

SOME IMPORTANT STUDIES ON AGRONOMIC IMPACTS OF VERMICOMPOST ON PLANTS pdf

1: Vermicompost and its Role in Plant Growth Promotion - Pen2Print- Open Access Educational Contents

Vermiculture for sustainable horticulture agronomic impact studies of earthworms, cow dung compost and vermicompost vis-a-vis chemical fertilisers on growth and yield of lady's finger (Abelmoschus).

This led to the exploration of alternatives to chemical fertilizers and pesticides among scientific communities. Several researches on potential of earthworms to degrade solid organic matter and analysis of worm cast have demonstrated the use of earthworm cast vermicompost in sustainable agriculture. Vermicompost is a nutritive organic fertilizer enriched with plant available forms of macro Nitrogen, Phosphorus and Potassium and micro Iron, Copper, Zinc, etc. In addition, composition of vermicompost show antagonistic ability against soil-borne pathogens thereby improving plant health. This article presents the importance and use of vermicompost in plant growth and protection and provides the insight on vermicomposting research in Nepal. N ratio, high porosity, aeration, drainage, water holding capacity, microbial activity and is the end product of non-thermophilic biodegradation of organic materials by combined action of earthworms and associated microbes Edwards and Burrows, ; Atiyeh et al. Earthworms act as mechanical blenders and by comminuting the organic substrate they alter its physical and chemical status thereby increasing the surface area favorable for microbial decomposition Dominguez, Earthworm gut plays a vital role in processing of soil and organic matters. Drake and Horn, Activities of endosymbiotic microbes and gut enzymes cellulase, protease, chitinase acid and phosphatase of earthworm aid in transformation of ingested soil and organic matters into valuable product constituting essential nutrients and active components of microbial biomass Zhang et al. Quality of vermicomposts are in correlation with the type of feeding materials for vermicomposting and the earthworm species used. Humic acid present in worm casts provides binding sites for nutrients such as phosphorus, potassium, sulfur, iron, calcium; releases these elements when plant requires and stimulates plant growth even with small amount of humic acid in the vermicompost Canellas et al. Eco-friendly conversion of these organic remains via earthworms provides a best alternative to manage solid wastes and generate valuable organic fertilizers. Source of plant nutrients: From earlier findings it is evident that vermicompost provides all necessary nutrients in plant available forms and also enhances uptake of nutrients by plants. Significant accumulation of N, P, K, Ca and Mg in root and shoot system with the application of humic acids derived from vermicompost was correlated to uptake of nutrients by plants Baldotto et al. Moreover, integrated application of vermicompost and inorganic fertilizer showed increased nutrient content in plant body. Vermicompost enriched with P₂O₅ demonstrated its superiority over other treatments for yield and uptake of major nutrients like N, P, K, Ca and Mg Kumari and Ushakumari, Greater diversity of beneficial microbes: Earthworm enhances microbial diversity and enzymatic activities of ingested microbes through gut associated processes Drake and Horn, As a result, vermicompost consisted of greater pool of soil friendly bacteria, fungi and actinomycetes Brown, ; Chaoui et al. Digestive enzymes lipases, chitinases, and cellulases are secreted into the intestine of earthworms by worm and ingested microorganisms which function in decomposition of ingested organic wastes Urbasek and Pizl, Earthworm gut provides home for anaerobic nitrogen-fixing bacteria and excrete them along with nutrients in its cast Singleton et al. Phosphorus is usually considered as limiting element for plants as it is present in insoluble forms in greater amount in the soil but plant can uptake only phosphate in a soluble ionic form Pi Goldstein, Enrichment of vermicompost with phosphate solubilizing bacteria like *Pseudomonas striata* aids in conversion of phosphorus in plant available form when phosphorus containing substances are added in the organic feed Kumar and Singh, Fungi capable of degrading cellulose can be part of the diet of earthworms and get excreted along with worm cast. When, earthworms ingest cellulolytic fungi along with the organic feed, cellulolytic activity in their gut is attributed to those fungi and the cellulase enzymes of earthworms gut. In presence of earthworms *Eisenia fetida* rate of cellulose decomposition was significantly increased 0. However, the direct contribution of *E. Eisenia fetida* along with beneficial microbes show greater enzymatic activity for processing of organic substrates. In addition, the

