

Educational (1895) Department.

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G.O., No. 691

Dated 15th Aug. 1895.

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[Despatch Abstract.]

AGRICULTURAL EXPERIMENTS

Communicating to the Director of Public Instruction, Proceedings Revenue Department, passing orders on the notes prepared by Messrs Benson and Kees with reference to Dr. Leather's suggestions regarding the recording and publication of results of -- carried out on farms, and addressing the Government of India on certain points with regard to the same.

BACK PAPERS.

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Current No. 959

Govt. of {1895} Madras.
REVENUE.

DESPATCH

Order of 15th August 1895 No 691

Communicated

to the O.P.O.

Issued

Recd. 12th August 1895

Encl.

G.O., 16th July 1895, No. 451.

DESPATCHED
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M.S.

JULY.

Agricultural Experiments.

Passing orders on the notes prepared by Messrs. Benson and Keess with reference to Dr. Leather's suggestions regarding the recording and publication of results of — carried out on farms, and addressing the Government of India on certain points with regard to the same.

Current No. 959.

16TH JULY 1895, No. 451, REVENUE.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—again the following G.O., dated 3rd May 1895, Mis. No. 1756, Revenue:—

Read—the following letter from E. V. LEVINGE, Esq., C.S., Under Secretary to the Government of India (Department of Revenue and Agriculture—Agriculture), to the Secretary to the Government of Madras, Revenue Department, dated Simla, the 22nd April 1895, Cir. No. 6—33—2:—

I am directed to forward, for information, a note by Dr. Leather, Agricultural Chemist to the Government of India, on the subject of annual reports on Experimental Farms. The Government of India think that Dr. Leather's recommendations are generally judicious, and that they will commend themselves to Local Governments and Administrations as useful suggestions. The value to the public of the experiments conducted by Government may be greatly enhanced by the results being exhibited in the most convenient and instructive manner; and the Governor-General in Council would be glad if Dr. Leather's advice were to be generally followed, so far as this can conveniently be done.

ENCLOSURE.

Note by DR. J. W. LEATHER, Agricultural Chemist to the Government of India, on the Recording and Publication of Results obtained at Experimental Farms in India.

In paragraphs 467 to 470 of Dr. Voelcker's Report on the improvement of Indian Agriculture, the subject of the present methods of recording and publishing results obtained at the various Experimental Farms in India is referred to and discussed.

2. The two main points to be considered in relation to this subject are (a) *what shall be published?* and (b) *in what form it shall be published?* and it is well, whilst considering this subject, to bear in mind the advantage of setting at the information in a form suitable to the general public as well as to Government departments.

3. (a) *What shall be published?*—At any Experimental Farm certain questions relating to agricultural practice are submitted to experiment, the progress of these experiments is watched, and the results periodically noted in one form or another. But the usual experience at such an institution as an Experimental Farm is that of numerous experiments commenced, few can be considered as having completely answered the question raised in one year, and still fewer to have proved themselves (in the popular sense) "successful"; that is, contradictory results are frequently the reward of the care which has been bestowed, and the question originally set cannot be satisfactorily answered. Hence the only information of general utility which is at the disposal of the officer in charge of the farm at the end of any one year may be very imperfect.

Under these circumstances it is desirable to state clearly at what stage an experiment may have arrived so that the results obtained may be understood both by Government departments and by others who may be interested. The care is particularly necessary at the initial stages of any experiment,—i.e., at a time when the results obtained must be read with caution. Indeed, in such cases as belong to the latter category, a very brief notice of them will often suffice, the publication of the more complete details being postponed until the experiment has assumed a definite course.

4. (b) *In what form shall the information be published?*—It is very desirable that certain information regarding any experiment shall be given in such a manner that its nature may be readily understood, but before considering this point, reference must be made to the general form of the farm reports.

There is much to be desired in regard to this. We may wish to know what value (in terms of food-grain) is to be attached to a particular manure at one farm, or we may wish to know the weight of fodders obtainable per acre at another. We take up the set of reports and too often find that in each year variations, and in many cases these are considerable, have occurred in the arrangement of the reports, and that after finding the results of the particular experiment in No. 1 report, we have to commence the search again in No. 2, and so on to the end of the chapter.

