

Revenue (1898) Department.

PRESS SERIES.

G.O., Nos 127-127B

Dated 3rd March

1/5/17
12/8

[Despatch Abstract.]

Comm^d to the Board of Revenue, with remarks
received from D^r A. G. Barrow of the Presidency
College Madras on Sugar cane disease in the
Godavari delta & neighbourhood.

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.

Reqd.

1898.

Enclosures

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 Gódvári 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 Gôdâvari 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 *Trichosphaeria 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 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, 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 velvety 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 Gódávri, 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 Gódávri 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 Góddavari delta.*]

From Dr. Bourne, dated 28th February 1898.

To Honourable Member—

This is Dr. Bourne's report on his visit to Góddavari 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 Ganjam." 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 Górávari, Vizagapatam and Ganjám to use every possible endeavour to get the ryots to adopt the precautions mentioned by Dr. Bourne. The Collector of Górávari 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 Górávari, 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.
4-3-93.

Seen.

2. With regard to the proposal in the last paragraph of Dr. Bourne's report that The Government Order referred only to "tops," so that we have not committed ourselves about *seed*. 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).

G.S.F.
8-3-98.

A.E.H.
6-3-98.

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.

Revenue (189⁸) Department.

D.C. CURRENT No. 36.

From

*G. A. Stuart Esq^r
Madras.*

Let

For Orders,

*with reference to the
under Secy's note below*

No.

*1000
21.11.98*

Secy

*Please see
note below; the
question as to ~~the~~ ^{whether}
whether Mr Bourne
is to be placed on
special duty has
been decided.*

*111
21-2-98*

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
Cocanada &c.*

21.2.98

G.O.	No.	Department.	Date.

G.O.	No.	Department.	Date.



My dear Bliss,
See this letter from
Bourne.

Last November, Brodie
 & Wilson & Co told India
 that a bad disease was
 affecting the ^{near Coconade} sugar cane,
 which was produced either
 by an insect or a fungus,
 & asked for an expert who
 sent. Mrs G & I said they
 had no experts available.
 We then told Brodie to
 send specimens of the

discussed cane with Central
Museum. Bourne was in
charge of it then.

When I came back
from the Red Hills at the
beginning of January,
Bourne told me that the
disease was probably caused
by some insect, but he
could not say for certain
by what insect unless he
knew the 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.

Since then Phurston has
come back. Bourne has ceased
to have charge of the Museum
but has asked if he is to con-
tinue as Botanical Keeper
of the herbarium. Thurstun 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-

claimed which he should, for if our
work comes to this worst, we shall
otherwise seem to have done nothing,
whereas 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. Grose

16/2/98

My dear John - I am not
satisfied with this proposal - rather the contrary.
I don't know that he is fit for special
duty - but that can
be considered later.

16/2/98

Yours
JG

23/11/1



My dear Forbes,

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

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

Coconadas is a ^{not an insect,} 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 post. Accordingly,
if the fungus is to be identified,
it is necessary that
Bourne should go in person
to Coconadas, & he says he
can go without detriment
to his professional duties, &
complete the work in
about a week.

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

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

Bourne to take Casual Leave
to go to Coimbra with the
view of identifying the
sugar-cane fungus.

} ours sincerely
J. E. G. M.

17/2/98

My dear Forbes,
Here is Bourne's
letter which has to be put
into the other paper
about the Coccoloba sugarcane
fungus.

Yours sincerely
J. E. Gore

20/2/98



Presidency College.

16/2/98

18 February 1898

My dear Mr. Foose

When I spoke to you
about sugar cane I
was under the impression
that the trouble was
due to some insect and
was very doubtful as to
whether I or anyone
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 Wilson & 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 - e.g.

- (i) burn all affected cane
- (ii) plant from absolutely
healthy localities
- (iii) put the new plants
on other soil and
a different crop where
the cane now is.

As 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 to write
direct to you and will
start on Saturday if you
think it desirable.

Yours sincerely

A. G. Andrews

Accepted
18/2/98

N^o 14
18-2-98

My dear Stuart

When doing the
work of Govt Botanist Borne
was engaged in investigating
a disease which was reported
to be injuring the sugarcane
plantations near Coconada.
He has now discovered that
the disease is a fungus
possibly a very dangerous
fungus. The exact nature
is however only ~~and~~ identifi-
able by the spores it
throws out on the surface
of the cane & these are
brushed off in transit
thru the post. It is therefore
necessary to examine the
cane on its spot & the Govt
considers that Borne should
proceed at once to Coconada
for that purpose. Pending
the decision of the question
whether he should put on
special duties for ~~unpaid~~
the Govt - consider ~~the~~

Sp
18/2/98

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

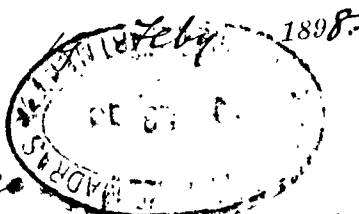
Yours
H. H. Stuart

Honble. H. Stuart, M.A.

