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MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No.	231	Press Mis.
Dated	21-2-	1880.

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GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

21st February 1880, No. 231.

No. 268. READ THE FOLLOWING PAPER:—

Endorsement of the Officiating Secretary to the Government of India,
No. 20.

From C. BERNARD, Esq., c.s.i., Officiating Secretary to the Government
of India (Home, Revenue, and Agricultural Department—Medical), to
the Secretary to the Government of Bengal, dated Fort William, 8th
January 1880, No. 19.

I AM directed to acknowledge the receipt of your letter, No. 275, of 10th December, forwarding Dr. King's interesting report upon his visit to the Java chinchona plantations.

2. It appears that the Java plantations are all at an altitude of more than 4,000 feet above the sea; that they enjoy a remarkably equable temperature with a mean average of 53° F., a minimum (rarely reached) of 44° and a maximum of 73°; that the yearly rainfall on the plantations varies from 120 to 140 inches, with more or less rain on nearly every day in the year, and that the soil is deep and rich, underlain by volcanic (kind not stated) rocks. In respect of soil and climate the Java plantations appear to have clear advantages over the Sikkim and Nilgiri plantations. Labor however is not so cheap as at Sikkim; and the annual cost of the plantation per 1,000 trees in stock appears to be about twice as dear as in Sikkim. The best Calisaya trees in Java belong to the Ledgeriana variety; the dry bark of which yields up to 13 per cent. of quinine. But these Ledgeriana trees are few. Dr. King finds that the Ledgeriana trees much resemble some of the varieties of Calisaya which are now being propagated at Sikkim. The Java plantations confirm experience in Sikkim that the several varieties yield irregularly,—trees of the same habit, with the same flowers and leaves and apparently the same bark, yielding very different percentages of quinine or other alkaloids.

3. The deductions which Dr. King draws for guidance of Indian plantations appear to be—

- (a) persistent effort should be made to graft Ledgeriana and approved varieties of Calisaya on Succirubra stocks;
- (b) further attention must be given to propagating the best varieties of Calisaya, which, though somewhat costly to grow, yield very much more quinine and other alkaloid;
- (c) trial should be made of the Java plan of shaving the bark of chinchona trees, taking off a considerable thickness of merchantable bark, and leaving the bark thick enough to renew itself in one and a half or two years.

The Government of India will be glad that action taken on these three deductions should be carefully noticed in future annual reports. The extension of the Calisaya plantations has already been approved by the Bengal and the Supreme Governments.

4. Dr. King's report does not say whether he was able to obtain any seeds or any plants of the best kinds of Ledgeriana. Nor is information given regarding the financial results of the bark sales at Amsterdam. Probably Dr. King has brought away notes on points not discussed in the present report, such as the rate of growth of trees in Java and their thickness, also their habit under different circumstances.

5. Dr. King advises that search be made for sites nearer the equator, on which chinchona could be grown under conditions more like the Java plantations, than the Sikkim estates can ever enjoy. He suggests particularly that attention be directed to the Andamans, the Khasia Hills, and Tenasserim with this object. The local authorities of those Provinces will be requested to report how far search for sites such as Dr. King describes can be undertaken with hope of success. But the Governor-General in Council apprehends that accessible sites, with soil, equable climate, constant rainfall, and altitudes such as are described at paragraph 2 of this letter can hardly be found at present.

No. 20.

CORR, with copy of Dr. King's report, forwarded to the Madras Government for information.

(Signed) C. BERNARD,
Offg. Secretary to the Govt. of India.

ENCLOSURE No. 1.

VISIT OF DR. KING TO JAVA.

From GEORGE KING, Esq., M.B., Superintendent, Royal Botanical Garden, Calcutta, and in charge of Chinchona Cultivation in Bengal, to the Secretary to the Government of Bengal, Revenue Department, dated Royal Botanical Garden, Howrah, the 22nd November 1879, No. 96-C.

