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Residual fertility status of soil under integrated nutrient management of soybean

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ABSTRACT

A field experiment was conducted during 2006 – 2007 at Agriculture College Farm, Nagpur (M.S) to study the impact of integrated nutrient management in soybean on residual fertility status of soil. It was observed that available N was maximum in treatment T_4 (277.65 kg/ha) which was at par to treatment T_{11} (276.91 kg/ha), T_7 (276.16 kg/ha) and T_6 (275.17 kg/ha) whereas available P was maximum in T_{11} (17.89 kg/ha) which was at par with T_7 (17.75 kg/ha) and T_6 (17.69 kg/ha) and available potassium was maximum in treatment T_4 (266.65 kg/ha) which was at par with T_{11} (265.91 kg/ha), T_7 (265.16 kg/ha), T_6 (264.92 kg/ha), T_{10} (264.41 kg/ha), T_9 (263.76 kg/ha).

Key words : Soybean, Integrated Nutrient Management, Residual fertility

INTRODUCTION

Soybean was introduced in India during mid sixties. It has become the miracle "Golden bean" of the twentieth century. Area of soybean in India and Maharashtra is continuously increasing due to its dual utility as pulse as well as oil seed crop. So indiscriminate use of chemical fertilizers, pesticides, and unplanned use of irrigation water have threatened the sustainability of agriculture production. Such chemical compounds are increasing health hazards, polluting soil and reducing the quality of production. Thus, there is increased relevance of use combination of inorganic, organic and biofertilizer for sustaining soil health, strengthening natural resource base, and production of nutritious food. Use of farmyard manure, compost and biofertilizer is an ecofriendly system of agriculture and improves soil fertility status thereby reduces the use of inorganic fertilizers to great extent.

The available research indicates that the use of appropriate combination of inorganic, organic and biofertilizer will be better to maintain productivity and soil health. The stability in production can also be achieved if the ecological base of agriculture is adequately protected from different forms of degradation. Thus, attempt was made to make combined use of organic, inorganic and biofertilizer with Amrutpani for improving residual fertility status of soil.

MATERIALS AND METHODS

The experiment was conducted during *Kharif* season 2006 – 2007 at Agriculture College Farm, Nagpur under Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The soil of experimental field was fairly clayey having organic carbon 6.2g/kg, available nitrogen 251.7 kg/ha, available phosphorus 12.89 kg/ha and available potassium 242.3 kg /ha. The experiment was conducted in RBD with eleven treatment combinations of inorganic, organic and biofertilizer and Amrutpani are T_1 RDF (30:75:00 kg NPK/ ha), T_2 Amrutpani, T_3 75 % RDF, T_4 75 % RDF + 5t FYM/ ha, T_5 75 % RDF + Amrutpani, T_6 75 % RDF + Amrutpani + PSB, T_7 75 % RDF + Amrutpani + PSB + *Rhizobium*,T_8 5t FYM/ha, T_9 5 t FYM/ha+ Amrutpani, T_{10} 5t FYM/ha + PSB, T_{11} 5t FYM/ha + Amrutpani + PSB + *Rhizobium*. In present investigation Amrutpani is prepared by taking 250 g Ghee + 15kg of cow dung + 10 lit of cow urine + 500 g of honey + 200 lit of water. The ingredients are thoroughly mixed together and allowed to ferment for one week, mixture so obtained is called as Amrutpani. Amrutpani known to have good population of PGPR and thereby improving soil properties (Rupela *et al*., 2006). The available nitrogen from soil after harvest was estimated by Alkaline permaganate method of Subbiah and Asija (1956), whereas available P in soil was determined by Olsen's method, and the available K in soil was determined in Neutral normal ammonium acetate (Jackson, 1967).

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized in Table 1 :

Residual fertility status of soil :

Nutrient status of soil significantly influenced by various treatments furnished in Table 1 indicate that available N was maximum in Treatment T_4 (277.65 kg/ ha) which was at par to treatment T_{11} (276.91 kg/ha), T_7 (276.16 kg/ha) and T_6 (275.17 kg/ha). This might be due to combined use of inorganic fertilizers and organic sources of nutrients that resulted into higher nodulation

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Table 1 : Available Nutrient (N, P and K) status of soil after harvest and N and P uptake as influenced by various treatments

Treatments	Available Nutrient status of soil after harvest		
	N	P	K
T_1	264.20	13.99	254.24
T_2	256.56	13.20	248.64
T_3	263.65	13.95	253.73
T_4	277.65	14.08	266.65
T_5	264.99	14.05	258.02
T_6	275.17	17.69	264.92
T_7	276.16	17.75	265.16
T_8	264.50	16.75	255.03
T_9	271.92	16.95	263.76
T_{10}	272.10	17.10	264.41
T_{11}	276.91	17.89	265.91
S.E. $\pm$	1.09	0.073	1.45
C.D. (P=0.05)	3.23	0.21	4.30
GM	269.43	15.76	260.04

and mineralization of N through microbial disintegration of organic matter. Dev and Tilak (1976) concluded that better nodulation resulted in more synthesis of leghemoglobin and consequently higher N fixation. The available phosphorus was maximum in T_{11} (17.89 kg/ha) which was at par with T_7 (17.75 kg/ha) and T_6 (17.69 kg/ha). This might be due to some sort of triggering action of native soil phosphorus resulting in increased P availability due to combined use of organic, Inorganic and Biofertilizer *i.e.* PSB + *Rhizobium* caused further improvement in soil P possibly due to solubilization of fixed or added 'P'. Similarly available potassium was maximum in Treatment T_4 (266.65 kg/ha) which was at par with T_{11} (265.91 kg/ha), T_7 (265.16 kg/ha), T_6 (264.92 kg/ha), T_{10} (264.41 kg/ha), T_9 (263.76 kg/ha). This may be due to combined use of inorganic, organic and biofertilizers and basically higher presence of K in soil. Also Amrutpani in combination with inorganic, organic and biofertilizer might have played vital role in improving nutrient availability status of soil by activating certain beneficial microorganisms and PGPR. Similar results were also found by Gupta *et al*. (1992), Sarkar and Tripathi (1996), Dubey (2001), Honale (1996), Anonymous (2005) and Rupela *et al.* (2006).

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