THE POTENTIAL ROLE OF VERMICOMPOST IN FRUIT ORCHARDS

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Malnutrition in child and youth is major crisis in modern era because of taking food lesser quality in food like, grains, pulses, fruits and vegetables. The quality of food and food products decreasing due to using heavier dose of chemical fertilizers instead of organic based fertilizers like, organic waste, composting, organic manures and other organic based fertilizers. All of these organic fertilizers, vermicompost is very important organic product which is prepared by using earthworms and organic waste. Vermicomposting is ecofriendly, biologically and low-technology method in which organic waste is treated and it has been shown to have many positive impacts on plants growth and development and it at the end converted into organic waste consisting high content of macro-elements and humus. Vermicompost is nourish the orchard crops by soil built-up organic carbon, improve nutrient status, enhance cation exchange capacity, microbial activities, microbial biomass carbon and enzymatic activities vermicompost also improves soil structure, soil aggregation and improve water retention capacity.

INTRODUCTION:

Excessive chemical fertilizer applications are contaminating surface and underground water bodies especially by nitrate leaching and causing detrimental effects on environment, soil physical, chemical and biological properties further, inducing secondary and micronutrient deficiencies in soil, nutrient imbalance in soil and plants, environmental hazards and decrease in total factor productivity. If we applied chemical continuously then microbial population in soil also severely affected due to imbalanced fertilizer application. Thus, inclusion of vermicompost organic manure in crop production is a better alternative for improving soil health, crop productivity and quality as it exerts a significant positive influence on soil properties and microbial population. Vermicompost contains most nutrients in plant available form such as nitrates, phosphates, exchangeable calcium and soluble potassium.The earthworms having behavior of feeding, burrowing and casting, modify the physical, chemical and biological properties of organic matter and soil for plant growth and nutrient acquisition. Vermicompost is usually rich in microbial populations and diversity particularly fungi, bacteria and actinomycetes. Thus, application of vermicompost as organic manure in soil built-up organic carbon, improve nutrient status, enhance cation exchange capacity, microbial activities, microbial biomass carbon and enzymatic activities.

NUTRITIONAL VALUE OF VERMICOMPOST:

The nutrients content in vermicompost generally depends on the waste material or base substrate that is being used for vermicompost preparation. Similarly, earthworm species used in vermicomposting may also influence the quality of vermicompost.

NUTRIENT CONTENT: -

Organic carbon	:	9.15 - 17.98 %
Total nitrogen	:	1.5 - 2.10 %
Total phosphorus	:	1.0 - 1.50 %
Total potassium	:	0.60 %
Ca and Mg	:	22.67 - 47.60 meq/100g
Available S	:	128 - 548 ppm
Copper	:	2 - 9.5 ppm
Iron	:	2 – 9.30 ppm
Zinc	:	5.70 – 11.5 ppm

Fig. 1. Site selection and structure preparation.

VERMICOMPOSTING AND ITS PROPERTIES:

Vermicompost is a nutrient-rich, microbiologically-active organic material and it is produced under mesophilic condition which is interactions between earthworms and microorganisms during the breakdown of organic matter. Although microorganisms degrade the organic matter biochemically, earthworms are the crucial drivers of the process, as they aerate, condition and fragment the substrate, thus drastically altering the microbial activity. Earthworms act as mechanical blenders, and by fragmenting the organic matter they modify its physical and chemical status by gradually reducing the

ratio of C:N and increasing the surface area exposed to microorganisms - thus making it much more favorable for microbial activity and further decomposition. Vermicompost exhibit different physical and chemical characteristics that affect soil properties and plant growth in diverse ways and generally converts organic matter to a more uniform size, which gives the final substrate a characteristic earthy appearance, whereas the material resulting from composting usually has a more heterogeneous appearance. When the vermicompost is applied as potting amendments in horticultural crops then many adverse effects are less like, electrical conductivity and excess ions that cause phytotoxicity as a consequence of the chemical properties of the initial waste.