In accordance with the orders of Government marginally noted, I proceeded in August last to Java to inspect the Chinchona Plantations of the Dutch. Government is aware that, although it is from the species known as *Calisaya* that the most valuable of all the medicinal chinchona barks are obtained, the cultivation of this sort has not hitherto been so successfully prosecuted in British Sikkim as has that of *Chinchona Succirubra*. *Chinchona Calisaya* is found to be in Sikkim (as has been explained in several of my annual reports) a very variable species, and its variations are not confined to the form of leaves and flowers, but extend also to the chemical constitution of the bark, that of some of the varieties grown in Sikkim containing nearly eight per cent. of pure quinine, while the bark of others yields very little of quinine or of any other useful alkaloid. But the differences in external form and of richness in alkaloid are not related to each other in any very definite way, and trees of which the leaves and flowers are so much alike as to be undistinguishable from dried specimens have been found to yield bark of quite different chemical composition. It had for some time been known from the official reports on their plantations in Java that the Dutch have in cultivation there a variety of *Calisaya*, the bark of which is richer in quinine than any bark ever imported from South America; some of the Dutch samples having yielded on analysis the extraordinary amount of 13.7 per cent. of quinine. The object of my visit was to see exactly what this variety is, and by spending some time in the plantation, to learn what the conditions are under which it has been so successfully cultivated. Before leaving India I was furnished with a letter of introduction from His Excellency the Viceroy to the Governor-General of Netherlands, India, and I have to acknowledge the courtesy and kindness which I received from the Dutch authorities, by whom every facility was afforded to me for travelling in Java and for inspecting the Government plantations.

2. The chinchona plantations of the Dutch Government do not, as in Sikkim, form a compact belt, but consist of seven distinct and separate estates scattered over a range of volcanic hills in the centre of the island. These estates range in altitude between 4,000 and 6,400 feet above the sea-level. In all of them the soil is of a dark-brown color, light and friable, very pervious to water, and almost free from stones. The surface soil is uniform, and in general deep (in some places it reaches a depth of 12 to 14 feet), and is rich in vegetable matter. The sub-soil is lighter in color from the absence of humus, but has similar physical properties. Both surface and sub-soil have as their basis decomposed trachytic rock rich in potash, and they were recognised by Hochstetter (an eminent German geologist familiar with the volcanic regions of the Andes and who recently visited Java) as almost identical with the Andesite formation of the Cordillera on which chinchona is indigenous. The slopes of the hills

on which the plantations stand are so very gentle that washing of soil is very slight and landslips are almost unknown. The drainage water finds its way underground to the larger streams which separate the ridges. The absence of small superficial drainage channels is quite a feature in the country and illustrates well the great permeability of the strata. The natural vegetation in these hills is very like that at a slightly lower elevation in Sikkim. The climate is, however, greatly different from that of Sikkim. At Tjinircean (5,100 feet above the sea) the temperature at 6 A.M. all the year round ranges from 50° to 59° Fahrenheit, except during the two dry months, when it occasionally falls as low as 41° Fahrenheit. The highest temperature during the day is 73.5° Fahrenheit. The mean average over the whole year is 53.5° Fahrenheit, while the constant temperature of the soil at five feet from the surface stands all the year round at 64.04° Fahrenheit. The rainfall for the year varies at the different estates from 120 to 140 inches. The rainy season *par excellence* extends from November to June. Of the remaining four months, August and September are the driest. But there are very few days absolutely without a shower in the afternoon. The rain falls at all times very gently, and violent storms and floods are very rare. It is only during the early part of the rainy season that rain falls during the early part of the day; at other times it falls chiefly in the afternoon. The climate is a remarkably even one, and the weather for the day can be predicted every morning from the temperature about sunrise. Experience at Tjinircean (the chief Government plantation) has shown that if the thermometer at 6 o'clock A.M. stands at or below 54.6° Fahrenheit, no rain will fall during the day. If it stands at 55.4° Fahrenheit, rain in the afternoon is probable; if at 57° Fahrenheit, rain in the afternoon is certain; while if it stands at 60.8° Fahrenheit, rain will surely fall before noon.

3. All this forms a strong contrast to the state of matters in Sikkim. There the basis of the soil is decayed primitive rock (gneiss and mica schist) poor in potash; the surface soil, although rich in vegetable matter, is very irregular in depth, is occasionally very stony, and is everywhere ploughed up into small channels for the transmission of superficial drainage. The sub-soil is stiff, cold, and little permeable to water. In Sikkim the contrast between the temperature of day and night and of summer and winter is great, and the rainfall, although about of the same volume as in Java, is so distributed over the year, that while for seven months everything is saturated with moisture, during the other five hardly a shower falls from the clouds.

4. The fertility of volcanic soils is proverbial, and the partiality of the medicinal chinchonas for such soils, as well as for a cool equable climate where the rainfall is well distributed over the year, has been testified to by all the collectors who have explored the regions of the Andes where they naturally grow. It might be anticipated therefore that in Java chinchona would thrive well, and especially so as the Dutch are known to be excellent cultivators; and their success has as a fact been great. I have no hesitation in saying that all the species of chinchona are to be found in greater perfection in Java than in Sikkim or the Nilgiris, and (judging from what I saw of their cultivation in that island some years ago) I believe I may also say than in Ceylon.

