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Influence of Fortified Organics on Organic Carbon Availability in Soil

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Abstract-- Increasing demand, and by the awareness of the environmental and human health damage induced by over use of pesticides and fertilizers (Avis et al. 2008; Leach and Mumford, 2008) worldwide agricultural practice is moving to a more sustainable and environmental friendly approach. Organic matter is known to improve soil health and availability of plant nutrients. In recent years, soil application of organic wastes has emerged as an attractive and cost effective alternate strategy for wastes management around the world. The composted or un composted organic waste material is applied in huge quantities to supply the required quantity of nutrients in agricultural systems.

In a nutshell, taking into consideration of the performance of various treatments on different doses of nitrogen and bio regulators enriched poultry manure studied, particularly yield and yield components and soil fertility status, it can be concluded that the treatment i.e. application of 100 per cent nitrogen enriched poultry manure at 2.5 t ha⁻¹ at seventh day of incubation along with bio regulators (AA 3) enriched poultry manure at 5.0 kg ha⁻¹ has resulted in the improvement of all beneficial parameters leading to enhanced yield and quality of onion var. Co (On) 5 by supplying balanced nutrients to the crop throughout the growth period and the same can be recommended to the farming community for adoption.

I. INTRODUCTION

Within the past few years, several organic sources have been placed on the market to regulate growth and production of crops. Growers are searching for ways to increase yield in an economic manner. Complementarily to those naturally occurring interactions, agricultural bio regulators include diverse formulations of compounds, substances and microorganisms that are applied to plants or soils to regulate and enhance the crop's physiological processes, thus making them more productive (Calvo et al., 2014). Increasing demand, and by the awareness of the environmental and human health damage induced by over use of pesticides and fertilizers worldwide agricultural practice is moving to a more sustainable and environmental friendly approach.

Organic matter is known to improve soil health and availability of plant nutrients. In recent years, soil application of organic wastes has emerged as an attractive and cost effective alternate strategy for wastes management around the world. The composted or uncomposted organic waste material is applied in huge quantities to supply the required quantity of nutrients in agricultural systems.

Adequate storage and transportation facility as well as extensive labours are required for their application. Moreover, availability of organic manures is decreasing day by day. This can be overcome to some extent through improving quality as well as nutrient status of compost so that it may be applied at substantially reduced rates (Kg/ha) than traditional application rates (t/ha).

II. REVIEW OF LITERATURE

The continuous use of large quantities of chemical fertilizers in intensive cropping system results in various adversities and unfavorable soil conditions (Parr et al., 1990). Consequentially, the supplementary and complementary use of the available source of nutrients in the form of organics in conjunction with the chemical fertilizers will increase the efficiency of both substances to maintain a high level of soil productivity. The value of these materials lays not only in their macro and micronutrients contents, but also in the substantial quantities of humus, which are essential for maintenance of SOM and soil health. The incorporation of organics, in the form of manures is known to influence beneficially the soil physical, chemical and biological properties. This can be overcome to some extent through improving quality as well as nutrient status of compost so that it may be applied at substantially reduced rates (Kg/ha) than traditional application rates (t/ha), by achieving enrichment the nitrogen dose can also be reduced.

Chibuikwe et al., 2012 reported that the soils amended with organic materials also showed higher amounts of pH reduction than the soils without additional organic materials.



Microbial oxidation of elemental sulphur using appropriate organic materials such as plantain peels is therefore recommended as a means of ameliorating sulphur deficiency and alkalinity in soils. Soil biomass carbon increased with the application of enriched organic manures and decreased with the application of ammonium sulphate.

III. MATERIALS AND METHODS

Field experiments were conducted to evaluate the nitrogen and bio regulator enriched organics on the yield and quality of onion, changes in soil physico-chemical properties, nutrients availability, nutrient release pattern, ammonia evolution pattern and its effectiveness on soil fertility status.

Preparation of nitrogen enriched poultry manures

For poultry manure enrichment, a well decomposed poultry manure (PM) was taken and physically mixed at the recommended ratio (1:10) with urea seven days before application. The constituent was thoroughly mixed and brought to the required moisture level (50 per cent in PM) with water to ensure moist friable manure. The enriched manure was kept as such for seven days.

Field experiments were conducted to evaluate the nitrogen and bio regulators enriched organics on plant growth, yield and yield attributes apart from its impact on soil fertility and nutrient availability by using onion as test crop.

Soil samples

A composite surface (0 -1 5 cm) soil sample was collected prior to the layout of the field trials for assessing the basic soil characteristics and fertility status of the experimental site.

