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Influence of Integrated Nutrient Management in Pearl Millet

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ABSTRACT

A field experiment was conducted at Experimental Farm, Annamalai University to evaluate the influence of integrated nutrient management techniques on the productivity of pearl millet. The combined application of organic manures and fertilizers had significantly increased growth and yield components of cumbu. The results indicated that the productivity of pearl millet crop can be induced by the application of balanced utilization of nutrients to the crops through integration of organic manures and fertilizers. Treatment T_{10} recorded the highest value in growth and yield components.

Keywords: *Pearlmillet, Vermicompost, Biofertilizers, Organic manures and Inorganic Fertilizers.*

INTRODUCTION

Pearl millet (*Pennisetum glaucum*) is an important millet crop and grown for both food and fodder purpose. It is also used a rainfed crop for dry land agriculture. India is the largest producer of pearl millet in the world occupying about 7.32 million hectare with annual production of 9.18 million hectare with annual production of 9.18 million tones with average productivity of 1255 kg ha^{-1}. Directorate of Economics and Statistics[3]. Pearl millet is more nutritious and the grain contains 11-19%, protein 60-78%, carbohydrates, and 4.6% fat and also it is at drought an resistant growing crop.

Application of organic and inorganic manures for sustaining productivity of soil and crops is an intensive cropping system. Farmyard manure has play a role in increasing fertility of the soil and improving water holding capacity of the soil[7].

With short in supply and escalating prices of chemical fertilizers there is an increasing awareness in favour of adopting biological routes of soil fertility management techniques so as to prevent soil degradation and improving the efficiency of applied fertilizers and thus maintaining crop growth. The combination of organic and inorganic sources of nutrients together with biofertilizer have proved good result to use of each component separately[4].

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The integrated approach of nutrient supply by chemical fertilizers along with organic manures and biofertilizers is gaining importance and balanced INM involving lower doses of organic materials is needed on priority to enhance the nutrient use efficiency of native and applied nutrients for restoring soil fertility[1].

MATERIAL AND METHODS

The field experiment was carried out during summer season of January – April 2013 at Experimental Farm, Annamalai University. The climate of the experimental site is semi-arid tropical type. The mean annual rainfall is 753.3 mm. The fertility status of the soil was 7.1 in pH, high in organic carbon (0.59%) low in available nitrogen (272 kg N ha^{-1}), medium in available phosphorus (13 kg P_2O_5 ha^{-1}) and potassium (234 kg K_2O ha^{-1}). The experiment was laid out in randomized block design with three replications, comprising thirteen treatments viz., T_1 – RDF, T_2 – T_1 + FYM @ 4 t ha^{-1}, T_3 – T_1 + Biocompost @ 4 t ha^{-1}, T_4 – T_1 + FYM @ 2.0 t ha^{-1}, T_5 – T_1 + Biocompost @ 2.0 t ha^{-1}, T_6 – 75% RDF + FYM @ 4 t ha^{-1}, T_7 – 75% RDF + Biocompost @ 4 t ha^{-1}, T_8 – T1 + Biocompost @ 2.0 t ha^{-1} + *Azospirillum* + Azotobacter, T_9 – T_1 + FYM @ 2.0 t ha^{-1} + *Azospirillum* + Azotobacter, T_{10} – 75% RDF + Biocompost @ 4 t ha^{-1} + *Azospirillum* + Azotobacter, T_{11} – 75% RDF + FYM @ 4 t ha^{-1} + *Azospirillum* + Azotobacter.

The application of inorganic fertilizers and organic manures were applied as per recommendation given in the treatment schedule. The fertilizers were applied uniformly to all plots at the time of sowing seeds were treated with biofertilizers as seed inoculation. The biometric observations were recorded on growth and yield components such as plant height, number of tillers per plant and seed yield. The observed data on crop were statistically analyzed based in the procedure given by Gomez and Gomez[5].

RESULTS AND DISCUSSION

The results obtained from the presence investigation as well as related discussion have been summarized under following title.

Effect of growth yield components of pearl millet

Growth components *viz.,* plant height and yield components like grain yield, fodder yield, number of tillers $plant^{-1}$ and crude protein content (%) had registered highest value under application of 75% RDF + Biocompost @ 4 t ha^{-1} + Azotobacter + Azospirillum (Table 1). Similar findings were reported by Sadyajeet *et al.*[9]. The beneficial effect of FYM and biocompost may be due to its contribution in supplying additional plant nutrients. Increase of grain yield might also be due to the increased photosynthetic activity which resulted in higher accumulation of photosynthates and translocation of sink due to better source and sink channel which resulted in higher grain yield. These observations correlated with those by Patil and Shete[8]. The increase in yield attributes may be due to the fact that INM application of fertilizer make more availability of nutrients which is provide to a higher availability of nutrient to the plant, while biocompost improves the soil physical properties, hydraulic conductivity of the soil and also availability of NPK, which promoted plant growth and development and resulting in increasing yield attributes of pearl millet. Application of biofertilizers led to higher availability of N and P as well as promoted the root growth, which promoted yield attributes characters. Similar findings were reported by Keerthanan[7], Singh and Singh[10], Jadhav *et al.*[6], and Blaise and Prasad[2].

Table 1. Influence of organic and inorganic sources of nutrients on growth and yield of pearl millet

Treatments	Plant height (cm)	No. of tillers plant^{-1}	Crude protein (%)	Grain yield (kg ha^{-1})	Fodder yield (kg ha^{-1})
T_1 – RDF	195.49	3.71	3.41	3112	6221
T_2 – T_1 + FYM @ 4 t ha^{-1}	198.32	4.78	4.42	3459	7168
T_3 – T_1 + Biocompost @ 4 t ha^{-1}	200.18	4.41	4.27	3391	7082
T_4 – T_1 + FYM @ 2.0 t ha^{-1}	202.77	4.56	4.09	3349	6929
T_5 – T_1 + Biocompost @ 2.0 t ha^{-1}	207.08	3.84	4.03	3288	6852
T_6 – 75% RDF + FYM @ 4 t ha^{-1}	208.27	3.24	3.67	3076	6541
T_7 – 75% RDF + Biocompost @ 4 t ha^{-1}	206.89	3.48	4.49	3526	7309
T_8 – T_1 + Biocompost @ 2.0 t ha^{-1} + Azospirillum + Azotobacter	205.02	4.76	3.84	3261	6709
T_9 – T_1 + FYM @ 2.0 t ha^{-1} + Azospirillum + Azotobacter	201.68	4.89	3.71	3192	6688
T_{10} – 75% RDF + Biocompost @ 4 t ha^{-1} + Azospirillum + Azotobacter	218.58	3.76	4.58	3628	7496
T_{11} – 75% RDF + FYM @ 4 t ha^{-1} + Azospirillum + Azotobacter	217.83	4.02	2.58	2839	6018
S.Ed.	3.13	0.18	0.22	121.0	328
CD (P=0.05)	4.26	0.36	0.44	242.0	656

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