appears to them a waste of time and energy, which might be devoted to what seems at the time more pressing work, but abhorrent though advertisement is to the sincere worker, it is only by bringing to the public the valuable results which have been already produced by his work, that he can obtain due recognition and the chance of embarking on wider schemes. There should be few among the educated classes who have not by now heard at any rate of the Department.

Growing green manure crops in Tanjore Delta.

The following extract from paper read at the annual meeting of the Kumbhakonam Agricultural Association by M. R. Ry. Rao Sahib A. Ram Rao, Farm Manager Manganallur, will be of interest to our readers.

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You know we are not getting the same amount of fertilizing silt through the River Cauvery as we were getting some decades back owing to the damming of the river higher up for the extention of irrigation and other works which cause the deposition of the silt in the beds of the river and the channels and its distribution over a larger area than formerly.

It is therefore high time for us not to depend any more on the silt brought down by the river, but to take to other means of manuring our lands in order to get remunerative yields which are most essential for self preservation in these days of increasing population and keen competition.

The manure of cattle and other domestic animals in the Delta is too small to meet the demand to any appreciable extent and in fact the quantity available is hardly sufficient for seed-beds and Kuruvai fields which form a very small portion of the wet area. We know there are also no facilities for increasing the number of our cattle for manuring and breeding purposes.

There are no forests to supply the manure leaf required for our wet lands though the cost of gathering and carting the leaf often proves prohibitive.

Certain Drawbacks TO BE OVERCOME.

I mentioned above that the growing of green manure crops is beset with some difficulties and it is now our purpose to consider the difficulties in detail and seek remedial measures.

The first and foremost complaint is that the green-manure seeds do not germinate in all soils and though they germinate the plants die at a certain stage. This is true to some extent and is chiefly due to the bad physical condition of the soil which cracks badly in summer and parts with its moisture too rapidly with the result that the young green-manure plants wither away and die for want of moisture to keep them green. The stiff and impervious nature of the soil is also responsible for the non-germination of certain kinds of green manure seeds, the young plants of which are too delicate to push through in such soils, *e. g.*, the wild Indigo (Káválai).

The question then naturally arises as how to grow green-manure crops for improving such soils. The answer is that if we choose the green-manure crop suitable to the soil and modify the methods of growing and handling it we can, no doubt, attain our object.

Daincha.

Now in soils which are too stiff and hard and even saline for Káválai we can grow Daincha by sowing the seed in the standing crop of paddy just at the time of draining the fields before the harvest instead of sowing it in the fields much earlier as we generally do in the case of Kavalai. The Daincha seed germinates in a few days after sowing and attains a certain height by the time the paddy is cut just above the heads of the Daincha plant which will then be about a span in height.

The Daincha continues to grow till the moisture in the soil is entirely dried up *i. e.* for a month or two after the harvest of paddy. In the meantime if we get a shower or two, the life of Daincha will be

extended and we will get the full crop. In the 4th month after sowing when the plant will be in full development and about 5 feet high, the crop should be cut close to the ground and preserved in the field to be applied to the land at the time it is prepared for paddy. If, on the other hand, the crop prematurely shows signs of withering on account of severe drought, it should be cut immediately and preserved for manure before the leaves are shed.

If you take the trouble of producing the crop the ways of preserving it, till required for use, are simple and easy and I am here mentioning a few methods from which to devise your own.

The stalks can be tied into bundles, immediately they are cut by twists of Daincha itself, and stacked at convenient spots and weighted with clods of earth to prevent their being blown away by wind. Kulivettu earth can be used for this purpose. Babul or other thorns can be planted all round to prevent any stray cattle interfering with the stack.

They can be pitted with a covering of a foot or so of soil, preferably damp soil, at the top and the compost thus formed can be applied to the same land on which the green manure crop was grown.

They can be built up into a rectangular stack about 5 feet high with alternate layers of damp soil and the top finally covered with soil and given a slope for the rain water to drain off. The sides also are plastered with damp soil. Under this method we can get about 2 cartloads of green leaf per acre which will form a fair dressing for the same area and this is of great moment in a place where manure is so scarce. The seed rate for Daincha is about 3 Madras measures per acre.

There are complaints from certain quarters that Daincha is destroyed by stray cattle. But this difficulty can be averted by growing Daincha on a sufficiently large scale in a portion of the village under Co-operative combination and putting a watch over the crop till it is cut and preserved.

Káválai.

For loamy soils which are loose and friable and possess drainage facilities, on account of a proper proportion of sand they contain, Kavalai suits best as most of you know. The Kavalai seed is sown either in the dressed or in the undressed state. The dressed seed should be shown in the standing crop of paddy at the time of draining the fields before the harvest, and the undressed seed should be sown in the puddled fields at the time of transplanting paddy or at weeding.

