Revenue (1898) Department.

PRESS SERIES.

G.O., Nos 127-127a

Dated 3rd March

[Despatch Abstract.]

Comm[n]s of the Board of Revenue, with Remarks thereon from Dr A.G. Bourne of the Presidency College Madras on Sugar-cane disease and the Godavari delta embankment.

## BACK PAPERS.

| G.O. | No. | Department. | Date. | G.O. | No. | Department | Date. |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

## FURTHER PAPERS.

| G.O. | No. | Department. | Date. | G.O. | No. | Department. | Date. |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

# Government {1898} of Madras.

## REVENUE.

*Recd.* } 1898. *Enclosures*

*Regd.* } *Spare copies*

**G.O., Nos. 127, 127A, 3rd March 1898.**

**MARCH.**

**Sugar-cane Disease.**

Communicating to the Board of Revenue, with remarks, report from Dr. A. G. Bourne of the Presidency College, Madras, on — in the Gódávari delta and neighbourhood.

GOVERNMENT OF MADRAS.

## REVENUE DEPARTMENT.

Read—the following letter from Dr. A. G. BOURNE, F.R.S., to the Secretary to Government, Revenue Department, dated 28th February 1898 :—

I arrived at Cocanada on Monday 21st and spent the 22nd—25th in examining the sugar-cane. I returned by steamer this morning and submit a report at once, as if anything can be done it should be done quickly. I have, in anticipation of the approval of Government, informed the Collector and some members of the Chamber of Commerce that the ryots should be induced by all possible means to root up the old stools, to burn all litter, to examine "tops" before planting and to plant only on land where paddy was last year.

The cutting and crushing is now going on and new planting will begin by the next new moon.

I think it would be desirable if Government were to call for a report as to the extent of the disease in all cane-growing districts. In such an enquiry it would, I think, be sufficient to ask whether any of the canes exhibited red spots or patches *in their flesh*. The ryots would have noticed such at the time of crushing. The damage done in the eastern delta at any rate is very great; from the forward crops which have been crushed, only half the usual yield of jaggery has been obtained while from many still standing, much less will be obtained.

Enclosure.

*Sugar-cane disease in the Gódávari Deltas and neighbourhood.*

1. *Introduction.*—My attention was drawn to this matter by letters from the Collector of the district and from Messrs. Wilson & Co. of Madras.

Numbers of canes in certain localities were reported to be withering and the evil was generally ascribed to the ravages of some insects.

A great variety of insects were sent to me, some perfectly harmless to the canes, others undoubtedly capable of doing damage. I do not propose to deal with these here as the total damage done by them in the gardens I have examined is infinitesimal as compared with that done by a fungoid growth.

This growth produces all the symptoms characteristic of an attack by *Trichosphæria sacchari, Massee.*

This is the fungus which has recently threatened to extinguish the sugar industry in Barbados. Different stages in its life history have been known as the "root fungus," and "rind fungus," respectively. I find both stages present and great damage is being done and unless some measures to check the progress of the disease are adopted at once matters will go from bad to worse.

Mr. Maxwell of Messrs. Wilson & Co. kindly secured me the services of several gumastas and we visited a great number of "gardens"—as the sugar-cane plantations are there called—and interviewed the ryots. All the gardens we examined, among



which were several reported to be quite healthy, showed much disease and now that I have pointed out what the symptoms really are, I gather from what I have been told that the disease is pretty widely spread along the whole coast, perhaps, even to Ganjám, and that it is no new thing this year but has been gradually coming on for some years. It is, however, only this year that the results have been sufficiently marked to cause it to have been brought to the notice of the Collector and Chamber of Commerce. It has evidently now taken a thorough hold of this district and is likely in my opinion to be infinitely worse next year unless prompt and concerted measures are taken to check it.

2. *Symptoms.*—Canes but slightly affected, *i.e.*, only recently attacked, show no external signs of disease, but transverse sections show one or more bright red spots in one or more internodes and if these are followed up by longitudinal sections they appear as red streaks which branch at the nodes. It is the fibro-vascular bundles which become coloured. Such slight attacks usually occur somewhere about the middle of the length of the cane. Where the disease is more advanced the colouration extends also to the ground tissue so that any section shows red patches. Subsequently the central portion of each red patch becomes opaque and white and acquires a texture like that of a "woolly" radish, the tissue is in fact dead. Where the disease is still further advanced, portions first at the nodes and later elsewhere, become black and at this stage or before, the leaves at the top wither, and the entire cane dies up. Some of the canes only, were attacked when sufficiently young to give time for the disease to run its full course, others were attacked at later stages and are yielding a certain amount of juice. Wherever the fungus has been growing in the cane for a sufficient length of time small black, minutely velvetty spots are to be found among the sleeping roots which look like warts on the nodes. These spots are groups of myriads of spores ready to be distributed by the wind.

Each garden which I examined showed the disease in all its stages, contained in fact plants which had been attacked at different periods.

3. *Methods adopted by the ryots which bear upon the spread of the disease.*—The only crop raised in rotation with sugar-cane by most of these ryots is paddy and it appears to be the general custom to keep a particular plot as a sugar-cane garden for two years, to plant paddy in the third year and then revert to sugar-cane. The sugar-cane crop of the first year is raised by planting "tops." Before the canes are passed through the crushing mill the upper portion with the leaves is cut off, this when trimmed constitutes a "top." The "tops" are put together in a heap loosely covered up with leaves and are planted out after about four or five weeks so that they remain exposed to any spores which may be about in the air for a considerable time; during this some of them are doubtless attacked.

If sufficient "tops" are not available any joint, *i.e.*, any internode with a couple of nodes showing buds is used.

The land from which paddy has been recently harvested is ploughed, dry if possible, after soaking if necessary. The "tops" are laid out in rows, trampled in, and after sprouting has begun furrows are made and irrigation commences. The second-year crop is raised by ratooning, *i.e.*, the stools of the previous crop are left in the ground and new shoots grow from them. If a second-year crop has been very good a third-year crop is sometimes attempted in the same way but this does not appear to be the custom, nor, apart altogether from this disease, do the ryots seem to expect a third-year crop to be a good one, the canes they say are likely to be thin and without much juice. This ratooning seems, under ordinary circumstances, to give very good results for one year. I may, however, at once point out that where this disease is present to attempt a second-year crop by this method is not only absolutely suicidal but helps to spread the disease. Almost all the second-year crops now being cut are worse than the first-year ones and the stools which are now being left to sprout are I find almost all infected so that next year's crops grown from them are almost sure to be complete failures. I expect the shoots, infected as they will be, from the very first, will soon wither.

