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Influence Of Integrated Weed Management Practices And Biofertilizers On Nutrient Uptake By Weed Flora And Soybean [*Glycine max (L.) Merill*]

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ABSTRACT
A field experiment entitled "Influence of integrated weed management practices and biofertilizers on yield attributes and yield of *kharif* soybean [*Glycine max (L.) Merill*] in southern Telangana agro- climatic zone"was conducted at the Agricultural College Farm Rajendranagar, Hyderabad.Telangana State during 2014 and 2015,Weeds removed 15.6-15.8 kg N; 8.8-9.3 kg P and 10.5-14.3 kg K ha^{-1} in the weedy check. Least quantity of 1.8-2.0 kg N; 1.0-1.2 kg P and 1.4 kg K ha^{-1} NPK was removed by the newly emerging weeds after hand weeding. The integrated or herbicide treatments also removed substantially lower quantity of nutrients than the un-weedy check but not equal to the hand weeding treatment. Soybean removed NPK content heavily due to hand weeding than any other treatment in 2014 and 2015. It removed > 2 times the N that was applied through the fertilizer.
Keywords: Glycine max, N, IWM

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INTRODUCTION

Soybean (*Glycine max (L) Merill*] is a miracle golden bean of the 20th century. It occupies third place among oilseed crops of Telangana State. It is a rich source of protein (40-42 %) and quality oil (20-22%). Protein is rich in valuable amino acid with 5% lycine. It also contains good amount of minerals, salts and vitamins.

Soybean suffers from heavy infestation of complex weed flora belonging to grasses, broad leaf weeds, sedges and perennial types. They emerge in several flushes depending on the rainfall distribution pattern. This makes their effective control difficult. The diversity and difficulty of weed management is further complicated by the inherent problem of manual, cultural and herbicide use to overcome highly divergent situations. The crop is highly sensitive to early weed infestation during the seedling stage and the critical crop-weed competition during 3-4 weeks after sowing [1], The losses caused by weeds are more than any other factor like insects, nematodes, diseases and rodents *etc.* [2]. Hand weeding and blade harrow are traditionally practiced to ward off the weeds, loosen the soil for good aeration and conserve the moisture. The indiscriminate urbanization, labour shortage and spiraling wages compel the farmers to switch over to the chemical weed control. Presently about 90% of the soybean cultivated area is treated with herbicides [3]. The herbicides are apprehended to have direct or indirect consequences on non-targeted organisms including soil micro flora in the field.

MATERIAL AND METHODS

A field experiment entitled "Influence of integrated weed management practices and biofertilizers on yield attributes and yield of *kharif* soybean [*Glycine max (L.) Merill*] in southern Telangana agro- climatic zone"was conducted at the Agricultural College farm Rajendranagar during 2014 and 2015. The soil was sandy loam in texture having 7.8 pH and EC 0.21 d S m^{-1}. It was very poor in nutrient status with 0.35% OC and 226 kg ha^{-1} available N. The available P was 18 kg $ha^{-1}$and available K was 236 kg ha^{-1}. The experiment

was conducted in the rainy season during 2014 and 2015. The layout was a split plot design. The main plot treatments comprising of : (W1) Pre-emergence application of pendimethalin @ 1.0 kg a.i ha^{-1} followed by hand weeding at 25 DAS, (W2) Pre emergence application of pendimethalin @1.0 kg a.i ha^{-1} followed by post-emergence application of imazethapyr @ 100 g a.i ha^{-1}+ quizalofop-p-ethyl @ 50 g a.i ha^{-1} 25DAS, (W3) Pre–emergence application of pendimethalin @1.0 kg a.i ha^{-1} followed by post-emergence application of odyssey i.e. imazethapyr + imazamox@ 70 g a.i ha^{-1} 25 DAS, (W4) Hand weeding 25 and 45 DAS and (W5) un-weeded check. The sub plot treatments were (F1) Recommended dose of fertilizers @ 30:60:40 kg ha^{-1} NPK, (F2) RDF+ seed treatment with rhizobium @ 250g10kg^{-1}seed, (F3) RDF+seed treatment with rhizobium @ 250g10kg^{-1} seed + phosphate solubilizing bacteria @ 5 kg ha^{-1} (F4) RDF + seed treatment with *rhizobium* @ 250 g10 kg^{-1} seed + phosphate solubilizing bacteria @ 5 kg ha^{-1} + potassium solubilizing bacteria@ 5kg ha^{-1}. Recommended fertilizer dose of 30:60:40 kg ha^{-1} NPK was calculated for the dimensions of each sub plot and applied at the time of sowing in the form of urea, Single super phosphate and Muriate of potash. The crop was sown on 10th July in 2014 and 18th June in 2015, by using 63 kg ha^{-1}seed rate in 30cm interval rows and two seeds were dibbled at 10cm apart. The bio fertilizers- brady rhizobium japonica and phosphate solubilising bacteria were mixed as per the treatment in jaggery solution prepared @ 250 g for 10 kg seed. The seed was thoroughly mixed with the solution and shade dried. The potassium solubulising bacteria were applied @ 5 kg ha^{-1} after mixing with FYM. Two seeds were dibbled for sowing.

