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DEVELOPMENT OF RURAL COMPOSTS

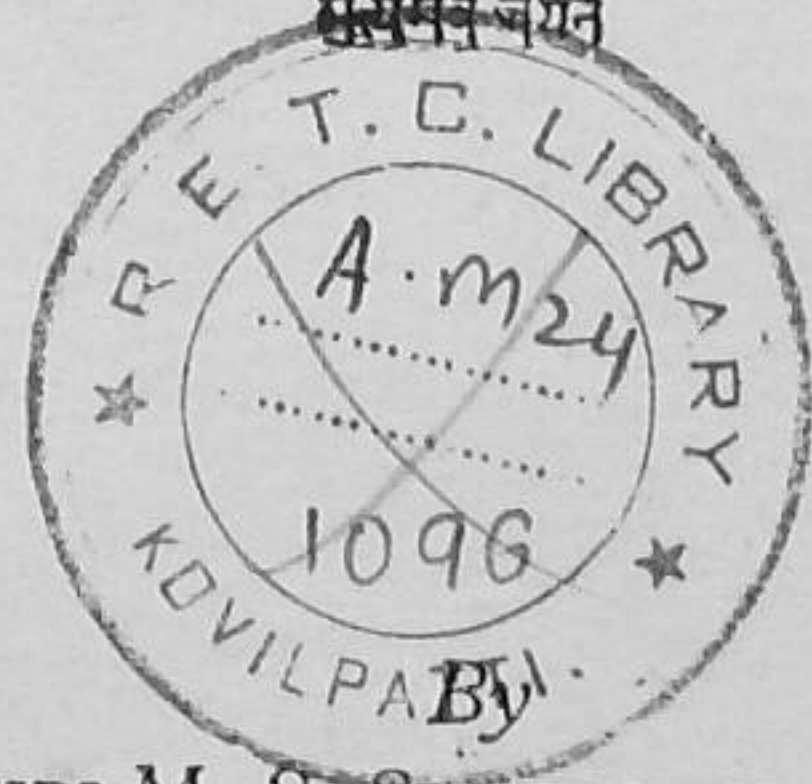
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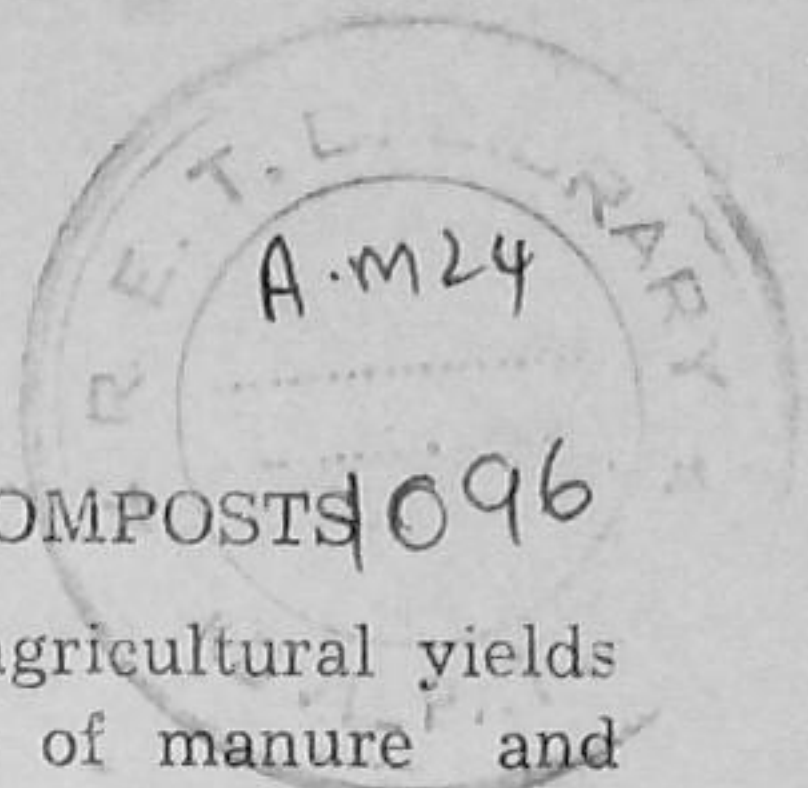
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DEVELOPMENT OF RURAL COMPOSTS 096

