

EFFECT OF HERBICIDES ON WEEDS AND YIELD OF RAINY SEASON GREENGRAM (*VIGNA RADIATA* L. WILCZEK)

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Received : 03-06-2011

Accepted : 11-11-2011

ABSTRACT

A field experiment was conducted during rainy season of 2009 on sandy loam soil to study the influence of weeds on yield of rainy season greengram (*Vigna radiata* L. Wilczek). Application of imazethapyr 100 g/ha at 15-20 days after sowing was found most effective in reducing population and dry weight of weeds and maximum yield of greengram. Quizalofop-p-ethyl 100 g/ha applied at 15-20 DAS was also equally effective.

Key words : Green gram, Imazethapyr, Quizalofop-p-ethyl, Pendimethalin, interculture HW, Weeds, Grain yield, Percent mortality, Pre-Emergence.

Among the pulses, greengram (*Vigna radiata* L. Wilczek) is one of the most important and extensively cultivated crop. It is grown during rainy and summer season. Weed management is an important factor for enhancing the productivity of greengram, as weeds compete for nutrient, water, light and space with crop plant during early growth period. Yield losses in greengram due to weeds have been estimated to range between 30-50 % (Kumar *et al.* 2004). Mechanical practices such as hand weeding and interculturing are effective but unavailability of labor and continuous rainfall in rainy season does not permit it to operate timely. Pendimethalin is most commonly used pre-emergence herbicides in greengram. It controls weeds during early growth stage, but later, newly germinated weeds flora cannot be controlled by pre-emergence application. Manual weeding or spraying of recommended pre-emergence herbicide is some time difficult in rainy season for efficient weed control. This warrants the use of post emergence herbicide for weed control. The current trends and further development of intensive agriculture likely to

seek the help of herbicide as an effective tool for weed control. Keeping this in view, the present investigation was undertaken in greengram.

A field experiment was carried out during rainy season of 2009 at Agronomy Instructional Farm, C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar (Gujarat). The soil was sandy loam in texture, low in organic carbon (0.15 %) and available N (168.0 kg/ha), medium in available P (32.4 kg/ha) and available K (234.0 kg/ha) with pH 7.9. Nine treatments of weed control (Table-1) were evaluated in randomized block design, replicated four times with variety GM-4. Pre-emergence herbicides *viz*; pendimethalin and imazethapyr were applied just after sowing, while, post-emergence herbicides *viz*; quizalofop-p-ethyl and imazethapyr were sprayed at 17 days after sowing (DAS). Interculturing and hand weeding were carried out at 20 & 40 DAS. Weed density (No. per m²) was recorded from 0.5 x 0.5 m² quadrat at 15, 40 DAS and at harvest. Dry weight of weeds (g/m²) was recorded at harvest. The observations

on yield and yield attributes were also recorded at harvest.

Most dominant weed species found on experimental site were *Cynodon dactylon*, *Cenchrus biflorus*, *Dactyloctenium aegyptium*, *Boerhavia diffusa*, *Trianthema monogyna*, *Corchorus olitorius*, *Portulaca oleracea*, *Tribulus terrestris*, *Spergula arvensis* and *Cyperus rotundus* which were recorded according to grassy (*Cynodon dactylon*, *Cenchrus biflorus* and *Dactyloctenium aegyptium*), broad leaves (*Boerhavia diffusa*, *Trianthema monogyna*, *Corchorus olitorius*, *Portulaca oleracea*, *Tribulus terrestris* and *Spergula arvensis*) and sedges (*Cyperus rotundus*).

Weed density was significantly influenced by weed control treatments. Among the different herbicides, pre-emergence application of pendimethalin 1.0 kg/ha reduced the weed density at 15 days after sowing. Application of imazethapyr 100 g/ha at 15-20 DAS recorded lowest grassy weeds and sedges (Table 1) at 40 days after sowing which was followed by quizalofop-p-ethyl 100 g/ha at 15-20 DAS, while pre-emergence application of pendimethalin 1.0 kg/ha was found most effective in reducing broad leaves weeds at 40 DAS. Application of imazethapyr 100 g/ha at 15-20 DAS was found most effective by recording lowest grassy weeds and sedges at harvest. While, interculturing and HW at 20 & 40 DAS and pendimethalin 1.0 kg/ha PE were found equal by recording lower broad leaves weeds at harvest. These results are in close proximity with findings of Malliswari *et al.* (2008).

Among the chemical weed control treatments, total number of weeds at harvest were recorded lowest (40.9 per m²) when imazethapyr 100 g/ha was applied at 15-20 DAS which was closely followed by quizalofop-p-ethyl 100 g/ha at 15-20 DAS.

Imazethapyr 100 g/ha at 15-20 DAS was the most effective in minimizing weed infestation and recorded significantly less dry

weight of weeds (Table 1). Similar findings were also reported by Mishra *et al.* (2004) and Begum and Rao (2006).