5. In Sikkim we have, however, the advantage of much cheaper labor than in Java. The expenditure on the Dutch plantations for the year 1877 (the latest for which returns have been published) was fifty-seven thousand guilders (a guilder is of about the same value as a rupee), and in 1876 it was forty-five thousand, the number of plants, including nursery stock, being 2,150,000. In Sikkim, on the other hand, the plantation consisted in 1878-79 of 4,881,055 plants (nursery stock being included), and the outlay for the year was Rs. 64,000.

6. The chinchona trees, of which the bark has yielded the Dutch such a high percentage of quinine, have all been raised from a parcel of seed purchased in 1866 by the Dutch Government from an English collector named Ledger after our own India Office had declined to buy them. These seeds were got by Mr. Ledger from a half-caste collector, who would not tell where he collected them, and who was murdered soon after. The exact locality in Bolivia where they were gathered therefore remains unknown. Mr. Ledger's seed produced 6,300 trees which have in late years been largely propagated from. Although these trees differ considerably among themselves in shape and size of leaf, in color of midribs, nerves, and undersurface, and although the bark of individual trees (in so far as it has been analysed) varies as to the amount of quinine contained, the majority agree in being much richer in that alkaloid than any other known variety or species of chinchona. The name *Ledgeriana* was originally given by the Dutch as a plantation name, to distinguish the produce of Ledger's seed from that of the seed collected by others; but, as the points of agreement, both anatomical and chemical, between individual trees so originating is greater than their points of difference, it is quite warrantable to retain the name as that of a very distinct variety of *Calisaya*, if not indeed of a distinct species of chinchona.

7. The 6,300 plants raised from Ledger's seed (which are now thirteen years old) all agree in being rather shabby-looking trees, averaging in height 25 feet and girthing at 6 feet from the ground twenty-seven (27) inches. They have tall stems and rather small, lax, conical heads, the branches of which are more or less distinctly arranged in tiers. The leaves of the majority are long and narrow, for the most part green, but very often with a tinge of red in the

footstalk, midribs, and nerves; while those of a few are of an uniform deep purple color on their lower surface. The mature leaves of all agree in being quite free from hairs. These trees flower much later in life than the other chinchonas; the flower panicles are small; the flowers which are very sweet-smelling are more or less drooping, of a yellowish-white color, with a tinge of green in the tube, which is short, wide, and inflated at the base. In the majority of the trees there is a total absence of red in the flower: one, however, of the very richest quinine-yielders has its flowers slightly tinged with pink. The seed-vessels are small, short, and almost globular in shape.

8. The Dutch mode of cultivation is similar to our own. The only method which they adopt, and which we have not hitherto tried, is that of grafting *Ledgeriana* on *Succirubra* stocks, and this plan I shall at once ask Mr. Gammie to try. The Dutch have devised a new way of taking the bark crop which they are very hopeful about. It consists in shaving off the greater part of the bark of a living tree to a height of eight or ten feet from the ground, taking care to leave everywhere a sufficiency to cover the wood. It is found that in Java a tree so treated gradually renews its bark, so that in the course of from twelve to twenty months the renewed bark is as thick as the original. This method is far less likely to injure the health of the trees than Mr. McIvor's plan of stripping and mossing which, after extended trials, has been finally abandoned by the Dutch. The conditions are so different in Sikkim, the lives of individual trees being much less certain than in Java, that I am not sure that the shaving plan can be very advantageously worked in our plantations; but I shall ask Mr. Gammie to give it a trial during the present barking season.

9. I have already stated (paragraph 1) that the trees of *Calisaya* in the Sikkim plantation present great variety in form of leaf and flower. The barks of all these varieties were submitted to Mr. Wood for report, and his analyses showed that while some of them were very poor in quinine, others contained as much as six and seven per cent. of that alkaloid. The *Calisaya* trees in our plantation were obtained at different times and from various sources. A few of them were raised from a pinch of *Ledger's* seed obtained at second hand from the Nilgiris. And I have much satisfaction in informing you that, after seeing the Java *Ledgerianas*, I have no doubt whatever that our three or four best kinds of *Calisaya* are precisely the same as some of the forms of *Ledgeriana* cultivated by the Dutch. It is true that none of the *Calisaya* barks grown in Sikkim contain so much quinine as the best forms of *Ledgeriana* grown in Java, but this I believe to be an affair of climate and soil. All the Java chinchonas are richer in alkaloid than those of Sikkim, and this will, I believe, always be the case, the physical conditions being so much more favorable in that island.

