question for the consideration
of the Committee and Government.

Classification of bark and Bokers Charge.

15. I should have continued to send
bark to England the subject of its sale ac-
-cording to classification and the deductions
and charges made merits special attention
as regards the former. I find great discrepan-
-cies in rates realised apparently without any
cause. As an instance at some of the latest
sales (April 25th 1878) renewed red bark mark-
-ed R (Reddivattam) sold at from 4/6d to
5/10^d per pound, whilst some renewed Red bark
marked P (Pekarra) realised only 3/ per pound.
Now the Hooker bark as has been stated is sold
at Reddivattam and the bales which fetched
only 3/ per pound although marked R contained
in reality bark from the Forest Plantation and
the Reddivattam Estate identical with that
which realised from 4/6^d to 5/10^d under a dif-
-ferent brand.

Again a deduction of 3% is made in account
sales on account of dust, apparently a tradi-
-tion from the sales of South American bark
rudely prepared and packed; for the said
dust from our plantations realised at last
sales 2/5 per pound. The brokers deductions &
charges as set out in the account sales men-
-tioned are, I confess, inexplicable to me or to

one connected with the plantations here. The deductions include tax, trell, duty R. R. whilst the general charges, beyond that usual on landing goods, include discount at 2 1/2 % to R. besides brokerage amounting altogether to a considerable sum.

I am informed that in the case of private estate adjoining Reddiattam the broker's charge 3/5% in all plus actual payments for wharfage R. but without any deductions such as I have alluded to. Some similar arrangement with regard to the Government bank would appear highly advisable.

I do not see why Government more than any private individual or firm should leave itself unreservedly in the hands of any broker however respectable and above suspicion they may be and doubtless are.

Future Prospects

16. The prospects of the plantations are, I consider, most encouraging.

The financial position is indeed the annual expenditure being moderate and comparing favorably with that of any undertaking of a like nature, public or private. The commercial value of the Imperial Government bank is fully established and the impetus already given to private planting of *Chinchona* on these hills highly satisfactory. The plantations might have been better

Uniform rate of
brokerage without
deductions seem-
-ing intended.

Results already
obtained

stocked, operations more carefully attended, and experiments in hybridization and cultivation of new species and varieties initiated. Still much has been done and the way towards further progress is clear.

850 acres of land formerly waste and unproductive have been brought under unintermitting cultivation and the enhanced value of the land and permanent buildings erected on it alone fully represent the total capital expended whilst the value of the annual crop represents an extraordinary high rate of interest. The success of the Government undertaking is well known and cannot fail to exercise a most favorable effect on the extension of *Chinchona* Cultivation which means the utilization of Government waste lands, employment of labor introduction and distribution of capital on the country and increased supply of the fever killer. - The Madras Government, and all concerned, may therefore be well satisfied with the result of their endeavours and encouraged to prosecute them further.

18. It will be observed that differing from most modern writers, I have spelt the word a genus "*Chinchona*" throughout both the Ch's being pronounced soft as in *China*. I have done so advisedly and after careful consideration I publish in Appendix

monograph with which Mr. Clement
Markham has favored me on the sub-
ject. His statement for the correct-
ness of the spelling appears to me conclusive and
with him I plead for its general adop-
tion in supersession of the varied
and erroneous methods which have
crept into general use.

Hamphreys ^{Sept 1880}

Adj. Comr of Lands

Vol 88

monographs with which Mr. Clements
Markham has favored me on the 1st

No 3067/78.

Report on the
Cinchona Plantation
by Captain Campbell
Walker.

Pres. 20th July 1878 N 207-8.

To. 274.

Office of Chief of Forests,
Cotacambú, 13th May 1878.

From,
Lieut. Col. R. H. Beddome,
Conservator of Forests.

To, C. G. Master Esquire,
Secretary to Government,
Revenue Department,
Cotacambú.

