

## Effect of organic manuring and mineral fertilizer on the growth, yield and economics of soybean [*Glycine max* (L.) Merrill]

G.S. TOMAR\* AND S.N. KHAJANJI

Department of Agronomy, College of Agriculture, Indira Gandhi Krishi Vishwa Vidyalaya, RAIPUR (C.G.) INDIA

### ABSTRACT

An experiment was conducted at Raipur during 2001-02 and 2002-03 to study the effect of organic and inorganic sources of nutrients on the productivity, quality and economics of soybean [*Glycine max* (L.) Merr.]. Treatments consisted of four combinations of organic manuring viz.  $M_0$ :control,  $M_1$ :crop residues-rice straw @ 5 t ha<sup>-1</sup>,  $M_2$ :FYM @ 5 t ha<sup>-1</sup> and  $M_3$ :crop residue + FYM each @ 5 t ha<sup>-1</sup> + Zinc @ 5 kg ha<sup>-1</sup> and three levels of mineral fertilizers viz.  $F_0$ :control,  $F_1$ : 100 % RDF and  $F_2$ :50 % RDF) laid out in split plot design with three replications. Significantly taller plants coupled with more number of branches, nodulation and dry matter accumulation per plant, pods per plant and seeds per pod due to the application of organic manuring and mineral fertilizers resulted higher seed yields during both the years. Organic manuring with crop residue + FYM each @ 5 t ha<sup>-1</sup> along with 5 kg ha<sup>-1</sup> of zinc ( $M_3$ ) registered its superiority with respect to growth and yield contributing parameters and hence seed and stover yields were enhanced significantly over rest of the treatments. Recommended dose of fertilizers ( $F_1$ ) recorded significantly higher plant height with profuse branching, more number of pods per plant and seeds per pod and finally the seed and stover yields of soybean as compared with control and 50 % RDF.

**Key words** : Soybean, Organic manuring, Fertilizers, Nutrient content and uptake

### INTRODUCTION

Soybean [*Glycine max* (L.) Merrill] an important oilseed crop of India. It has the capacity to fix atmospheric nitrogen with the help of rhizobium and improves soil fertility. Soybean is gaining popularity in the new state of Chhattisgarh. However, its average yield is deplorably low in rainfed uplands because of injudicious use of plant nutrients. This calls for balanced use of fertilizers and adoption of appropriate agronomic practices. In view of escalating prices and high demand supply gap of chemical fertilizers, there is strong need to adopt an integrated nutrient supply system by judicious combination of organic manures and mineral fertilizers to improve soil health and soybean productivity. Integrating chemical fertilizers with organic manures has been found to be quite promising not only in maintaining higher productivity but also in providing greater stability in crop production (Nambiar and Abrol, 1992). The information on the use of organic manuring along with mineral fertilizers is not available especially in the agro-climatic conditions of Chhattisgarh, thus it had become necessary to formulate an experiment to work out the optimum level of nutrient supply system through organic manuring and mineral fertilizers for increasing the yield potential of soybean.

### MATERIALS AND METHODS

The present study was conducted at College of Agriculture, IGKV, Raipur during *kharif* seasons of 2001-2002 and 2002-2003. The soils of the experimental site was clayey in texture with pH 7.12, low in available

nitrogen (237 kg/ha), medium in available phosphorus (13.75 kg) and high in available potassium (362 kg/ha) The treatments comprised of 4 levels of organic manuring viz.  $M_0$ :control,  $M_1$ :crop residues-rice straw @ 5 t ha<sup>-1</sup>,  $M_2$ :FYM @ 5 t ha<sup>-1</sup> and  $M_3$ :crop residue + FYM each @ 5 t ha<sup>-1</sup> + zinc @ 5 kg ha<sup>-1</sup> allocated to main plot and three levels of mineral fertilizers viz.  $F_0$ :control,  $F_1$ : 100 % RDF and  $F_2$ :50 % RDF) assigned to sub plot laid out in split plot design with three replications. Recommended doses of fertilizers (RDF) viz., 20 kg nitrogen through urea, 60 kg phosphorus through single super phosphate and 40 kg potash through muriate of potash were given. Well decomposed farm yard manure (FYM) and crop residue(decomposed rice straw) was incorporated in to the soil a week before sowing, where as full doses of NPK was applied in furrows as basal placement before seed sowing as per the treatments.

Soybean variety JS-335 was sown in third and fourth week of June in 2001 and 2002, respectively using a seed rate of 70 kg per hectare and spaced 30 cm and 5 cm between rows and plants, respectively. Seeds were treated with Carbendazim @ 3 g/kg of seed and latter with *Bradyrhizobium japonicum* culture. A total of 560.11 and 538.4 mm rains were received during crop growth period. To control weeds alachlor was applied @ 2.0 kg/ha as pre-emergence spray. One manual weeding was done 30 days after sowing. The crop was harvested in the second and third week of October during 2001 and 2002, respectively. The observations on growth and yield contributing parameters, seed and straw yields of soybean were recorded and analyzed statistically and harvest index