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INFLUENCE OF ORGANIC SUPPLEMENTS AS FOLIAR SPARY ON SOIL MICROBIAL POPULATION AND YIELD OF MAIZE (ZEA MAYS)

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ABSTRACT

To study the influence of foliar spraying of different organic compounds namely panchagavya, humic acid and kunapanjola on the yield of maize and their impacts on soil microbes after the harvest of the crop a field experiment was conducted at experimental farm, Faculty of Agriculture, Annamalai University, Chidambaram. It was laid out in Randomized Block Design with eleven treatments and replicated thrice. The treatments includes control, Recommended dose of fertilizers, and foliar spraying with three different organic products viz., panchagavya, humic acid and kunapanjola with three levels of spray on 20,40 and 60 DAS on maize. Grain yield of maize varied significantly due to different organic compounds and at varied time of application. Application of 100% recommended dose of fertilizers (RDF) and 3 sprays (20,40 and 60 DAS) of 3 % Panchagavya recorded the highest yield of maize and this was followed by application of recommended dose of fertilizers (100 %) along with 3 sprays (20,40 and 60 DAS) of 3 % humic acid . Similarly higher rhizosphere microbial population was observed in the same treatment that receives 3% panchagavya at 3 different growth phases of the study. The least maize yields and post harvest microbial population was recorded in absolute control without use of organic products and inorganic fertilizers.

INTRODUCTION

Maize (Zea mays) is a major rainy season cereal crop, which provides the nutritional security due to its high nutritional value and having great demand. Maize grain contains about 10% protein, 70% carbohydrates, 4.1% oil and 2. 3% crude fibre. Due to its high yield potential, it is called queen of cereals. It is grown in 645 million hectare land with 11 .11 million tonnes of production and 1723 kg/ha productivity in India. With increased awareness on organic farming among the farming community the use of many organic formulations in crop production is increasing. During the last few years there has been increasing interest in the use of panchagavya, beejamrutha, kunapanjola, jeevamrutha and other liquid organic formulations. Panchagavya and kunapanjola are two organic products which have received wide spread attention and acceptability among organic farming practitioners. They proved to be efficient plant growth stimulants which enhances the biological efficiency of crops and the nutritional quality of the fruits and vegetables. Swaminathan *et al*., (2007) and Devakumar *et al*., (2008) reported the presence of naturally occurring beneficial microorganism's predominantly lactic acid bacteria, yeast, actinomycets, photosynthetic bacteria, nitrogen fixers, phosphorus solublisers and fungi in panchagavya. Similarly, Humic acid is another organic component obtained from humic substances. Humic acid, which is used as a commercial product normally contains, 6-8% H, 44-58% C, 0.5-4% N, 42-46% O and many other components (Larcher, 2003). Humic acid may be utilized in agriculture as a fertilizer, plant growth promoter, nutrient carrier and soil conditioner (Bidegain *et al*., 2000). An attempt was made to study the effect of foliar spraying of these organic inputs along with inorganics on soil microbial population and yield of maize. The objectives are to study the effect of panchagavya, kunapanjola and humic acid on yield of maize, and to study the effect of these on soil microbial population.

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MATERIALS AND METHODS

A field study was conducted at experimental farm, Department of Agronomy, Faculty of Agriculture, Annamalai University, Tamil nadu, India. The soil type of experimental field was clay loam. Panchagavya was prepared by following standard procedure given by Natrajan (2007). Panchagavya was filtered through a clean cloth. Kunapajala was prepared by following the procedures.

