

Research Paper :

Potentiality of bio-fertilizer and various resources for sustaining pearl millet yield and soil productivity under rainfed agriculture

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ABSTRACT

A field experiment was conducted on sandy soils at Agricultural Research Station, Radhanpur (North Gujarat) during 2003-2006 to ascertain the effect of bio-fertilizer, various organic sources alone or along with inorganic fertilizers on productivity of pearl millet and post harvest soil fertility under rain fed condition. There were twelve treatments involving inorganic, organic and bio fertilizers (*Azotobacter* / *Azospirillum* and PSM). All the treatments of nutrient management found significantly superior over absolute control. Maximum yield (1920 kg/ha), total income, net realization (Rs.16709/ha) and BC Ratio (2.75) were obtained due to application of recommended dose of NP fertilization (80:40 NP kg/ha) along with gypsum @ 250 kg/ha. The maximum uptakes of N, P and K by pearl millet were significantly affected and recorded maximum with application of NP fertilization + gypsum @ 250 kg/ha. The available phosphorus and DTPA extractable micronutrients status after harvesting of crop were significantly affected due to different treatment.

Key words : Pearl millet, Biofertilizer, Nutrient uptake, Productivity

Pearl millet is important crop in North West Agro-climatic Zone of Gujarat. Now a days, use of chemical fertilizer is increasing to boost up crop production to meet the need for increasing population of the nation. Simultaneously, cost of chemical fertilizer is increased constantly, besides these, use of inorganic fertilizer only is injurious to soil health and soil productivity. Integration of inorganic, organic and bio-fertilizers for enhancing crop production and sustaining soil fertility, this prove great promise for farmers. Nitrogen fixers and phosphate solubilizers contribute through biological fixation of nitrogen, solubilization of fixed nutrients and enhanced uptake of plant nutrients (Mane *et al.*, 2000). Keeping these views in mind, an experiment was conducted to find out the effect of bio-fertilizer and various resources for sustaining pearl millet yield and soil productivity under rain fed conditions.

MATERIALS AND METHODS

A field experiment was conducted on sandy soils at Agricultural Research Station, Radhanpur (North Gujarat) during 2003-2006 to ascertain the effect of bio-fertilizer, various organic resources alone or along with inorganic fertilizers on productivity of pearl millet and post harvest soil fertility under rain fed condition. The experiment comprising of total 12(twelve) treatments involving: T₁- Absolute control, T₂- NP Fertilization (80:40 kg NP/ha), T₃- T₂ + 40 kg K₂O/ha, T₄- T₂ + 250 kg gypsum/ha, T₅- 50% RDF + compost 5t/ha, T₆- 50% RDF + castor cake

@ 500 kg/ha, T₇- 50% RDF + bio-fertilizer(seed dressing of *Azotobacter* / *Azospirillum* and PSM @ 1.25 kg/ha each and top dressing @ 1.25 kg/ha each at 35-40 DAS), T₈- T₇ + 40 kg K₂O/ha, T₉- T₇ + 250 kg gypsum/ha, T₁₀- T₇ + castor cake @ 500 kg/ha, T₁₁- T₇ + compost 5t/ha, T₁₂-compost 5t/ha + castor cake @ 500 kg/ha + bio-fertilizer + top dressing of 50 % N only in randomized block design with three replications. The grain, fodder and soil samples were collected after completion of the experiment (2006), processed and analyzed for various soil chemical properties using standard procedure (Jackson, 1973; Lindsay and Norvell, 1978).

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

Grain and fodder yield:

The results revealed that grain as well as fodder yields of pearl millet were significantly affected due to different treatments (Table 1). All the treatments of nutrient management found significantly superior over absolute control (T₁). Maximum grain yield (1920 kg/ha) and fodder yield (7891kg/ha) were obtained due to application of recommended dose of NP fertilization (80:40 NP kg/ha) along with gypsum @ 250 kg/ha (T₄) which was higher by 327 and 306 per cent as compared to their respective absolute control. Of course, grain and fodder yields of plot treated with T₄ were statistically at par