In most gardens a certain number of canes are cut from day to day and sold for "chewing" and fetch about 2 pies each at the garden. The "chewing" season lasts from about January to March. When the bulk of the canes is ripe a mill is erected in

nearly every garden, the cutting commences in earnest and the crushing goes on day and night, on some gardens at any rate. About ten coolies and six pairs of buffaloes are employed at each mill. The leaves are given to the buffaloes, the "tops" are put aside as described above, the crushed stems are spread out upon the ground to dry and when dry are used as fuel for the boiling which takes place on the spot. The ash and scum are used as manure and any fuel unused is stacked. At all the mills I visited the procedure was identical.

4. *The way in which the disease is spread.*—This disease is actually caused by the fungus. Insects may damage some of the canes, the quality of the water, the use of unsuitable manure, or the exhaustion of the soil may cause a weak crop; but it must be clearly understood that if spores of this fungus enter its tissues the strongest and healthiest cane will be attacked. It is the spread of the spores of the fungus which we must endeavour to check, and unless this is done no other measures are likely to have any beneficial result.

The spores are extremely minute and occur in inconceivable numbers in the little black patches on the surface as well as inside the tissues of every diseased cane. They are capable of being dried up without losing their vitality and in this condition are blown about by the wind. There is no doubt but that in an infected area spores are constantly settling everywhere in the form of impalpable dust particles. We have thus to deal with a most insidious foe. The greater portion of the surface of the cane is protected by a hard cuticle but the spores easily effect an entry at the broken leaf bases and the attack usually commences here. They also enter at any spot where the surface is injured or at a hole made by a boring insect or at a crack caused by exposure to sun or dry wind. Where the fungus exists in a stool or in a planted "top" it will assuredly grow into the young plant which shoots up thence. It is evident that some of the methods adopted by the ryot are calculated to spread the spores as widely as possible, and his method of planting and more especially of raising a second crop where the disease is prevalent are almost certain to ensure its recrudescence in an aggravated form.

5. *Measures which should be adopted.*—All land which has been under sugar-cane this year should be sown with paddy, all cane roots which have been left in the ground wherever there has been any disease being taken up and burnt.

All the crushed cane and old leaves, and other litter should be burnt at once and none stacked for future use. This can easily be done now while the boiling is going on. The ash will be quite harmless and a most valuable manure.

The best plan to adopt where new gardens are being planted would be to secure "tops" from a perfectly healthy area, but this will not, I think, be feasible this year. The "tops" now at the gardens will have to be used but they should be carefully examined by cutting across at each end, and any showing red spots in the flesh scrupulously rejected and burnt.

Next year it will be necessary to consider the feasibility of importing seed or taking other measures, but it is now too late to do so this year.

Madras,
28th February 1898. (Signed) A. G. BOURNE.

---

Order—No. 127, Revenue, dated 3rd March 1898.

Miscellaneous.

Communicated to the Board of Revenue.

2. The Collectors of Gódávari, Vizagapatam and Ganjám should be at once instructed to use every possible endeavour to induce the ryots to adopt the precautions mentioned by Dr. Bourne. The Collector of Gódávari should report in what taluks the disease has been observed and the Collectors of all other cane-growing districts should ascertain and report whether the red spots and patches spoken of by Dr. Bourne, have ever been noticed when the cane has been cut or crushed. Wherever this has occurred, the precautions advised by Dr. Bourne should be pressed upon the ryots.



3. The Board should consider, with reference to the suggestion in paragraph 5 of the report, whether arrangements cannot be made for importing healthy "tops" for the use of ryots in infected areas.

(True Extract.)

(Signed) G. S. FORBES,
Ag. Secretary to Government.

To the Board of Revenue (Revenue Settlement, Land Records and Agriculture).

Copy to Dr. Bourne, F.R.S.

---

Endorsement No. 127A.

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

(Signed) N. E. MARJORIBANKS,
Ag. Under Secretary to Government.

Exd. Shaik Karim.

80 Copies.

REVENUE DEPARTMENT.

# NOTES CONNECTED WITH G.O., NO. 127, REVENUE, DATED 3RD MARCH 1898.

[SUBJECT.—*Dr. Bourne's report on sugarcane disease in Gódávari delta.*]

*From Dr. Bourne, dated 28th February* 1898.

*To Honourable Member—*

This is Dr. Bourne's report on his visit to Gódávari and his examination of the disease-infected sugarcane.

The disease has been identified as that which has committed such havoc in Barbados.

As to the extent to which it has spread, Dr. Bourne found *much* of it in all the gardens he visited during his four days' inspection and he believes from what he learned that the disease is "pretty widely spread along the whole coast, perhaps even to Ganjám." This year the affected crops will give only half the saccharine yield; and next year's crops grown from the canes infected this year "are almost sure to be complete failures." The situation is therefore most serious. The nature, symptoms, and propagation of the fungus are fully explained in the report and need not be recapitulated.

The question is what is to be done. It is pointed out that the ryots' "methods of planting, and more especially of raising a second crop where the disease is prevalent, are almost certain to ensure its recrudescence in an aggravated form."

The measures which Dr. Bourne recommends are —

(1) All cane roots left in the ground in an infected area to be taken up and burnt.

(2) All land under sugarcane this year to be sown with paddy (*i.e.*, a second year's crop should not be raised but the paddy rotation introduced at once).

(3) All crushed cane and old leaves and litter burnt at once and none stacked for the future.

(4) For *new* gardens "tops" from a healthy locality should be obtained, or, if this is not feasible, tops locally procured may be used, provided they are previously examined and all showing signs of the fungus rejected (and burnt).

In the absence of legislation we can only commend these suggestions to the ryots. Dr. Bourne tells me they are thoroughly alarmed and will probably adopt them largely. The Collector should do all he can to induce the ryots to do so, pointing out how inevitable ruin must be the result of delay.

Collectors of sugarcane districts should make careful inquiries as to the existence of the fungus in their districts and adopt similar measures and report.

The Board should ascertain at once whether healthy tops can be obtained and sent to the infected areas for *new* gardens. But it is clear that so long as there are diseased plants in the neighbourhood of a new garden any imported and healthy cuttings will soon be in the same category. Still the first year's outturn will probably not be much affected, and the ryots probably cannot afford to forego a whole year's cultivation.

Probably legislation may be necessary to deal effectively with the disease; and I will see if any such measures were taken in the West Indies. Meantime I circulate this note.

G. S. Forbes.
2–3–98.

The report (and Dr. Bourne's demi-official note) should be sent at once to the Board and it should tell the Collectors of Gódávari, Vizagapatam and Ganjám to use every possible endeavour to get the ryots to adopt the precautions mentioned by Dr. Bourne. The Collector of Gódávari should report in what taluks the disease has been observed, and the Collectors of all other cane-growing districts should ascertain whether the red spots and patches spoken of by Dr. Bourne have ever been seen when the cane has been cut and crushed.

