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Editorial

Earthworms as Ecological Waste Managers

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Editorial

Earthworms are one of the most important soil animals which have an ability to maintain the soil fertility and can play a major role in sustainability. Since long, earthworms have been known as farmer's friends, natural ploughmen and intestines of the earth. The beneficial role of earthworms in the breakdown of dead plant material in the forest litter was documented first of all by Darwin [1]. They are also known as ecosystem/ecological engineers. Earthworms are very important components for the maintenance of soil fertility and nutrient cycling. It maintains the nutrient level of soil by converting organic wastes into vermicast. Earthworms *in vivo*/nature enhances the incorporation of plant materials into soil aggregates, creates soil porosity, formation of humus, casting activities and also affect localization of soil organic matter [2].

Over the last few years, waste generation and its management has become one of the biggest major environmental concerns. A number of new types and categories of solid wastes have been added in the atmosphere ranging from household to nuclear wastes including municipal, industrial, biomedical, and plastic and many more. The safe disposal and management of these wastes have become a global priority. Open dumping of wastes facilitates the breeding for the disease vectors, and at the same time also creates the issues of environmental degradation and pollution. Decrease in the space availability and other disposal problems have drawn the attention of researchers towards searching and employing a viable cost-effective and eco-friendly technique for the stabilization of the organic waste materials. Vermitechnology has been arising as an innovative eco-technology for the stabilization of various types of organic wastes into nutrient rich vermicompost [3-5]. Vermicomposting is the stabilization of organic waste into nutrient rich manure with the help of earthworms [6]. Earthworms act as mechanical blenders, modifying composition of organic waste, gradually reducing its organic carbon, C: N ratio and retains more available nutrients (NPK). Vermicomposting is beneficial for industrial wastes/sledges as it reduces the sludge genotoxicity [7-9]. Eisenia fetida is the most preferred species in industrial waste vermicomposting as its reproduction rate is much higher, tolerates a wide range of temperature and accepts a wide variety of food. Presence of fungi and actinomycetes during vermin stabilization processes becomes additional food to earthworms which contributes to the higher weight of the earthworms [10].

Earthworms have been used in vermicomposting of various types of solid wastes to produce organic manure [11-13]. Industrial wastes which have been successfully vermicomposted by many workers and turned into organic rich manure include dyeing sludge [5], tannery industry sludge [14], beverage industry sludge [15], distillery sludge [16], paper mill sludge [17], sugar industrial wastes [4,8,9], milk processing industry sludge [18], food industry waste [19]. The study demonstrates that the bioconversion of industrial wastes by earthworms is a simple and low cost technique for bio safe disposal and the breakdown of complex chemicals in sledges/wastes to non toxic forms. However, these wastes need to be premixed with cow dung to improve their acceptability for earthworms and also improves the physico-chemical characteristics. Suitable species of earthworms, capable of consuming wide variety of organic wastes include Eisenia fetida, E. andrei, Eudrilus eugenie, Lumbricus rubellus, L. festivus, L. castaneus, Bimastus eiseni and Perionyx excavates. The most earthworm species used for vermicomposting of industrial wastes is E. fetida as it has high tolerance of environmental conditions (temperature, moisture), higher rates of organic matter decomposition, higher rate of reproduction and shorter life cycle. Vermiculture is a growing industry and a waste less enterprise all over the world as all by-products and finished products are economically useful. Government of India in 1998 announced exemption from tax liability for practicing vermiculture on commercial scale. Vermitechnology provides opportunities in people of rural areas for self employment by utilizing the agricultural waste residues. Apart from providing self-employment to millions of people and utilization of agricultural and industrial waste it will also help in maintaining of cleaner environment for sustainable development. Therefore by adopting vermitechnology is of double interest as along with checking pollution it also converts waste into a fertilizing material.

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