RESULTS AND DISCUSSIONS

Weeds removed 15.6-15.8 kg N; 8.8-9.3 kg P and 10.5-14.3 kg K ha^{-1} in the weedy check. Least quantity of 1.8-2.0 kg N; 1.0-1.2 kg P and 1.4 kg K ha^{-1} NPK was removed by the newly emerging weeds after hand weeding. The integrated or herbicide treatments also removed substantially low quantity of nutrients than the un-weedy check but not equal to the hand weeding treatment. The data on uptake of N, P and K by soybean in response to different treatments is presented in table 2. Soybean removed maximum of 61.9 kg N, 21.5 kg P and 49.1 kg K ha^{-1}in response to hand weeding at 25 and 45 DAS during 2014. It removed 65.7 kg N, 22.0 kg P and 52.3 kg K ha^{-1} during 2015. The crop removed extremely low quantity of 28.9 kg N, 8.5 kg P and 20.4 kg K ha^{-1} during 2014 if it was allowed to grow with weeds unchecked. The uptake reduced to 32.7 kg N, 8.5 kg P and 35.0 kg K ha^{-1}during 2015.The crop removed significantly low quantity of 54.7 kg N during 2014 and 62.7 kg N ha^{-1}during 2015 in response to the integrated weed management treatment compared to hand weeding. The uptake of P was on par in both the treatments in 2 years. The uptake of K was significantly low due to the integrated weed management treatment during 2014 but on par with hand weeding twice during 2015. There were no significant differences in the uptake of N, P or K due to the pre-emergence application of pendimethalin @ 1.0 kg *a.i* ha^{-1} followed by hand weeding at 25 days or post emergence application of odyssey at 70g *a.i* ha^{-1}. On the other hand, the uptake of N and K was significantly low due to pre-emergence application of pendimethalin @ 1.0 kg *a.i* ha^{-1} and post emergence application of imazethapyr @ 100 g and quizalofop-p-ethyl at 50 g *a.i* ha^{-1} compared to the weed management treatment. The uptake of phosphorus was similar in these treatments.

The nutrient uptake did not increase due to the supplementation of *Rhizobium*, phosphate and potassium solubilizing bacteria to the recommended dose of fertilizers in either of the two years. Previous investigations recorded highly inconsistent response of biological inoculants on the nutrient uptake by soybean. Son *et al*. (2006) recorded no distinct pattern in the N and P uptake by the seed of soybean due to the inoculation of *Bradyrhizobium* and *Pseudomonas* with different levels of fertilizers at 3 locations. The uptake of these 2 nutrients was more by these inoculations with low proportions than the recommended dose of 80:60:30 kg ha^{-1}. Singh *et al*. (2009) also observed that the crop removed significantly low quantity of N P K due to combined application of *Rhizobium* and *pseudomonas* but surpassed the uptake due to the application of 20:17.5:33.3 kg ha^{-1} N P K when combined with FYM @ 5 t ha^{-1}. Shubhangi *et al*.(2008) from his findings reported that the uptake of N P K increased significantly over the recommended dose of fertilizers when, it was supplemented with *Rhizobium* and phosphate solubilizing bacteria. The interactions were not significant to influence the pattern of N, P and K uptake due to the combined influence of weed management treatment.

Table 1.Nutrient removal by weeds (kg ha^{-1}) at harvest as influenced by weed management treatments and bio-fertilizers during 2014 and 2015

Treatment	2014			2015		
	N	**P**	**K**	**N**	**P**	**K**
Main plot- Weed management						
W1:PE Pendimethalin @ 1kg *a.i* ha^{-1}fb Hand weeding at 25 DAS	4.9	3.0	4.6	6.0	3.5	4.2
W2:PE Pendimethalin @ 1kg *a.i* ha^{-1}fb PoE Imazethapyr @100 g *a.i* ha^{-1} + Quizalofop-P-ethyl @ 50 g *a.i* ha^{-1} 25 DAS	6.4	3.9	5.7	6.8	3.8	4.7
W3:PE Pendimethalin @ 1kg *a.i* ha^{-1} fb PoE Imazethapyr +Imazamox @ 70 g *a.i* ha^{-1} 25 DAS	6.8	4.3	5.7	7.0	4.2	4.3
W4:Hand weeding at 25 and 45 DAS	1.8	1.0	1.4	2.0	1.2	1.4
W5:Un-weeded check	15.8	8.8	10.5	15.6	9.3	14.3
SE±	0.5	0.5	0.4	0.8	0.7	0.5
CD (P=0.05)	1.4	1.3	1.2	2.3	1.7	1.3
Sub-plot-Bio-fertilizers						
F1:Fertilizers @ 30:60:40 kg ha^{-1} N:P_2O_5:K_2O	6.7	3.7	5.5	7.2	4.3	6.1
F2:F1+ Rhizobium @ 250 g10 kg^{-1} seed	7.2	3.9	5.8	7.3	4.4	6.2
F3:F2+ Phosphate solubilising bacteria @ 5kg ha^{-1}	7.1	4.1	6.0	7.8	4.5	6.5
F4:F3+ Potassium solubilising bacteria @ 5kg ha^{-1}	7.9	4.4	6.8	8.8	4.9	7.6
SE±	0.9	0.7	0.7	3.2	1.0	0.7
CD (P=0.05)	NS	NS	NS	NS	NS	NS
Weed management x Bio-fertilizers						
SE±	0.23	0.17	0.18	2.6	2.4	0.22
CD (P=0.05)	NS	NS	NS	NS	NS	NS

