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RESEARCH PAPER

Weed dynamics and yield as influenced by various weed control methods and fertility levels in soybean

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Abstract : The experiment was conducted during *Kharif* season of 2006 at Junagadh (Gujarat) to study the weed dynamics and yield as influenced by various weed control practices with different fertility levels in soybean [*Glycine max* (L.) Merril]. Results indicates that at 20 DAS the treatment W_1 (Pre-emergence pendimethalin @ 0.5 kg ha^{-1} + HW and IC at 30 DAS) recorded lowest number of monocots, dicots and sedges weeds next to W_5 (Weed free upto 60 DAS through hand weeding). Similarly at 40 and 60 DAS the treatment W_3 (Post-emergence imazethapyr @ 75 g ha^{-1} at 25 DAS + HW and IC at 45 DAS) also reported minimum number of weeds next to W_5. The lowest dry weight of weeds was recorded under treatment W_5 followed by W_4 and W_3. Application of 40:80:40 kg NPK ha^{-1} recorded significantly higher values of weed count and total dry weight of weeds and grain yield compared to other levels. The treatment W_4 (2 HW + 2 IC at 20 and 40 DAS) was found at par with treatment W_5 in respect of grain yield.

Key Words : Soybean, Weed count, Pendimathalin, Quizalofop-ethyl, Imazethapyr, Fertility levels

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INTRODUCTION

In agriculture, weed causes more damage to crops as compared to insect, pest and diseases. Due to hidden loss by weeds in crop production, it has not drawn much attention of agriculturists (Rao, 1983). The judicious use of herbicides in crop lands generally results in increased crop yield with reduction in crop production costs. Therefore, herbicides used alone or in combination with other weed control methods reduce weed crop competition and the risk of weeds growing unchecked in period of adverse weather or soil condition. The ever increasing cost of fertilizers limits the use of them for crop production, therefore, to find optimum dose of fertilizers along with suitable weed control technique is a prerequisite for farmers in securing higher economic yields. The present investigation was undertaken to study the influence of various weed control methods and fertility levels in relation to weed dynamics yield in soybean.

MATERIAL AND METHODS

The present study was carried out at Instructional Farm, Junagadh Agricultural University, Junagadh during *Kharif* season of 2006. Typically the climate of this region was subtropical characterized by hot and dry

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summer, cool and dry winter and warm and humid monsoon with the average annual rainfall of 848.4 mm. The soybean variety Gujarat soybean-1 was sown during 28th standard meteorological week on 11th July 2006. The crop was fertilized with urea, SSP and MOP as per need of the treatment. The preemergence herbicides was applied after 24 hrs of sowing. The post emergence herbicides application and other weed control methods was also carried out as per the treatment. The experiment was laid out in Split Plot Design with eighteen treatment combinations comprising six levels of weed management practices as main plot treatments *viz.*, W_1- Pre-emergence pendimethalin @ 0.5 kg ha^{-1} + HW and IC at 30 DAS, W_2 – Post-emergence quizalofop-ethyl @ 40 g ha^{-1} at 25 DAS + HW and IC at 45 DAS, W_3- Post-emergence imazethapyr @ 75 g ha^{-1} at 25 DAS + HW and IC at 45 DAS , W_4- 2 HW + 2 IC at 20 and 40 DAS, W_5- Weed free upto 60 DAS through hand weeding and W_6- Unweeded control and three levels of fertilizers as sub plot treatments *viz.*, F_1- 20:40:20 kg $N:P_2O_5:K_2O$ ha^{-1} F_2- 30:60:30 kg $N:P_2O_5:K_2O$ ha^{-1} F_3- 40:80:40 kg $N:P_2O_5:K_2O$ ha^{-1}. The experiment was tried in three replications.. The soil of the experimental plot was clayey in texture and slightly alkaline in reaction. The rainfall recorded in 28th ,29th ,30th and 31st meteorological week was 5.0, 78.7, 77.1 and 295.5 mm, respectively. The major weed flora observed during experimentation was sedges (purple nutsedge), monocots (bermuda grass, single grass) and dicots (purselane, wild indigo congress grass etc.) The biometric observations were recorded and statistical analysis was carried out.

RESULTS AND DISCUSSION

he results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Effect of various weed control method on weeds:

At 20 DAS :

Results from Table 1 indicate that besides the treatment W_5 (free upto 60 DAS through hand weeding), the lowest monocots, dicots and sedges were recorded under treatment W_1 (Pre-emergence pendimethalin @ 0.5 kg ha^{-1} + HW and IC at 30 DAS). This might be due to the effective weed control at early stages of crop growth by pendimethalin application. These findings corroborate the results reported by Suzuki *et al.* (1991) and Nayak *et al.* (2000).

At 40 DAS:

Minimum number of monocots, dicots and sedges at 40 DAS were recorded by W_5 (free upto 60 DAS through hand weeding) followed by W_3 (Post-emergence imazethapyr @ 75 g ha^{-1} at 25 DAS + HW and IC at 45 DAS). This might be due to the application of imazethapyr at 25 DAS. Similar results were recorded by Bhan and Kewat (2002).

