No. 23. Read the following letter from C. J. LYALL, Esq., Officiating Under-Secretary to the Government of India, Department of Agriculture, Revenue, and Commerce, (Agriculture and Horticulture,) to the Hon. R. A. DALYELL, Acting Secretary to the Government of Madras, dated Simla, 18th September 1873, No. 6-374 :—

WITH reference to the Resolution by the Government of India in this department, No. 2-77—86, dated the 6th March last, relative to the experimental cultivation in India of Carolina rice, I am directed to forward herewith fifty copies of a Note on the subject by Mr. R. Knight, Assistant Secretary to the Government of Bengal, and of a Resolution thereon by the Government, and to request that you will be good enough, with the permission of His Excellency the Governor in Council, to cause copies of this paper to be distributed to the persons to whom the conduct of this year's experiments has been entrusted.

No. 24. ORDER THEREON, 4th October 1873, No. 1,061.

Miscellaneous.

ORDERED that forty copies of the Note, received with the foregoing letter, be forwarded to the Board of Revenue for distribution.

(True Extract.)
(Signed) R. A. DALYELL,
Acting Secretary to Government.

To the Board of Revenue.

RESOLUTION.

AGRICULTURAL DEPARTMENT.

Calcutta, the 21st August 1873.

READ—

A Note by Mr. R. Knight, Assistant Secretary, Agricultural Department, on the cultivation of Carolina Paddy.

Note.—The importance of the attempt to substitute the cultivation of Carolina rice for the indigenous paddy is hardly as yet generally understood in Bengal. The rice plant is not indigenous to America, but was introduced from the Old World, India and China being the natural habitat of the grain; but so great has been the improvement effected therein by careful cultivation in the virgin soil of the States, that the normal price of Carolina rice in the European markets is nearly three times that of the best Patna. Rice, in its natural state in the husk, is called *paddy*, and the varieties of the Indian grain are almost innumerable. That which is exported from Bengal generally goes by the name of *cargo* rice. It is sweet and large-grained, but is of a coarse, reddish cast, and is not kiln dried, but parboiled in earthen pots, partly to destroy its germinating power, and partly to faciliate *husking*. Patna rice is more esteemed in Europe than any other of the Indian kinds, but it is small-grained, though remarkably white. It will bear no comparison, however, with the rice of South Carolina, the superiority of which is sufficiently attested by the fact that it sells in London at 35*s*. to 36*s*. per cwt., when Patna will not command more than 14*s*. to 15*s*.

A great physiological change in point of fact has taken place in the plant in the course of its cultivation in Carolina, so that whereas the Indian rice is a surface-feeding plant, throwing out short roots laterally, seldom or never piercing the soil three inches deep, the improved Carolina variety throws a straight, vigorous root, six or eight inches deep through the surface into the sub-soil. The result is that while country paddy will live and thrive upon two or three inches of surface soil in good condition, the Carolina variety pines and fails, unless the tillage has reached the sub-soil and brought it into a healthy condition. A soil in a bad physical state, with but a healthy surface of two or three inches, will produce fair crops of country paddy, but no harvest of Carolina. To introduce Carolina rice successfully into Indian husbandry, therefore, there must be systematic and sustained effort to improve the depth of the tillage, with drainage of the sub-soil possibly also. We have abundant proof that this rice will produce as luxuriant crops in India as in Carolina itself, with a sub-soil in healthy condition; and when we remember that it commands nearly three times the price of the Indian staple, and that the yield per acre is indefinitely greater, the importance of the effort to introduce it into India will, it is believed, be more generally understood.

The statement frequently appears in the history of our attempts to acclimatize this rice, that the people would not eat it even if they could grow it. I take the liberty to doubt this; but were it even true, and the grain grown for export only, the experiment is of great importance. The people do not eat jute, but they are glad to grow it for all that.