Among the chief factors that limit agricultural yields in India are want of adequate supply of manure and moisture for a major part of the cultivated area. While irrigation can supply the required moisture, the scope for it is restricted and over 200 million acres out of a cultivated area of 320 million acres may have to depend very largely upon annual rainfall for the water requirements of crops. If the rainfall is not adequate and timely, the crop yields will be low. We have therefore to adopt agricultural practices which will help to keep up the yields on such lands: and the use of composts plays a very important part in this. For composts provide the manure, conserve the moisture in the soil and enable the crop to withstand moderate periods of drought.

2. Composts are formed by the decay of the waste products of plant and animal life like leaves, twigs, roots, dung, night-soil, urine, etc. Countless millions of invisible organisms, like bacteria, fungi and various types of microflora feed on these wastes, multiply very fast and convert them into forms which sustain plant life once again. This chain of changes goes on endlessly in Nature and the operation of composting forces the pace of these changes. The tremendous magnitude of what happens can be imagined from the fact that a pinch of any good soil contains over 300 crores of bacteria.

3. These organisms develop rapidly under suitable conditions of moisture, aeration and temperature. It is for this reason that the wastes are allowed to decay in shallow pits in which water is sprinkled occasionally. A pit of 8' x 6' dug to a depth of 3' will be required to produce the manure normally required for an acre of dry land crops. Aeration is affected if the pits are deeper and this slows down decomposition. Mixing small quantities of dung with the water adds more organisms to the decomposing mass. The addition of ash which contains

phosphates and potash helps faster growth of the organisms. Covering the pit with a thin layer of earth maintains more favourable conditions of humidity and temperature inside. Turning the contents of the pit once or twice helps aeration and nitrification and brings about uniform decomposition. If these different operations are not carried out, the decomposition of wastes will still take place with the help of rain water and atmospheric moisture, but at a slower rate. What may be completed in 4 to 6 months may take 9 months to a year if left merely to Nature. If water is not available or labour cannot be spared for turning the contents of the pit, two or even three pits per acre may be filled in to allow for the extra time taken for decomposition.

4. A question may be asked why the waste materials should not be directly ploughed into the soil and allowed to decompose in the field. If this is done a part of the available moisture in the field will be used for decomposition of the wastes. In dry land cultivation in areas of below 30" precipitation, the rainfall is hardly sufficient to provide even the moisture for the growing crop. In the process of decomposition, nitrogen in the soil may also be taken up by the bacteria for their life processes and in the result the crop will suffer through depletion of moisture and nitrogen. The competition for the limited supply of these growth factors in the field is avoided if the decomposition takes place in a pit. The decomposed material has the property of absorbing water and thus helps to retain more moisture in the field.

5. A distinction has to be drawn between composting and green manuring or ploughing in of green leaves into the soil. Green manuring can be practised under irrigated conditions or when the rainfall is sufficient, so that moisture is not reduced in the field. This is possible in the case of paddy fields where water will be available in plenty and cultivation can therefore be taken up immediately after the incorporation of the leaves. In the

case of wheat and barley the ploughing of green leaves is done 6 to 8 weeks ahead of sowing so that the decomposition is nearly completed by then.

