

Fish manures and their importance to soil fertility*

By

R. VENKATARAMAN, M.Sc., & S. T. CHARI, B.Sc.,
Fisheries Technological Station, Kozhikode.

Fish Manures have been classified as concentrated organic manures and their use as a fertiliser to various crops is very well known. In the days of the Oil Sardine Fishery of the West coast of this Presidency, the Fish Scrap, after cooking and pressing for oil—popularly known as Fish Guano—was in wide use as a manure for coconut trees, coffee, tea and tobacco plantations locally and the surplus amounting to many thousands of tons of this manure were exported. But the sardine fishery is almost a feature of the past and so the people here look to other kinds of fish manures.

Various kinds of manures are generally prepared during seasonal gluts of the fishery and are immediately utilised in the nearby coffee, tea and tobacco plantations, so much so there is not sufficient manure left for use in the interior parts of the coastal strip. The types of manure manufactured at present can be broadly classified as beach—dried fish manure, pit fish manure and prawn shell manure.

Beach dried manure as the very name indicated is prepared from either whole round fish during surplus catches, or from wastes of fish like guts and gills, head, fins, etc. The whole fish or the waste are merely thrown on the sands of the beach and allowed to dry in the hot sun for about two or three days after which the fishermen collect them at their leisure and store for use. The manure thus obtained contains a high percentage of sand, about 30% and attempts should always be made by the manufacturer to see that the manure is not wilfully adulterated with sand to increase weight.

The other type of manure viz., pit fish manure is prepared by burying fish or the wastes in pits about 4ft. by 4ft. having an inner lining of cudjan leaves and covered up with earth on the top. After about 35 to 60 days, the pits are opened, contents removed and dried for two or three days. Here again there is a high percentage of sand due to obvious reasons and more than that, the Nitrogen of the fresh components is lost due to the action of bacteria present in the soils and subsequent absorption in the soil. Prawn shell manure is obtained as a bye-product when prawns are cooked, dried and shelled during the preparation of prawn pulp for edible purposes. On an average these shells contain Moisture 15%, Nitrogen 5 to 6%, Phosphate 2 to 5%, lime 13% and Insolubles 15%. In addition to Nitrogen and Phosphorous, it also contains

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a high percentage of lime which makes it as one of the best suited organic manures for acid soils. A few experiments on lines similar to the methods of preparation of the manures as adopted locally were conducted and the products obtained from each method of preparation was subjected to careful analyses. The table below gives the average analytical data to bring out the comparative merits of the method of preparation of the different types of manures.

Table 1 Analysis of Fish Manures.

Particulars	Analysis on fresh basis						Analysis on moisture free basis				
	H ₂ O %	N %	P ₂ O ₅ %	C ₂ O %	K ₂ O %	Insol. %	N %	P ₂ O ₅ %	C ₂ O %	K ₂ O %	Insol. %
Fresh Mackerel fish analysed whole	75.4	3.5	1.9	1.7	0.3	0.3	14.0	7.6	6.6	1.2	1.2
Beach dried Mackerel manure A	11.3	6.8	5.9	5.2	0.9	8.2	7.7	6.7	5.8	1.0	9.3
Do. B	13.1	5.7	3.9	3.3	0.5	27.0	6.6	4.5	3.7	0.6	31.08
Pit fish manure Mackerel A	15.6	3.1	4.9	5.2	0.8	11.1	3.67	5.81	6.2	0.95	13.15
Do. B	6.5	1.9	5.5	3.3	0.4	45.6	2.0	5.9	4.9	0.4	48.77
Guts and gills fresh	75.3	2.2	0.7	0.52	0.12	2.25	3.8	2.8	2.1	0.5	9.1
Beach dried guts and gills manure A	14.1	4.7	2.1	1.7	0.3	3.8	5.4	2.4	1.9	0.4	4.4
Do. B	10.5	4.4	1.1	1.0	0.2	16.9	4.9	1.2	1.1	0.2	18.9
Pit manure guts & gills A	10.2	2.8	1.6	1.0	0.1	9.6	3.1	1.8	1.1	0.1	10.7
Do. B	10.2	1.1	2.0	0.9	0.08	22.9	1.2	2.2	1.0	0.1	23.3
Guts and gills cooked, pressed and dried	11.6	4.9	2.3	2.6	0.6	5.3	5.5	2.6	2.9	0.7	6.0

A: Prepared under control and care. **B:** Prepared under conditions as adopted by the Trade.