Significantly highest grain yield of greengram (999 kg/ha) was recorded under treatment weed free. Among different herbicides, application of imazethapyr 100 g/ha at 15-20 DAS, quizalofop-p-ethyl 100 g/ha at 15-20 DAS and pendimethalin 1.0 kg/ha PE recorded statistically similar seed yield of greengram which were 927, 920 and 645 kg/ha, respectively. Increase in seed yield of greengram under treatments weed free, imazethapyr 100 g/ha at 15-20 DAS, quizalofop-p-ethyl 100 g/ha at 15-20 DAS and pendimethalin 1.0 kg/ha PE over unweeded control was to the tune of 72.8, 70.7, 70.5 and 63.6 per cent, respectively. Higher seed yield obtained under these treatments might be due to the maintenance of weed free environment, especially during critical growth stages of crop growth as evident from increase in the values of yield attributes under these treatments. In addition to this the least population and dry weight of weeds were recorded under these treatments are also responsible for better seed yield.

Highest net return of ₹ 53,539 per hectare was secured under the treatment weed free condition. Among the other weed control treatments application of imazethapyr 100 g/ha 15-20 DAS as post-emergence recorded maximum net return of ₹ 50,472 per hectare followed by quizalofop-p-ethyl 100 g/ha 15-20 DAS, interculturing and HW at 20 & 40 DAS and pendimethalin 1.0 kg/ha PE with the net return of ₹ 50,285, ₹ 48,915 and ₹ 38,120 per hectare, respectively. Whereas, unweeded control recorded the lowest net return of ₹ 5,770 per hectare. The higher seed yield under these treatments as a result of better weed control is responsible for higher net return per hectare. The highest Benefit : Cost Ratio (3.33) was obtained when quizalofop-p-ethyl 100 g/ha was applied at 15-20 DAS which was closely followed by imazethapyr 100 g/ha 15-20 DAS, interculturing and HW at 20 & 40 DAS and weed

Table 1 : Effect of treatments on weed density at 15, 40 DAS & at harvest, total no. of weeds/m², weed dry weight, yield, net return and B : C ratio of rainy season greengram.

Treatments	Weed density per m ²												Total no. of weeds/m ²			Weed dry weight		Yield (kg/ha)	Net return (₹/ha)	B : C ratio	
	Grassy weeds				Broad leaves weeds				Sedges				15	40	At harvest	Weed dry weight (g/m ²)	Straw				
	15	40	DAS	At harvest	15	40	DAS	At harvest	15	40	DAS	At harvest									Grain
Pendimethalin	(6.1)	(9.2)	(14.7)	(3.8)	(8.8)	(12.5)	(8.6)	(15.4)	(19.6)	18.5	33.4	46.8	70	745	823	38120	2.56				
1.0 kg/ha PE	2.57	3.11	3.86	2.01	3.05	3.59	2.98	3.98	4.48	61.7	50.8	64.2	194	430	508	16179	1.12				
Quizalofop-p-ethyl 50 g/ha at 15-20 DAS	4.82	4.16	4.35	4.53	4.32	5.20	4.38	3.99	4.48	62.4	43.5	55.4	102	536	663	23398	1.58				
Quizalofop-p-ethyl 75 g/ha at 15-20 DAS	4.69	3.97	4.14	4.76	4.04	4.91	4.36	3.48	3.94	61.7	28.2	44.4	54	920	978	50285	3.33				
Quizalofop-p-ethyl 100g/ha at 15-20 DAS	4.66	2.95	3.80	4.69	3.44	4.27	4.40	3.03	3.59	22.2	50.8	64.2	71	629	706	29329	1.89				
Imazethapyr 100 g/ha PE	(7.1)	(15.8)	(16.9)	(5.1)	(17.7)	(24.6)	(10.0)	(17.3)	(22.7)	59.2	27.2	40.9	52	927	1036	50472	3.26				
Imazethapyr 100 g/ha at 15-20 DAS	2.69	3.98	4.08	2.37	4.27	5.01	3.24	4.20	4.81	60.3	48.1	38.1	53	910	927	48915	3.11				
Interculturing and HW at 20 & 40 DAS	4.57	2.67	3.60	4.47	3.79	4.47	4.35	2.65	3.08	0.0	0.0	0	0	999	1094	53539	3.05				
Weed free	(22.1)	(18.5)	(14.7)	(17.7)	(14.4)	(12.3)	(20.5)	(15.2)	(11.1)	68.6	138.0	180.5	336	271	318	5770	0.42				
Unweeded control	4.75	4.34	3.86	4.24	3.84	3.56	4.59	3.90	3.39	-	-	-	5	32.48	77.73	-	-				
S.Em. ±	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	C. D. at 0.05 %	0.57	0.59	0.70	0.50	0.60	0.96	14	94.82	226.90	-	-
C. V. (%)	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	C. V. (%)	10.59	11.38	12.23	9.54	10.94	15.05	9.53	9.18	19.83	-	-

DAS= Days after sowings, PE= Pre-emergence

Values in parentheses are original subjected to square root transformation (" x + 0.5) before analysis.

free under which benefit : cost ratio was recorded 3.26, 3.11 and 3.05, respectively. Similar trend was also observed by Begum and Rao (2008).

Based on the results from one year experimentation, it can be concluded that under constraints of labour availability, maximum yield, net profit and effective weed control in green gram crop can be achieved with application of imazethapyr or quizalofop-p-ethyl 100 g/ha 15-20 days after sowing.

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