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COMPOSTING

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COMPOSTING.

Garden soils in Malaya are generally so infertile that the production of vegetables and flowers is possible only when some kind of fertilizer, usually cattle manure, is available in quantity. Unfortunately the cost of cattle manure and the added difficulty of obtaining adequate supplies are limiting factors; thus most gardens receive insufficient manure and consequently unsatisfactory results are obtained. Further, even when cattle manure is added to the soil in quantity, its disappearance is rapid as a result of factors such as high temperature, sunlight and heavy rainfall, all of which assist decomposition. As a general rule, therefore, flower and vegetable production in the garden is in direct ratio to the amount and frequency of organic matter added to the soil. Numerous experiments in Malaya have shown that the superiority of organic manures over artificials is very great here, much greater, for instance than in a temperate climate. At the Central Experiment Station, Serdang, artificial fertilizers have been proved quite inadequate to restore fertility to an impoverished soil. Immediate response is, however, always obtained from application of cattle manure. This is borne out by experience on small holdings in mining districts, where good crops are raised on soils composed mainly of sand, by means of the addition of copious supplies of pig manure. The use of organic fertilizers *e.g.* bone meal, restores fertility, but they are costly. In some gardens, attempts have been made to provide organic matter by collecting available refuse and allowing it to rot in pits. This method has only proved partially satisfactory and is frequently objectionable as the pits afford breeding places for flies and mosquitoes.

During recent years, investigations have been conducted in India with the object of producing well broken down organic matter from the waste products accumulating on the farm. This system has become known as the Indore process since the details of manufacture were elaborated at the Institute of Plant Industry at Indore. Employing a modification of this process, it has been found possible to utilize garden refuse for the production of organic compost in Malaya. The organic manure so produced has proved an excellent fertilizer and is capable of yielding results equal to, and possibly better than, those from cattle manure. The object of this leaflet is to describe how such compost may be made, in order that horticulturists may maintain the soil in their gardens at an adequate standard of fertility without undue expense.

Method of Composting.

In every garden there is a certain amount of refuse, such as grass and hedge clippings, dead plants from the flower and vegetable beds, fallen leaves, and prunings from shrubs and secondary jungle. This material forms the basis of the compost heap and should be collected periodically and placed to dry in a corner of the garden. The less woody the material the sooner the compost will be ready for use. It will be noted that a supply of bulky plant residue obtainable from *'lalang'* grass and secondary jungle growth is a great advantage, and may be used to supplement the usual refuse from the garden. Such growth is not ordinarily available in town gardens but may usually be obtained on estates and in country districts.

The material to be used in the compost heap should be thoroughly withered in the sun. A cleared piece of land in an open situation is required to build up the heap. Since water is required to maintain the compost heap in a moist condition, the site should be selected as near as possible to the water supply. The dimensions of the heap may vary a little, but a convenient size is 9 ft. by 6 ft. at the base, 8 ft. by 5 ft. at the top and 3 ft. high. Such a heap will absorb about 500 lbs. of dried garden refuse. The heap should not be made too deep, otherwise decomposition may be retarded and the sequence of supply of compost manure is interrupted.

The following ingredients are required to complete the compost heap of the size suggested above. Fresh cattle dung 32 lbs. and fine dry wood ash 1½ lbs.; the former is usually obtainable from local cattle-keepers, and ash may be obtained from the kitchen or may be secured by burning wood or other vegetable matter in the garden. In making a heap, the fresh cattle manure and ash, mixed with water to form a slurry, is added in eight layers to the semi-dried material. Slurry, sufficient for one heap, is formed by mixing 8 lbs. of fresh cattle dung together with 8 ozs. ash in four gallons of water. This slurry is then divided into eight equal parts, each part being applied over successive layers of the material to be composted. In addition a further 3 lbs. of fresh dung and 2 ozs. ash is scattered between each layer of material. Thus each of the eight layers of manurial matter will consist of 1 lb. cattle dung and 1 oz. ash in half a gallon of water forming the slurry, and 3 lbs. of fresh dung and 2 ozs. ash applied direct. Provided the compost material, cattle manure, and ash are all collected in a suitable position, the heap can be completed by one man in four hours. Thus, allowing for time spent in turning the heap, the amount of labour necessary,

other than collecting the material, is altogether approximately one labourer's working day. Collecting the fresh material and transporting it to the composting heap is rather laborious and is best performed by the use of large bamboo baskets.