10. Ever since Mr. Wood's analyses showed the excellence of some of our forms of *Calisaya*, every effort has been made to propagate these artificially, experience having shown that they do not come true to seed. Now that I am satisfied that we have in Sikkim the true *Ledger Calisaya*, I am more strongly than ever of opinion that we should go on increasing the cultivation of it as much as possible. I do not anticipate that we shall be able to grow it quite so cheaply as *Succirubra*, or that we shall be able to produce bark of such high quality as the Dutch. But the object of the Indian Government is not to grow a very fine bark for the European market (which is the object of the Dutch), but from the yield of its plantation to produce a good and cheap cure for fever. And even in Sikkim, where the climate and soil are not so suitable as could be desired, I believe we might grow a bark rich enough in quinine to enable us to turn out pure quinine at probably two or two-and-a-half rupees per ounce which is less than the price of the London quinetum (a preparation made in imitation of the Government chinchona febrifuge) and greatly below the market-price of quinine.

11. I have no doubt that a more suitable locality for chinchona cultivation than Sikkim could be found further south. The chinchonas in South America are never found further north than 10° nor further south than 20°. Favorable spots might be discovered in Burma, perhaps in the Andaman Islands, and possibly in the Khasia hills. Such spots should be searched for. In the mean time the conditions in Sikkim appear to me to be sufficiently favorable to promise a moderate success and to warrant considerable extensions of our plantations of yellow bark there. To carry out these it may be necessary to ask for a slight increase in the annual grant for the present plantation. But, as that is now being worked to a considerable profit, I hope, when necessary, an additional grant may be allowed.

12. The Dutch Government has hitherto manufactured neither quinine nor chinchona febrifuge from its bark, but has consigned the annual crop to Amsterdam for sale. Of late a few pounds of febrifuge have been made as an experiment at the Medical Depot in Batavia, the process followed being that of Mr. Wood, and the product being undistinguishable from his.

13. I may mention that during my recent tour I have taken every opportunity of collecting living plants for the Botanical Garden and dried specimens for the Herbarium, and that I have brought safely to Calcutta twenty (20) large cases of the former and three (3) of the latter.

Miscellaneous.

COMMUNICATED to the Commissioner, Nilgiris.

2. An experimental trial of the plan of grafting varieties of *Calisaya* on *Succirubra* stocks should be made at Neddiwatum.

3. The "shaving" method of taking bark should also be tried at all the plantations on few trees of different kinds of chinchonas.

(True Extract.)

(Signed) J. H. GARSTIN,
Acting Secretary to Government.

To the Commissioner of Nilgiris.

,, the Board of Revenue.

,, the Conservator of Forests.

,, the Superintendent, Government Central Museum.

Exd. W. H. French.

80 Copies.

VISIT OF DR. KING TO JAVA.

No. 96C, dated Royal Botanical Garden, Howrah, the 22nd November 1879.

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and in charge of Cinchona Cultivation in Bengal,

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Government of Bengal, Financial Department, Agriculture docket No. 39, dated 19th February 1879, forwarding copy of Government of India, Department of Revenue Agriculture, and Commerce No. 47, dated 10th February 1879.

Govt. of (1880) Sikkim.

REVENUE.

THE COMMISSIONER OF NILGIRIS,

Ac., Ac., Ac.

Dated February 21st.

Printed March 2nd.

Recd.

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G.O., 21st February 1880, No. 551.

FEBRUARY.

Nos. 268-269.

Java Cinchona Plantations.—Communicating with remarks, to the Commissioner of Nilgiris endorsement of the Government of India forwarding letter to the Government of Bengal reviewing Dr. King's interesting report upon the same.



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11. I have no doubt that a more suitable locality for cinchona cultivation than Sikkim could be found further south. The cinchonas in South America are never found further north than 10° nor further south than 20° . Favourable spots might be discovered in Burma, perhaps in the Andaman Islands, and possibly in the Khasia hills. Such spots should be searched for. In the meantime the conditions in Sikkim appear to me to be sufficiently favourable to promise a moderate success and to warrant considerable extensions of our plantations of yellow bark there. To carry out these it may be necessary to ask for a slight increase in the annual grant for the present plantation. But as that is now being worked to a considerable profit, I hope, when necessary, an additional grant may be allowed.

12. The Dutch Government has hitherto manufactured neither quinine nor cinchona febrifuge from its bark, but has consigned the annual crop to Amsterdam for sale. Of late a few pounds of febrifuge have been made as an experiment at the Medical Depot in Batavia,—the process followed being that of Mr. Wood, and the product being undistinguishable from his.