A case now before me may be taken as an example. In the report on a certain farm for the year ending 1893, "Fodders" are placed under one head at the commencement of the report; in that for 1894, on the same farm reference to some fodders is made similarly at the commencement, whilst others come under the head of "General cultivation" in another part; the outturns of guinea-grass and lucerne are in one case to be found at the beginning, in the other in the middle of the report. Other examples of a like nature might be quoted from different reports, but the above may serve as a sufficiently simple illustration to show the desirability of adhering to the same arrangement of any report from year to year. It need hardly be mentioned that this does not imply a necessity that the reports of all farms shall be arranged in the same uniform manner. One officer may choose to place "Implements" first; another, "Experiments with manures"; a third, "Dairying."

All that I would recommend is that, having decided upon a certain order of things, it shall be adhered to, and thus any one wishing to compare the results, either of different years or of different farms, may do so without any unnecessary waste of time.

Dr. Voelcker has expressed the opinion that good work has been and is being done at the different farms, and I also enjoy the same opinion. The hope may therefore be fairly entertained that there is a portion of the outside public who will read these reports and be benefited by them. It is all the more necessary that one may readily find what one wants. The opening sentence of paragraph 470 of Dr. Voelcker's report may here be appropriately quoted: "Upon the wide dissemination, in a clear and intelligible form, of the results of experiments depends much of their value and also popularity." Thus there is a strong argument that these annual reports should be written in a form suitable, not only for Government departmental purposes, but likewise for those outsiders who are interested in what is going on at the farms.

5. The above has reference to *uniformity of arrangement*. But before leaving this part of the subject I would mention an example of *bad arrangement*.

In paragraph 4 I have said that it matters little what the order of arrangement is, provided it be maintained,—i.e., it is of no great consequence whether "trials of implements" are discussed before "trial of manures." But the arrangement should be nevertheless a *good one*. Now, as an example of what I should call a *bad arrangement*, I may instance a report issued last year. The arrangement is this: Experiments with paddy—

- (a) Ploughing with the iron plough for the rice crop.
- (b) Testing the value of different manures on the rice crop.
- (c) Varieties of paddy.

Then follow experiments with wheat—

- (a) Manures for the wheat crop.
- (b) Deep and shallow ploughing for the wheat crop.

Then come "trials of implements."

Now, clearly under "trials of implements" should be placed "ploughing with the iron plough" for rice or wheat or any other crop. Consider for a moment the case of any one interested in the matter of the suitability of iron ploughs in India? Will he not naturally look for the chapter "Implements" in order to find the information required? Who, desiring this information, would look under "experiment with paddy" or "experiments in wheat"?

In the same way the testing of manure on the paddy or wheat crop should come under "manures" and not under these crops separately: varieties of paddy should come under "varieties of crops." Thus it will be seen that *any sort of arrangement*, even of a permanent nature, will not answer the purpose. The arrangement should be *good*.

I might perhaps here add a few main heads which appear to me to be fairly simple and at the same time capable of including most things which form the subject of experiment—

- (a) Implements—Trials of new or reported implements, e.g.—
Iron ploughs, Water lifts, Threshing machines.
Trials of native implements from other provinces.
- (b) Methods of cultivation,—e.g., "crashing" (binding) sugarcane—
Mauritius system of planting sugarcane.
Mixed and simple crops.
Rotation of crops.
Irrigation.

- (c) Manures, of whatever sort, and to include ploughing in "green" crops.
- (d) Varieties of crops, e.g., varieties of wheat or maize—
Fodders.

(Fodders may come under this head, even if they form a speciality at the farm, or they may be classed separately if desired)—

- (e) Distribution of seed.
- (f) Fungicides.
- (g) Cattle and cattle-breeding, dairy cattle, etc.
- (h) Dairying, milk yields—butter, cheese, etc.

6. I now come to a consideration of the manner in which the details regarding any experiment should be set out. This subject may be divided thus:—first, one wishes to know what question the experiment is intended to answer; secondly, in what manner the experiment is being conducted; thirdly, the results.

