

Effect of dual inoculation of *rhizobium* and PSB on yield, nutrient content, availability of nutrient contents and quality of soybean [*Glycine max* (L.) Merrill]

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ABSTRACT

A field experiment was conducted to study the effect of dual inoculation of *rhizobium* and PSB on yield, nutrient (N, P, K) content, quality parameter *i.e.* protein as well as oil content and availability of nutrients in soil at harvest of soybean. The highest grain yield was recorded due to inoculation of *rhizobium* + PSB with 100% RDF. The highest grain yield of 15.46 q ha⁻¹ recorded in 100% RDF + *rhizobium* + PSB was significantly superior over all the treatments. However, lowest of 7.52 q ha⁻¹ were obtained in control. The highest N (6.23%), P (2.68%) and K (2.29%) contents in seed was obtained in T₁S₃ treatment. Dual inoculation of *rhizobium* + PSB also improved the quality of soybean in presence as well as absence of chemical fertilizer. The residual fertility in soil was also more due to 100% RDF + *rhizobium* + PSB treatment.

Key words : Soybean, Biofertilizers, *Rhizobium* and PSB inoculation, Yield, Quality.

Oilseeds contributed to yellow revolution and significant role has been played by introduction of soybean and sunflower. The crop soybean has been playing an important role in national economy by earning an average of Rs. 20,000 million per annum through export of soymeal and contributing about 10% to the edible oil production. Madhyapradesh, Maharashtra, Rajasthan, Karnataka and Andhra pradesh are the main soybean producing states in India. Maharashtra occupies 2nd position in soybean production. It has brought the revolutionary changes in the rural economy management by way of increasing the social and economic status of the farmers through soybean farming. Considering all these facts the present investigation was carried out.

MATERIALS AND METHODS

An experiment with bio-fertilizers *viz.* *rhizobium* and phosphorous solubilizing bacteria inoculation on soybean was conducted at Research farm, Cotton Research Station, Marathwada Agricultural University, Parbhani (M.S.) during *khariif*, 2005-06. The soil of the experimental site belongs to clay and slightly alkaline. The soil had pH 8.30, EC 0.27 dSm⁻¹, organic carbon 4.6 g kg⁻¹, available phosphorous 15.90 kg ha⁻¹ and available potassium 588 kg ha⁻¹. The area falls under semi-arid agro-climate with annual mean precipitation of 786 mm.

The Twelve treatments consisting of different combinations of 3 main and 4 sub treatments. The three main treatments were T₁=100% RDF, T₂=75% RDF and T₃=No RDF combined with four sub treatments S₁= only *rhizobium* inoculation, S₂= only PSB inoculation, S₃= *rhizobium* + PSB inoculation and S₄= No bio-fertilizer (Table 1). The treatments were laid out in factorial

Randomized block design with four replications. *rhizobium* and PSB inoculation were used @ 250 g/10 kg seeds. The crop was fertilized @ 30 kg N, 60 kg P₂O₅ and 30 kg K₂O ha⁻¹ through Urea, SSP and Muriate of potash, respectively at sowing to the plots where 100 % RDF and 75%RDF treatments were applied.

RESULTS AND DISCUSSION

Grain, straw and biological yield:

It was observed from the Table 1, that the highest grain yield was recorded due to inoculation of *rhizobium* + PSB with or without chemical fertilizers. Among the different treatment combinations the dual inoculation of *rhizobium* + PSB with 100% RDF gave highest grain yield than only chemical fertilizer and only bio-fertilizer. The data further revealed that the incorporation of 100% RDF with *rhizobium* + PSB (T₁S₃ treatment) inoculation recorded maximum grain yield of 15.46 qha⁻¹ which was significantly superior over control. In case of bio-fertilizer treatments, S₃ (*rhizobium* + PSB) treatment showed highest grain yield of 13.47 qha⁻¹ which was 37.34 per cent more over control. Namdeo and Gupta (1999) recorded the highest yield with co-inoculation of *rhizobium* + PSB along with 100% RDF. Shrivastav and Rajput (2000) recorded similar findings. The straw yield and total biological yield due to various treatments indicated trend similar to grain yield. (Table 1).

Nutrient content:

It was observed from the Table 2, that the highest nutrient content (N, P and K) was recorded at flowering stage of crop and there after gradually decreased with advancement of crop growth (*i.e.* in straw).