SOME IMPORTANT STUDIES ON AGRONOMIC IMPACTS OF VERMICOMPOST ON PLANTS pdf

number of microbes is also increased in the vermicompost as compared to compost. Comparative assessment of enzyme activities and microbial population in vermicompost and normal compost resulted in maximum enzymatic cellulase, amylase, invertase, urease and protease activity in vermicompost than compost Haritha Devi et al. Additionally, most of the enzymes showed positive correlation with change in number and types of bacteria, fungi and actinomycetes during vermicomposting with maximum number of x, 28x, 93x CFU gm⁻¹ of sample, respectively. Vermicompost is reported to contain microbial produced plant growth promoting hormones like auxins, gibberellins and cytokinins Tomati et al. Growth promoting activity of vermicompost was assessed in *Zea mays* Nagavallema et al. The marked differences in plumule length of maize seedling soaked in vermicompost water Vermicompost as soil supplement: It is observed that supplement of vermicompost at the rate of 20 t ha⁻¹ to an agricultural soil in two consecutive years significantly ameliorated soil porosity and aggregated stability Ferreras et al. The effects of vermicompost on soil physio-chemical properties evaluated in tomato *Lycopersicum esculentum* var. Super Beta field Azarmi et al. Effect of vermicompost on soil properties, soil losses and soil restoration showed positive result with decrease in soil loss Plant growth, yield and fruit quality: Vermicompost can induce plant growth and increase yield when supplemented to the soil. Substitution of vermicompost prepared from different sources into soilless nutritive medium Metro-mix in different ratios resulted in increased germination, flowering and growth of *Petunia* Arancon et al. Joshi and Vig, had studied the effect of vermicompost on growth, yield and quality of tomato *Lycopersicum esculentum* L. They demonstrated growth, yield and quality parameters that increased significantly in tomatoes grown in soil amended with vermicompost as compared to soil without fortified with vermicompost. Supplement of vermicompost in soil is dose dependent for better yield of plant and soil properties. There is sufficient scientific evidence that humic acid fraction in vermicompost can trigger plant growth and increase yield. Moreover, integrated use of vermicompost and NPK fertilizer showed positive effect on essential oil content in *Foeniculum vulgare* Valiki et al. Suppression of plant diseases: Vermicompost provides biological control of plant diseases bacterial and fungal ; yet, data on plant disease inhibition mediated by this organic use is scarce Rivera and Wright, Presence of bacterial and fungal load in vermicompost has been confirmed Anastasi et al. Suppressive effect of vermicompost on some root infecting pathogens i. Also, vermicompost has proven to be the best option in management of tomato bacterial spot disease caused by *Xanthomonas campestris* Reddy et al. Control of fungal plant pathogen *Rhizoctonia* spp. Vermicompost is enriched with beneficial bacteria and fungi Proteobacteria, Bacteroidetes, Verrucomicrobia, Actinomycetes, Aspergillus, Trichoderma and Firmicutes which shows antagonistic effect against various plant pathogens like *Fusarium* species and protect plant health Szczech, ; Yasir et al. Severity of infections of *Phytophthora* spp. Use of aqueous extract of vermicompost in control of powdery mildew *Erysiphe cichoracearum* of pea was correlated with the induction of phenolic acids and antifungal activity Singh et al. Moreover, worm cast also enhances the performance of plant growth promoting rhizobacteria against fungal pathogens. Biological management of common scab of potato through *Pseudomonas* spp. Protection against arthropod and nematode pests: The ability of vermicompost to protect plants against arthropod and nematode pests by suppressing, killing, repelling or by inducing biological resistance in plants to fight against them have been demonstrated. Other successful experimental trials against arthropods have been performed by many researchers Yardim et al. Soils from all of the vermicompost treated plots contained smaller populations of plant parasitic nematodes and increment in population of fungivorous and bacteriovorous nematodes as compared to soil from inorganic fertilizer treated plots. Also, vermicompost has been proven effective against infestation of nematode i. *Meloidogyne incognita* Pandey and Kalra, ; Nath et al. Assessment of fruit and vegetable waste at wholesale markets in Nepal for vermicomposting showed greater potential for vermicomposting in terms of nutrient content from leafy vegetables waste, composite waste, leguminous vegetable waste and fruit waste, however, root vegetables waste contained significantly lower N,P,K values Devkota et al, Feeding materials for earthworms show pronounced effect in growth, reproduction and quality of vermicompost. Effect of feeding materials cow dung, cabbage, banana stem, grasses and mixture of all in