The Government Order should be communicated to India, as the information may be of value in other provinces.

There is no sugarcane in Kistna, and the disease is probably limited to Gódávari, Vizagapatam and Ganjám at present.

J. G[rose].
2–3–98.
A. E. H[avelock].
6–3–98.

*To His Excellency—*

*To Honourable Sir H. Bliss—*

Please see Dr. Bourne's report and the Government Order *issued* thereon, as matter was urgent.

G.S.F.
4–3–98.

Seen.

2. With regard to the proposal in the last paragraph of Dr. Bourne's report that seed should be imported, I think I am right in saying that sugarcane is practically never propagated from seed. (See Watt's Economic Products of India, pages 83 to 88).

A.E.H.
6–3–98.

The Government Order referred only to "tops," so that we have not committed ourselves about *seed*.

G.S.F.
8–3–98.

I believe His Excellency is quite right as to the propagation of sugarcane. In fact, I understand that it was only quite lately that it was discovered that the sugarcane had seeds. They are microscopic and, to the best of my recollection of some papers on the subject which appeared five or six years ago in, I think, the Proceedings of the Agri-Horticultural Society, have never been separated and sown. I urged the Society, as soon as I heard of the discovery of the seeds, which implied the existence of flowers, to try experiments in cross-fertilisation, so that, if possible, canes which yielded a heavy proportion of juice might be crossed with those which gave the largest proportion of crystallizable sugar. The experiments were commenced, but I believe came to naught in consequence of a season of drought; and have not since been renewed. The matter should, I think, be taken up at the Agricultural College, for, if the ryots are to try seed or tops imported from non-infected localities, it is of great importance that they should be supplied with the best available cane, by which I mean that variety of cane which yields the largest quantity of juice per ton and in which the juice contains the largest proportion of crystallizable sugar.



In the meantime, unless in the Government office or the Board's or some other local library there exists information as to the steps taken by the French and Italian Governments to eradicate the *Phylloxera vastatrix*, India should be telegraphed to, to send it us if they have it; and, failing that, we should telegraph to the Secretary of State for it. It is quite possible that legislation will be needed to deal with this very serious matter, and the sooner we are prepared for it the better.

I should communicate Dr. Bourne's report to the Mysore Government; a great deal of sugarcane is grown in parts of Mysore.

All Collectors should, of course, be warned, for all districts grow more or less sugarcane, so far as I know.

H. W. B[liss].
7–3–98.

$\frac{O}{18}$ 4,000—19-7-97.

# Revenue (189 8 ) Department.

D.O. CURRENT No. 36.

From

G. B. Stuart Esqre
Madras.

List

For Orders,

with reference to the under Secy's note below

No.

Dated 19 Febry

Received 19 —

Registered 19 —

Enclosures

Spare copies.

SUBJECT.

Stating that he told Mr Bourne that he can take casual leave to enable him to go to Coonoor &c.

21-11-98

Secy

Please see notes below; the question is whether Mr Bourne shd be placed on special duty here shd be decided.

Mlls
21-2-98

21-2-98

## BACK PAPERS.

| G.O. | No. | Department. | Date. |
|---|---|---|---|
| | | | |

## FURTHER PAPERS.

| G.O. | No. | Department. | Date. |
|---|---|---|---|
| | | | |

GOVERNMENT OF MADRAS

My dear Bliss,

I see this letter from Bourne.

Last November, Brodie & Wilson & Co told Indian that a bad disease was affecting the Cocoanut, which was produced either by an insect or a fungus, & asked for an Expert who knew. Mr Gough said they had no experts available. We then told Brodie to send specimens of the

O

diseased cane when Central
Museum. Bourne was in
charge of it then.

When I came back
from the Nilgiris at the
beginning of January,
Bourne told me that the
disease was probably caused
by some insect, but he
could not say for certain
what insect unless he
knew where place. After
talking over the matter with
him, I told him not to go,
but to send instructions to
Brodie which would ensure
his getting more specimens
& better preserved ones.

O

Since then Thurston has
come back. Bourne has ceased
to have charge of the Museum.
He has asked if he is to con-
tinue as Botanical Keeper
of the Herbarium. Thurston is
being asked if he thinks this
necessary, & if so what allowance
ought to be given for the Bo-
tanical work.

Bourne now writes, having
got the new specimens, that
the disease is probably the
effect of a fungus, & is a
very serious matter. You will
see what he says.

He asks if he should go
to Coconada now & I am in-

clined which he should, for if no
worst comes to the worst, we shall
otherwise seem where done nothing
where as we might have done
something.

If he goes he must be
put on special duty.

What do you think
about it?

Yours very sincerely
J. Grove.

16/2/98

My dear Sir - Discussion & discussion - rather the contrary. I don't know that he need formally be put on special duty - But that can be considered later.

Yrs
JS

16/2/98

GOVERNMENT OF MADRAS

17/2

My dear Forbes,

See this letter from me to Bliss & his reply. Send this letter to Bourne (which is referred to) to Duncan yesterday, not knowing that he had left Madras. When I get it back, I will send it to this Office to be kept with the other papers.

Bourne has now made certain that the sugar-cane disease which prevails near

not an insect),
Cocoanadas is a fungus, and it
may be a particular fungus
which is very dangerous. It
can only be identified by the
spores it throws out on the
surface of the cane, & these
are reduced to powder in
going through the press. According
if the fungus is thus identi-
fied, it is necessary that
Bourne should go in person
to Cocanadas, & he says he
can go without detriment
to his professorial duties, &
complete the work in
about a week.

Bliss & I think he should go. I think he must be placed on Special duty, but Bliss says: "I don't know that he need be formally put on Special duty." Will you look this up? His travelling expenses to be paid, & I think he should have some allowance — at all events, if we don't make him Govt Botanist.

In the meantime, you had better write demi-officially to Stuart, & tell him if he sees no objection (I consider he has none), he should instruct

Bourne to take Carnal Lime
& go to Coimadai with this
view of identifying this
sugar-cane fungus.

Yours sincerely
J Grove

17/2/98

My dear Forbes,

Here is Bourne's letter which has to be forwarded with two other papers about the Cocanada sugarcane fungus:

Yours sincerely
J Lowe

20/2/98

Presidency College,
16/2/98

16 February 1898

My dear Mr Grose

When I spoke to you about sugar canes I was under the impression that the trouble was due to some insect and was very doubtful as to whether I or any one could do much good by visiting the spot

I wrote for more specimens and have had several bundles and boxes of Cane from the Collector and from Watson & Co. Careful Examination has convinced me that the disease is due to a fungus this is a much more serious matter I think it is the same fungus that has recently almost ruined the Cane industry in Barbados but I must examine it on the spot

If it is as I fear immediate and concerted action must be taken - eg.