The opinions expressed as to the quality of the straw are of almost endless diversity. According to some, the straw is superior as fodder to that of any indigenous paddy whatever; according to others, inferior to that of the worst. According to some reports, it is admirable for thatching purposes; according to others, it is almost worthless for such uses. Now all this, as it seems to me, simply shows that there has been no systematic, sustained, and careful effort in what we have been doing, combined with watchful observation of the results of every mode of cultivation upon the grain itself, and then upon the straw. The long record of failures from drought, inundation, blight, wild

animals, birds, and insects may be dismissed with the remark that the league which the birds of the air and the beasts of the field, and the very elements themselves, seem to have made against the experiment simply show how feebly we have conducted it. The marked preference for this rice shown by birds and insects and vermin, over the indigenous kinds, is strong presumptive proof that the grain is worth the attention of man himself. I believe it will be generally found that birds and rats are not bad judges of the quality of food-grains.

The great fact it is necessary to mark with care, is the fact that the American mode of cultivation is entirely different from the Indian. The Carolina seed that comes to us from America is the product of a very peculiar mode of cultivation, to which the seed has been accustomed for probably 200 years. The rice is sown in the States in rows, in the bottom of trenches about 18 inches apart. The trenches are filled with water to the depth of several inches till the seed germinates, when the water is drawn off. Shortly afterwards the fields are again flooded for rather more than a fortnight, to kill the weeds; and they are flooded once when the grain is near ripening.

Now, this mode of cultivation is entirely different from the Indian, and although its peculiarities were brought to the notice of the Government several years ago, I cannot find the record of a single attempt to cultivate the plant in Bengal in the same way. So far back as 1869, Mr. Kitteridge, the American Consul at Bombay, supplied the Government of Bombay with the following short note on the subject:—

"Rice is sown in Carolina in long drills, made by hoes (machinery does "not work well) of about one foot deep, drills one foot apart, two bushels "to an acre. Water is let on as soon as the rice is three inches high, and is "kept under water; that is, the water is kept to within two inches of the "top until (rice) is about four inches high; it is then drawn off and the weeds taken out; after this the water is let on again, when it begins to head; the water must be allowed to rise just below the head (that is, the point where the kernels grow). The water must be high enough to keep the stem steady in case of wind."

This memorandum was forwarded by the Government of India to the Government of Bengal, under date, Simla, 30th June 1869, No. 367, and a copy of it was forwarded to the Board of Revenue for information by No. 2518 of 15th July 1869. I cannot find, however, that a single attempt has been made to cultivate the seed in this way. Instead of taking these instructions as a guide to be followed as closely as possible, they seem to have been ignored altogether, and the cultivation of the new and peculiarly educated plant attempted in methods wholly foreign to the treatment under which it had been produced in America. We have sown it broadcast and in nurseries, on high land and low land, on wet land and dry land, and in every conceivable way but the one in which we were *told* to sow it, namely, the way to which it had been accustomed during 200 years of cultivation. The reports from the Board of Revenue of the results of the experiments made with the 20 barrels of seed distributed last year are of the same order as all preceding reports. The seed was received and sent to the Board of Revenue, and by it distributed all over the country; and instead of looking for success in the way of concentrated careful efforts year after year upon the same spot, we have hoped that by wide-spread, isolated, desultory sowings, success might "turn up" somewhere.

The 100 barrels received this year from the Secretary of State, costing a large sum of money, have been distributed in the same way, and I fear that we might as well have sown them in the Hooghly for any practical good that will result. I have asked the Board to be good enough to let us have copies of any instructions they may have issued as to the cultivation of the seed.

Mr. Kitteridge's instructions show that the water with which the rice is flooded must be under control, and the suggestion naturally arises that the vast

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canal systems which the Government has constructed at immense cost in various parts of the country—the Soane Canals, Midnapore, and Cuttack—supply us with the means of attempting the acclimatization of the plant, under conditions of cultivation similar to those which have produced it in America. Indian rice lives on the rain-fall; Carolina on irrigation; and this fact opens up to us an interesting and possibly valuable field of experiment in the neighbourhood of the canals, upon which the State has spent so many millions.