Discussion: It can be seen from the above table that the sand content in the A sample (exercising control and strict supervision) has been kept to the barest possible minimum ranging from 3.8% to 11.1% whereas B samples (prepared under conditions similar to that adopted by the fishermen) usually contained varying quantities of sand ranging from 16.9 to 45.6% with detrimental effect on the nitrogen value. Even

in the A samples there is a reduction of the nitrogen content as compared with the original raw material which is inevitable under the circumstances of the method of preparation. But it must be borne in mind that increase in the sand content either by wilful adulteration, carelessness or otherwise is sure to bring down the value of the manure and it can be seen from the above Table that if sufficient care is exercised a product of high manurial value can be obtained. Beach dried fish manure contains on an average 5 to 7% percent of nitrogen, 5 to 6% of phosphate and calcium and varying quantities of sand. This is a highly variable factor and to assess the value of the fish manures this variable should be taken always into consideration.

Pit fish manure gives on the average 3 to 5% of nitrogen, 2 to 6% of phosphate, 1 to 5% of lime and 10 to 45% of sand. In the beach-dried manure some control can be exercised in the admixture with sand whereas in the case of the pit fish manure there is bound to be some sand. However, about 15% insolubles should be the maximum limit that can be allowed. In general fish manures are not considered to be potassic manures and this is quite evident from the results of the analysis. All the A samples of manure show a sand content of less than 10% and this was possibly due to the care in the collection of the wastes free from sand by throwing them in trays or old four-gallon open tin containers, instead of on the sands. Further, if the material is dried on raised wooden platforms, or over coir mattings spread over the ground, a much better product results.

General properties and values of fish manure; Fish manures are good sources of nitrogen and phosphorus. Besides they are also important in that they supply to the soil what is known as "humus" which is essential to maintain the soil fertility and to maintain the organic balance of the soil. Cattle manure, green manure and oil cakes, besides fish manure come under the group which supply "humus" to the soil. When the soil is normally rich in organic matter, the application of artificial manures is the best and increased yield of crops result. At one time after the famous experiments of Liebig and Lawes, it was thought that artificial manures would revolutionise the course of agricultural practice, but nature has tried to assert herself. Organic manures supply the standard plant food, keep up the supply of organic matter which plays a very important part in absorption and exchange processes of plant life, impart desirable physical properties to the soil and influence the moisture content of the soil. Thus the importance of fish manures as fertilisers is obvious.

It was mentioned above that the prawn shell manure contains a high percentage of calcium besides a fair percentages in nitrogen and phosphorus. In the words of Sir. A. Hall, "of all soil factors making fertility, lime should be the first since the action of lime on different soils is

physical, chemical and biological". Physical in the sense it improves the soil texture. Chemically, liming of the soil tends to correct its acidity, regenerating inorganic plant foods from combination in the soil and thus making them available to the plant. Use of a limy manure controls the undesirable micro-organisms and encourages beneficial ones, an example of which is the process of nitrification by certain types of bacteria which will not be able to thrive and carry on its work in an acid medium. So prawn shell manure is a naturally available organic manure rich in lime content and this should prove very useful for certain types of soil.

Experiments on the manuring of soils with fish manures have been conducted at the various Agricultural Research Stations of the Madras Government and increased yield of crops due to fish manure have also been reported in some stations. However, there seems to be a dearth of detailed systematic investigations for the various crops and soils of this Presidency, and it is to be hoped that this type of investigations will be taken up by the Agricultural Department.

Conclusions: Beach-dried fish manures contain about 3 to 7% of nitrogen, 4 to 6% of phosphate and an equal amount of CaO with sand varying from about 10 to 30%. Pit fish manures prepared out of whole fish and out of wastes contain about 3 to 5% nitrogen and 2 to 6% phosphate and 1 to 5% lime. In all these cases sand, i.e., the percentage of insolubles is an important factor in deciding the quality of a manure since it is found to be anywhere between 20 to 45%. It is possible to bring down the high sand content by observing a few precautions during preparation. Fish manures are concentrated organic manures and should be of high value to the various types of crops though at present they are popular with only tobacco, tea and coffee planters. Experimental data on all important crops is lacking and it is hoped that ere long the Agricultural Department will be in a position to take up this problem.

Manurial Experiments on Rice*

2. *Effects of season and continuous green leaf manuring on yield*

By

C. HANUMANTHA RAO, B. Sc. (Ag.)

Introduction: Rice growers of this Province, by traditional experience resort to green leaf manuring with a view to obtain increased yields. Investigations to assess its effect were for some time past in

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