

## Effect of bio and inorganic fertilizers combination on growth and yield of soybean

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### ABSTRACT

A field experiment was conducted during the *Kharif* season 2006-2007 at Farm of University Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, to study the "Effect of bio and inorganic fertilizer combinations on growth and yield of soybean". Four fertilizer levels viz., No fertilizer ( $F_0$ ), 50% RDF ( $F_1$ ), 75% RDF ( $F_2$ ) and 100% RDF ( $F_3$ ) in main plots and four biofertilizer treatments viz., No culture ( $B_0$ ), *Rhizobium* culture ( $B_1$ ), PSB culture ( $B_2$ ) and *Rhizobium* + PSB culture ( $B_3$ ) in sub plots were replicated four times in a split plot design. *Rhizobium* strains *Rhizobium japonicum* and PSB strain *Pseudomonas striata* were inoculated @ 25 g each  $kg^{-1}$  seed. The effect of biofertilizer levels and inorganic fertilizer levels on growth and yield of soybean were statistically significant. Higher grain yield was obtained with 30 kg N + 75 kg  $P_2O_5$  + 30 kg  $K_2O$   $ha^{-1}$  (100% of RDF) and *Rhizobium* + PSB. (250 g each to 10 kg of seed)

**Key words :** N.P.K, PSB, *Rhizobium*, Yield and soybean

### INTRODUCTION

Soybean is an important pulse and oilseed crop grown through out the world. It is *Kharif* crop so grown in rainy season. It is third major oilseed crop in India. It is originated in China and established itself as a leading crop in USA, Brazil and China. India ranks 5<sup>th</sup> in soybean production in world after Brazil, America, Australia and France (Anonymus, 2007). Generally soybean is grown in soil with low N and P status or with application of lesser quantity of organic, inorganic and bio-fertilizers which has resulted in deterioration of both *i.e.* soil health and productivity. The productivity of soybean can be increased by inoculation of bio-culture *i.e.* *Rhizobium* and phosphorus solubilizing bacteria which showed encouraging results in sustaining the crop productivity and to improve the soil fertility (Dubey, 1997).

### MATERIALS AND METHODS

Field experiment was carried out at the Agronomy Department Farm of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola on plot No. 66 during the *Kharif* season of 2006-07. It was observed from the analysis that, the soil of experimental field was clay in texture. Soil was slightly alkaline in reaction. The soil was medium in available nitrogen (285 Kg  $ha^{-1}$ ), low in available phosphorus (19.12 kg  $ha^{-1}$ ), fairly high in available potassium (356 kg  $ha^{-1}$ ) and moderate in organic carbon.(0.52 %) The experiment was laid out in split plot design with four replications, four combinations of nitrogen, phosphorus and potassium levels through urea; single super phosphate and murate of potash *i.e.*  $F_0$  : Control,  $F_1$  : 15 kg N + 37.5 kg  $P_2O_5$  K + 15 kg  $K_2O$   $ha^{-1}$  (50%

of RDF),  $F_2$  : 22.5 kg N + 56.25 kg  $P_2O_5$  + 22.5 kg  $K_2O$   $ha^{-1}$  (75% RDF),  $F_3$  : 30 kg N + 75 kg  $P_2O_5$  + 30 kg  $K_2O$   $ha^{-1}$  (100% of RDF) and Four levels of biofertilizers *i.e.* Control, *Rhizobium* (250 gm per 10 kg seed), Phosphate solubilising micro-organisms – (250 g per 10 kg seed) and *Rhizobium* + PSB (250 g each to 10 kg of seed). The soybean seeds were sown on 2<sup>nd</sup> July with seed rate 75 kg  $ha^{-1}$  at different row spacing 45 x 5. Weed control was done by one hand operated hoeing and 2 weeding and spray of Endosulfan (35 EC). Organic manure *i.e.* FYM was given to all the plot as per the recommended dose (5 t /ha). The various fertilizers and biofertilizers were applied as per the treatments. One pre-emergence and one protective irrigation were given. The total rainfall received during the crop season was 740.2 mm.

### RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

#### Effect of inorganic fertilizers on the growth and yield of the soybean:

Maximum plant height was observed at all stages by 100 per cent recommended dose of fertilizer ( $F_3$ ) which was at par with 75% of RDF ( $F_2$ ). This might be due to more amount of nutrient applied through chemical fertilizers at sowing as well as one month after sowing which provide nutrient in more amount as compared to other treatments. Rapid availability of nutrient through fertilizers caused more uptake of nutrients through plant. N, P and K are major plant nutrients causing increased meristematic activity of the plant as a result of increased

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