6. The main available source of organic wastes that is used in India is the dung of domestic animals, a large part of which is however burnt as fuel for want of cheaper substitutes. In rural areas, plant wastes other than root residues of crops are available only in limited quantities as most of the plant materials is used as cattle feed or burnt as fuel. In urban areas some of the waste products are led into the sewage systems and the total output of composts from urban wastes all over India in 1955 was only 1.79 million tons sufficient for manuring a few lakhs of acres of cultivated area as against nearly 200 million acres for which composts are required. The present production of rural and urban composts is therefore very limited for want of sufficient waste materials.

7. In most villages the fields around the habitation receive proper attention. The bulk of the farm-yard manure that can be spared is applied to these while distant fields particularly the dry fields receive little or no manure or an inadequate dose of manure once in two to three years. The compost pits such as exist, are used for composting cattle dung mixed with waste straw and bedding used in the cattle shed. For various reasons the cattle are kept in the village site and the pits are found either in the backyard of the houses or in the outskirts of the village. It is too much to expect anyone to take the trouble to transport the cattle dung periodically to distant fields. A practical solution for this problem is to produce if possible some other types of wastes in every field and compost the same in the field itself.

8. The chief problem in large scale production of rural compost is therefore to produce sufficient quantities of organic wastes near the fields. Of the different types of such wastes, plant wastes can be developed in large quantities from perennial shrubs grown for this purpose

along the margins of cultivated fields or in the corners of fields or along sides of paths and roads, canal and tank bunds, waste areas, common lands, scrub jungles and in all other places which are not now put to any other proper use. Experiments done on the dry lands in the Agricultural Research Stations of the Madras State have shown that it is possible to grow on the borders of cultivated fields certain types of perennial shrubs which do not materially affect the yields of the crops. For instance in the Koilpatti Research Station a 100 acre farm in the Tirunelveli District which receives annually 25 to 30" of rain, a large scale development of *Ipomea carnea* was taken up in 1951. Within one year 10 miles of *Ipomea* hedge was planted from cuttings developed from a single head-load of the plant. From the third year, the production of *Ipomea* loppings was $3\frac{1}{2}$ tons per acre which was sufficient to provide the necessary manure for the dry crops.

9. *Ipomea carnea* grows very well in all parts of India. It is popularly known by apt descriptive names like "Amari" or "Undying" in Orissa; "Sada Bahar" or "Ever green" in Uttar Pradesh. It is not eaten by goats; withstands drought and also water logged conditions. It is easily raised from cuttings. A cutting 8" long inserted half its length into the soil in the rainy season begins to sprout in 3 to 4 days. The plant is allowed to grow for 6 to 8 months and then lopped at a height of one foot from the ground level. The stem thickens as a result and fresh shoots are thrown out. Each of these shoots can be used for further propagation of the plant. The main shoot is allowed to grow and then lopped at a height of $1\frac{1}{2}$ to 2 feet from the ground. Thereafter no side shoots are allowed below 2 feet and the lopping of the branches is done 3 or 4 times in the course of the year. *Ipomea* can be planted 6" apart or even closer. *Ipomea* should not be allowed to grow into unkempt bushes but trimmed as described above into neat hedges and lopped from time to time and the loppings should be placed in the compost pits dug in the field.

10. There are several other useful plants of this type which can be raised from seeds or cuttings. Some of these which are not eaten by goats are *Jatropha Curcas*, Hindi:—Jangli Erandi, Tamil:—Kattamanakku; *Adathoda Vasika*, Hindi:—Bandari, Tamil:—Virali. The choice of plants is determined by high drought resistance, absence of adverse root effect on the crops, ability to withstand frequent lopping and adaptability to varying conditions. Above all the plants should not multiply too rapidly from seeds and suckers so as to become a pest on the cultivated land like *Cassipourea*, Hindi:—Chakunda, Tamil:—Tagarai or *Croton Parsiflorous*, Tamil:—Mulagaipundu.

