

## Vermicomposting: An Effective Tool for Recycling Organic Wastes in Agriculture

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### Introduction

Recent trend of declining sustainability in agricultural production is appearing as a major threat to most of the Asian countries. The major challenge which the mankind is currently facing is to provide food sustenance for all the people. With per capita land decreasing consistently, various measures are being adopted to increase the agricultural production from these shrinking resources to meet the emergent demand of escalating population. The recent trend of consistently reducing use efficiency of mineral fertilizers under high productive systems associated with the problems of gradual deterioration of soil health due to indiscriminate use of fertilizers is raising frequent questions about over dependence on mineral fertilizers in sustaining the health and, consequently, the productivity of the arable soils. However, sustaining the food production from these decreasing land areas depends largely on one factor, maintenance of soil health at high levels for encouraging good growth of plants. To combat the situation, increasing importance is now being paid on incorporation of organic materials for rejuvenating the health condition and, hence, the productivity of these soils. Large scale availability of conventional organic manures being a big problem nowadays, major attention is being paid on recycling of different kinds of organic wastes for this purpose. Apart from abatement of environmental pollution, such reuse of organic wastes in agriculture helps in the improvement of various physical, chemical and biological properties of the soils and, thus, helps in sustaining the soil health. While recycling different organic wastes in agriculture, it is essential to process the materials through an adequate period of composting for improving their usability in the soils. However, due to some short comings of traditional composting systems, the technology of recycling of organic wastes has not been widely accepted so far. Under this situation, vermicomposting has recently emerged as a simple but efficient biotechnology for recycling wide ranges of organic wastes with the help of some specific groups of earthworms.



Vermicomposting is a method of preparing enriched compost with the use of earthworms. It is one of the easiest methods to recycle agricultural wastes and to produce quality compost. Earthworms consume biomass and excrete it in digested form called worm casts. Worm casts are popularly called as Black gold. Vermicomposting as a completely environmental friendly technology is a viable method of diverting the organic wastes, avoiding the costs of disposal and converting it to a value-added Vermicompost. Vermicompost, product of vermicomposting is nutrient rich organic compost with active microorganisms resulting from the interaction between earthworm and microorganisms during the breakdown of organic matter. Many studies have demonstrated positive effects of vermicompost on a wide range of crops, including cereals and legumes, ornamental, and flowering plants, vegetables, and field crops. Application of vermicompost can also increase soil organic carbon, nitrates, phosphates, exchangeable calcium and some other nutrients for plants. Most of these investigations have confirmed that vermicompost usually has significant beneficial effects on plant growth. Vermicompost also help microbial agents function effectively in soil. Vermicompost is ideal organic manure for better growth and yield of many plants because it has higher nutritional value than traditional composts, has high porosity, aeration, drainage, and water-holding capacity. The presence of microbiota particularly fungi, bacteria and actinomycetes makes it suitable for plant growth. Nutrients such as nitrates, phosphates, and exchangeable calcium and soluble potassium in plant-available forms are present in vermicompost. Plant growth regulators like auxins, cytokinins and other plant growth influencing substances produced by microorganisms are also present in vermicompost. Earthworms release certain metabolites, such as vitamin B, vitamin D and similar substances into the soil. In addition to increased N availability, C, P, K, Ca and Mg availability in the vermicompost are also found. Vermicompost prepared from mixtures of cattle wastes and fly ash to exhibit high occurrence of such microorganism. Such rich occurrence of phosphorus-solubilizing bacteria is likely to solubilise good amount of phosphorus from insoluble form in any organic waste material, and also to qualify vermicompost as a potential phosphatic biofertilizer.

While recycling different organic wastes in agriculture, it is essential to process them through an adequate period of composting. Different types of wastes have been treated through a vermitechology process like dyeing sludge, paper mill sludge, tannery sludge, soft

drink industry waste, beverage sludge. Vermiwash is a liquid fertilizer and used as a foliar spray produced by passing water through columns of vermiculture beds. The work intends to reduce the soil toxicity and degradation caused due to excessive use of chemical fertilizers.



**Fig 1: Vermicompost Unit**



**Fig 2: Prepration of Vermicompost (Vermicomposting)**



**Fig 3: Vermicompost**



**Fig 4: Vermiwash**