D. O.

The Presidency College,

Madras,



My dear Forbes

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

Yours sincerely

G. H. Stuart

The Honble G. S. Forbes M.A. ICS

Revenue (1898) Department.

D.O. CURRENT No. 44.

From

Dr. A. G. Boirne
Madras.

Order

No.

Dated 28 Febry

Received 1 Mar.

Registered 2

Enclosures

Spare copies.

SUBJECT.

Furnishing a report on
the Sugar cane disease in
Godavari.

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

Have you got the
 B. in the office
 what day?
 4/3

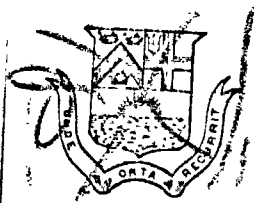
The copies were obtained
 last evening and were
 despatched then and there
 as ordered by the Secretary
 (under the Under Secy's si-
 gnature - the Secy not having
 been in the office at the time)

for Secy

Wm
 2.3.98

How me

The only spare copy available
 is submitted. The Press has
 since been instructed to print
 the



Presidency College.

28 February 1881

My dear Mr. Forbes

I arrived at Cocacada on Monday 21st and spent the 22nd - 25th in examining the Liger - case. 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

Print this letter Monday. 27 -

From A. G. Burne Esq
T. R. S. Presidency Office
to the Secretary
Bt. Rev. Dept.

Print it & send
Carriage with
copies of the
Report as it is
by Mr. Burne (sent
into the Secretary)
Signature & date

10

Sugar-cane disease in the Godaveri Deltas and Neighbourhood.

1. Introduction.

My attention has been drawn to this matter by letters from the Collector of the District and from Messrs. Wilson & Co of Madras.

Numbers of Cane 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 me, some perfectly harmless to the Cane, 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 fungus growth.

This growth produces all the symptoms characteristic of an attack by *Trichosphaeria 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 ~~the~~ 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 gunastas and we visited a great number of "gardens" - as the Sugar-cane plantations are there called - and interviewed the Ryots. As 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 Goujan, 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~~ 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. ~~Later~~ 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 velvety spots are to be found among the sleeping roots ~~which~~ 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

370

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 ~~at~~ 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 is. 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 ~~app~~ 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

440

to give very poor 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. Except the shoots, infected as they will be from the very first, will soon wither.

In most gardens so certain numbers 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. At a mill is erected ^{at} 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 screen 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 if 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 growth

5-10

Spread of the spores of the fungus which be most
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 ~~an~~ imperceptible 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
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 ~~the~~
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

6/60
All the Crusts, 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 ~~is~~ 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 ^{by cutting across at each end} examined, 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.

A. F. Bowring

Madras

28 February 1898

Hy dear Rawne

Herewith a proof

Sp. 10. 5. 1998
4/3/98

Proof 2/3/98

Corrected A. F. Rawne

Sugar-cane disease in the Góddavari 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 *Trichopharia 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 gumastās 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 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, 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 velvety 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 have 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 imperceptible 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

Revenue (1898) Department.

CURRENT No. 1424

(1) H8
(2) Kan Si

Order

From

Dr. A. G. Bourne
Presidency College
Madras.

No.

Dated 28 Febry

Received 28

Registered 3 Mar.

Enclosures /

Spare copies.

SUBJECT.

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

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 Gôdâvari 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 *Trichosphaeria 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 Ganjâm, 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 velvety 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.

127
 Col. Dr. Bourne
 127

127
 the D. 1131

From Dr. Bourne
 28 Feb 1898

To H. M.

This is Dr. Bourne's report on his visit to Godavari this examination of the disease in pined 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 & he believes from what he learned that the disease is "pretty widely spread along the whole coast, perhaps even to Zangam". This year the affected crops will give only half the saccharine yield; & next year crops grown from

[The report (and Dr. Bourne's note) was sent at once to the Board & it was told the Com. of Godavari, Vizagapatnam & Gungam to use every possible endeavour to get the report to adopt the precautions mentioned by Dr. Bourne. The Com. of Godavari should report in what tracts the disease has been observed, & the Com. 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 cultivated & crushed.