Soon after constructing the compost heap, the internal temperature will commence to rise until at the end of the second day it will reach a point between 135° and 145°F. In the absence of a suitable thermometer, the temperature may be gauged by plunging a stick into the centre of the heap and leaving it there for three minutes. When withdrawn it should be very hot to the touch. The presence of considerable heat within the heap gives an assurance that decomposition is in progress and that conditions are such as to preclude flies from breeding.

At the end of 15 days the heap should be turned and rebuilt. If any part of the heap is found to be dry, water should be added. In another 15 days, the heap is again broken down and the same procedure repeated. Decomposition will now be active and the heap will be found to have shrunken considerably. The heap is again turned and re-made at two further fifteen-day intervals; water is added on both occasions if the decomposing matter is found to be at all dry. Satisfactory compost may often be obtained with only three turnings, if the material used is soft and rots down quickly. The quantity of water required to damp the reconstructed heaps depends upon rainfall. During dry seasons as much as eight gallons may be necessary, whereas in rainy weather the addition of water is usually not necessary.

The heap should have decomposed sufficiently to be in a fit state for use at the end of two months, but is in a finer state of division at the end of three months. The material is then dark in colour and any twigs and stalks completely broken down into small fragments.

The original 500 lbs. of semi-dry matter which formed the heap will have decreased considerably in volume but will show an increased weight due to added water.

In order to have a continuous supply of compost available, it is necessary to construct fresh heaps at regular intervals. It is important to add the compost to the land as soon as ready, for if it is kept too long, nitrogen will be lost and the fertilizing value of the compost will decrease. When mixing the slurry for use in subsequent heaps, several handfuls of the former heap should be added in order to induce bacterial action early and thus assist decomposition.

So far no particular local difficulties have been encountered in the manufacture of compost. The main factors upon which success appears to depend are maintenance of high temperatures in the heaps and adequate aeration during the process of manufacture. It is possible that some trouble from over-saturation of the heaps may occur during the height of the wet seasons in November—December and April—May, but so far it is uncertain whether an overhead shelter would be an advantage. The quantities of fresh cattle manure and ash added to the heaps at construction, based on practice in India, appear adequate but with further experience may be subject to modification.

Uses of Compost.

Compost that has been properly made is superior in certain respects to local cattle manure. Owing to its having been thoroughly broken down into fine particles, it is speedily incorporated with the soil and is thus more readily available for conversion into food material for plants than cattle manure.

It is difficult at the present juncture to make fair comparisons between compost and cattle manure since analyses show considerable variations in both materials, depending upon whether leaching has occurred in the former case, and the quality of food fed to the cattle in the latter. Compost recently made by the Department of Agriculture from grass clippings and fallen leaves contained nitrogen (N) 1.5 per cent., phosphoric acid (P_2O_5) 0.5 to 0.7 per cent., and potash (K_2O) 0.5 to 0.9 per cent., calculated on a moisture-free basis. Manure purchased from local cattle keepers, judged by chemical composition, is approximately of the same manurial value as compost, though the nitrogen content of the cattle manure is often higher. All fertilizer constituents in properly stored manure from well-fed cattle are, however, much greater; in some instances the figures may be nearly double those recorded for compost.

The average moisture content for both compost and cattle manure is about 65 per cent. and this fact should be remembered when calculating the amount of fertilizing constituents present in any given quantity of material.

Compost may be used as a fertilizer for incorporating in vegetable and flower beds, or mixed with soil and sand as a potting medium. As a result of a small trial conducted with Indian corn as an indicator crop, compost has been proved to give satisfactory returns when applied to the land at the rate of 10 tons per acre or 5 lbs. per square yard of land. Increased yields were obtained when the application was doubled.

Further trials with flowers and vegetables are necessary, since there are many aspects of composting that require elucidation. At present there is little or no information as to the frequency of application of compost that is necessary to maintain fertility. As a general guide it is suggested that compost prepared as outlined above may be substituted normally for cattle manure with about the same frequency of application.

If a particularly rich medium is desired, artificial fertilizers may be added to the compost shortly before use. Owing to the compost being in a fine state of division it is possible to mix the fertilizers thoroughly and to secure even distribution in the soil.

Cover crops - Common names.

1. Pueraria phaseoloides ✓
2. Centrosema pubescens
3. Calopogonium mucunoides.
4. Desmodium ovalifolium
5. Desmodium polycarpum.
6. Mimosa invisa
7. Crotalaria anagyroides.
8. Tephrosia Candida.
9. Tephrosia Vogelii.
10. Leucaena glauca (Lamtoro)
11. Flemingia Congesta.
12. Stylosanthes gracilis.
13. Crotalaria striata.
14. Crotalaria useramoensis.
15. Sesbania Sp.