

Production of Organic Manure from Kitchen Waste: Ensuring livelihood of Resource Poor Women

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A griculture production in last 1-2 decades has increased tremendously with the help of recent technologies and farm mechanization, but extensive use of fertilizers, insecticides and many other pesticides have also provided negative impact on human health, polluted the environment, and made the crop cultivation expensive. This negative impact has been well documented and the pesticides residues in the food chains have endangered the life sustaining system around the world. Synthetic fertilizers have also jeopardized the environment through nitrate poisoning and have adversely affected the soil micro-flora by altering the chemical and physical properties of the soil.

Now Agriculture Universities and Research Institutes are focusing in integrated pest and nutrient management by exploiting various microbial natural resources as biofertilizer by modifying several traditional practices. In view of the above, various bio-agents such as parasite and predators of crop pests and biofertilizers such as Azolla (blue green algae), Rhizobium species and a variety of green manures are extensively investigated to standardize their use as biofertilizers. The detailed studies on these biofertilizers are among the priority thrust area of many research institutes. This integrated approach has provided a sound package of environmentally safe and low cost farming technology. Biofertilizers can also bring about soil nutrient enrichment without any adverse effect on soil and human health. The term "biofertilizer" or more appropriately a "microbial inoculant" can generally be defined as preparations containing live or latent cells of efficient strains of nitrogen fixing, phosphate solubilizing or cellolytic microorganism used for application to seed or composting areas with the objective of increasing the numbers of such microorganism and accelerate those microbial processes which augment availability of nutrient that can easily assimilated by plants.

Agriculture in India need to develop a suitable method to increase organic matter contains in the soil. This can be achieved with the organic manuring including green manuring and kitchen waste composting etc. During the past few years the concept has evolved that the periodic addition of large quantities of either crop residue or green organic matter to the soil results in increased production of the plant material.

The organic substances play direct role in the enhancement in the soil fertility as they are the sources of plant nutrients librated in available form during the course of decomposition. Humus is the ultimate product, which can be considered as a store house of various plant nutrients essentials plant growths. During the microbial decomposition of organic substance there is a release of nutrient with subsequent mineralization of carbon, nitrogen, sulphur, phosphorus and other elements. Decomposition is the conversion of complex organic substances into simple once that animals and plants are broken down into large particles and eventually into small molecules. The dead organic matter is thus gradually disintegrated until structure can no longer be recognized and the complex organic molecules are broken down into carbon-dioxide, water and mineral nutrients.

Decomposition of organic matter is a necessary and preliminary step to utilization, since the protein



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molecules must be broken before crop plants can use the mineral and nitrogen logged up in the plant cell. The process of bacterial and fungi of many kinds take place in several stages; various intermediately products being formed before the final substance useful to crop plants appears. The soil fauna cropped down thus solid waste material into small pieces and provide more surface area for soil organism to decompose them at faster rate. Soil organic level and microbial activities vital for nutrients, turn over long term productivity of soil are enhanced by use of organic amendments.

Therefore, it is possible to improve soil fertility by maintaining good soil condition through appropriate cultivation. Vigorous organic recycling in such a manner plays an important role in nutrient recycling and soil fertility. New technology is being produced to assessed the organic based treatment confirming to strict environment regulation. One of these technologies being proposed is the use of effective micro-organisms (EM). The EM technology was developed during the 1970's at the University of Ryukus Okinawa, Japan. Sangakara, 2002 suggested that EM may have a number of applications inducing agriculture livestock, gardening and landscaping, composting bioremediation cleaning septic tanks, algal control and household uses (Higa and Chinen, 1998).

The basis for using these EM species of microorganism is that they contain various organic acids with major emphasis on *Bacillus* spp. (due to the presence of lactic acid producing bacteria), that are strong sterilizing compounds to suppress harmful microorganisms and enhance decomposition of organic matter. They also have the ability to suppress disease inducing microorganism such as Fusarium, which occur in continuous cropping programs. We have examined the efficacy of thermophilic microbiota of solid waste composting with trypticase soy broth (BBL, microbiology system) and 2% agar as initial planting medium.

Land application of products from organic waste such as compost and biofertilizer, is gaining importance as integrated and biological agriculture is becoming increasingly popular. This is because such products are often considered beneficial for the soil and at the same time the problem of organic waste streams is alleviated, resulting in an environmentally actable way of recycling waste materials.

Organic amendments activate the microorganism of the soil, and indirectly stimulate the biochemical cycle therein to provide various minerals (e.g. NPK) essential for plant nutrient. They also increase soil organic matter content and influence soil structure and many other related physicochemical and biological properties. In addition the microbial biodiversity may be increased.

People living with chronic hunger exist in conditions of severe poverty. What they lack is the chance to change their situation, to develop their own self-sufficiency. The most potent confirmation of this fact can be seen in the lives of women. They, along with their children, are the main victims of hunger, and they are also most lacking in opportunities to end their own and their families' hunger. At the Institute of Agricultural Sciences, Banaras Hindu University extension and developmental activities has made several landmarks in establishing rural livelihood programs among rural poor through biofertilizer production. Efforts have been made to train people for adapting pro-environmental technologies for food crops and good health.

Over the last decades, considerable effort has been made throughout the world to provide women farmers and women on the farm with efficient, effective, and appropriate technology, training and information. The positive effects are beginning to show in agricultural production statistics and in indices of family welfare. Biodegradation of kitchen waste for the production of organic manure by using soil microflora is one of the important aspects for women welfare. Quick decomposers *viz*. fungi, bacteria and actinomycetes of kitchen waste are culture in mass scale.

Production of manure from kitchen waste

Different kinds of kitchen wastes from houses, canteens, mess and hotels etc. were collected. A pit of $2 \times 1 \times 1$ meter in the field was prepared and soil is added in to the pit up to 2 to 3 inches along with 50

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kg of kitchen waste as the upper layer. The efficient decomposing microflora formulations were mixed in the kitchen waste at the rate of 250g/10 kg. For maintaining of the moisture content the water was sprinkled regularly and the pit was covered with a layer of garden soil. After 40 to 50 days the waste is converted into manure. The cycle is continued in the same manner to produce more and more organic waste. This method provides an excellent eco-friendly product with quick decomposition of solid waste.

Solid waste digestion of kitchen waste is done in the pits depending on availability of kitchen waste and space for decomposition. In general a pit of approximately $2 \times 1 \times 1$ m will be used for filling the kitchen waste. The beneficiaries may dig out pits on their own or they may deploy labours which will cost approximately Rs. 125/- per pit. A beneficiary may easily utilize 10 pits for production of organic manure. The total manure produced out of this method would be approximately 10 quintal per cycle. In one year about 80 quintal of organic manure will be produced hence a beneficiary may earn about Rs. 10,000/- per year.

Over the last several decades, considerable effort has been made throughout the world to provide women farmers and women on the farm with efficient, effective and appropriate technology, training and information. The positive effects are beginning to show in agricultural production statistics and in indices of family welfare. The production of organic manure from kitchen waste are sustainable and easy to produce with self-developed methods of their production at field level and it can also improve the quality of life and as well as environment.

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