

INTRODUCTION TO VERMICULTURE

Vermiculture is a method of converting all the biodegradable wastes such as farm wastes, kitchen wastes, market wastes, bio-wastes of agro-based industrial wastes, livestock wastes etc. into useful product through the action of earthworms. Through their digestive process, earthworms convert decaying vegetable matter, composted green waste, animal waste and paper into valuable nutritive products for agriculture. The ideal objectives of vermiculture are to upgrade the value of the original waste material, produce upgraded material *in situ* and to obtain a final product free of chemical and biological pollutants. Earthworms form a major component of the soil system and these organisms have been efficiently ploughing the land for millions of years and assist in the recycling of organic nutrients for the efficient growth of plants. Compost worms are being used for recycling of organic waste and have the potential to be used in vermiculture waste conversion systems for industrial or municipal applications. Although many species of earthworms are suitable for waste processing; two species namely *Eisenia fetida* and *Eudrilus eugeniae* have mainly been taken into consideration for vermicomposting. Their growth, productivity and ability to transform organic waste as animal dung, agricultural residues, urban wastes and sludge have been widely reviewed. The process of converting organic waste by earthworm consumption into nutrient-filled humus is called vermicomposting. Worm castings, the scientific name of worm manure are nature's finest soil conditioners that are called as "Gardeners Gold" on account of their excellent soil amending value. In natural system, earthworms along with soil microorganisms degrade organic waste materials of soil and thus maintain nutrient flux. Earthworm cast consists of excreted masses of soil mixed with residues of pulverized and digested plant residues usually called as vermicompost. The vermicompost is a product rich in organic bioremediated matter which differ from the compost obtained from the same matrix for its level of humification and the greater presence of microbial metabolites responsible for the fertilizing value of casts. By maintaining suitable temperatures in even the coldest winter months and creating suitable conditions for earthworms to thrive they can process a large amounts of organic material, consuming, digesting and passing almost any decaying organic matter including food waste, leaves and grass, shredded paper or cardboard waste, and chopped straw or hay.

HISTORY OF VERMICULTURE

The Egyptians were one of the first cultures to recognize the soil amending properties of the earthworm. Under Cleopatra's rule, the removal of earthworms from Egypt was a crime that could have one killed. Worms have been observed by such scholars as Aristotle and Charles Darwin as organisms that decompose organic matter into rich humus or compost. However, the actual practice of vermiculture is about a century old. Charles Darwin (1809-1882) who studied earthworms for 40 years, estimated that an acre of British farmland contained 50,000 worms, producing about 18 tons of worm-casts per year.

The first serious experiments on vermiculture were conducted in Holland in 1970 and subsequently in England and Canada. It is believed that the mother of modern day vermiculture is Mary Appelhof (1972). As a Michigan (U.S.A.) biology teacher, Appelhof wanted to continue composting in winter months even though she lived in a northern climate. She ordered worms from a bait shop nearby and set up one of the first indoor composting systems. She found her composting system to be a great success. She published two brochures titled "Basement Worm Bins Produce Potting Soil and Reduce Garbage" in 1973 and "Composting your Garbage with Worms" in 1979. Her work was featured in a New York Times titled "Urban Composting: A New Can of Worms". Finally in 1982 she published a book entitled "Worms Eat My Garbage". This inspired many people to partake in vermiculture, especially urban apartment dwellers. The American Earthworm Technology Company started a vermicomposting farm in 1978-79 with 5000 tons per

month of vermicompost production. In the early 1980 under the leadership of Dr. Roy Hartenstein, field-scale practical methods were developed for disposing of poultry, pig and cattle wastes in an interdisciplinary research project. Since then a number of vermiculture studies in USA, France, Germany, Italy, Spain, Phillipines, Australia, etc. have demonstrated a very considerable economic potential.

The University of Agricultural Sciences, Bangalore initiated vermiculture in India and propagated the knowledge to farming community by releasing a press note in the year 1984. M.R. Morarka-GDC, Rural Research Foundation in Rajasthan has been the most entrepreneuring organization for vermicomposting technology in India so far. Recently, the Haryana community forestry project has been started in 43 development blocks of Haryana with financial aid from European Union. Vermicomposting plants with a capacity of 100 tons per day are operating in Pune, Bangalore and several other cities of India. In Assam, the practice of vermicomposting was started at Assam Agriculture University, Jorhat. Now, it has gained popularity in all the corners of the state.