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Vermicompost for Improvement of Soil Health

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Vermicompost is the product of the decomposition process using various species of worms, usually red wigglers, white worms, and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast. This process is called vermicomposting, while the rearing of worms for this purpose is called vermiculture.

Vermicast (also called worm castings, worm humus, worm manure, or worm is the end-product of the breakdown of organic matter by earthworms. These excreta have been shown to contain reduced levels of contaminants and a higher saturation of nutrients than the organic materials before vermicomposting. Vermicompost contains water-soluble nutrients and is an excellent, nutrient-rich organic fertilizer and soil conditioner. It is used in gardening and sustainable, organic farming. Vermicomposting can also be applied for treatment of sewage. A variation of the process is vermifiltration (or vermidigestion) which is used to remove organic matter, pathogens and oxygen demand from wastewater or directly from blackwater of flush toilets.

Suitable worm species

All worms make compost but some species are not suitable for this purpose. Vermicompost worms are generally epigean. Species most often used for composting include:

- *Eisenia fetida* (Europe), the red wiggler or tiger worm. Closely related to *Eisenia andrei*, which is also usable.
- *Eisenia hortensis* (Europe), European nightcrawlers, prefers high C:N material.
- *Eudrilus eugeniae* (West Africa), African Nightcrawlers. Useful in the tropics.
- *Perionyx excavatus* (South and East Asia), blueworms. May be used in the tropics and subtropics.
- *Lampito mauritii* (Southern Asia), used locally.

Role of vermicompost in crop production

- Vermicompost has been advocated as good organic manure for use in intregated management practices in the field crops.
- Use of vermicompost as a biofertlizer and substitute for chemical fertilizer is advised by pioneers of organic farming.
- Vermicompost would not only increase organic carbon status of the soils but also increase the soil water holding capacity, flocculation of soil and availability of nutrients, thus improve the soil and crop production sustainable.

- The role of vermicompost in increasing of soluble nutrients in soil. Cowpea seeds of Kanakamony variety were sown in the field in furrows, observation on root shoot ratio, yield and yield attributes were recorded.
- The root shoot ratio, yield and yield attributes were significantly influenced by different treatments.
- Highest value of root shoot ratio were enrich vermicompost in the increased phosphorus availability.
- The enriched vermicompost compared to the other treatments promoted root growth and rigid root shoot ratio.
- Maximum value for yield contributing characters like number of pods per plant, number of seeds per pod and 100 seed weight was recorded in enriched vermicompost.
- Application of vermicompost @ 7.5 t/ha enhanced the yield both grain as well as seed and yield attributing characters of green gram as compared to control and lower levels of vermicompost.
- It was also reported that use of 5 t /ha of vermicompost and 10 t /ha of FYM proved equally effective in enhancing the yield and yield attributing characteristics of green gram.

Advantage of Vermicompost

Vermicompost is the dropping of earthworms after the intestinal digestion of organic matter. These dropping are high in nutritive value. Even of the vermicompost dries there is no harm to these microorganisms. Hence, it can also be called as biological manure. Research has revealed the vermicompost contains many micro nutrients like Mn, Fe, Mo, B, Cu, Zn etc. in addition to some of the growth regulators.

It has many advantages important ones are:

- Vermicompost rich in several microflora like *Azospirillum*, Actinomycetes, *Phosphobacillus*, which multiply fast of through digestive system of earthworms.
- Several enzymes, auxins and complex growth regulators like gibberellins which are not formed in different soil and environmental conditions are present in the earthworms that feed organic wastes.
- Earthworms coccons multiply through vermicompost and churn and turned the soil and make it porous, improve water infiltration, moisture retention etc.
- Soil pH is neutralized by buffering action.
- Vermicompost helps multiplication of earthworms which reduce the incidence of nematodes.
- Due to buffering action, mineral and trace mineral and trace elements become available more easily to crops.
- Nutrient leaching of chemical fertilizers in the soils is reduced considerably especially of N-fertilizers.

Benefits in soil health

- Improves soil aeration
- Enriches soil with micro-organisms (adding enzymes such as phosphatase and cellulase)
- Microbial activity in worm castings is 10 to 20 times higher than in the soil and organic matter that the worm ingests·
- Attracts deep-burrowing earthworms already present in the soil
- Improves water holding capacity