

USE OF COMPOST IN TEA

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From the time Liebig advanced a new thought in 1840 in his treatise "Chemistry in its Applications to Agriculture and Physiology" embodying his well-known mineral theory there was steady progress in the manufacture and use of artificial manures. The use of nitrogenous fertilizers increased, until today the majority of farmers base their manurial programme wholly on different forms of nitrogen, phosphates and potash. The NPK mentality soon established itself and continues to this day.

In several soil systems, over the years, the soil has suffered the loss of organic matter and the destruction of crumb structure by losing an essential constituent, the cement provided by humus. However, if one examines the centuries old Chinese system of agriculture it would be seen that their soils have stood the test of time. These soils have, over the years, been fortified with every possible kind of waste vegetable, animal and human - which has been carefully collected and put back into the soil. Animal residues, and more especially urine are utilized to the full. The crowded population of China was maintained on the produce of its soil after its agricultural use for over forty centuries. This is perhaps the most convincing proof of the perfect balance of ancient systems of agriculture with their environment. The success of the methods followed by the peasants of China was one of the factors which gave rise to the Indore process of the conversion of vegetable and animal wastes into humus.

Composting as originally propounded by Howard and Wad is a process whereby the waste products of agriculture are converted into humus. In principle it corresponds to the natural process which goes on in the jungle whereby the residues of plant and animal life are converted to humus through the agency of fungi and bacteria. Nature's method of dealing with forest wastes is to convert them into an essential manure for trees by means of continuous oxidation.

The main object of composting is to alter the C/N ratio from 40/1 or 50/1 down to 10/1. Because crop residues contain approximately the same amount of carbon (40% on a dry weight basis), their N contents are often compared on the basis of C:N ratios. Thus a low N content or wide C:N ratio is associated with slow decomposition.

Most of the waste and residue materials applied to soil consist of a water-soluble fraction and a water-insoluble fraction with vastly different rates of decomposition. The water-soluble fraction is comprised of sugars, starches, organic acids, pectins, tannins, etc which are subject to early, rapid utilization as carbon and energy sources by the soil microflora. At a less rapid rate, compounds in the water-insoluble fraction consisting of hemicellulose, cellulose, fats, etc would be utilized. Lignin, the constituent least susceptible to degradation would tend to persist and accumulate in the soil organic matter or humus.

During decomposition of waste and residues low in N, the C:N ratio tends to decrease with time and after about 6 months this residue would approach a C:N ratio similar to that reported for most native soil organic matter, i.e. about 10:1 or 12:1. The decrease in the C:N ratio results from the net loss of carbon as CO_2 during decomposition, while most of the N (including available inorganic soil N) is quickly assimilated

and immobilized in microbial cellular material until the C:N ratio is sufficiently narrowed. Thus the percentage of N in residual plant material steadily increases as decomposition proceeds. Most organic wastes and residues inherently contain populations of indigenous microorganisms including bacteria, fungi, actinomyces and protozoa which aid in decomposition of these materials.

Composting is a convenient and profitable means of the sanitary disposal of all vegetable and animal residues. In composting one could use all green vegetation that is available in tea plantations that could be obtained like Guatemala, Mana, *Eragrostis* grasses etc, Dadap, *Gliricidia* leaves etc along with some tea refuse and cow dung. It is imperative that whatever green vegetation that is available should not be allowed to go waste and should be profitably used. Waste material and residues could be composted by one of two methods - the trench and the heap. The heap method is preferable except during the dry months of the year when water is scarce and when there is a labour shortage for turning the material in the heap.

The trench or heap may be of convenient length depending on the amount of material available for composting. The heap may be 3 ft wide and built to a height of about 3 ft. The ground should be cleaned and the green vegetation could be spread out in layers on top of which a thin layer of tea refuse could be added. A slurry of cow dung is now liberally sprinkled over the material. The packing of the different layers should be loose. The materials which went to form the first layer could be repeated. The first turning could be done in 2-3 weeks time while the second turning is done in about a fortnight's time after the first turning. Then a final turning could be done four weeks after the second turn and the compost will be ready in 3 months time.

The raising of tea on organic manure could be envisaged if a concerted effort is made to harness all available vegetation. If organic manure fed tea is to be raised on a wider scale then it is important that certain areas be set aside for the growing of green material. If adequate compost is available then it is possible to raise tea from the nursery stage itself.