Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.8384

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2020) *8*(5), 515-518

Research Article

Indian Journal of Pure & Applied Biosciences

Peer-Reviewed, Refereed, Open Access Journal

Site Specific Nutrient Management for Increasing Soybean Production

M. S Dandge[1*], P. D. Peshattiwar[2], R. S. Ghawde[3], P. V. Mohod[4]

Regional Research Center, (Dr. PDKV, Akola) Amravati-444603

*Corresponding Author E-mail: msdandge@rediffmail.com

Received: 8.09.2020 | Revised: 14.10.2020 | Accepted: 26.10.2020

ABSTRACT

The field experiment was conducted in field at Regional Research Center, Amravati during kharif season in 2018-19. The experiment was laid out in Randomized block design with three replications consisting of seven treatments. Based on inputs nutrient application rate 25:32:32 kg/ha N:P_2O_5:K_2O comprising of T1: SSNM basal recommendation through nutrient expert (35:49:43 NPK kg/ha), T2: T1 – N Omission (00:32:32 NPK kg/ha), T3: T1 – P Omission (25:00:32 NPK kg/ha), T4: T1 – K Omission (25:32:00 NPK kg/ha), T5: RDF (NPKS) (30:75:30:20 NPK S kg/ha), T6: Farmers practice (23:58:00 NPK kg/ha), T7: Absolute control. The observation on Yield attributes viz., pods per plant, seed index, seed yield kg/ha, straw yield kg/ha and harvest index was recorded at the time of harvesting. Significantly highest no. of pods per plant (19.00) was recorded with application NPK. The mean of test weight was (10.73 g) found to be highest with the ample application of NPKS. The significantly highest seed yield (1718 kg ha^{-1}) was recorded with application of NPKS followed by omission of K (1517 kg ha^{-1}) while lowest seed yield (1115 kg ha^{-1}) was recorded under absolute control and omission of Phosphorus (1296 kg ha^{-1}). The mean straw yield recorded was significantly highest (2111 kg ha^{-1}) under combined application of NPKS whereas lowest straw yield (1443 kg ha-1) was registered in treatment absolute control. The treatment with RDF (NPKS) recorded higher net returns and higher B: C ratio.

Keywords: *Site Specific Nutrient Management, Soybean.*

INTRODUCTION

Soybean has already established as one of the substitute crop for major *kharif* cash crop. The improved production technology has increased the productivity of soybean. There are various package of practice has developed for increasing soybean production. Now a day's most of the farmers are alert regarding adoption of recommended dose of fertilizer, incorporation of FYM, compost and crop residues as well as seed treatment with bio-fertilizers etc. for getting maximum yield. The major concern today is the low productivity of soybean and one of the major concerns of low productivity is declining soil fertility.

Cite this article: Dandge, M. S., Peshattiwar, P. D., Ghawde, R. S., Mohod, P. V. (2020). Site Specific Nutrient Management for Increasing Soybean Production, *Ind. J. Pure App. Biosci.* *8*(5), 515-518. doi: http://dx.doi.org/10.18782/2582-2845.8384

Continuous use of imbalance fertilizers has resulted in macro and micro nutrient deficiencies and is consider as the most important factor for low productivity of soybean after water management. The existing fertilizer recommendation for soybean often consists of fixed rates and timing of N, P and K for vast areas of production. Such recommendations are constant over the years over large areas. But crop growth and crop need for supplemental nutrients are strongly influenced by crop growing conditions, crop and soil management and climate which can vary greatly among field, season and year (Umesh et al., 2014).

The SSNM (Site Specific Nutrient Management) approach does not significantly aim to either reduce or increase fertilizer use. Instead, it aims to apply nutrients at optimal rates and times in order to achieve high yield and high efficiency of nutrient use by the crop, leading to high cash value of the harvest per unit of fertilizer invested (Shankar & Umesh, 2008). Considering the fertilizer cost and availability, this limited resource needs to be saved for sustainable crop production through improving the nutrient use efficiency by site specific application. The concept of site specific nutrient management (SSNM) for crop emerged in the mid-1990s. Site specific nutrient management (SSNM) is a set of scientific principles for optimally supplying essential nutrients (Umesh et al., 2014). We need SSNM mainly for increasing nutrient use efficiency and profitability. Therefore, an experiment was conducted with the objective to study the bridging yield gap of soybean through site specific nutrient management (SSNM).