SOME IMPORTANT STUDIES ON AGRONOMIC IMPACTS OF VERMICOMPOST ON PLANTS pdf

equal ratio on yield and quality of vermicompost and multiplication of *Eisenia fetida* was conducted in sub-tropical environment of Nepal Tripathi et al. The result showed total N, P, K content significantly higher in cow dung vermicompost. Moreover, multiplication of worms was shown to be highest in cow dung worms followed by mixture, banana stem, grasses and cabbage. In another study, elephant vermicompost showed significantly higher phosphorus and potassium content. Solid wastes generated from Kathmandu Valley Ayurveda industry, sugar mill, wood mill, kitchen and vegetable and fruit market was vermicomposted using *Eisenia foetida* and resulted significantly higher N,P,K content and organic matter in Ayurveda industry waste woody and non-boiled waste and boiled and non-woody wastes but rapid multiplication of worms was found in sugarcane bagasse sugar mill Pant et al. Utilization of different types of feeding material Sericulture waste, leaves of *Populus deltoides* and whole plant of *Eupatorium adenophorum* for production of earthworm *Eisenia fetida* biomass through vermiculture was conducted Patrabansh. However, feeding materials along with inoculation of beneficial microbes also shows significant difference in earthworm population and NPK content in the final vermicompost. Evaluation of different vermiculture systems bed, cement ring and bin systems for recycling of fruit and vegetable wastes in Bharatpur area of Chitwan was conducted Shrestha et al. The bin system was found superior in terms of production of superior quality nitrogen content significantly higher. Vermicompost alone or integrated use of vermicompost and mineral fertilizers shows plant growth promotional effect and yield. The application of vermicompost at 6. Furthermore, vermicompost produced highest vitamin C content in cabbage *Brassica Oleracea L. Capitata* 80mg as compared to chemical fertilizers 56mg Kafle et al. California Wonder as compared with NPK chemicals. Moreover, recommended dose of NPK gm: Bhattarai and Tomar. The integrated use of vermicompost and farmyard manure shows effect on growth and yield of plants. Moreover, plant growth height: However, integrated use of vermicompost, farmyard manure and recommended dose of NPK chemicals also shows plant growth promotional effect. Maximum plant height and number of leaves per plant along with fruit yield of. The use of vermicompost along with inoculation of rhizospheric organisms shows beneficiary response on growth of plants. Moreover, integrated use of vermicompost, bacterial and mineral fertilizers also shows significant effect in yield of plants. Combined application of vermicompost, *Rhizobium* and mineral fertilizer had positive effect in yield of vegetable green soybean Bajracharya et al. Vermicompost provides biological control of plant and soil pathogens. In addition, it is considered as a promising alternative to harmful chemical fertilizers and pesticides in crop production. It is becoming popular as a major component of organic agriculture to produce healthier foods and better option for management of organic solid wastes. Exploration of potential species of earthworms in vermiculture technology along with soil friendly microbes, use of different high nutrient organic substances, efficient vermiculture system, dose specific use of vermicompost, integrated use of vermicompost with other inorganic fertilizers and research on earthworm-microbe interactions provide bright future of vermicompost use in organic farming systems. To sum up, this article opens the scope for further researches regarding vermicompost in sustainable agriculture and provides the potential of vermicomposting in Nepal. Vermicompost, the story of organic gold: *Agricultural Sciences*, 37, " *Eisenia fetida* Oligochaeta, Lumbricidae activates fungal growth, triggering cellulose decomposition during vermicomposting. *Microbial Ecology*, 52, "

SOME IMPORTANT STUDIES ON AGRONOMIC IMPACTS OF VERMICOMPOST ON PLANTS pdf

2: Vermicompost, the story of organic gold: A review

Vermiculture for sustainable horticulture agronomic impact studies Biographical notes: Sunita Agarwal is an Assistant Professor in the PG Department of Home Science, University of Rajasthan.

