SHORT COMMUNICATION

EFFECT OF CROP GEOMETRY AND WEED MANAGEMENT PRACTICES ON GROWTH AND PRODUCTIVITY OF SOYBEAN

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Abstract : A field experiment was conducted during Kharif season at 2007 at Research-cum-Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh), India, .to study the Effect of crop geometry and herbicides on growth and productivity in soybean(Glycine max L. Merrill). The experiment was laid out in Split plot Design (SPD) with two treatments main plot six treatments sub plots and three replication. At harvest, not significant affect by plant spacing but significantly higher seed yield obtained with treatment Fluchoralin@ 100 g ha^{-1} (PE) + Hand weeding at 40 DAS (2354 kg ha^{-1}), however, it was found comparable with the yield of Hand weeding twice at 20 and 40 DAS (2316 kg ha^{-1}). Significantly lowest weed count and highest weed control efficiency also recorded with T6

Keywords : Crop, Effect, Growth, Productivity, Soybean

INTRODUCTION

The Soybean *(Glycine max* L. Merrill) is recognized as one of the premier agriculture crops. It has revolutionized the agricultural economy with its immense potential for food, fuel and numerous industrial products. It contains 19-20% oil, 40-42% protein, 20-30% carbohydrates, vitamins and other essential amino acids. The root of the soybean those of the most legumes, harbor micro organism that fix nitrogen from the atmosphere enabling the plant to grow within limits on marginal soil that cannot support most other crops. This characteristic has made soybean to fit well in sustainable agriculture. Soybean due to its various uses is rightly called "Golden Gift" of nature to mankind

Weed flush come at the same time almost all the *kharif* crops, which also restrict the availability of manpower for weeding operation in the crop. The ultimately and poor weed management adversely affect proper growth and yield of soybean. It is estimated that the loss in yield of soybean in the tune of 30 to 77 per cent due to poor weed control (Chandel and Saxena, 1998 and Tiwari and Khurchania, 1990). These losses can be alleviated by effective integrated weed management practices. Crop geometry play an important role in contributing the higher yield because dance plant population will not get proper light for photosynthesis and can easily affected by diseases. On other hand poor population reduced the yield. Plant population by manipulating the planting geometry exerts marketed influence on the yield potential the soybean crop. Besides arrangement of plant in a given area is also important consideration in respect to weed population. Alleviating weed competition through weed management practices was found to be effective in enhancing crop yield of soybean. The use of selective herbicides in soybean seems to be effective and economical. However, effectiveness depends upon the weed flora and their time of emergence. The traditional methods of weed control, *viz*, manual and mechanical methods are cumbersome and time consuming and hence prove costly. However, many times non-availability of labourers at critical period leads to ineffective control of weeds and severe crop-weed competition. The crop-weed competition starts from the beginning, since the crop and weed emerge simultaneously, thus, warrants the suitable weed management practices to get effective, timely and economical control of weeds in soybean. Therefore, it is of paramount importance that the weeds are to be kept under check right from the beginning for efficient utilization of applied inputs. To overcome this problem integrated weed management practices need to be adopted as per suitability of given agro-ecological situations. Now a days a few herbicides like Alachlor, Fluchloralin, Fenoxyprop-e-ethyl are available, which can be used safely in soybean. It has been reported that most of the selective herbicides do not control all the weeds present in the crop. Therefore integrated approach of chemical and cultural control may be more feasible and tractable. In view the above facts present investigation was carried out *during Kharif season of year 2007 at Research-cum-Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh), with objective Effect of crop geometry and herbicides on* growth and productivity *in soybean(Glycine max L. Merrill).*

MATERIAL AND METHOD

The experimental was conducted *during kharif season of year 2007 at Research-cum-Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh),* field was clayey in texture with medium in available nitrogen (216.6 kg ha^{-1}) and in available phosphorus (12.14 kg ha^{-1}) available potassium (366.2 kg ha^{-1}) contents. The experiment

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was laid in split plot design with three replications. Soybean variety "JS-335" was sowing on 6 July at the seed rate of 75 kg seed per ha. and harvested on October 23 I