11. Other examples of useful perennial shrubs which deserve to be popularised are: 1. *Sesbania aegyptiaca*, Hindi:—Jayanthi, Tamil:—Champu; 2. *Glyricidia*, Tamil:—Eruthzai; 3. *Indigofera Teysmanni*, Tamil:—Semai Avari; 4. *Crotalaria anagyroides*, Tamil:—Semai Janappanor; 5. *Tephrosia Candida*; 6. *Leucaena glauca*, Tamil:—Javandali. The first four of these can be grown along the borders of cultivated fields and of these *Sesbania aegyptiaca* is found in all parts of India. Examples of plants which can be developed from cuttings, stumps or seeds on tank and canal bunds to provide abundant supplies of leaves from repeated loppings are *Thespesia populnea*, Hindi:—Parus pipal, Tamil:—Purvarasu; *Thevetia nerifolia*, Hindi:—Pila kanar, Tamil:—Pachai Alari; *Hibiscus tiliaceus*, Bengali:—Chelva, Tamil:—Malaipuvarasu; *Pongamia glabra*, Hindi:—Karanj, Tamil:—Pungam; *Pinciana alata*, Tamil:—Vada naryana; *Cassia Siamea*, Tamil:—Kattu Konnai; *Calatropis gigantea*, Hindi:—Madar, Tamil:—Erukku. The main difficulty in growing some of these perennials from seeds is that they are browsed by cattle and goats in the early stages. In some parts of Orissa and Bengal, *Ipomea carnea* is raised as a hedge to protect the cultivated fields and this practice has to be popularised all over the country. Once a hedge is formed in one cultivation season along the outer periphery of a holding or the place selected it will not be difficult to grow some of the other plants inside, in the next season. Many of

the plants suggested are however very quick growing and if the seeds are sown at the beginning of the rainy season, they grow to a height beyond the reach of cattle within a few months. To begin with, stress may be laid on shrubs which will not be eaten by cattle or goats.

12. The Indian cultivators are as a class very shrewd and given a workable idea they will raise the shrubs or plants for producing the plant wastes under local conditions. In the beginning the shrubs may be raised on the field border which does not join another's land. The necessary seeds or cuttings should be obtained in advance from the Agriculture Department and a small nursery may be raised near wells in the lands of select cultivators in each village for providing local supply of plant materials. Pits of the dimension mentioned should be dug in corners of the unirrigated fields. Loppings of the shrubs and other available wastes should be placed in the pits from time to time. The process of composting is started by sprinkling water mixed with a small quantity of dung and ash. Later on the decomposed materials from the pits can also be used as starters. In areas adjoining forests, the leaves that fall can be gathered and composted in the pits.

13. A vigorous and systematic effort has to be made all over the country to produce the composts required for the rainfed dry crops which are now hardly manured. Every farmer knows the value of manure in almost every shape including that of vegetable organic matter; but not being aware of the rationale of his process he does not develop his practice or correct his failings. Not knowing that he removes from the soil some of its valuable plant nutrients in the shape of crops he has not learned to restore to the land all that he takes from it. If to the vast knowledge of the practical details possessed by the Indian farmer is added a knowledge of the principles of his art, his industry will soon develop into a better practice and extract a higher yield from the unwilling soil.

14. Broadly speaking it is the poverty of the average individual cultivator which perpetuates poor cultivation

and this in turn makes him poorer with every increase in the number of mouths to feed. A rational method of attacking both poverty and poor cultivation will be therefore to devote attention to factors in crop production which involve little or no financial outlay. The problem of manuring millions of acres of cropped area in the country where the soil has been reduced to a low static level of productivity through centuries of cropping and the problem of improving the yield of crops in large areas subject to the varying factor of uncertain rainfall has to be primarily solved through measures which can be followed on every field without much expenditure of money. The method suggested costs nothing except intense effort and is essentially practical. Every farmer should have a programme of large scale planting of suitable shrubs to produce the manure from plant wastes for his fields and unless this is carried out methodically and successfully there can be no permanent improvement in the agricultural production of areas in which rainfed dry crops are raised.