

Achieving livelihood through indigenization and popularisation of wormicompost production at farmers courtyard

Organic, inorganic fertilizers and microbial biomass are the main resource for building up soil fertility. In investigation area huge potential of organic residues are lying untapped. There is wide gap between nutrient removal and their proper addition in soil. The recycling of crop residues is essential for supplementing plant nutrients. A proper technology is needed to meet the shortage of plant nutrients through organic resources and their application in a balanced way to provide humified materials for maintaining soil productivity. Composting is a microbiological non-polluting and safe method for disposal and recycling of organic waste by its conversion to organic fertilizers.

The compost prepared by using earthworms is called Vermicompost. The Vermiculture Biotechnology is all about the rearing of the Earthworms using modern scientific methods and using the same for soil conservation and many other sustainable agricultural activities. Scientific rearing of earth worm, their reproduction, nutrition and conservation come under Vermiculture. Bio-Technology and the earth worms are used in degradation of organic /agricultural waste and the product after degradation is known as vermicompost.

Production Technology for Small and Marginal Farmers

Out of three ecological varieties of earthworms, the *epigeics* in particular and *anecics* in general have largely been harnessed for the use in the vermicomposting processes. The vermicomposting is carried out in different types of pits i.e. *low cost bamboo pit* and *concrete pit* of 4 m X 1m X 0.75 m size, loaded with partially decomposed (30-45 days) cow dung, organic waste and soil mixture in the ratio of 3:2:1 at optimum temperature ($< 35^{\circ}\text{C}$), moisture (75% w/w), which will allow for decomposition. Suitable strains of earthworms @1500-2000 worms per cubic meter are inoculated per 100 kg of waste. Earthworms are not disturbed during course of decomposition. To protect from rain and wind, a polythene sheet or temporary shed of about 5 feet height above the ground level is required to cover the pit. Compost becomes ready in 60-80 days.

At Rajendra Agricultural University, activities on vermicompost started in the year 2006 at Krishi Vigyan Kendra, Birauli (Samastipur). Since then it has traveled long and now-a-days almost all the KVKs of the Universities are directly or indirectly involved in promotion of this ecofriendly technology. Recently under the dynamic leadership of Vice-Chancellor, Dr. M. L. Choudhary, Department of Soil Science has taken a lead to establish large scale production cum demonstration unit at University Head quarter, where the process of vermicomposting is carried out by different methods i.e. Pit Method, Windrows method, trench method as well as in low cost bamboo pit.

So far, 14 groups each consisting of 20 men and women farmers have been formed in selected villages of Samastipur (Thahra Gopalpur, Bahadurpur, Gokhula, Malpur, Kalwara, Mabbi), Muzaffarpur (Bahuara, Bimalpur, Baburban, Mathina) and Sheohar (Chiknauta, Sundarpur) districts. To acquaint farmers about the proper technology of vermicomposting, group wise two days training programmes were conducted at University headquarters at Pusa.

Formation of Vermicompost Pits

The process of vermicomposting is carried out in different type of pits. But in Pusa cluster, low cost bamboo pit and brick pit of size 4m x 1m x 0.75m has been promoted. Low cost bamboo pit is our innovative idea which costs about Rs. 2450 per pit including labour charges. Following pits have been constructed in various NAIP villages of Samastipur.



A bamboo vermicomposting unit under construction.



A bamboo vermicomposting unit ready for use.



Windrows method of vermicomposting

Farmers as well as farm women were engaged in agriculture. Prior to our intervention they had no or little knowledge about the vermicomposting. To develop the confidence of people 25 quintals of vermicompost was distributed for use in standing vegetable crops during Kharif, 2009. After visualizing the effect farming community has showed their interest to use it at large scale. Farm women have been mobilized to produce vermicompost at their own premises. Due to initiative of Rajendra Agricultural University, farm women groups were constituted in each village. Till December, 2009, 68 vermicompost pits (52 of bricks and 16 of low cost bamboo pit) have been constructed in the farmers' premises and they have been observed actively engaged in vermicompost production. Many members beneficiaries have started construction of another pit at their own cost. Now a days, the members of the groups are using their own vermicompost to crops and selling the excess product to the other farmers @ Rs. 400/q.



Rotten cow dung + organic matter



***Eisenia foetida* (Earthworm)**

Impact of training generated highest interest among the farmers and they have been able to construct 137 vermicompost pits till date (38 of low cost bamboo pit and 99 brick pit) at their own premises properly inoculated with earthworms. The cost of construction of low cost bamboo pit of size 4m x 1m x 0.75m along with thatched roof is about Rs. 2250/- where as similar size brick pit with thatched roof can be constructed by an expenditure of Rs. 8000/-. The Windrows method is recommended for large scale production. On an average individual farmer is producing 2 MT of Vermicompost annually and earning Rs. 8000/ year. In addition to this some of the farmers are raising vegetable crops organically with the vermicompost alone. Besides this general awareness programme is regular process and construction of vermicomposting pit at other farmer's premises is going on.

Plan for Popularization:

The organic wastes resistant to biodegradation having wider C:N ratio needs to be converted into narrow C:N ratio material to use it as manure with the help of appropriate Technology. Earthworms are ideal agent for quick biodegradation. With the help of vermicomposting technologies the organic wastes can be recycled, processed and put to productive use for maintaining soil quality and reduce the dependency on chemical fertilizers. In Muzaffarpur and Kanti cluster under NAIP, the approach is to include this technology in fertilizer chain of the farmers to use it as conditioner for amendments of saline sodic soil. Optimum use of vermicompost will enhance the efficiency of chemical amendments and fertilizer use.

Addition of Vermicompost in Integrated Nutrient Management (INM) system will help to achieve the advantages, manifold. Vermicompost, is an excellent soil conditioner, which improves the soil quality by three modes of actions (physically, chemically and biologically). Efforts are on to evaluate the overall utilization of organic waste for vermicomposting, its enrichment through the addition of cheaper natural occurring minerals (i.e. Rock Phosphate, gypsum, Pyrites etc), to govern the maturity index (index of decomposition) of prepared compost and to educate and train the farming community about the advantages of waste recycling and vermicomposting.