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

There is no sugar cane in Kishna, & the disease is probably limited to Godavari, Vizagapatnam & Gungam for present.

2/3/98

6398
 2/3/98
 2/3/98
 2/3/98
 2/3/98

127

the canes infected this year "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 recapitulated.

para 3 - page 2

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

para 4 - page 2

The measures which Mr Osbourne recommends are:-

para 5 - p 3

(1) all cane roots left in the ground in an infected area to be taken up & 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 sold leaves & ~~sugarcane~~ litter burnt at once once started in the future.

(4) ~~When~~^{For} new gardens top 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. Mr Osbourne 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 in-

4
quiries as to the existence of
the fungus in their districts &
adopt similar measures &
report.

The Board sh^d. 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 ~~will~~ ^{will} soon
be in the same category. Still
the first year's outturn will probably
not be much affected, & the ryots
probably cannot afford to
keep 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.

8/11/98

Print from report & copy above

By the
Wt. Secy to Govt

1938/98

Press
not first

Not Secy, Govt
Director
prints
sending for
then send him

Let to be kept in
the hands of the
Director of the
State of when
the year is
over. I
will be
able to
send you
a copy of the
report.

Alter
Read Dr. Bowrie's ~~note~~ report.
(CN 1727)

GO. N. 127 of 3rd March 1898.
Communicated the Board
of Revenue. ...
2. The Collector of
Godavari, Vizagapatam,
& Ganjam should be at
once instructed to, as
every month endeavour
to induce the ryots to
adopt the precautions
mentioned by Dr. Bowrie.
The Collector of Godavari
should report in what
taluk the disease has
been observed and the
Collector of all other
cane-growing districts
should 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

127

C. H. 1898

Dr. Bourne should be pressed upon the mpts.

3. The Board should ^{with reference to the suggestion in para 5 of the report} consider whether the arrangements cannot be made for importing healthy tops for the use of mpts in infected areas.

WLE 3/13/88

5 to the Bd of Rev. R.S.H.R.A.
2 Copy to Dr. Bourne F.R.S.
Encl. No. 127A

1 Copy to the Govt of India
Dept of Rev & Agri.
WLE 3/13/88

Press
with 1000 for
reception of
understanding of the

Separate
Send him 2 copies
WLE 3/13/88

Not attached
3/13/88

Have see Dr. Bourne's report & the C.O. in med thereon - as matter was urgent
WLE 3/15/88

The draft 90. referred up to to 100. So that we have not committed ourselves about 200.

(1) H.S.
(2) H.S. in H. M.

1. Bourne.
2. With regard to the proposals in the last para. Dr. Bourne's report that the importation of seed should be imported, I think I am right in saying that importation is practically never propagated from seeds (see W.L.'s economic products in India, pages 53 to 58). 3/15/88

I believe H.S. is quite right as to the propagation of sugar cane - In fact, I understand that it was only quite lately that it was discovered that the sugar cane had seeds - They are microscopic & to the best of my recollection of some person the subject which appeared 5 or 6 years ago in, I think, the Proc of the Agricultural Society have now been separated & sown - I urged the Society to sown a third of the quantity 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 crystallisable sugar. The experiments were commenced, but I believe came to naught in consequence of a season of drought; & have not since been renewed - I mention should I think, be taken up at the Agricultural College, for, if the mpts 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.

Con In the meantime, unless in
the Govt. office, or the B.D. or
the ^{local} ~~main~~ library there exists
info as to the ~~steps~~ ^{steps} taken
by the French & Italian Govts
to eradicate the Phyloxera
as botanica, India should be
telegraphed to to find it out
if they have it; and, failing
that, we should telegraph
to the I. of I. Govt. It is with
5/10 the promise that legislation will
be needed to deal with this
2. Copy very serious matter & the
Government were prepared for it
1. Copy the better.

Should communicate
Dr. B's report to the Mysore
Govt - a great deal of sugar
cane is grown in parts of
Mysore.

All Crops should of course
be warned for all districts
Draw more slips sugar cane,
as far as I know
report
thereo
AS
7/3/98

Returned for signature.

Despatched in print.

RECEIVED G.O., No.
100

STATEMENT No.

EXCERPTS TO G. No.

ORDER OF GOVERNMENT

LETTER OF GOVERNMENT

STATEMENT WITH EXITS

PAPERS NOT FILLED UP, LEAVE MEANT FOR DELIVERY
IN ORIGINAL.

N.B. -

- A = Print in full.
- E = Not to be printed.
- P = Print abstract only.
- Q = Print heading only.