(a) *The question submitted to experiment.*—This is generally fairly clearly stated in the reports. It should, I think, be printed in different type to the remainder, although this is not always necessary. It should certainly form a separate paragraph and be placed first. It should, if possible, be explained concisely and in few words.

Sometimes each experiment bears a separate number. This has no value to the outside public, but it is a great convenience in certain cases to those in whose charge the farm is. It should be adhered to throughout, after being once applied to a particular experiment, and the same number should not be utilized for another experiment commenced on the same land at a later date.

(b) *In what manner the experiment is conducted.*—Under this head there is much to be desired. We wish to know when the experiment was commenced, an item very commonly omitted. Then should be given, as concisely as possible, such details as time and description of cultivation, amount of manure, time of sowing, amount and sort of seed, time of harvest or number of cuttings (in case of fodders), etc., etc., according to the nature of the experiments; or if an implement is being tried, how it was compared with another implement; or if dairy cattle are being compared, the quantities of food, etc.

Then, have any material changes been made since commencing the experiment?

Of course all these items are not applicable to all experiments alike. I merely mention them as examples. In some cases one finds that having stated these conditions of experiment in one report, the reader is in the following year referred back for the information to the previous report. This, I think, should be avoided as far as may be. The paragraph dealing with these details need not be a long one and it might be very well introduced each year. It will not require much alteration whilst the experiment lasts, unless some alteration in the latter be made, and then it is all the more necessary that the former procedure should be compared with the new one.

(c) *The results obtained.*—Under this head we have, in the case of (at least) such heads as "Methods of cultivation," "Manures," "Varieties of crops," the statements of outturns.

Now, just as, when discussing (in paragraph 4) the general arrangement of reports, I have said that the particular order does not signify, provided it be good and be adhered to, so also here, provided the statement of outturn of crops be clear and contain the necessary information, it is all that need be done. In a former note on this subject I suggested a form which is suitable for certain cases, and I reproduce it here:—

Plot No.	Plot area.	Treatment with reference to manure, etc.	Outturn per acre.			
			1890-91.	1891-92.	1893.	1894.
			lb.	lb.	lb.	lb.

Other methods of stating the results may also be applicable, but in suggesting the suitability of the above form, I have kept in view one or two factors which I hold to be most

important for the proper appreciation of any experiments by outsiders, who wish to carefully and independently study the results obtained.

The plot number.—This is an item which enables any one to trace out the history of the plot, so that if in one case a large outturn is obtained, say without manure, the cause may perchance be traced to previous manuring or methods of cultivation, etc.

The plot area.—Is equally of interest, for no one cares to place too much reliance on experiments made on too small an area or even conversely on too large a one.

Treatment.—The insertion of this column enables one to grasp at a glance the treatment of each plot individually; of course where there is only one plot or where all are subjected to like treatment, such as in the case of fodders or new crops, this column may become unnecessary.

The outturn.—Regarding this it appears to me that in case of any experiments carried on for a series of years, it is a great advantage to be able to compare these succeeding outturns at a glance. For example, take the case of the permanent experiments on the value of different manures for the wheat and maize crops at Cawnpore or for the wheat crops at Nagpore, how much simpler it is to obtain an insight into these by reference to pages 17 and 18 of the Cawnpore Farm Report, 1892-93, than from pages 2 and 7 of that for 1893-94: or in the case at Nagpore, by reference to pages 8 and 9 of the Report for 1889-90, than to page 10 of that for 1890-91. In the case of any experiment which has been carried on for more than ten years, two averages may, if desired, be stated, the one for the first five years, the second for the second five years; but even this is unnecessary, and may become even objectionable if serious irregularities have occurred. For instance, if any one can show such uniform results as those which Lawes and Gilbert have obtained at Rothamsted, averages are not only admissible but serviceable, but so far as I am aware we have no results in India of so uniform a nature as to make averages of any great advantage, or at least, if applied, they are apt to cover up irregularities which ought to be discernible to those who may wish to know them. As to merely stating in any annual report only the outturn of the year under report, such a procedure entails a considerable loss of time on those who wish to examine the whole experiments.