(i) burn all affected canes

(ii) plant from absolutely healthy localities

(iii) put the new plants on other land and a different crop where the Cane now is.

or the disease is pretty sure to be infinitely worse next year.

I can manage to arrange

work for my classes. to go
on with and if I go by
train do not suppose I
need be away more than
a week
I ought to go at once
if at all and so write
direct to Sam and how
shall we [illegible] if I am
think it desirable.

Yours Sincerely
A. G. [illegible]

Weeds attached 18/2/98

18/2/98

No. 14
18-2-98

My dear Stuart

When doing the work of Govt Botanist Bourne has engaged in investigating a disease which was reported to be injuring the sugarcane plantations near Cocanada. He has now discovered that the disease is a fungus possibly a very dangerous fungus. Exact nature is however not identified by the spores it throws out on the surface of the cane & these are brushed off in transit thro the post. It is therefore necessary to examine the cane on the spot & the Govt considers that Bourne shd proceed at once to Cocanada for that purpose. Pending the decision of the question whether he shd go out on special duty for the Govt consider[illegible] that

can for the purpose & I am to request that you will be good enough to permit him to go accordingly.

Yrs
5/2/98

Hon'ble G. H. Stuart, M.A.,

D. O.

The Presidency College,

Madras, 7th Feby 1898.

My dear Forbes,

I have told Bourne he can take casual leave to enable him to go to Cocanada and he starts this evening.

Yours sincerely
G H Stuart

The Hon'ble G S Forbes MA ICS

O & 4,000—19-7-97.

# Revenue (1898) Department.

D.O. CURRENT No. 44.

*From* Dr. A. G. Bourne
Madras.

*Order*

No.

*Dated* 28 Febry
*Received* 1 Mar.
*Registered* 2 "
*Enclosures*
*Spare copies.*

SUBJECT.

Furnishing a report on the sugar cane diseases in Godavari.

## BACK PAPERS.

| G.O. | No. | Department. | Date. |
|---|---|---|---|
| | | | |

## FURTHER PAPERS.

| G.O. | No. | Department. | Date. |
|---|---|---|---|
| | | | |

43

The copies were obtained last evening and were despatched then and there as ordered by the Secretary (under the under Secy's signature – the Secy not having been in the office at the time)

4.3.98

The only spare copy available is submitted. The Press has since been instructed to print the [illegible] in it.

Presidency College.
28 February 18

My dear Mr Forbes,

I arrived at Cocanada on Monday 21st and spent the 22nd – 25th in examining the Sugar-canes – I returned by steamer this morning and submit a report at once as if anything can be done it should be done quickly – I have in anticipation of the approval of Government appointed the Collector and some members of the Chamber

# Sugar-cane disease in the Godaveri Deltas and Neighbourhood.

## 1. Introduction.

My attention was drawn to this matter by letters from the Collector of the District and from Messrs. Wilson & Co of Cuddapah.

Numbers of Canes in certain localities were reported to be withering and the evil was generally ascribed to the ravages of some insect.

A great variety of insects were sent to us, some perfectly harmless to the canes, others undoubtedly capable of doing damage. I do not propose to deal with these here as the total damage done by them in the gardens I have examined is infinitesimal as compared with that done by a fungoid growth.

This growth produces all the symptoms characteristic of an attack by Trichosphæria Sacchari, Massee.

This is the fungus which has recently threatened to extinguish the Sugar industry in Barbados. Different stages in its life-history have been known as the "root fungus" and "rind fungus" respectively. I find both stages present and great damage is being done, and unless some measures to check the progress of the disease are adopted at once matters will go from bad to worse.

Mr Maxwell of Messrs Wilson & Co kindly secured me the services of several gumastas and we visited a great number of "gardens" - as the Sugar-Cane plantations are there called - and interviewed the ryots. All the gardens be examined, among which were several reported to be quite healthy, showed much disease and now that I have pointed out what the symptoms really are, I gather from what I have been told that the disease is pretty widely spread along the whole Coast perhaps even to Ganjam, and that it is no new thing this year but has been gradually coming on for some years. It is however only this

year that the results have been sufficiently marked to cause it to have been brought to the notice of the Collector and Chamber of Commerce. It has evidently now taken a thorough hold of this district and is likely in my opinion to be infinitely worse next year unless prompt and Concerted measures are taken to check it.

2. Symptoms.

Canes but slightly affected - i.e. only recently attacked - shew no external signs of disease, but transverse sections shew one or more bright red spots in one or more internodes and if these are followed up by longitudinal sections they appear as red streaks which branch at the nodes. It is the fibro-vascular bundles which become coloured. Such slight attacks usually occur somewhere about the middle of the length of the cane. Where the disease is more advanced the Colouration extends also to the ground tissue so that any section shews red patches. Subsequently the central portion of each red patch becomes opaque and white and acquires a texture like that of a 'woolly' radish - the tissue is in fact dead. Where the disease is still further advanced, portions, first at the nodes and later elsewhere, become black and at this stage as before, the leaves at the top wither and the entire cane dries up. Some of the canes only were attacked when sufficiently young to give time for the disease to run its full course others were attacked at later stages and are yielding a certain amount of juice. Wherever the fungus has been growing in the cane for a sufficient length of time small black, minutely velvetty spots are to be found among the sleeping eyes which look like warts on the nodes. These spots are groups of myriads of spores ready to be distributed by the wind.

Each garden which I examined shewed the disease

in all its stages, Contained in fact plants which had been attacked at different periods.

3. Methods adopted by the Ryots which bear upon the Spread of the Disease.

The only Crops raised in rotation with Sugar-Cane by most of these Ryots is paddy and it appears to be the general Custom to keep a particular plot as a Sugar-Cane Garden for two years, to plant paddy in the third year and then revert to Sugar-Cane. The Sugar-Cane Crop of the first year is raised by planting "tops". Before the Canes are passed through the Crushing Mill the upper portion with the leaves is Cut off, this when trimmed Constitutes a "top". The "tops" are put together in a heap, loosely Covered up with leaves and are planted out after about four or five weeks so that they remain exposed to any Spores which may be about in the air for a Considerable time during which some of them are doubtless attacked.
If sufficient "tops" are not available any joint i.e. any Internode with a Couple of Nodes bearing buds is used.
The land from which paddy has been recently harvested is ploughed, dry if possible, after Soaking if necessary. The "tops" are laid out in rows, trampled in and after Sprouting has begun furrows are made and irrigation Commences. The second year Crop is raised by ratooning i.e. the stools of the previous Crop are left in the ground and new Shoots grow from them. If a second year Crop has been very good a third year Crop is sometimes attempted in the same way but this does not appear to be the Custom, nor, apart altogether from this disease, do the Ryots seem to expect a third year Crop to be a good one, the Canes they say are likely to be thin and without much juice. This ratooning seems under ordinary circumstances

to give very good results for one year. I may however at once point out that where this disease is present to attempt a second year Crop by this method is not only absolutely suicidal but keeps to spread the disease. Almost all the second-year crops now being cut are worse than the first year ones and the shoots which are now being left to sprout are I find almost all infected so that next year's crops, grown from them are almost sure to be complete failures. I expect the shoots, infected as they will be from the very first, will soon wither.