Sir,
Referring to para 4 of the
Government Order of 1872 of the 10th
instant I have the honor to in-
form you that I do not think
that Captain C. Walker could be
better employed than on the
selection and demarcation of
Reserve District by District. In
most Districts there is still
a very large area of Government
forests out of which Close Reserves
should be formed for climatic
and other considerations, and
until these Reserves are pro-
perly demarcated and declared
to be such, alienation must
be constantly going on. The

2. The Forest Act would greatly strengthen work of this nature but I am of opinion that it can be commenced and even carried out, as far as Government Forests are concerned, without one, where delay is dangerous as the tracts of forest most important for preservation are generally the first to be alienated, and as Year by year forests recede before Railways and Cultivation the question will become more and more beset with difficulties and opposition, it is not yet too late to carry out the work in a systematic way in all or almost all Districts, but it would have been far easier if it had been inaugurated with Railways, and if now much further delayed the results may be very serious.

3. Alienations have occurred on the Nilgiris in many directions where they ought

91 ought not to have been. The very woodlands that I should have been most anxious to reserve, such as the Devi Ghata, the Coonoor slopes, the Karsberg Railway &c. being the first to go; alienation, equally opposed to the general welfare of the country, is going on in Wynad and elsewhere.

4. A Forest Act would empower Captain Walker also to take into consideration the preservation and proper treatment of private forest lands as well as those of Government and without this the work cannot be brought to a really satisfactory issue. The deforesting of mountain tracts not belonging to Government has already taken place caused damage in Tinnevely, Madurai, and at Arcot and if this be allowed to go on without any check for a few years more the results will be

believe the most serious.

5. The reservation of Government forests will probably be unpopular with a certain portion of the Community at first, and there will be still more opposition with reference to private forests, but I have not a doubt myself that both are necessary to the welfare of the Country and that they must be taken in hand before long, whereas every year's delay will only add to the opposition and difficulties in more ways than one. I also feel certain that any well considered system of Close Reserves from which fire and Cattle can be excluded could not be in force many years without its beneficial results being apparent to every one.

6. A demarcation or Survey branch of the Forest Department has been sanctioned by the Government of India and

has been for some time in play in different parts of Northern India, Burma &c. and I would suggest that the Government of India should be asked for fuller particulars as to its working and general results &c., in Bengal. I believe a Senior Forest Officer is placed at the head of this branch, and that he has several assistants in Young Forest Officers, I do not think that Captain Walker would require the entire services of any other Officers at all events at first and we have none to spare just now, the Forest Officer of each District to which he proceeds could be associated with him in his work and be able to go about with him to a certain extent, one of the Revenue Officers should however certainly accompany him and be detailed solely for this work as long as Captain Walker should be employed in his District and

an officer or subordinate of the Survey Department should be permanently attached to the Office, a Writer, and 2 or 3 peons will also be required, as the Divisional Establishments are not as a rule strong enough to be able to spare men for the work without detriment to current duties.

7. Captain Walker should indicate the tracts for close Reserves from which both fire and Cattle are to be excluded, for open forests in which grazing will be allowed, and also forests and jungles for village requirements (timber and fuel) and the whole should be clearly laid down on maps of a scale 1,000 Yards to the inch, he should work under the orders of the Board of Revenue and the Collector of the District he may be in, but his reports and accounts should go through this Office.

North

8. North Arcot & Madurai are the two Districts that should I think be first taken up, a perusal of my last South Arcot report now before Government will exemplify what is required; in that District the necessary reservation and demarcation of forests and jungles for the various purposes they are intended for in the future has been put in a fair way to completion without much extra assistance except that of a Surveyor, but this was only rendered possible by the Collector taking great interest in the work and supporting it, and by more than usual energy and devotion to duty on the part of the Forest Officer, it would not however be possible in the more heavily worked Districts of North Arcot and Madurai except with the assistance of a separate

if I can get
the necessary
to all the
the order
for forest
the Government
may be required
19/7

There is no
usual

* Proceedings of the Board of Revenue
No. 623 dated 14th March 1878

separate Forest Officer in the
way I now propose.

I have the honor to be

Sir,

Your most obed^t servant.

J. H. Allen Esq.

Conservator of Forests.