Influence of organic nutrients on soil microbial population and yield on Maize

Treatments	Yield (kg/ha)		Microbial Population		
	Cob	Stover	Bacteria (10^5)	Fungai (10^4)	Actenomycetes (10^3)
T1 - Absolute control	2200	5720	114	7	14
T2 - Recommended dose of Fertilizers alone	3100	6386	187	8	16
T3 - T2 + Foliar spray of panchagavya at 30 DAS	4040	7434	261	11	22
T4 - T2 + Foliar spray of panchagavya at 25 and 50 DAS	4920	8266	321	12	24
T5 - T2 + Foliar spray of panchagavya at 20, 40 and 60 DAS	5560	8729	342	18	29
T6 - T2 + Foliar spray of Kunapajala at 30 DAS	3520	6934	232	11	19
T7 - T2 + Foliar spray of Kunapajala at 25 and 50 DAS	4460	7939	268	12	22
T8 - T2 + Foliar spray of Kunapajala at 20, 40 and 60 DAS	5010	8166	320	13	25
T9 - T2 + Foliar spray of humic acid at 30 DAS	3600	7056	225	11	19
T10 - T2 + Foliar spray of humic acid at 25 and 50 DAS	4540	7990	276	10	24
T11 - T2 + Foliar spray of humic acid at 20, 40 and 60 DAS	5100	8211	318	13	25
SEd	160	192	Data not Analysed		
CD	320	385			

It contained fish scale waste 10Kg, grind sesame oil cake 4 kg, rice husk 4kg, molasses 4kg and fresh cow urine 30L. These ingredients were taken in an 80L plastic pot, mixed well and allowed to ferment aerobically in shade for 60 days, the preparation was sieved well with the help of a fine cloth and stored for use. 3 liters of Panchagavya and Kunapajala filtrate was diluted in 100 liters of water and sprayed according to the treatment schedule at different growth stages of maize crop. Grain and stover yields were recorded and microbial population viz; bacteria, fungi, actinomycetes, present in rhizosphere were analysed. Serial dilution and standard plate count methods were used for isolation of rhizosphere bacteria, fungi and actinomycets using nutrient agar, Martin's rose bengal agar and Kuster's agar respectively. Inoculated plates were incubated at 32 ± 2^0 C for 5 days and the colony counts were recorded. The initial microbial population for bacteria, fungi, actinomycets were 126 x (10^5), 9 x (10^4) and 16 x (10^3) respectively. Field experiment consists of 11 treatments comprising of three different organic compounds Viz Panchagavya , Kunapajala and humic acid applied as foliar spraying at different stages of crop growth along with recomended dose of fertilizers. The experiment was laid out in Randomized Block design with three replications

RESULTS AND DISCUSSION

Yield: A perusal of the data indicated that the yield of maize significantly differed with the combined application of recommended dose of fertilizers along with foliar spray of different organic suppliments. The highest yield of maize is observed in the 100 % RDF + spraying of 3 % Panchagavya at 20, 40 and 60 DAS. This might be due to adequate supply of nutrients at different growth stages of the crop as well as presence of growth regulators in Panchagavya contributing to higher grain yield (Sridhar e*t al*., 2001). Next in order of higher corn yield was recorded in treatment which receives foliar spraying of humic acid at three different DAS. The least corn yield recorded under absolute control might be due to lack of adequate supply of nutrients (nitrogen, phosphorus and potassium) to the crop which in turn affected the growth of the crop ultimately reflecting on yield.

Microbial population

The rhizosphere microbial population varied due to the application of varied organic nutrients at different stages of crop growth and was significantly superior than absolute control and recommended dose of fertilizers. Application of liquid manure promotes biological activity in soil and enhances nutrients availability to crops.

Among different organic nutrients, higher microbial population was observed in treatment T_5 with panchagavya spray on 20, 40 and 60 DAS followed by with humic acid spray three times at different growth stages of the crop. This may be attributed to the fact that panchagavya is a rich source of beneficial micro-organisms like N-fixers and P-solubilizers. Similar observations were made by Swaminathan *et al*. (2007). Lower microbial population was observed in treatment T6 with foliar spraying of Kunapajala at three different stages of crop growth.

Conclusion

Based on the study, corn yield was higher in application of recommended dose of fertilizer along with three sprays of three per cent panchagavya at 20,40 and 60 DAS and also registered higher microbial activity in rhizosphere soil. Also all the liquid formulations are found to superior than recommended dose of fertilizer and control. Use of these formulations would help framers to get higher yield and besides improvement in biological properties. These formulations can be prepared locally by resource poor farmers and improve soil health, besides obtaining higher yields to the farmers in rural areas.

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