In most gardens a certain number of Canes are cut from day to day and sold for "chewing" and fetch about 2 pice each at the garden. The "chewing" season lasts from about January to March when the bulk of the canes is ripe a mill is erected at the nearly every Garden. The Cutting Commences in earnest and the crushing goes on day and night, on some gardens at any rate. About 10 Coolies and 6 pairs of buffaloes are employed at each mill. The leaves are given to the buffaloes, the "tops" are put aside as described above, the Crushed Stems are spread out upon the ground to dry and when dry are used as fuel for the boiling which takes place on the spot. The ash and Scum are used as Manure and any fuel unused is stacked. At all the mills I visited the procedure was identical.

4. The way in which the disease is Spread.

This disease is actually Caused by the fungus. Insects may damage some of the Canes, the purity of the water, the use of unsuitable manure, or the exhaustion of the soil may cause a weak Crop; but it must be clearly understood that if spores of this fungus enter its tissues the strongest and healthiest cane will be attacked. It is the

Spread of the spores of the fungus which he must endeavour to check and unless this is done his other measures are likely to have any beneficial result.

The spores are extremely minute and occur in inconceivable numbers in the little black patches on the surface as well as inside the tissues of every diseased cane. They are capable of being dried up without losing their vitality and in this condition are blown about by the wind. There is no doubt but that in an infected area spores are constantly settling everywhere in the form of ~~dust~~ impalpable dust particles. be hind this to deal with a most insidious foe. The greater portion of the surface of the cane is protected by a hard cuticle but the spores easily effect an entry at the broken leaf bases and the attack usually commences here. They also enter at any spot where the surface is injured as at a hole made by a boring insect or at a crack caused by exposure to sun or dry wind. Where the fungus exists in a stool or in a planted "top" it will assuredly grow into the young plant which shoots up thence. It is evident that some of the methods adopted by the ryot are calculated to spread the spores as widely as possible, and his method of planting and more especially of raising a second crop where the disease is prevalent are almost certain to ensure its recrudescence ~~of the disease~~ in an aggravated form.

5 Measures which should be adopted.

All land which has been under sugar-cane this year should be sown with paddy, all cane roots which have been left in the ground wherever there has been any disease being taken up and burnt

All the Crusted Canes and old leaves and
other litter should be burnt at once and none
stacked for future use. This can easily be
done now while the boiling is going on. The
ash will be quite harmless and a most valuable
manure.

The best plan to adopt where new gardens
are being planted would be to secure "tops" from
a perfectly healthy area but this will not
I think be feasible this year. The "tops" now
at the Gardens will have to be used but they
should be carefully examined by cutting across at each end
and any showing
red spots in the pith scrupulously rejected
and burnt

Next year it will be necessary to consider the feasibility
of importing seed but it is now too late to
do so this year.

A. G. Gamble

Madras
28 February 1898

Proof 2/3/98

My dear Bourne
Herewith a proof
Yrs sincy
E. Butler
2/3/98

Corrected
A. F. Bourne

7

*Sugar-cane disease in the Gódávari Deltas and neighbourhood.*

1. *Introduction.*—My attention was drawn to this matter by letters from the Collector of the district and from Messrs. Wilson & Co. of Madras.

Numbers of canes in certain localities were reported to be withering and the evil was generally ascribed to the ravages of some insects.

A great variety of insects were sent to me, some perfectly harmless to the canes, others undoubtedly capable of doing damage. I do not propose to deal with these here as the total damage done by them in the gardens I have examined is infinitesimal as compared with that done by a fungoid growth.

lc This growth produces all the symptoms characteristic of an attack by Trichosphæria Sacchari, Massee.

This is the fungus which has recently threatened to extinguish the sugar industry in Barbados. Different stages in its life history have been known as the "root fungus," and "rind fungus," respectively. I find both stages present and great damage is being done and unless some measures to check the progress of the disease are adopted at once matters will go from bad to worse.

Mr. Maxwell of Messrs. Wilson & Co. kindly secured me the services of several gumastas and we visited a great number of "gardens"—as the sugar-cane plantations are there called—and interviewed the ryots. All the gardens we examined, among which were several reported to be quite healthy, showed much disease and now that I have pointed out what the symptoms really are, I gather from what I have been told that the disease is pretty widely spread along the whole coast, perhaps, even to Ganjám, and that it is no new thing this year but has been gradually coming on for some years. It is, however, only this year that the results have been sufficiently marked to cause it to have been brought to the notice of the Collector and Chamber of Commerce. It has evidently now taken a thorough hold of this district and is likely in my opinion to be infinitely worse next year unless prompt and concerted measures are taken to check it.

2. *Symptoms.*—Canes but slightly affected, *i.e.*, only recently attacked, show no external signs of disease, but transverse sections show one or more bright red spots in one or more internodes and if these are followed up by longitudinal sections they appear as red streaks which branch at the nodes. It is the fibro-vascular bundles which become coloured. Such slight attacks usually occur somewhere about the middle of the length of the cane. Where the disease is more advanced the colouration extends also to the ground tissue so that any section shows red patches. Subsequently the central portion of each red patch becomes opaque and white and acquires a texture like that of a "woolly" radish, the tissue is in fact dead. Where the disease is still further advanced, portions first at the nodes and later elsewhere, become black and at this stage or before, the leaves at the top wither, and the entire cane dies up. Some of the canes only were attacked when sufficiently young to give time for the disease to run its full course, others were attacked at later stages and are yielding a certain amount of juice. Wherever the fungus has been growing in the cane for a sufficient length of time small black, minutely velvetty spots are to be found among the sleeping roots which look like warts on the nodes. These spots are groups of myriads of spores ready to be distributed by the wind.

Each garden which I examined showed the disease in all its stages, contained in fact plants which had been attacked at different periods.