At 60 DAS :

The treatment W_3 also recorded less weed count at 60 DAS in response to monocots, dicots and sedges population. The lowest weed count was observed under

Table 1: Weed dynamics and yield as influenced by various weed control methods and fertility levels in soybean

Treatments	No. of monocot weeds per m^2			No. of dicot weeds per m^2		
	At 20 DAS	At 40 DAS	At 60 DAS	At 20 DAS	At 40 DAS	At 60 DAS
Weed control practices						
W_1	3.69(13.12)	3.87(14.46)	3.92(14.87)	3.25(10.08)	3.50(11.59)	3.86(14.41)
W_2	7.32 (53.11)	3.72(13.35)	3.24(10.03)	6.24(38.44)	3.55(12.20)	2.97(8.33)
W_3	7.58(56.89)	2.83(7.52)	2.60(6.24)	6.21(38.01)	2.66(6.62)	2.32(4.90)
W_4	7.55(56.50)	3.38(10.92)	3.29(10.32)	6.32(39.44)	3.24(10.09)	2.48(5.66)
W_5	0.71 (0.00)	1.88 (3.03)	2.00 (3.50)	0.71 (0.00)	2.16 (4.17)	1.90 (3.11)
W_6	8.25 (67.60)	8.36 (69.41)	8.39 (69.95)	6.60 (43.06)	6.50 (41.88)	6.53 (42.14)
C.D. (P= 0.05)	0.49	0.48	0.52	0.48	0.30	0.38
Fertility levels (kg $N:P_2O_5:K_2O$ ha^{-1})						
F_1	5.67(31.61)	3.78(13.79)	3.70(13.19)	4.74 (23.00)	3.45(11.40)	3.18(9.61)
F_2	5.89(34.25)	4.03(15.74)	3.98 (15.34)	4.91(23.65)	3.67(12.97)	3.40(11.06)
F_3	5.99(35.35)	4.21(17.22)	4.04(15.82)	5.00(24.53)	3.69(13.12)	3.45(11.40)
C.D. (P= 0.05)	0.24	0.22	0.17	0.14	0.16	0.17

Table 1 : Contd.……..

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Treatments	No. of sedges per m^2			Total dry wt. of weeds (kg/ha)	Grain yield (kg/ha)
	At 20 DAS	At 40 DAS	At 60 DAS		
Weed control practices					
W_1	3.25(10.08)	3.47(11.52)	3.86(14.41)	32.77(1073.37)	1663
W_2	4.74(21.97)	3.75(13.69)	3.71(9.56)	30.75(945.06)	1852
W_3	4.61(20.71)	2.86(7.67)	2.47(5.62)	29.77(885.75)	1950
W_4	4.92(23.71)	3.74(13.52)	2.68(6.69)	25.01(625)	2129
W_5	0.71 (0.00)	2.10 (3.91)	2.05 (3.70)	3.59 (12.39)	2336
W_6	5.20 (26.49)	5.50 (29.71)	6.20 (37.88)	38.94(1515.82)	1220
C.D. (P= 0.05)	0.48	0.30	0.38	1.94	235.85
Fertility levels (kg $N:P_2O_5:K_2O$ ha^{-1})					
F_1	3.76(13.64)	3.43(11.26)	3.24(10.00)	25.92(671.35)	1596
F_2	3.93(14.95)	3.64(12.75)	3.47(11.54)	26.86(720.86)	1973
F_3	4.02(15.56)	3.64(12.75)	3.51 (11.82)	27.63(762.92)	2006
C.D. (P= 0.05)	0.14	0.16	0.17	0.94	108.38

$\sqrt{x+0.5}$ transformation (figure in parenthesis are original values)

treatment W_5. This might be due to the combined effect of post emergence herbicides and hand weeding and interculturing carried out at 45 DAS. The results are in close conformity with Sonawane and Sabale (2003).

On total dry weight of weeds:

The data presented in Table 1 reveal that the lowest dry weight of weeds was recorded under the treatment W_5. The next best treatments were W_4 and W_3.The results might be due to effective control of weed by hand weeding and interculturing and post emergence herbicides in respective treatments. The results substantiated the findings of Arya *et al* (1994) and Bandiwaddar and Itnal (1998).

On grain yield :

Grain yield of soybean was significantly higher in treatment W_5 but found at par with treatment W_4. Weed free environment upto 60 DAS coupled with accelerated nutrients uptake might helped to improve yield of soybean.

Effect of various fertility levels :

On weed count :

The data furnished in Table 1 show that the fertilizers levels significantly influenced the monocots, dicots and sedges per m^2 at 20,40 and 60 DAS. Application of F_3 (40:80:40 kg $N:P_2O_5:K_2O$ ha^{-1}) recorded significantly higher values of monocots, dicots and sedges per m^2. The probable reason for increasing weed count with increase in fertilizer level may be due to availability of nutrients to the weeds.

On total dry weight of weeds :

As the rate of fertilizers increased, the total dry weight of weeds also increased. Significantly the highest total dry weight of weeds was recorded with application of F_3 over rest of two levels. This might be attributed due to the fact that weeds got nourishment which further helped in their establishment, vigour and competitive ability. The results are in accordance with those obtained by Kumar *et al*. (2004).

On grain yield :

Application of F_3 (40:80:40 kg $N:P_2O_5:K_2O$ ha^{-1}) resulted into significant increase in grain yield while it was significantly lower with the application of F_1- 20:40:20 kg $N:P_2O_5:K_2O$ ha^{-1}. The favourable effect of increased level of fertilizers increased the growth parameters and grain yield of soybean. These findings are in agreement with the results obtained by Dubey (2004).

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