The dressing of the seed is done by spreading it on a layer of sharp sand and getting it trodden over by cattle for about an hour. The seed gets scratched in the process which facilitates early germination owing to the water easily soaking into the seed. If a small quantity of the seed is to be dealt with, the dressing may be done by pounding equal quantities of Kavalai seed and sand in an household mortar for about half an hour each charge. In both cases the seed can be freed from the sand by sifting and winnowing. The skin of the Káválai seed is very hard and the seed remains dormant in the soil without losing its vitality for a long time even under water-logged conditions and sprouts only when the excessive moisture is dried up. This quality in the seed is advantageous, because, though the seed does not sprout in the first year, we can expect a crop of green manure in the second year, provided the soil is suitable. The crop becomes self sown in course of years by shedding its seed on the land and this obviates the necessity of sowing it every year. The Káválai plants are not eaten by cattle and goats.

It will be quite a fortunate time for India when all her wet lands are made suitable for bearing a crop of Kavalai when the lands are idle, and this end can be attained when the land is improved by growing other green manure crops in the beginning. The seed rate for Kavalai is 4 measures per acre. The plant can be ploughed into the soil or pulled up and applied to the land at the time the land is prepared for paddy, or it can be gathered and preserved till required, in any of the ways mentioned under Daincha. About 2 cartloads of green leaf can be got from an acre of land.

Indigo.

Indigo is grown on a large scale near Ayyempet for green manure as most of you know. The seed for this can be sown on land, which is a little too stiff for wild Indigo but not so stiff as to crack badly, at the rate of 3 Madras measures of seed per acre. It should be sown in the standing crop of paddy when there is still moisture after the fields are drained before harvest. The crop yields as good a quantity of green stuff as any other green manure crop. It will be interesting to know that in some parts of Ceded Districts the ryots are making very good profits by growing Indigo as a second crop after paddy for making the dye. They put the leaf refuse back into the soil which is thus kept on increasing in fertility. There is no reason why we should not hope to get such crops of Indigo by improving our soils with sufficient manuring.

Other sources of obtaining the leaf manure.

I may here mention that the green leaf available from other sources, in whatever quantity it may be, should not be neglected. Kavalai is seen growing wild on certain dry lands and also on the river and channel banks from which it may be cut and removed with the permission of the Public Works Department. There are Portia, Nim and other trees and shrubs which can contribute leaf to a certain extent. All such leaves should be carefully collected and applied to the land which will otherwise go without manure.

The advantages of growing green manure crops.

The advantages of growing green manure crops and applying them to the land are briefly these.

They, as leguminous crops belonging to the sub order papilionaceæ, absorb Nitrogen from the atmosphere which is a valuable manure for grain crops. They also take up from the soil certain crude manurial ingredients which cannot be easily assimilated by the grain crops and present them to the grain crops in a more readily available form. When they decompose in the soil they evolve certain acids which dissolve the inert plantfood in the soil and make it readily available for the crop. They improve the physical texture of stiff

soils like our Delta soils *i. e.* they make them more free and friable which quality improves natural drainage, enables the roots of crops to go deeper and feed over a greater range, makes the ordinary deleterious salts to be washed off easily and renders the soils to be easily worked which is an advantage to weak cattle like our Delta cattle.

The organic matter supplied by these crops is a very valuable ingredient in Indian soils which are subjected to a great parching heat. The presence of this organic matter in sufficient quantity enables the soil to absorb moisture from the atmosphere and retain it for a longer time than soils which are deficient in it and tide over the ordinary periods of drought.

Therefore the addition of organic matter to our stiff Delta lands by growing green-manure crops will correct their adhesiveness and prevent them from cracking badly as they do now. This condition is quite essential for growing all green-manure crops successfully without any chance of losing them half way as we do now because in this case the roots of green-manure crops can go deep in the loose and friable soil and thrive by absorbing the moisture which is provided by the organic matter present in the soil.

To quote an instance I may here mention that at Sholavandan in Madura District the texture and natural drainage of an ordinary saline land is so much improved by the growing and applying of Daincha as green-manure that the yield of paddy rose to 850 Madras measures per acre while the yield in the previous years never went up beyond 175 Madras measures per acre. At Sivagiri where Kavalai was regularly cultivated for some years the yields of paddy increased from 600 to 1300 Madras measures per acre.

Our aim and object should be to increase the organic matter in our soils by growing certain green-manure crops and applying them to the land in the way mentioned above so that in course of time the matter of growing green-manure crops on our stiff Delta soils may become quite easy and common, not to speak of other advantages which are manifold.