3. *Methods adopted by the ryots which bear upon the spread of the disease.*—The only crop raised in rotation with sugar-cane by most of these ryots is paddy and it appears to be the general custom to keep a particular plot as a sugar-cane garden for two

years, to plant paddy in the third year and then revert to sugar-cane. The sugar-cane crop of the first year is raised by planting "tops." Before the canes are passed through the crushing mill the upper portion with the leaves is cut off, this when trimmed constitutes a "top." The "tops" are put together in a heap loosely covered up with leaves and are planted out after about four or five weeks so that they remain exposed to any spores which may be about in the air for a considerable time during which some of them are doubtless attacked.

If sufficient "tops" are not available any joint, *i.e.*, any internode with a couple of nodes showing buds is used.

The land from which paddy has been recently harvested is ploughed, dry if possible, after soaking if necessary. The "tops" are laid out in rows, trampled in, and after sprouting has begun furrows are made and irrigation commences. The second-year crop is raised by ratooning, *i.e.*, the stools of the previous crop are left in the ground and new shoots grow from them. If a second-year crop has been very good a third-year crop is sometimes attempted in the same way but this does not appear to be the custom, nor, apart altogether from this disease, do the ryots seem to expect a third-year crop to be a good one, the canes they say are likely to be thin and without much juice. This ratooning seems, under ordinary circumstances, to give very good results for one year. I may, however, at once point out that where this disease is present to attempt a second-year crop by this method is not only absolutely suicidal but helps to spread the disease. Almost all the second-year crops now being cut are worse than the first-year ones and the stools which are now being left to sprout are I find almost all infected so that next year's crops grown from them are almost sure to be complete failures. I expect the shoots, infected as they will be from the very first, will soon wither.

In most gardens a certain number of canes are cut from day to day and sold for "chewing" and fetch about 2 pies each at the garden. The "chewing" season lasts from about January to March. When the bulk of the canes is ripe a mill is erected in nearly every garden, the cutting commences in earnest and the crushing goes on day and night, on some gardens at any rate. About ten coolies and six pairs of buffaloes are employed at each mill. The leaves are given to the buffaloes, the "tops" are put aside as described above, the crushed stems are spread out upon the ground to dry and when dry are used as fuel for the boiling which takes place on the spot. The ash and scum are used as manure and any fuel unused is stacked. At all the mills I visited the procedure was identical.

4. *The way in which the disease is spread.*—This disease is actually caused by the fungus. Insects may damage some of the canes, the quality of the water, the use of unsuitable manure, or the exhaustion of the soil may cause a weak crop; but it must be clearly understood that if spores of this fungus enter its tissues the strongest and healthiest cane will be attacked. It is the spread of the spores of the fungus which we must endeavour to check, and unless this is done no other measures are likely to have any beneficial result.

The spores are extremely minute and occur in inconceivable numbers in the little black patches on the surface as well as inside the tissues of every diseased cane. They are capable of being dried up without losing their vitality and in this condition are blown about by the wind. There is no doubt but that in an infected area spores are constantly settling everywhere in the form of impalpable dust particles. We have thus to deal with a most insidious foe. The greater portion of the surface of the cane is protected by a hard cuticle but the spores easily effect an entry at the broken leaf bases and the attack usually commences here. They also enter at any spot where the surface is injured or at a hole made by a boring insect or at a crack caused by exposure to sun or dry wind. Where the fungus exists in a stool or in a planted "top" it will assuredly grow into the young plant which shoots up thence. It is evident that some of the methods adopted by the ryot are calculated to spread the spores as widely as possible, and his method of planting and more especially of raising a second crop where the disease is prevalent are almost certain to ensure its recrudescence in an aggravated form.

5. *Measures which should be adopted.*—All land which has been under sugar-cane this year should be sown with paddy, all cane roots which have been left in the ground wherever there has been any disease being taken up and burnt.

All the crushed cane and old leaves, and other litter should be burnt at once and none stacked for future use. This can easily be done now while the boiling is going on. The ash will be quite harmless and a most valuable manure.

The best plan to adopt where new gardens are being planted would be to secure "tops" from a perfectly healthy area, but this will not, I think, be feasible this year. The "tops" now at the gardens will have to be used but they should be carefully examined by cutting across at each end, and any showing red spots in the flesh scrupulously rejected and burnt.

Next year it will be necessary to consider the feasibility of importing seed, but it is now too late to do so this year.

MADRAS,
28th February 1898.

(Signed) A. G. BOURNE.

or taking other measures

0/16 4,000—19-7-97.

# Revenue (1898) Department.

**CURRENT No.** 1424

C/1898
(2) Kan Sri

***From***

Dr. A. G. Bourne
Presidency College
Madras.

***Order***

**No.**

***Dated*** 28 February
***Received*** 28 "
***Registered*** 3 March
***Enclosures*** /
***Spare copies.***

**SUBJECT.**

Submitting Report on Sugarcane-disease in the Godavari deltas & neighbourhood.

## BACK PAPERS.

| G.O. | No. | Department. | Date. |
|---|---|---|---|
| | | | |

## FURTHER PAPERS.

| G.O. | No. | Department. | Date. |
|---|---|---|---|
| | | | |

From A. G. BOURNE, Esq., F.R.S., Presidency College, to the Secretary to Government, Revenue Department, dated 28th February 1898.

I arrived at Cocanada on Monday 21st and spent the 22nd—25th in examining the sugar-cane. I returned by steamer this morning and submit a report at once, as if anything can be done it should be done quickly. I have, in anticipation of the approval of Government, informed the Collector and some members of the Chamber of Commerce that the ryots should be induced by all possible means to root up the old stools, to burn all litter, to examine "tops" before planting and to plant only on land where paddy was last year.

The cutting and crushing is now going on and new planting will begin by the next new moon.

I think it would be desirable if Government were to call for a report as to the extent of the disease in all cane-growing districts. In such an enquiry it would, I think, be sufficient to ask whether any of the canes exhibited red spots or patches *in their flesh*. The ryots would have noticed such at the time of crushing. The damage done in the eastern delta at any rate is very great; from the forward crops which have been crushed, only half the usual yield of jaggery has been obtained while from many still standing, much less will be obtained.

---

ENCLOSURE.

*Sugar-cane disease in the Gódávari Deltas and neighbourhood.*

1. *Introduction.*—My attention was drawn to this matter by letters from the Collector of the district and from Messrs. Wilson & Co. of Madras.

Numbers of canes in certain localities were reported to be withering and the evil was generally ascribed to the ravages of some insects.

A great variety of insects were sent to me, some perfectly harmless to the canes, others undoubtedly capable of doing damage. I do not propose to deal with these here as the total damage done by them in the gardens I have examined is infinitesimal as compared with that done by a fungoid growth.

This growth produces all the symptoms characteristic of an attack by Trichosphæria sacchari, Massee.