With reference to the terms in which the results should be recorded, I think the English pound avoirdupois and the acre will prove the most suitable. I do not think that native gentlemen, who may read these reports in English, would have any difficulty in appreciating either of these standards. They are now being employed almost entirely at the Experimental Farms.

I may next refer to the question of inserting money values. Dr. Voelcker has dealt with this in the latter part of paragraph 468 (page 353), and I also hold the same opinion as Dr. Voelcker. I am not unmindful of the fact that one naturally wishes to know whether any new implement process or manure can be employed or a particular crop grown at a profit to the cultivator, as also what that profit may be. But is it not first of all necessary to complete the experiment before we can proceed to make this calculation? If we are testing a manure, is it not first necessary to find out what increase of crop is obtained by its use? If we are growing a new crop, is it not first necessary to show that we have determined the conditions under which it may be best grown? And yet, in at least a large number of our agricultural experiments we cannot pretend to obtain a definite result in one year. Even in simple cases, we frequently require to determine the effect of season, and thus it generally occurs that an experiment must be carried on for a series of years before we can say that we have obtained a result which may be fairly relied upon. As I suggest, therefore, should we not wait until we have obtained this definite result before we pretend that we can say what the money value of the result is?

It would not be difficult to quote examples from different reports to show how great is the error of attempting to gauge the annual results of experiments in terms of rupees. Under a change of management the cost of labour is reduced! Suddenly therefore the profit in a certain experiment which has been proceeding for years is increased. And yet this is not due to the conditions of the experiments proper at all, but purely to better farm management.

Or, again, there is a case before me where the outturn of a certain crop was in one year 35,028 pounds, in the next 21,295 pounds. The cause of the lesser yield is explained to have been due to want of canal water. If therefore any one might wish to cultivate this crop, he would conclude that it is a considerable advantage to have a good supply of water at his command. But the reports show the rupee values of the operations to have been, in the one case a profit of Rs. 123, and in the second only Rs. 24. Now, this is obtained purely on a basis of the value, in the two years respectively, of the crops in a particular market. For any one living at a distance from that market, these money values have no value whatever, and indeed may cause him to misjudge the result.

Again, one may take the case of two substances now being employed largely as manure,—namely, poudrette and castor cake: the cost of the former varies a good deal in the neighbourhood of different towns, since it depends considerably not only on the local demand, but also on the manner in which the scavenging operations are performed. Where these are carried out economically, poudrette may be produced much more cheaply than where it is otherwise. And in the case of castor cake, there has been such an increase in its use as manure in different places, that its market price has doubled and trebled in a few years. Yet surely these questions of cost have nothing to do with the manurial value of the materials. First let us determine what increase of outturn of crop may be expected from their use, and then let us say that provided they cost only so much, a profit of so and so much may be anticipated.

7. I now come to the last item regarding the report on any experiment,—namely, the discussion of the results. Very little can be said about this, for it must always be left to the reviewer to draw his conclusions from the results obtained by the experiment. I think it should form a separate paragraph, and not be combined with the one indicating the nature of the experiment. Sometimes I have met with remarks which are not the outcome of any sound reasoning. An example may be given. Bone dust in a particular year has given a larger outturn on one plot than on another, *because*, says the writer, *bones require a long time to decompose and they have had a longer time for this decomposition in the one case than in the other.* When, however, the results of previous years are examined, we do not find that there has been any such uniformity of result as would warrant the explanation just quoted. In one-half the series of years we find an opposite result has been obtained.

8. There is one subject which has, in the case of one Provincial report at least, been generally omitted altogether, and that is the distribution of seed, the only information regarding this being inserted in the annual report of the department. Where, in any case, seed is grown on the farm for distribution and distributed through the agency of the farm, it should, I think, find a place in the annual report of the same, just as in the case of implements, which may be made at the farm workshops, where such exist, and distributed to ryots through the farm agency.