MATERIALS AND METHODS

The field experiment was conducted in field at Regional Research Center, Amravati during *kharif* season in 2018-19. The experiment site was fairly uniform, leveled and have medium black soil. The experiment was laid out in Randomized block design with three replications consisting of seven treatments. Based on inputs nutrient application rate 25:32:32 kg/ha N:P_2O_5:K_2O comprising of T1:SSNM basal recommendation through nutrient expert (35:49:43 NPK kg/ha), T2: T1 – N Omission (00:32:32 NPK kg/ha), T3: T1 – P Omission (25:00:32 NPK kg/ha), T4: T1 – K Omission (25:32:00 NPK kg/ha), T5: RDF (NPKS) (30:75:30:20 NPK S kg/ha), T6: Farmers practice (23:58:00 NPK kg/ha), T7: Absolute control.

After seed bed preparation, sowing Soybean cv JS-95-60 was done by dibbling. The net plot size was 5.0 m x 2.7 m. The observation on Yield attributes *viz*., pods per plant, seed index, seed yield kg/ha, straw yield kg/ha and harvest index was recorded at the time of harvesting.

RESULTS AND DISCUSSION

Yield attributes

The number of pods per plant ranged 14.53 to 19.00. Significantly highest no. of pods per plant (19.00) was recorded with application NPKS followed by omission of K (17.60) while lowest number of pods per plant (14.53) was recorded under absolute control and omission of Phosphorus (14.73). The seed index of soybean seed at harvest stage varied from 9.71 to 10.73. The mean of test weight was (10.73 g) found to be highest with the ample application of NPKS. The test weight of soybean seed in NPK omission treatments indicated that the nutrients are required in balanced quantity. Nath et al. (2012) reported similar results with the application of NPK.

Growth and biomass production were strongly influenced by indigenous nutrient supply and the nutrients supplied through fertilizers. This was reflected in yield parameters, seed and straw soybean yield (Table 1). The seed yield of soybean ranged from 1151 to 1718 kg $ha^{-1.}$ The significantly highest seed yield (1718 kg ha^{-1}) was recorded with application of NPKS followed by omission of K (1517 kg ha^{-1}) while lowest seed yield (1115 kg ha^{-1}) was recorded under absolute control and omission of Phosphorus (1296 kg ha^{-1}). Thus indicates the importance of phosphorus in soybean crop and its sensitivity to phosphorus. The seed yield was decrease due to omission phosphorus, omission of nitrogen and omission of potassium over combined application of NPK.

Highest yield gap over SSNM treatment was observed in control treatment of P omission treatment i.e. 206 kg/ha while least yield gap over RDF was noticed in K omission treatment (-201 kg/ha) (Table 2). The higher seed yield with the combined application of NPK could be attributed to adequate supply of nutrients through balanced nutrient management system which helped for proper growth and yield attributes and led higher grain yield. Kolo et al., (2012) also reported similar findings. Katkar et al. (2012) and Janjilwad et al. (2019) recorded significantly highest yield of soybean by the application of NPK.

The straw yield of soybean at harvest stage varied from 1443 to 2111 kg ha^{-1}. The mean straw yield recorded was significantly highest (2111 kg ha^{-1}) under combined application of NPKS whereas lowest straw yield (1443 kg ha-1) was registered in treatment absolute control. The highest straw yield in balanced NPK might be ascribed due to enhanced nutrient uptake and efficiency of nutrients. The results are in line with the findings reported by Singh et al. (2001). The highest harvest index was observed in K omission treatment.

Economics in soybean

Economics is an important factor that determines practical utility/ feasibility of the technology in crop production. Different nutrient management practices increased seed yield accordingly net returns and benefit cost ratio. The treatment with RDF (NPKS) recorded higher net returns and higher B: C ratio. Need based application of fertilizers to the crop under SSNM might have led to the higher production. Hence higher net returns and B: C ratio than control were observed under NPKS approach. Biradar et al. (2006) made similar observation in wheat, rice and chickpea crops. Lower net returns and B: C ratio was recorded in Absolute control.