This is the fungus which has recently threatened to extinguish the sugar industry in Barbados. Different stages in its life history have been known as the "root fungus," and "rind fungus," respectively. I find both stages present and great damage is being done and unless some measures to check the progress of the disease are adopted at once matters will go from bad to worse.

Mr. Maxwell of Messrs. Wilson & Co. kindly secured me the services of several gumastas and we visited a great number of "gardens"—as the sugar-cane plantations are there called—and interviewed the ryots. All the gardens we examined, among which were several reported to be quite healthy, showed much disease and now that I have pointed out what the symptoms really are, I gather from what I have been told that the disease is pretty widely spread along the whole coast, perhaps, even to Ganjám, and that it is no new thing this year but has been gradually coming on for some years. It is, however, only this year that the results have been sufficiently marked to cause it to have been brought to the notice of the Collector and Chamber of Commerce. It has evidently now taken a thorough hold of this district and is likely in my opinion to be infinitely worse next year unless prompt and concerted measures are taken to check it.

2. *Symptoms.*—Canes but slightly affected, *i.e.*, only recently attacked, show no external signs of disease, but transverse sections show one or more bright red spots in one or more internodes and if these are followed up by longitudinal sections they appear as red streaks which branch at the nodes. It is the fibro-vascular bundles which become coloured. Such slight attacks usually occur somewhere about the middle of the length of the cane. Where the disease is more advanced the colouration extends

also to the ground tissue so that any section shows red patches. Subsequently the central portion of each red patch becomes opaque and white and acquires a texture like that of a "woolly" radish, the tissue is in fact dead. Where the disease is still further advanced, portions first at the nodes and later elsewhere, become black and at this stage or before, the leaves at the top wither, and the entire cane dies up. Some of the canes only, were attacked when sufficiently young to give time for the disease to run its full course, others were attacked at later stages and are yielding a certain amount of juice. Wherever the fungus has been growing in the cane for a sufficient length of time small black, minutely velvetty spots are to be found among the sleeping roots which look like warts on the nodes. These spots are groups of myriads of spores ready to be distributed by the wind.

Each garden which I examined showed the disease in all its stages, contained in fact plants which had been attacked at different periods.

3. *Methods adopted by the ryots which bear upon the spread of the disease.*—The only crop raised in rotation with sugar-cane by most of these ryots is paddy and it appears to be the general custom to keep a particular plot as a sugar-cane garden for two years, to plant paddy in the third year and then revert to sugar-cane. The sugar-cane crop of the first year is raised by planting "tops." Before the canes are passed through the crushing mill the upper portion with the leaves is cut off, this when trimmed constitutes a "top." The "tops" are put together in a heap loosely covered up with leaves and are planted out after about four or five weeks so that they remain exposed to any spores which may be about in the air for a considerable time; during this some of them are doubtless attacked.

If sufficient "tops" are not available any joint, *i.e.*, any internode with a couple of nodes showing buds is used.

The land from which paddy has been recently harvested is ploughed, dry if possible, after soaking if necessary. The "tops" are laid out in rows, trampled in, and after sprouting has begun furrows are made and irrigation commences. The second-year crop is raised by ratooning, *i.e.*, the stools of the previous crop are left in the ground and new shoots grow from them. If a second-year crop has been very good a third-year crop is sometimes attempted in the same way but this does not appear to be the custom, nor, apart altogether from this disease, do the ryots seem to expect a third-year crop to be a good one, the canes they say are likely to be thin and without much juice. This ratooning seems, under ordinary circumstances, to give very good results for one year. I may, however, at once point out that where this disease is present to attempt a second-year crop by this method is not only absolutely suicidal but helps to spread the disease. Almost all the second-year crops now being cut are worse than the first-year ones and the stools which are now being left to sprout are I find almost all infected so that next year's crops grown from them are almost sure to be complete failures. I expect the shoots, infected as they will be from the very first, will soon wither.

In most gardens a certain number of canes are cut from day to day and sold for "chewing" and fetch about 2 pies each at the garden. The "chewing" season lasts from about January to March. When the bulk of the canes is ripe a mill is erected in nearly every garden, the cutting commences in earnest and the crushing goes on day and night, on some gardens at any rate. About ten coolies and six pairs of buffaloes are employed at each mill. The leaves are given to the buffaloes, the "tops" are put aside as described above, the crushed stems are spread out upon the ground to dry and when dry are used as fuel for the boiling which takes place on the spot. The ash and scum are used as manure and any fuel unused is stacked. At all the mills I visited the procedure was identical.

4. *The way in which the disease is spread.*—This disease is actually caused by the fungus. Insects may damage some of the canes, the quality of the water, the use of unsuitable manure, or the exhaustion of the soil may cause a weak crop; but it must be clearly understood that if spores of this fungus enter its tissues the strongest and healthiest cane will be attacked. It is the spread of the spores of the fungus which we must endeavour to check, and unless this is done no other measures are likely to have any beneficial result.



The spores are extremely minute and occur in inconceivable numbers in the little black patches on the surface as well as inside the tissues of every diseased cane. They are capable of being dried up without losing their vitality and in this condition are blown about by the wind. There is no doubt but that in an infected area spores are constantly settling everywhere in the form of impalpable dust particles. We have thus to deal with a most insidious foe. The greater portion of the surface of the cane is protected by a hard cuticle but the spores easily effect an entry at the broken leaf bases and the attack usually commences here. They also enter at any spot where the surface is injured or at a hole made by a boring insect or at a crack caused by exposure to sun or dry wind. Where the fungus exists in a stool or in a planted "top" it will assuredly grow into the young plant which shoots up thence. It is evident that some of the methods adopted by the ryot are calculated to spread the spores as widely as possible, and his method of planting and more especially of raising a second crop where the disease is prevalent are almost certain to ensure its recrudescence in an aggravated form.

5. *Measures which should be adopted.*—All land which has been under sugar-cane this year should be sown with paddy, all cane roots which have been left in the ground wherever there has been any disease being taken up and burnt.

All the crushed cane and old leaves, and other litter should be burnt at once and none stacked for future use. This can easily be done now while the boiling is going on. The ash will be quite harmless and a most valuable manure.

The best plan to adopt where new gardens are being planted would be to secure "tops" from a perfectly healthy area, but this will not, I think, be feasible this year. The "tops" now at the gardens will have to be used but they should be carefully examined by cutting across at each end, and any showing red spots in the flesh scrupulously rejected and burnt.

Next year it will be necessary to consider the feasibility of importing seed or taking other measures, but it is now too late to do so this year.

MADRAS,
28th February 1898.

(Signed) A. G. BOURNE.

From Dr Bourne
D 28 Feb 1898

To H.M.

This is Dr Bourne's report on his visit to Godavari & his examination of the disease in sugar cane.