Fig. 2. Applicationof Earthworms,

Fig.3.Releasing of earthworms in organic waste

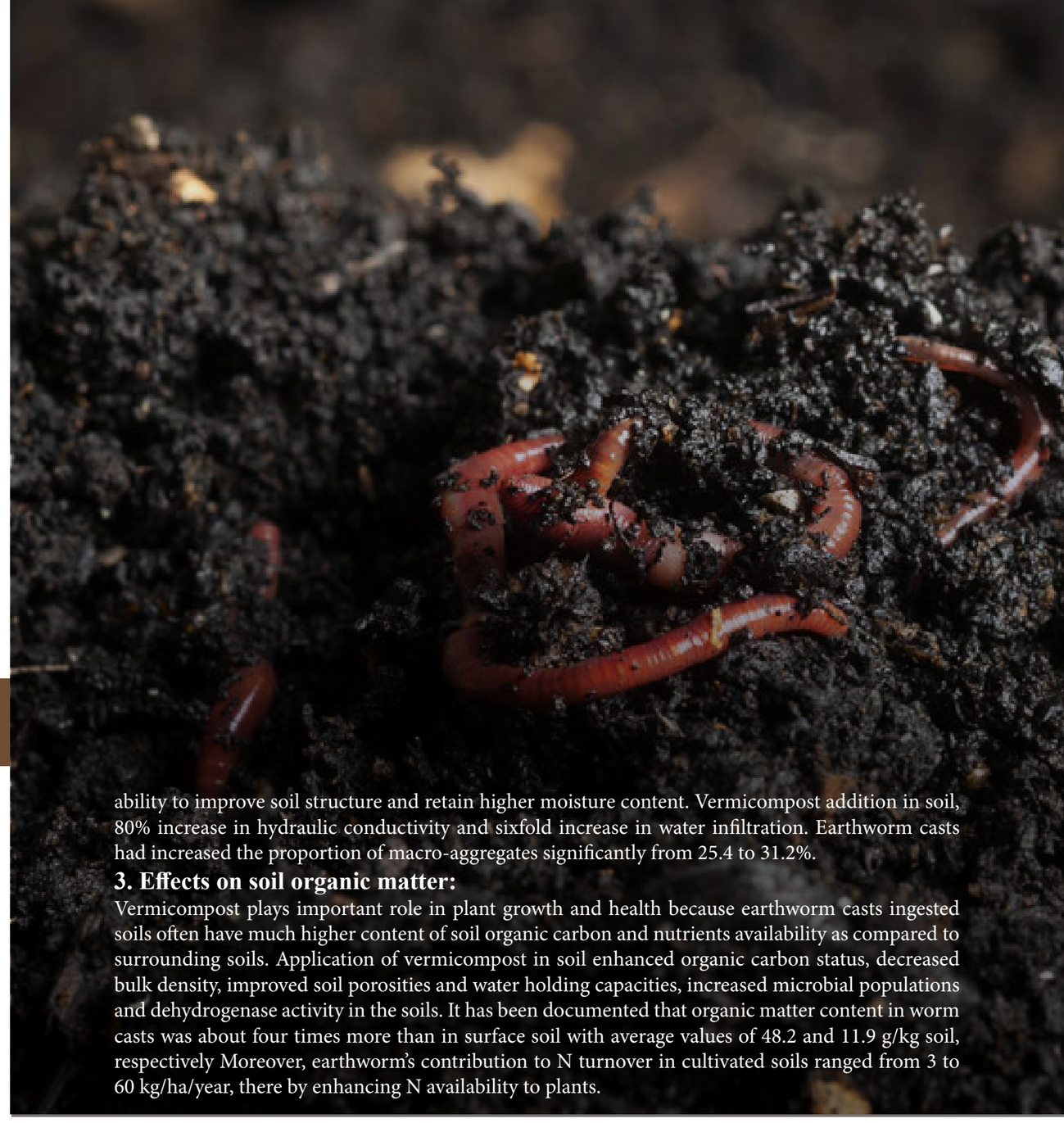
POTENTIAL ROLE OF VERMICOMPOST:

1. Effects on crop growth and productivity:

Application of Vermicompost enhanced plant growth and also has a positive influence on vegetative growth, stimulating shoot growth and root development. The other positive influence of vermicompost application include alterations in morphology of crop plants such as increased leaf area and root branching and stimulated flowering, increase in the number and biomass of and overall increase in fruit yield. Addition of hormones rich vermicompost into the soil resulted in better growth and overall development of plants. Thus, vermicompost usage reduced dependence on costly fertilizer input and enhanced net returns from rice produce. Application of vermicompost increased biomass and grain yield in different crops following judicious application of vermicompost and chemical fertilizers. It also enhanced growth of a wide range of plant species following vermicompost incorporation as it is an instant source of nutrients supply.

2. Effects on soil properties:

Earthworms' application in soil regenerate compacted soils and improves water penetration in such soils and also become soil favorable for essential activity of microbes. The behavioral activity of earthworms that is feeding, burrowing and casting, modify the physical, chemical and biological properties of organic matter and soil. In fact, vermicompost can enhance soil fertility physically, chemically and biologically. Physically, vermicompost supplemented soils have better aeration, porosity, lower bulk density and higher water retention capacity. Soil chemical properties such as pH, electrical conductivity, organic matter and nutrient status improved significantly and led to better plant growth and yield owing to vermicompost application. Moreover, humic acid present in humus provides binding sites for the several plant nutrients viz. calcium, iron, potassium, Sulphur and phosphorus. Earthworm casts ingested soil might create even more favorable environment to plant growth because of higher moisture content and nutrient availability in fresh casts. It also increased growth of rice stalks and improvement in soil fertility status following vermicompost application. Vermicompost have



ability to improve soil structure and retain higher moisture content. Vermicompost addition in soil, 80% increase in hydraulic conductivity and sixfold increase in water infiltration. Earthworm casts had increased the proportion of macro-aggregates significantly from 25.4 to 31.2%.

3. Effects on soil organic matter:

Vermicompost plays important role in plant growth and health because earthworm casts ingested soils often have much higher content of soil organic carbon and nutrients availability as compared to surrounding soils. Application of vermicompost in soil enhanced organic carbon status, decreased bulk density, improved soil porosities and water holding capacities, increased microbial populations and dehydrogenase activity in the soils. It has been documented that organic matter content in worm casts was about four times more than in surface soil with average values of 48.2 and 11.9 g/kg soil, respectively Moreover, earthworm's contribution to N turnover in cultivated soils ranged from 3 to 60 kg/ha/year, there by enhancing N availability to plants.

CONCLUSION:

Nowadays we need to consuming of organic and ecological produced quality fruits and vegetables because of the application of chemical fertilizers is more and more questioned by the consumers and health practitioners. The enhanced plant growth may be attributed to various direct and indirect mechanisms, including biologically mediated mechanisms such as the supply of plant-growth regulating substances, and improvements in soil biological functions. Stimulation of plant growth may depend mainly on the biological characteristics of vermicompost, the plant species used, and the cultivation conditions.