Resolution.—The Lieutenant-Governor is much obliged to Mr. Knight for this Note, and directs that it be circulated through the Board of Revenue to all officers and private gentlemen who have undertaken the cultivation of Carolina paddy in this and past years. Collectors will be requested to cause verbal instruction to be given to ryots, mouzadars, and zemindars who may undertake experiments. The Lieutenant-Governor is not sure that the experiments heretofore made have altogether been barren of result; for out of the 107 cases reported by the Board, 32 are said to have been successful, 62 doubtful, and 13 wholly unsuccessful. Many of the doubtful cases, however, were very nearly failures. In some of the successful cases, it was established that Carolina rice yields more than one crop from the same stalk.

2. It is, however, quite clear that the proper mode of cultivating this rice was not sufficiently known; and it is probable that its high market value is not generally known. It may possibly be that in America the rice is raised of a fine quality by a *quasi*-garden cultivation, and sells higher, just as garden potatoes sell higher than field potatoes. From the description of the Carolina cultivation it is evident that an artificial supply of water is necessary. The crop should be tried on our canals. If it turns out that with command of water we can really raise a rice very much more valuable than ordinary rice, we may save millions now sunk on canals. In that view the question is of immense importance. Mr. Knight's figures regarding the price of Carolina rice are taken from price-currents of some years back; the Calcutta merchants to whom reference has been made not being able to state the present price of this rice. Reference has been made to the several American Consuls in India for information regarding the price of Carolina rice, and the Government of India has been asked to favor the Lieutenant-Governor with any available information upon the point. If the price of *ordinary* unselected Carolina rice in Europe turns out to bear towards *ordinary* unselected Indian rice a different proportion to that stated in the 1st paragraph of Mr. Knight's Note, further detailed information upon the subject will be circulated. Meanwhile, the Lieutenant-Governor does not desire to delay to place Mr. Knight's Note in the hands of persons conducting this year's experiments.

By order of the Lieutenant-Governor of Bengal,

C. BERNARD,

Offg. Secretary to the Govt. of Bengal.

No. 2365.

COPY, with copy of the Board's letter and enclosure, submitted to the Government of India in the Agricultural Department, with the request that the Lieutenant-Governor may be favored with any information in the hands of the Government of India regarding the price of Carolina rice.

By order of the Lieutenant-Governor of Bengal,

C. BERNARD,

Offg. Secretary to the Govt. of Bengal.

CALCUTTA,
The 21st August 1873.

No. 6

FROM

C. J. LYALL, ESQUIRE,

Offg. Under Secretary to the Government of India,

To

Department of Agriculture,
Revenue, and Commerce.

(*Agriculture and Horticulture.*)

SIMLA, *the* *September* 1873.

SIR,

WITH reference to the Resolution by the Government of India in this Department, No. $\frac{2}{77-86}$, dated the 6th March last, relative to the experimental cultivation in India of Carolina rice, I am directed to forward herewith copies of a note on the subject by Mr. R. Knight, Assistant Secretary to the Government of Bengal, and of a Resolution thereon by that Government, and to request that you will be good enough, , to cause copies of this paper to be distributed to the persons to whom the conduct of this year's experiments has been entrusted.

I have the honour to be,

SIR,

Your most obedient Servant,

Offg. Under Secretary to the Govt. of India.

1873.

DEPARTMENT OF REVENUE,
AGRICULTURE, AND COMMERCE.

[Agriculture and Horticulture.]

To

No. 6

Dated Simla, *September* 1873.

SUBJECT.

FORWARDS for information and distribution, copies of a note by Mr. R. Knight on the cultivation of Carolina paddy, and of a Resolution thereon by the Government of Bengal.

1873.

DEPARTMENT OF REVENUE,
AGRICULTURE, AND COMMERCE.

[Agriculture and Horticulture.]

To

No. 6 / 374

Dated Simla, 18th September 1873.

Rec'd. 27

SUBJECT.

FORWARDS for information and distribution, copies of a note by Mr. R. Knight on the cultivation of Carolina paddy, and of a Resolution thereon by the Government of Bengal.