The experiment was laid out in Split plot Design (SPD) with three replication. The treatments compare two treatment 45*5cm and 30*10cm plant spacing main plot and six treatments sub plots and three replication. $W_{1:}$ Weedy check W_2 : Two hand weeding 20 and 40 days after sowing W_3 : lachlor 1.50 kg ai ha^{-1} Pre- emergence W_4: Alachlor 2.0 kg ai ha^{-1} Pre -mergence W_5: Fenoxaprop-p-ethyl 75 g ha^{-1} pre-emergence W_6 : Fluchloralin 1.0 kg ai ha^{-1} Pre-emergence + hand weeding at 40 days after sowing by using the Knapsack sprayer fitted with flat fan nozzle with volume of 750 lit/ ha water. Recommended dose of fertilizer 20 kg N, 80 kg P,5 kg Z/ha was applied as basal at the time of sowing. Soybean seed treated with thiram 75% WP 2g + bavistine 1.0 g per kg of seed before inoculation followed by inoculating with *Bradyrhizobium japonicum* culture (7g/kg of seed) To protect the crop from stem fly, 2 to 3 spray of trizophos 40 EC 500 ml/ha was done in the year of experimentation. Thinning was perform to maintain optimum plant population (i.e. 0.4 million plants/ha) during 15-20 DAS.

Weed control efficiency (WCE) was computed by using formula, WCE = (P-Q/P) x 100, where P and Q respectively, refer to oven dry weight of weeds at specific sampling in weedy check and particular treatment for which value is computed. Weed index (WI) was computedby WI = (A-B/A) x 100, where A and B refer to grain yield in weed-free and treated plots respectively

RESULT AND DISCUSSION

Result revealed that the plant height and dry matter production of soybean plant did not significantly affected by any crop geometry. Fluchloralin @100 g ha^{-1} (PE) + Hand weeding at 40 DAS produce significantly taller and heavier plants than others at 90DAS and at harvest. It was found at par to hand weeding twice at 20 and 40 DAS. The highest plant height and dry matter production was recorded under above treatments are mainly due to lower crop weed competition. Crop growth rate (g day^{-1} $plant^{-1}$) and Relative growth rate (g g^{-1} day^{-1} $plant^{-1}$) did not significantly affected by any crop geometry and all the treatment. In case of different crop geometry, plant height (cm) at harvest, Pods plant $^{-1}$, Seed plant $^{-1}$, 100 seed weight (g) at harvest did not show significant differences in crop geometry. Concerning to weed management practices number of Pods plant $^{-1}$ at harvest recorded significantly maximum under treatment Fluchloralin @100 g ha^{-1} (PE) + Hand weeding at 40 DAS than others .it was found at par to Hand weeding twice at 20 and 40 DAS

Seed yield of soybean did not show significant differences in crop geometry. Significantly higher seed and stover yield of soybean was found under treatment Fluchloralin @100 g ha^{-1} (PE) + Hand weeding at 40 DAS (2354kg ha^{-1}) than others. it was found at par to Hand weeding twice at 20 and 40 DAS(2316kg ha^{-1}) The yield and yield attributing characters, *viz.* Pods plant $^{-1}$, Seed plant $^{-1}$ and 100 seed weight (g) were significantly influenced by different weed control treatments (Table 2). Among herbicidal applications, significantly higher seed yield obtained with treatment Fluchoralin@ 100 g ha^{-1} (PE) + Hand weeding at 40 DAS.

Weed control efficiency is directly proportional to dry matter production of weed. Maximum weed control efficiency was observed under Fluchloralin @ 1000 g ha^{-1} (PE) + Hand weeding at 40 DAS respectively followed by Hand weeding twice at 20 and 40 DAS. This might be owing to less dry matter production and population of weed in the above treatment. The lower weed population and higher weed control efficiency also resulted in higher grain yield. similar findigs were reported by Chandel and Saxena(2001)and Raman and Krishnamoorthy (2005).contrarily the poor growth of plants as well as development of yield attributes in weedy chek might be due to higher weed interference, less space and nutrient available at the time of flowering and pod development adversely influenced the seed yield.

