

Organic Matter Amendments Improve Soil Health, Productivity and Profitability of Maize and Soybean



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Abstract

Field trials were conducted for consecutive two years (2016 & 2017) at Agriculture Research Institute Mingora Swat, Pakistan to study the effect of various organic matter incorporation to soil on maize and soybean yield and soil health. Results revealed that phenological and Morphological traits responses of both crop were positive to organic matter incorporation. Pre and post-harvest soil analysis of the maize and soybean field showed that soil health was significantly boosted with organic matter addition.

Introduction

Organic matter incorporation is an ancient age agriculture practices to enhance soil aeration, nutrients supply and water infiltration rate along with water holding capacity. In modern day agriculture practices, the organic matter amendments is proven beyond doubts in respect of their diverse role for soil health [1-3].

Initially it was used as supplement of chemical fertilizer to provide nutrients in abundance for crop growth and maintenance [4-9]. OM (manure and composted manure brings a lot of beneficial microorganisms that can act as PGPR. For degraded soil reclamation organic matter is mostly incorporated acts mainly as a source of nutrients, and improves some physical properties. On strongly degraded soils, mainly by acidity (pH in KCl even of 3,2, in water probably about 4) the effect of single dose of farmyard manure last even 3 years or more and consists mainly on softening of negative effects of acidity (probably complexing of exchangeable Al). It also depends on crop. It has been reported that, during 3 years the crop uptake (apparent) from farmyard manure was about of 25-40% of N, 20% P, 37-55%K and 10% of Mg introduced with farmyard manure [2,5,10-12]. All manures are not the same the manure which gives the quick response is Vermi compost or earth worm castings. These are low in ammonia but have good nitrate concentration.

In addition they are high is soluble phosphate and the complete complement of needed nutrition including its excellent ability to supply Calcium. The use of a thermophilic turned leaf compost when amended with 10 to 20% castings gives season long and early growth stimulus. This is a best of both worlds all organic solution to many issues in feeding plants organically. It also saves on application since it is useful for early and later stage nutrition without unnecessary multiple lay by applications.

Vermi compost (VC) and plant residues (PR) are environmentally friendly materials. VC has many favorable physicochemical characteristics, making it suitable for mixture in substrates including high porosity, good aeration, drainage and water holding capacity (WHC). Vermi composting, in contrast to conventional compost, is the product of an accelerated biooxidation of organic matter by the use of high densities of earthworm populations without passing a thermophilic stage [5,10,12,13]. Different earthworm species are able to consume a wide range of organic residues such as sewage sludge, animal wastes ; crop residues; and industrial wastes.

The earthworm-processed organic wastes are finely divided peat-like materials with high porosity, aeration, drainage, and water-holding capacity sludge Compared to conventional compost which passes a thermophilic stage, vermicompost usually has a much finer structure and larger surface area providing strong absorbability and retention of nutrients. Based on all these characteristics, earthworm-processed organic waste would have a great commercial potential in the horticultural industry as container media for growing bedding and vegetable plants. There is strong scientific evidence that vermicompost can significantly influence the growth and productivity of plants. All these characteristics of soil known as soil health [14-29].

Material and Methods

Field experiment was conducted at Agriculture Research Institute Mingora Swat to evaluate the impact of organic matter on maize and soybean growth and yield. The design for study was used randomized complete block design with three replication of each crop. All recommended agronomic practices was followed till harvest of the crop [30-39].

Results and Conclusion

Phenological and Morphological traits responses of both crops were positive to organic matter incorporation. Pre and

post-harvest soil analysis of the maize and soybean field showed that soil health was significantly boosted with organic matter addition (Figure 1 & 2) [40].



Figure 1



Figure 2

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