1103
99
1103
99

Revenue Department

Memorandum
On letter from Com^r of Forests dated 15 May 1898
Submitting his proposals as to the employment
of Capt. C. Walker with reference to para 4 of
G.O. 1027 dated 10 May 1898.

As furnished in para 4
G.O. 1027 dated 10 May 1898
Biddome submit proposals
for the employment of Capt.
C. Walker and suggests that
his work should be "the selec-
tion and demarcation of
reserves District by District"
a somewhat
similar proposal was made
by Capt. Walker himself
in 1894 when acting as
Inspector of Forests in Col
Biddome's

In sanctioning the
arrangement placing Capt.
Walker in Communi-
cation with the Collector
of the respective Dist^s
- in careful consul-
tation with other all-
reserves are to be de-
cided upon. & reported
thru the Com^r of Forests
for decision -
Communal with
due attention

Revenue 1898-99
Forest

Mem^o 20/4/99
The Conservator of Forests
to The Secretary to Govt.
Rd. Deptt.
Col. 1106 - 20 July 1898

Dated 13th
Sept. 14th } 20 May 1898
Rd. 1106

210:274.
(Enclosure 110)
Original.

With reference to para 4 of
G.O. 1027 dated 10 May 1898
Submitting his proposals as
to the employment of
Capt. C. Walker -

C 21-6-78 RE 15-7-78
R 15-7-78 R 17-7-78

N-207-

Beddome's absence but the
Govt. then said the services
of a special officer were
not likely to be available.

2. The Govt. did not how-
ever lose sight of the ne-
cessity of demarcating
state reserves and in their
order reconstituting the
Forest Department in Nov 1875
they said proposals "for
immediate action" should
be submitted.

They remarked that
"the best results will proba-
bly be obtained through
the agency of District Com-
mittees composed of the Coll-
Conservator, a District Forest
officer and such Revenue
Officers of the District as

of cultivation must be
be thwarted - & private
Forest rights - scrup-
ulously respected -
See Mr. Walker
Col. R's observations
& inaccuracy of
survey - of 8
the Crown Valley Cult-
ivation in 20 years
old 250 on 1900
22/6

see para 9 p. 10
19th Nov 75. No. 166

Letters in Lind
suggestions. L.P.

the Board may approve.
3. No such special
action seems to have been
taken, but if approved,
this order might now be
acted upon, Capt. Walker
being substituted for the
Conservator.

4. Col Beddome wishes
to obtain information as to a
Demarcation and Survey
Branch of the Forest Dept
which has been for some
time working under the
Govt. of India and would
apparently create such a
special branch here as
he proposes that "an officer
or subordinate of the Survey
Department should be
permanently attached" and
that there should be a
writer and 2 or 3 persons.

5. In the matter of
Surveying Fuel Reserves
and State Forests the
Board in October 1874
suggested "a small sur-
vey party" to "pass from
District to District under
immediate instructions of
collectors and Deputy
Conservators but under
general control of Supt
of Revenue Survey who
will connect these details
with his regular work
in the taluq." The Govt
asked the probable cost of
such a scheme.

After some correspon-
dence, the Supt Ar Survey
was told that "work on
the fuel reserves in Solan
and Juddapah should be
commenced at an early
date," and he said that
not being able to obtain
information

para 7 G.O. 2^d Feb'y 1875 No 195

G.O. 6 July 1875 No 1011

G.O. 4 November 1875 No 1575

See letter in G.O. 31 Jan'y 1876 No 130

information as to extent
he could not furnish an
estimate of cost but an-
ticipated "no difficulty
in surveying the bounda-
ries of all fuel reserves
and State Forests with
the agency already at my
disposal."