Table 2.Nutrient uptake by soybean (kg ha^{-1}) at harvest as influenced by weed management treatments and bio-fertilizers during 2014 and 2015

Treatment	2014			2015		
	N	**P**	**K**	**N**	**P**	**K**
Main plot -Weed management						
W1:PE Pendimethalin @ 1kg *a.i* ha^{-1}fb Hand weeding at 25DAS	54.7	18.8	44.0	62.7	19.1	49.6
W2:PE Pendimethalin @ 1kg *a.i* ha^{-1}fb PoE Imazethapyr @100 g *a.i* ha^{-1}+ Quizalofop- P-ethyl @ 50 g *a.i* ha^{-1} 25DAS	40.0	16.4	34.0	64.2	16.9	42.1
W3: PE Pendimethalin @ 1kg *a.i* ha^{-1}fb PoE Imazethapyr + Imazamox@ 70 g *a.i* ha^{-1}25DAS	42.6	17.3	39.2	48.7	16.9	45.6
W4:Hand weeding at 25 and 45 DAS	61.9	21.5	49.1	65.7	22.0	52.3
W5:Unweeded check	28.9	8.5	20.4	32.7	8.5	35.0
SE±	2.5	1.2	1.5	3.1	1.5	1.7
CD (P=0.05)	5.8	2.9	3.6	7.3	3.5	4.2
Sub-plot -Bio-fertilizers						
F1: Fertilizers @ 30:60:40 kg ha^{-1} N:P_2O_5:K_2O	45.3	17.0	37.2	50.3	15.9	43.6
F2: F1 + Rhizobium @ 250g10 kg^{-1} seed	45.3	16.4	37.4	50.6	16.5	44.4
F3: F2 + Phosphate solubilising bacteria @ 5 kg ha^{-1}	45.8	16.2	37.4	51.3	16.9	45.3
F4: F3+ Potassium solubilising bacteria @ 5 kg ha^{-1}	46.1	16.5	37.5	52.5	17.4	46.5
SE±	4.0	1.0	2.1	4.4	1.0	2.0
CD (P=0.05)	NS	NS	NS	NS	NS	NS
Weed Management x Bio-fertilizer						
SE±	9.1	2.4	4.7	9.8	2.2	4.6
CD (P=0.05)	NS	NS	NS	NS	NS	NS

REFERENCES

1. Jha, B.K., Chandra, R and Rohitashav Singh. 2014 Influence of post emergence herbicides on weeds,nodulation and yields of soybean and soil properties.*Legume Res.,* 37 (1) : 47 - 54,
2. Chavan, G.A., Deshmukh, L.S., Nayak, S.K and Jadhav S.G. 2015. Influence of chemical weed management on yield attributes, yield and economics of Soybean (*Glycine* max (L.) Merill.). *International journal of Tropical Agriculture*.Vol(33):515-517.

3. Peer, F.A., Badrul Hassan, Lone, B.A., Sameera Qayoom., Latief Ahmad, Khanday, B.A., Purshotam Singh and Gurdeep Singh. 2013. Effect of weed control methods on yield and yield attributes of Soybean. *African Journal of Agricultural Research* 8(48): 6135-6141.
4. Ram Hari, Guriqbal Singh, Navneet Aggarwal, Buttar, G.S and Onkar Singh. 2013. Standardization of rate and time of application of imazethapyr weedicide in soybean. *Indian Journal of Plant Protection.* 41(1): 33-37.
5. Son,Tran Thi Ngoc., Cao Ngoc Diep and Truong Thi Minh Giang. 2006. Effect of bradyrhizobia and phosphate solubilizing bacteria application on soybean in rotational system in the mekong delta. *Omonrice* .14 48-57.
6. Singh, S. R., Singh, Ummed and Singh, J. K. 2009. Effect of bioinoculants and FYM on growth, yield and quality of soybean (*Glycine max*) under rainfed conditions of Kashmir valley. *Annuals of Agricultural Research*. New Series .30 (3&4): 87-90.
7. Shubhangi, J., Dhage, K.G., Kachhave and Shirale,S.T.2008. Effect of biofertilizers on nodulation, uptake of nutrients, yield and economics of soybean [*Glycine max* (L.) Merrilli] production in vertisol. An Asian Journal of Soil Science.3:299-303.

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