CONCLUSION

Closer row spacing recorded most appropriate for maximization of yield attributes, growth and seed yield (985 kg ha^{-1}) of soybean.The minimum population and dry matter production of weeds with maximum weed control efficiency (77.34%) and the highest economic returns in terms of gross realization (Rs 32000 ha^{-1}), net realization (Rs 22236.5 ha^{-1}) and net realization per rupee invested (2.27).

As regarded to pre-emergence application of fluchloralin @ 1000 g ha^{-1} (PE) + Hand weeding at 40 DAS was most appropriate for maximization of yield attributes, growth and seed yield (985 kg ha^{-1}) of soybean.The minimum population and dry matter production of weeds with maximum weed control efficiency (77.34%) and the highest economic returns in terms of gross realization (Rs 32000 ha^{-1}), net realization (Rs 22236.5 ha^{-1}) and net realization per rupee invested (2.27) were also obtained under the above weed management practice.

Table 1. Effect of weed control treatment on total weed dry weight, weed control efficiency

Treatment	Dose (g ha^{-1})	Time of appli-cation	Total weed dry weight gm-2			Weed control efficiency (%)		
			30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
Crop geometry								
45*5 cm			14.87	19.66	23.62	79.08	76.10	60.39
30*10			14.63	19.24	23.39	79.99	76.45	60.58
SEm□			0.49	0.53	1.32	-	-	-
CD (P=0.05)			NS	NS	NS	-	-	-
Weed management practices								
W_1 : Weedy check	-	-	26.84	-	37.74	-	-	-
W_2 : HW twice	-	20 & 40 DAS	8.25	71	16.38	87.06	82.63	71
W_3 : Alachlor	1500	PE (2 DAS)	13.65	53.06	24.48	84.83	70.83	53.06
W_4 : Alachlor	2000	PoE (10 DAS)	12.33	53.1	24.44	85.63	72.63	53.1
W_5 **:** Fenoxaprop-p-ethyl	75	PoE (10 DAS)	16.49	53.84	24.36	53.07	63.07	53.84
W_6 : Fluchloralin + HW	80	PoE (10 DAS)	10.22	72.42	13.97	87.11	85.11	72.42
SEm□			0.22	0.66	0.66	0.22	0.27	0.66
CD (P=0.05)			0.59	1.78	1.78	0.59	0.73	1.78

DAS = Days after sowing; PE = Pre-emergence; PoE = Post-emergence; HW= Hand weeding

Table 2. Yield attributes and yields of soybean as affected by weed management practice

Treatment	plant height (cm) at harvest	Dry matter production (g plant $^{-1}$)	Pods plant $^{-1}$	Seed plant $^{-1}$	100 seed weight (g)	Seed yield (q ha^{-1})	Stover yield (q ha^{-1})	Net income (Rs ha^{-1})	B:C ratio
Crop geometry									
45*5 cm	48.4	23.7	28.2	2.3	11.3	19.0	46.1	17749	2.12
30*10	50.9	24.6	28.6	2.4	11.5	19.6	46.2	18478	2.21
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
Weed management practices									
W_1 :	48.4	21.0	18.8	2.2	9.4	7.3	25.6	2098	0.25

Weedy check									
W_2 : HW twice	57.9	25.1	31.7	2.6	12.4	23.2	53.7	21452	2.13
W_3 : Alachlor	49.4	24.0	30.7	2.3	11.3	20.9	46.6	19311	2.11
W_4 : Alachlor	50.1	24.3	30.7	2.4	11.3	21.4	47.2	19733	2.10
W_5 **:** Fenoxaprop -p-ethyl	48.8	24.2	24.6	2.2	11.5	19.7	46.2	18139	2.06
W_6 : Fluchloralin + HW	59.2	25.1	31.9	2.6	12.5	23.5	54.5	22236	2.27
CD (P=0.05)	5.74	4.04	1.14	0.14	0.15	1.67	4.82	NS	NS

DAS = Days after sowing; PE = Pre-emergence; PoE = Post-emergence; HW= Hand weeding

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