The disease has been identified as that which has committed such havoc in Barbados.

As to the extent to which it has spread, Dr Bourne found much of it in all the gardens he visited during his four days' inspection & the believes from what he learned that the desease is "pretty widely spread along the whole coast, perhaps even to Ganjam". This year the affected crops will give only half the saccharine yield; & next years crops grown from

127

[The report (and Dr Bourne's D note) should be sent at once to the Board of Agriculture, Coimbatore, Vizagapatam & Ganjam to make every possible endeavour to put them in a position to adopt the precautions mentioned by Dr Bourne. The Collr of Godavary should report whether the disease has been observed, & the Collrs of all other cane-growing districts to ascertain whether the red spots & patches spoken of by Dr Bourne have ever been seen where the cane has been cut & crushed.

The G.O. should be communicated to the Govts, as the information may be of value in other provinces

As there is no sugar cane in Kistna, & the disease is probably limited to Godavary Vizagapatam & Ganjam last present.

JG
2/3/98

H.M. 6.3.98

Letter submitted at page 4 below

C. 7/3/98.
S. 10/3/98.
R. 9/3/98.

the canes infected "in par" are almost sure to be complete failures". The situation is therefore most serious. The nature, symptoms, & propagation of the fungus are fully explained in the report need not be re-capitulated.

The question is what is to be done. It is pointed out that the reports "methods of planting & more especially of raising a second crop where the disease is prevalent are almost certain of leading to re-crudescence in an aggravated form".

The measures which Dr Bourne recommends are :-

(1) All cane roots left in the ground in an infected area to be taken up & burnt,

(2) All land under sugar cane this year to be sown with paddy i.e. a second year's crop should be raised but the paddy rotation introduced

para-3-page 2

bottom of page 2

para-5-p-3



at once).

(3). All crushed cane sold canes & sugarcane either burnt at once or stained in the future.

(4) ~~Either~~ For new gardens tops from a healthy locality should be obtained, or if this is not feasible, ~~only~~ tops locally procured may be used provided they are previously examined & all showing signs of the fungus rejected (& burnt).

In the absence of legislation we can only commend these suggestions to the ryots. Dr Bourne tells me they are thoroughly alarmed & will probably adopt them largely. The Collector should do all he can to induce the ryots to do so pointing out how inevitable ruin must be the result of delay.

Collectors of sugar cane districts should make careful en-

(2)

queries as to the existence of the fungus in their districts & adopt similar measures & report.

The Board shd. ascertain at once whether healthy tops can be obtained and sent to the infected areas for new gardens. But it is clear that so long as there are diseased plants in the neighbourhood of a new garden the any imported & healthy cuttings must with soon be in the same category. Still the first years outturn will probably not be much affected, & the spots probably cannot appear to keep a whole years cultivation

Probably legislation may be necessary to deal effectively with the disease; and I will see if any such measures were taken in the West Indies. Meantime I enclose this note.

G.C. 2/3/15

Read Dr Bowrie's letter & report (C.N. 1727)

G.O. No. 127 of 3rd March 1898.

Communicated the Board of Revenue.

2. The Collectors of Godavery, Vizagapatam, & Ganjam Shd. be at once instructed to use every possible endeavour to induce the ryots to adopt the precautions mentioned by Dr Bowrie. The Collectors of Godavery Shd. report in what taluks the disease has been observed and the Collectors of all other cane growing districts Shd. ascertain & report whether the red spots & patches spoken of by Dr Bowrie have ever been noticed when the cane has been cut or crushed. Wherever this has occurred the precautions advised

C. 4/3/98 [illegible] 127

6.

Brass
W.C. Worsfold
Director of Imperial Institute

Dr. Bourne & should be pressed upon the matter.

3. The Board should consider whether with reference to the suggestion in para 5 of the report arrangements cannot be made for distributing Leaflets &c. for the use of millers in infected areas.

H.L.
2/8/98 S/S 3/3/98.

5/ of the Bd of Rev. R.S.K.R.A.
2 Cop[y] & Dr Bourne F.R.S. [Despatches Send him 2 copies] Scott
Encl. No. 127A. 8/2
1 Copy of the Govt of India Dept of Rev & Agri. 8/3
H.L. 2/8/98 S/S 3/3/98 1/
Westwatched 2/3/98

F.H.S.
Have see Dr. Bourne's report & the C.O. is med. thereon - as matter was explained
S/S 3/3/98

The draft C.O. referred only to "D" so that we have not commented ourselves about seed. S/S 4/3

(1) H.L.
(2) Hon Sec A Rly

1. Sir,
2. With regard to the portions in the last paragraph of Dr. Bourne's report which call the imputation of seed should be imputed, I think I am right in saying that sugar-cane is practically never propagated from seeds. (See Watt's Economic Products of India, pages 82 & 88). S.H.

I believe H.L. is quite right as to the propagation of sugar-cane - but I understand that it was only quite lately that it was discovered that the sugar cane had seeds - they are microscopic & the best of my recollection of some papers on the subject which appeared I or 2 years ago in, I think, the Proc. of the Agri-Horticultural Society have now been separated & sown - I urged the Society to avoid of the discovery of the seeds, which implied the existence of flowers, & by experiments in cross-fertilisation, so that, if possible, canes which yielded a heavy proportion of juice might be crossed with those which gave the largest proportion of crystalizable Sugar. The experiments were commenced, but I believe came to naught in consequence of severe drought; & have not since been renewed - Dr. Watt should I think, be taken up by the Agricultural College, & if they are to try seed or tops imported from non-infected localities it is of great importance that they should be supplied with the best available cane, by which I mean that [illegible]

Returned for signature.

Despatched in print.

Reply again G.O., No. 150 — Dated

Current No.

Enclosures to G. No.

Order of Government

Letter of Government.

Statement with ditto.

Papers not filed up, being meant for retention in original.

N.B.—
A = Print in full.
B = Not to be printed.
P = Print abstract only.
Q = Print heading only.

Letter only.
Order to apply as in [illegible]

of cane which yields the largest quantity of juice per ton and in which the juice contains the largest proportion of crystalizable sugar.

In the meantime, subject to the Govt. approval, & the Bd. or some other [illegible] library there exists information as to the steps taken by the French & Italian Govts to eradicate the Phylloxera vastatrix, which should be telegraphed to & sent to us if they have it; and failing that, we should telegraph to the S. of S. for it. It is quite possible that legislation will be needed to deal with this very serious matter & the papers were prepared first for the better.

I should communicate Dr. B's report to the Mysore Govt — & put that paragraph of Carey's forward in favour of Mysore.

All Cane should of course be burned in all districts & drawn more stringent, as far as Salem.

Bd
7/3/78