13. I may mention that during my recent tour, I have taken every opportunity of collecting living plants for the Botanical Garden and dried specimens for the Herbarium, and that I have brought safely to Calcutta twenty (20) large cases of the former and three (3) of the latter.

Rev: 22/9/80

Recd 14/Jan/1880

No. 19

FROM

C. BERNARD, Esq., C. S. I.,
Offg. Secretary to the Govt. of India.

TO

THE SECRETARY TO THE GOVT. OF BENGAL.

Home, Rev. & Agri. Dept.
Medical.

FORT WILLIAM, the 8 January 1880.

SIR;

I AM directed to acknowledge the receipt of your letter, No. 275 of 10th December, forwarding Dr. King's interesting report upon his visit to the Java cinchona plantations.

2. It appears that the Java plantations are all at an altitude of more than 4,000 feet above the sea; that they enjoy a remarkably equable temperature with a mean average of 53° F., a minimum (rarely reached) of 44° and a maximum of 73° ; that the yearly rain-fall on the plantations varies from 120 to 140 inches, with more or less rain on nearly every day in the year, and that the soil is deep and rich, underlain by volcanic (kind not stated) rocks. In respect of soil and climate the Java plantations appear to have clear advantages over the Sikkim and Nilgiri plantations. Labour however is not so cheap as at Sikkim; and the annual cost of the plantation per 1,000 trees in stock appears to be about twice as dear as in Sikkim. The best Calisaya trees in Java belong to the Ledgeriana variety, the dry bark of which yields up to 13 per cent. of quinine. But these Ledgeriana trees are few. Dr. King finds that the Ledgeriana trees much resemble some of the varieties of Calisaya which are now being propagated at Sikkim. The Java plantations confirm experience in Sikkim that the several varieties yield irregularly,—trees of the same habit, with the same flowers and leaves and apparently the same bark, yielding very different percentages of quinine or other alkaloids.

3. The deductions which Dr. King draws for guidance of Indian plantations appear to be,—

- (a) persistent effort should be made to graft Ledgeriana, and approved varieties of Calisaya on Succirubra stocks;
- (b) further attention must be given to propagating the best varieties of Calisaya, which, though somewhat costly to grow, yield very much more quinine and other alkaloid;
- (c) trial should be made of the Java plan of shaving the bark of cinchona trees, taking off a considerable thickness of merchantable bark, and leaving the bark thick enough to renew itself in $1\frac{1}{2}$ or 2 years.

The Government of India will be glad that action taken on these three deductions should be carefully noticed in future annual reports. The extension of the Calisaya plantations has already been approved by the Bengal and the Supreme Governments.

4. Dr. King's report does not say whether he was able to obtain any seeds or any plants of the best kinds of Ledgeriana. Nor is information given regarding the financial results of the bark sales at Amsterdam. Probably Dr. King has brought away notes on points not discussed in the present report, such as the rate of growth of trees in Java and their thickness, also their habit under different circumstances.

5. Dr. King advises that search be made for sites nearer the equator, on which cinchona could be grown under conditions more like the Java plantations, than the Sikkim estates can ever enjoy. He suggests particularly that attention be directed to the Andamans, the Khasia Hills, and Tenasserim with this object. The local authorities of those Provinces will be requested to report how far search for sites such as Dr. King describes can be undertaken with hope of success. But the Governor General in Council apprehends that accessible sites, with soil, equable climate, constant rain-fall, and altitudes such as are described at paragraph 2 of this letter can hardly be found at present.

I have the honour to be,

S I R ,

Your most obedient Servant,

C. BERNARD,

Offg. Secretary to the Govt. of India.

No. 10. +

COPY, with copy of Dr. King's report, forwarded to the Madras Government for information.

C. Bernard

Offg. Secretary to the Govt. of India.

Print Enclosed here

PRINT

№ 231.

Communicated to the
Commissaries Nilgins.

2. An experimental
trial of the plan of
grafting varieties of
Calisaya on *freecorn*
stocks should be made
at Niddawatum.

[illegible]

Dated. 8th July 1880.
At 2 14 - do

The Commission of Virginia & Co.
 Board of Revenue
 Commissioners of Lands & Co.
 Sup^t of Post Office & Co.

Copy of letter to
 the Govt. of Brazil
 reviewing Doctor
 Kings interesting
 Report upon his visit
 to the Terra Chirichoma
 Plantations.

No. 231 - 21 February 1886

with Order (see over)
Communicated Letter
Capt. Kilgus

21 February 1880.

268-269

C. 17/1/80 R. 12/2/80 R.C. 18/2/80 R. 19/2/80