9. I have now dealt with the form of report, and the manner of reporting on any particular experiment. One or two things remain to be commented upon. One is the number of statements contained in the appendices to many reports. I fail to see why, if the reports are systematically written, any statements either relating to outturns of individual experiments or of "lists of experiments in progress" or "programmes of experiments for the current year," etc., are necessary. If such an arrangement of the report be adopted as that indicated in paragraph 8, there will be no difficulty in the reader readily finding out what are the principal experiments in progress. Others, which are of such a nature that no good can be gained by reporting on them fully in any particular year, would be mentioned in a paragraph either at the conclusion of the report or in a separate paragraph under the particular head to which they belong. In some cases the appendices actually occupy more space than the report, so that the saving in the matter of printing would be considerable. The only thing which seems to me to be generally valuable as an appendix is the balance sheet, and even this, if it requires to be discussed in any way, should form an independent chapter.

10. Two other useful chapters are, a brief history of the farm, such as when instituted, area, position, kind of soil, facilities for irrigation, etc., which would always enhance the value of a report, even if put in word for word in the same manner each year, and to which should be attached a *plan of the farm*, on which each field or plot bears its respective number. The second is a brief description of the meteorology of the year under report, which should, of course, be compared with the normal. In reference to the latter it is well, however, to keep clear of unnecessarily attaching blame to the weather. This is a weakness with farmers at home and in India alike, and in one set of reports it is difficult to find an instance in which the weather has not been considered abnormal. The weather is not always abnormal and should not be so characterised. Although I have mentioned these last, it occurs to me that their proper place is *first* in the report.

Order—dated 3rd May 1895, Mis. No. 1756, Revenue.

Referred to the Board of Revenue and to the Principal of the College of Agriculture at Saidapet for remarks.

(True Extract.)

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

To the Board of Revenue (Revenue Settlement,
Land Records and Agriculture).
" the Principal, College of Agriculture at Saidapet,
through the Educational Department.

READ—also the following Proceedings of the Board of Revenue (Revenue Settlement, Land Records and Agriculture), dated 19th June 1895, Mis. No. 3138 :—
 Read—G.O., dated 3rd May 1895, Mis. No. 1756, Revenue.

Read—also the following note from the Deputy Director of Land Records and Agriculture, dated 13th May 1895 :—

Dr. Leather's note, referred with G.O., 3rd May 1895, Mis. No. 1756, for remarks, relates to the systematizing of the manner of publishing results obtained on Government Experimental Farms in India. It is not, at present, of much interest in this Presidency, but may be in the future.

2. Speaking generally, I agree with what Dr. Leather says, but I do not think that he has dealt with the most important question there is in connection with the subject. That is, when should information regarding experiments made be published? For reasons stated in paragraph 3 of his note, it appears to me to be undesirable to commence publication until a sufficiency of data has been accumulated to allow of some opinions being formed of the reply to the questions put in the experiments. Thus in the initial stages of any experiment, no results would be published, and a mere note of the fact that such and such an experiment was being proceeded with would suffice in the farm report.

3. As to the question of arrangement of matter in the farm reports, I consider that it is advisable that this should be systematic, but it matters little how the main heads of the subject-matter appear therein.

4. I differ *in toto* from Dr. Leather in some of his examples in paragraph 5, for "ploughing with the iron plough" is not a trial of an implement, but of a method of cultivation. So too under the classification, Dr. Leather proposes, I do not see how experiments on "mixed and simple crops" or on the "rotation of crops" can be termed methods of cultivation. A good classification would be useful, but I do not think any likely to be drawn up except in consultation by officers who have had experience of the problems to be taken up.

5. In the first portion of paragraph 10 of his note, Dr. Leather proposes that each report should be preceded by a brief history of the farm. I fail to see the necessity for such repetition year after year, and if my view, that the publication of the results of experiments should be deferred until some useful data are acquired, be accepted, then publication should take some other form than that of the ordinary farm report, which is not one that commends itself for facility of reference or convenience to the general reader. Such results could be more usefully published as bulletins, such as have been issued from this department, and would include a discussion of the whole history of the experiment.

6. The farm report should in fact be made merely one of the management of the farm and not usually a means of communicating to the public the results obtained thereon.

7. In connection with this subject, I would, however, suggest that Dr. Leather might be asked to draw up, in consultation with the agricultural officers of different provinces, a set of standard forms and instructions for recording the history and results of all experiments. This appears to me to be the matter that most requires systematizing.

Read—letter from the Principal, College of Agriculture, Saidapet, dated Saidapet, 1st June 1895, No. 378.