Received Apr 29; Accepted Aug This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Abstract This study was conducted to investigate direct short-term impact of vermicompost on some soil biological properties by monitoring changes after addition of vermicompost as compared to farmyard manure in an alkaline soil with high lime content from semiarid Mediterranean region of Turkey. For this purpose, mixtures of soil and organic fertilizers in different doses were incubated under greenhouse condition. Even though soil dehydrogenase activity appeared to be dose-independent based on overall evaluation, organic amendments were found to elevate dehydrogenase activity when sampling periods are evaluated individually. A slight but statistically significant difference was detected between organic amendments in terms of urease activity. Vermicompost appeared to more significantly increase bacterial number in soil. Clearly, vermicompost has a potential to be used as an alternative to farmyard manure to improve and maintain soil biological activity in alkaline calcareous soils from the Mediterranean region of Turkey. Further studies are needed to assess its full potential for these soils. Introduction It is known that microorganisms are the key players in processes such as degradation of organic material, formation of soil organic matter, and nutrient cycles and that these processes are the ones determining soil quality and fertility. Therefore, application of organic fertilizers is a recommended management practice since it stimulates microbial growth and activity leading to chemically and physically more favorable soil environment for plant growth. Microorganisms perform these processes through extracellular enzymes that they secrete. Extracellular enzymes could remain active in soil for a long time and they tend to increase with application of organic fertilizers [1]. They contain beneficial microorganisms secreting extracellular enzymes to release nutrients bound to organic compounds. Due to the fact that organic fertilizers include compounds that are substrates for soil enzymes, they also stimulate indigenous microorganisms to perform these processes. Therefore, enzyme activity analyses can be used in order to assess effect of organic amendments on microbial status of a soil. In larger context, soil enzyme activities have been used as indicators of soil quality due to their sensitivity to any changes that may occur in soil [2 , 3]. For the last four decades, effect of numerous factors, including organic amendments, on soil enzyme activity has been intensively studied by many scientists [1 , 4 – 11]. It is known that measuring activity of a single soil enzyme is not sufficient since they are generally substrate-specific [12 , 13]. Conventional organic fertilizers, such as compost and farmyard manure, are widely recommended for agricultural production as nutrient source and soil conditioner. In recent years, vermicompost has been considered as an alternative to conventional organic fertilizers. Vermicompost is a product of nonthermophilic biodegradation of organic material by earthworms with the help of microorganisms [15]. Besides being nutrient source and improving soil chemical and physical properties, vermicompost has been reported to contain plant growth promoting compounds hormones and to have disease suppression properties, distinguishing it from other conventional organic fertilizers [16]. It has also been suggested that nutrients are released more gradually from vermicompost preventing problems, such as nutrient loss, toxicity, and salinity, which may otherwise be associated with utilization of organic materials under certain conditions [17 – 19]. Studies conducted on vermicompost have been mainly focused on its effects on plant growth and yield [20 – 26], its disease suppression properties [27 – 30], and also changes in microbial activity during the vermicomposting process [15 , 31 – 36]. Several studies investigating relationships between vermicompost and microbial activity in soil under various conditions are also available in scientific literature [37 – 42]. However, most of these studies were conducted on soils with neutral or acidic pH. Surprisingly, there is limited information on effect of vermicompost on soil biological properties

SOME IMPORTANT STUDIES ON AGRONOMIC IMPACTS OF VERMICOMPOST ON PLANTS pdf

such as soil enzyme activities and relationships with other soil properties in alkaline soils. Moreover, most of the vermicompost-related studies employing measurement of soil microbial activity have been conducted in the presence of plants and with soil samples taken in limited frequency. Even though the ultimate goal is to utilize vermicompost to improve plant growth and yield, one must also know the direct effect of such materials on soil microorganisms without any interference that may come from plants. In addition, such studies must involve more frequent soil sampling in order to monitor changes in microbial activity after addition of vermicompost to soil. Therefore, studies are needed to address these issues. This is especially important for Turkish Mediterranean region because soils of this region are typically in alkaline character and have high lime content and, to our knowledge, no such study involving vermicompost has been conducted in this region.

Materials and Methods This study was conducted as a pot experiment in which mixtures of soil and organic materials were incubated for sixteen weeks under greenhouse conditions in the Akdeniz University campus. The soil used in the experiment was obtained from a land that was previously used as citrus orchard in Bogacay section of Antalya located in the Mediterranean region of Turkey and taxonomically determined to be fluvent class. The vermicompost was produced mainly from farmyard manure and provided by a local company, and farmyard manure was obtained from the dairy farm belonging to the Faculty of Agriculture at Akdeniz University. Physical and chemical properties of soil, vermicompost, and farmyard manure used in the study are given in Table 1. Table 1 Physical and chemical properties of soil and organic materials used in the study.

SOME IMPORTANT STUDIES ON AGRONOMIC IMPACTS OF VERMICOMPOST ON PLANTS pdf

Confusions of pleasure Naturalists scrapbook Starting Lettering (First Skills Series) Fortran 77 for Engineering and Scientists The Neapolitan streak Histopathology (Wolfe Medical Atlases) H.P. Lovecrafts Cthulhu Mythos A discourse on the agriculture of the state of Connecticut, and the means of making it more beneficial to Health care system of india . Leiningers cultural care model Botulinum toxin : history of clinical development Daniel D. Truong, Dirk Dressler, and Mark Hallett Reading ancient texts Elements of power electronics krein Target four dollar list Modern African wars Large synchronous machines The logic of action rothbard Harvard business review on pricing. Fashion illustration techniques book The federalist papers publius Agricultural Drainage (Agronomy, No. 38) Historic charter chests of the Borough of Swansea You can overcome despondency Thoughts on business, service, and investing Things of Magic, Science and Invention. Three Mezzo-Soprano Arias from Margaret Garner Crimes of neglect Disneys Robin Hood John Wayne Stand Up Be Counted, Pilgrim Live as if there are no secrets British empire series. Blossom and the Fruit a True Story of a Black Magician Narrowing Circles The deteriorative power of conventional art over nations Selection of the hplc method in chemical analysis Dr seuss coloring book Why monkeys live in trees Rules for old men waiting Essays on press freedom English for academic correspondence and socializing