IV. EXPERIMENTAL RESULTS

The analytical data of the initial soil of the experimental site and the soil of the experimental field was sandy clay loam, neutral in reaction (pH 7.52) and EC 0.50 dSm⁻¹. The organic carbon content was found to be low (3.3 g kg⁻¹). The organic carbon content (SOC) of the soil ranged from 3.43 to 3.74, 3.63 to 4.04, 3.68 to 4.20 and 3.56 to 3.98 g kg⁻¹ at vegetative, bulb formation, bulb development and harvest stages, respectively. The data indicated that the SOC content was increased significantly with increasing growth stages of the crop up to harvest.

The different treatments significantly affected the soil organic carbon content. The highest mean value (3.74, 4.04, 4.20 and 3.98 g kg⁻¹) of SOC content was recorded by the treatment T 15 (100 per cent N enriched poultry manure at 2.5 t ha⁻¹ + AA 3 at 5.0 kg ha⁻¹) followed by T 14 (100 per cent N enriched poultry manure at 2.5 t ha⁻¹ + AA 3 at 2.5 kg ha⁻¹) and T 13 (poultry manure at 5.0 t ha⁻¹ + AA 3 at 5.0 kg ha⁻¹) registered 3.74, 3.94, 4.20 and 3.98 g kg⁻¹ at vegetative, bulb formation, bulb development and harvest stages, respectively. The treatment T 1 (control) and T 2 (100 per cent N + Farm yard manure at 25 t ha⁻¹) was found to register lower SOC content (3.43, 3.63, 3.68 and 3.56 g kg⁻¹) at vegetative, bulb formation, bulb development and harvest stages, respectively. Soil OC content is generally considered as an index of soil fertility and sustainability of agricultural systems. It improves the physical, chemical and biological properties of soil.

In this investigation, the SOC content got marginally increased with the advancement of growth in both the crops recording about 10 per cent increase from initial to later stages of the crops. The application of organic manure or nitrogen and bio regulators enriched organic manures registered significant increase in SOC over the control. The increase in soil organic carbon content might be due to the presence of carbonaceous materials for decomposition by microorganisms and subsequent conversion to mineralized organic colloids besides adding them to the soil reserves (Sharma and Mitra, 1990). On application of organic manures, the microorganisms flourish and later perish adding to the organic carbon pool. The increase in SOC content with the stages of sampling might be attributed to the increase in root growth and subsequent addition of crop residues, decaying root biomass and senescing leaves to the organic carbon pool of the soil (Nagarajan et al., 2000).

V. CONCLUSION

In a nutshell, taking into consideration of the performance of various treatments on different doses of nitrogen and bio regulators enriched poultry manure studied, particularly yield and yield components and soil fertility status, it can be concluded that the treatment i.e. application of 100 per cent nitrogen enriched poultry manure at 2.5 t ha⁻¹ at seventh day of incubation along with bio regulators (AA 3) enriched poultry manure at 5.0 kg ha⁻¹ has resulted in the improvement of all beneficial parameters leading to enhanced yield and quality of onion var. Co (On) 5 by supplying balanced nutrients to the crop throughout the growth period and the same can be recommended to the farming community for adoption.



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REFERENCES

- [1] Avis, T.J., V. Gravel, H. Antoun and R.J. Tweddell. 2008. Multifaceted beneficial effects of rhizosphere microorganisms on plant health and productivity. *Soil Biol.Biochem.*, 40: 1733-1740.
- [2] Calvo, P., L. Nelson and J.W. Kloepper. 2014. Agricultural uses of plant biostimulants. *Plant Soil*, 383: 3-41.
- [3] Chibuike, G. U., N. N. Agbim and C. L. A. Asadu. 2012. Microbial oxidation of elemental sulphur as a means of increasing sulphate availability and combating alkalinity in soils.
- [4] *Nature and Sci.*,10(11). Leach, A.W. and J.D. Mumford. 2008. Pesticide environmental accounting: a method for assessing the external costs of individual pesticide applications. *Environ. Pollut.*, 151: 139-147.
- [5] Nagarajan, R., P. Stalin, P. Muthukrishnan and M. Subramanian. 2000. Effect of continuous manurial practices on grain yield and soil chemical properties in a rice based cropping system of Cauvery delta of Tamil Nadu. *Madras Agric. J.* 87(6-7):186-190.
- [6] Sharma, A.R. and B.N. Mitra. 1990. Complementary effect of organic, bio and mineral fertilizers in rice based cropping system. *Fert. News* 35:43-51.