ABSTRACT.—Forwarding a copy of his remarks on Dr. Leather's note as requested by the Board.

Resolution—dated 19th June 1895, Mis. No. 3138.

The note drawn up by Mr. Benson with reference to Dr. Leather's suggestions referred with the Government order read above will be submitted for the information of Government.

2. The Board does not share the views expressed by Mr. Benson in paragraph 2 of his note. In the conduct of experiments there appears no occasion for secrecy. An unsuccessful experiment may be as instructive as a successful one, and it would seem profitable to record in the annual reports exactly what is done in pursuance of an experiment year by year, irrespective of the ultimate result.

3. When an experiment has been concluded and the results are of sufficient importance, the bulletin appears (as stated by Mr. Benson) to be the best form in which the results can be published for the public benefit.

4. Mr. Benson's suggestion in paragraph 7 appears deserving of consideration.

5. When agricultural experiments are recommenced in this Presidency the Board considers that Dr. Leather's recommendations may be usefully and conveniently adopted.

(True Extract.)

(Signed) P. RAJARATNA MUDALIAR,
 Secretary.

To the Secretary to Government, Revenue Department.
 " Deputy Director of Land Records and Agriculture.

READ—also the following letter from W. KEESS, Esq., M.A., M.R.A.C., Acting Principal, Madras College of Agriculture, to the Director of Public Instruction, dated Saidapet, 27th May 1895, No. 377 :—

I have the honour to acknowledge receipt of your endorsement No. 5833, dated 17th May, forwarding G.O., dated 3rd May 1895, Mis. No. 1756 in which I am called upon to submit remarks on the circular from the Government of India forwarding a note from the Agricultural Chemist on the recording and publication of results of experiments carried out on farms in India.

2. No experiments are at present conducted on the Saidapet Farm, which is utilized entirely for educational purposes. In the annual report of the College of Agriculture a certain number of paragraphs is devoted to the farm, but the information given is intended purely and simply to satisfy the controlling authorities that the students of the College have, during the year under report, seen a sufficient variety of cultivation and the efficient management of a herd of cattle. Should any agricultural experiments be in future undertaken at Saidapet, they will be reported upon in accordance with Dr. Leather's recommendations.

3. The Library of the College of Agriculture contains a goodly array of farm reports and of departmental reports containing records of agricultural experiments. In looking through these publications I have been much struck with the imperfections to which Dr. Leather has called attention. In this Presidency a certain amount of valuable information has been obtained as the result of experiment, but the form in which this information is available to the public is capable of improvement. A resumé of the various experiments conducted on the old Saidapet Farm was issued several years ago under the title of "Records of the Saidapet Farm." This publication is now, I understand, out of print. The present seems an appropriate time for issuing a new edition and I would urge that this should be done, the record of each experiment being arranged in the manner recommended by Dr. Leather.

Endorsement No. 6947.

Submitted to Government.

(Signed) D. DUNCAN,
 Director of Public Instruction.
 28th June 1895.

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16TH JULY 1895, No. 451, REVENUE.

Endorsement No. 1570.

Forwarded to the Revenue Department.

OOTACAMUND,
8th July 1895.(Signed) L. DAVIDSON,
Acting Under Secretary.

ORDER—dated 16th July 1895, No. 451, Revenue.

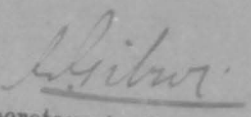
Miscellaneous.

The Government agrees generally with the Board of Revenue. As regards the publication of the results of experiments, the results of each year should be reported, but it should be stated clearly at what stage the experiment has arrived. The suggestion contained in paragraph 7 of Mr. Benson's note will be submitted for the favourable consideration of the Government of India.

2. It is observed that the Board has not noticed Mr. Keess' proposal regarding the issue of a second edition of the "Records of the Saidapet Farm." This proposal merits consideration and will be re-transmitted to the Board for its remarks.

3. The following letter will be despatched to the Government of India.

(True Extract.)


Secretary to Government.

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

Then given for copying _____
Then copied _____
Then examined _____
Then signed _____

189

READ AGAIN G.O., No.
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