I concur in the employment
of Mr. Walker in the
survey proposed in accordance
with the Collector of the
several districts. But I
would in debate the
question with the Govt. as to
whether the Govt. should
attend to the
demarcation of the
State Forests in the
Punjab & the

Land in Valley Forest
in Madras

That he should demarcate
+ mark on the Mad. Survey
Map - the existing
boundaries at present morning
of Forest or jungle
and next demarcate that
which is State Forest
Not subject to village rights
reporting in each case
the circumstances of the
+ the amount which he
considers should be paid
and under for a defined
period of years - He
should provide that duty of
acc. and the collection should
be directed to give all
assistance information + to
give constant attention to the
completion of this important
duty -

I think the pro

C 21-6-78
R 12-7-78
R 15-7-78
R 17-7-78

should be required to give

The grant of details of
the alienation of forest
not belonging to Govt. in Madras
He refers to at once. He
is not entitled to keep
such information to himself
+ I consider that paragraph
4. to be a very simple affair
me - as if Govt. were
not entitled to the full
information and as if his
duty was to withhold instead
of supplying information
I should tell him so

Bel. 13/7

Revenue Department

No. 1105

Proceedings of the Madras Government
under date the 20 July 1878

Read the following
letter from the Conservator
of Forests dated 13 May 1878
No. 274, submitting his
proposals as to the employ-
ment of Capt. C. Walker
with reference to para 4
of G.O. No. 724 of 10 May 1878.

Bel. 17/7

MD 18/7

Note

No reference is made to Col.
Beddome's general remarks in
paragraphs to the deforestation
of mountain tracts not belonging
to Govt. because when they
were formed Col. Beddome had
recently called special attention to
this subject in connection with
Timber supply Madras. This paper
is now in circulation. It is also in a
great measure owing to Col. Beddome
that the Zaminari forests in these
districts are now being demarcated
+ surveyed. Is
anything being done?

The Govt. approve the
Conservator's suggestion that
Capt. C. Walker should be
employed in selecting
and demarcating portions
of Govt. Forest to be con-
sidered close reserves.

2. The importance of
this work has long been
recognized and in their
order.

order reconstituting the
Conservator the head of the
Forest Department they
indicated that the best
results would probably
be attained through the
agency of District Committees.
No systematic operations
appear to have been
undertaken in accordance
with this suggestion, and
the Conservator is unable
to give to each of the
Districts in his extensive
charge the time necessary
for this work.

3. Under these circum-
stances the Governor in
Council resolves to depute
Capt. Walker to take the
place of the Conservator in
these District Committees.
Captain Walker will
invariably place himself
in communication with
the Collector of the District

Para 9. W. 19 Nov. 1895
N. 662 A.

Wm. 19

and which he is about
to work and the joint pro-
posals of these officers
will be forwarded to the
Conservator who will sub-
mit them to Government
through the Board of
Revenue. Existing com-
munal privileges and
future requirements must
be carefully considered
and the extension of cul-
tivation provided for.
4. The Conservator pro-
poses that North Arcot and
Madurai should be "first
taken up" but looking
to difficulties at present
experienced in the way
of systematic conservation
and protection from fire
in the Annamallay range
owing to no portion being
a close reserve the Governor
in Council considers that
these forests should first
engage.

engage Capt. Walker's attention. That officer will accordingly proceed to Comptroller immediately after the submission of his report on the Guichona plantations, which, it is understood, has now been completed. No time should be lost as the work-
ing season on the Annamallays which is always short is already well advanced. The question as to the reserves near Mettupallicam might then next be considered and afterwards the requirements of the Madurai & Tirunelveli Districts.

5. The Govt. presume that the map of the Annamallay forests referred to by the Conservator in his inspection report of Aug. 1876, is now complete

and

G.O. 30 March 1876 No. 443.
3rd July 1878 No. 1063.

G.O. 4 Dec. 1876 No. 1893.

as these reserves are claimed

and in this and all similar cases where the Revenue Survey maps are available the boundaries of all Government Forests in which no communal rights exist can be ascertained provided for will be clearly marked by Capt. Walker as some of those portions which it is proposed to constitute close reserves for a definite period. The Board will instruct Collectors to render Capt. Walker cordial assistance and to give earnest and continued attention to the completion of the work in their several Districts.

- 21 To the Conservator of Forests every day
- 14. The Board of Revenue every day
- 1. Capt. L. Walker every day
- 6. The Assistant and General every day

G. D. S. S.

City of
Employment of
C. Walker

1105
98

1105
98

circ

Det
20

Spec

Ordered in Council