Table 1: Fffect of site specific nutrient management on yield and economics of soybean

Treatment	Pods/ plant	Seed index	Seed Yield (kg/ha)	Straw yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
SSNM basal recommendation through nutrient expert	17.93	10.06	1502	1886	44.31	28752	50894	22142	1.77
T1 – N omission	17.20	10.35	1488	1840	45.10	28927	50362	21435	1.74
T1 – P omission	14.73	10.39	1296	1606	44.67	25892	43883	17991	1.69
T1 – K omission	17.60	10.20	1517	1817	45.47	28542	51261	22719	1.80
RDF (NPKS)	19.00	10.73	1718	2111	44.86	29787	58128	28341	1.95
Farmers practice	16.67	10.13	1417	1740	44.91	28107	47968	19861	1.71
Absolute control	14.53	9.71	1161	1443	44.58	24344	39304	14960	1.61
SE m±	**0.63**	**0.23**	**67.12**	**110.49**	**--**	**127.53**	**2278.34**	**--**	**--**
CD (P=0.05)	**1.95**	**NS**	**206.81**	**340.44**	**--**	**392.93**	**7019.82**	**--**	**--**

Table 2: Effect of site specific nutrient management over treatments in respect to seed yield

	Treatment	**Yield (kg/ha)**	**Yield gap (kg/ha) over SSNM**	**Yield gap (kg/ha) over RDF**
T1	SSNM basal recommendation through nutrient expert	1502	--	-216
T2	T1 – N omission	1488	-14	-230
T3	T1 – P omission	1296	-206	-422
T4	T1 – K omission	1517	15	-201
T5	RDF (NPKS)	1718	216	--
T6	Farmers practice	1417	-85	-301
T7	Absolute control	1161	-341	-557
	SE m±	**67.12**		
	CD (P=0.05)	**206.81**		

REFERENCES

Biradar, D. P., Aladakatti, Y. R., Rao, T. N., & Tiwari, K. N. (2006). Site-specific nutrient management for maximization of crop yield in northern Karnataka. *Better crops*, *90*(3), 33-35.

Madhavi, J., Katkar, R. N., Kharche, V. K., Lakhe, S. R., & Konde, N. M. (2019). Effect of Site Specific Nutrient Management on Yield and Quality of Soybean [Glycine max (L.)] in Soybean in Vertisols. *Int. J. Curr. Microbiol. App. Sci*., *8*(11), 2113-2118.

Katkar, R. N., Sonune, B. A., Puli, M. R., & Kharche, V. K. (2012). Effect of integrated nutrient management on productivity and soil fertility under soybean–wheat cropping system. *PKV Res. J*., *36*(1), 17-20.

Kolo, E., Takim, F. O., & Fadayami, O. (2012). Influences of planting date and weed management practices on weed emergence, growth and yield of maize in southern Guinea savanna of Nigiria. *J. Agric and Biodiver. Res*., *1*(3), 33-42.

Nath, D., Haque, F., Sh. Islam, M., & Saleque, M. A. (2012). Farmers participatory site specific nutrient management in ganges tidal flood plain soil for high yielding boro rice. Int. Conference on Environment, *Agriculture and Food Sci*., Aug 11-12 Phuket Thailand: 29-30.

Shankar, M. A. and Umesh, M. R., 2008, Site specific nutrient management (SSNM): an approach and methodology for achieving sustainable crop productivity in dryland Alfisols of Karnataka. In: Tec. Bult. Univ. Agric. Sci., Bangalore.

Singh, G., Singh, H., & Kolar, J. S. (2001). Response of soybean to nitrogen, phosphorous, potassium and zinc fertilization. *J. Res. Punjab Agric. Univ*., *38*(1), 16-19.

Umesh, M. R., Manjunatha, N., Shankar, M. A., & Jagadeesha, N. (2014). Influence of nutrient supply levels on yield, nutrient uptake, grain quality and economics of corn (Zea mays L.) in Alfisols of Karnataka. *Indian J. Dryland Agric. Res. and Dev*. *29*(1), 73-78.