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COMPOSTING OF TOWN REFUSE BY THE 'EDELMIST' PROCESS

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CONVERSION of organic wastes, including night-soil, into manures has been practised for a number of years. Among the methods so far developed, those of Hutchinson and Richards (1921), Waksman and co-workers (1927), Fowler (1930) and Howard and Wad (1931) are most extensively adopted. These methods involve fermentation under essentially ærobic conditions. They are fairly rapid, but they also involve serious loss of both nitrogen and organic matter. Repeated attempts to raise the level of organic nitrogen, at any rate under Indian conditions, in the fermenting heap by the ærobic processes have not so far met with much success. Besides this particular aspect which, no doubt

is the most important from the agricultural point of view, there are several others, pertaining to the hygiene of the disposal which need careful study, *e.g.*, (1) prevention of fly-breeding and (2) maintenance of high temperature at least in the early stages to destroy pathogenic and putrefactive organisms. These points are of considerable importance where night-soil is added as the source of available nitrogen for the decomposition of town refuse. Attempts to improve the hygiene of disposal and prevention of fly-breeding by chemical sprays have proved costly. Sometimes the chemical used may even have an adverse effect on the course of decomposition by a modification of the micro-flora.

Among the other methods, the 'Edelmist' (hot fermentation) process originally developed by Krantz [Cunningham (1927), Ruschmann (1927), Boctskaul (1927), Fruwith (1928)] is best known. It is claimed to be hygienic and economical in regard to both nitrogen and organic matter. Quite apart from the above considerations, the Edelmist process should be regarded as a decided advance on ordinary methods in that it affords a means of controlling the fermentation of the manure. It was considered desirable therefore to make a systematic enquiry into the possibility of applying this process to the disposal of town refuse in India. The process, in short, consists in allowing the compost heap to ferment ærobically till the maximum temperature is attained. It is then pressed and packed tightly and maintained under anærobic conditions for three to four months after which the manure is ready for application to land.

The method is being examined critically under both field and laboratory conditions with a view to standardizing the condition by which

the disposal will be hygienic and will, at the same time, give a good yield of manure of a high organic nitrogen content. The enquiry has been divided into two sections—decomposition of (1) refuse in big chambers under field conditions or in small jars under laboratory conditions, and (2) a plant material like ragi straw in bottles. Only a few of the more important results obtained in the field study have been included in the following table.

There was absolutely no smell at any time during the fermentation; nor was there any fly-breeding. The finished products—especially that originally treated with night-soil—had a pleasant earthy odour and crumbled readily to fine powder. In three of the sets there was complete recovery of nitrogen when the C-N ratio was 30 : 1 though there was some loss at the narrower ratios (especially at 10 : 1). In the latter case the loss was not entirely due to the formation of gaseous products. It was largely due to the heavy rains which percolated through the brick and clay walls and caused a part of the soluble salts to diffuse out. It may be noted, however, that the nitrogen contents of the finished products were higher than those obtained by the other methods in vogue. The losses in dry matter which are also below 20 per cent are lower than those obtained by the ærobic methods.

Experiments are in progress to further standardize the method; to determine the optimum moisture content; to control the initial ærobic fermentation; to devise new types of cheap, water-proof cisterns; to compare the relative merits of fermentation in overground and underground pits; and to determine the best method of storing the finished product till it can be applied to land.

TABLE

Form of nitrogen added to refuse	Ratio of carbon to nitrogen before fermentation											
	30 : 1				20 : 1				10 : 1			
	Recovery of dry matter after composting (per cent)	Total N initially present (in kg.)	Total N after composting (in kg.)	Percentage of total N in the finished product	Recovery of dry matter after composting (per cent)	Total N initially present (in kg.)	Total N after composting (in kg.)	Percentage of total N in the finished product	Recovery of dry matter after composting (per cent)	Total N initially present (in kg.)	Total N after composting (in kg.)	Percentage of total N in the finished product
Ammonium sulphate.	86.4	1.50	1.53	1.79	83.6	2.30	2.22	2.49	82.0	3.5	3.00	3.62
Calcium cyanamide.	86.4	1.50	1.06	1.19	94.7	2.30	1.75	2.06	96.2	3.5	2.40	2.45
Sodium nitrate.	82.8	1.50	1.53	1.82	91.2	2.30	1.91	2.13	89.5	3.5	2.5	2.74
Night-soil	89.7	1.40	1.38	1.47	..	..	..	..	..	..	..	..

The results have been expressed as on 100 kg. of original material.

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