Research Paper

ADVANCE RESEARCH JOURNAL OF
C R P
IMPROVEMENT
Volume 5 | Issue 1 | June, 2014 | 40-43

e ISSN-2231-640X
Open Access-*www.researchjournal.co.in*

Studies on efficiency of herbicides against weeds of blackgram (*Vigna mungo* L.)

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ABSTRACT : A field experiment was conducted during *Kharif* 2009-10 at Students' Instructional Farm, C.S. Azad University of Agriculture and Technology, Kanpur. The experiment consisted 10 treatments *viz.*, six doses of herbicide clethodium, single dose of quizalofop-ethyl and fenoxaprop-P-ethyl each, hand weeding twice and untreated control. The results revealed that clethodium @ 60 g.a.i./ha + NIS + AMS controlled weed population and biomass at par with hand weeding treatment. Both these treatments improved growth and yield attributes of blackgram as compared to other treatments. Grain yield was significantly highest (8.50 q/ha) under hand weeding treatment followed by clethodium @ 60 g/ha + NIS + AMS with 6.90 q/ha. Net income was also obtained significantly maximum of Rs. 13916/ha under hand weeding followed by clethodium @ 60 g ai/ha treatment with Rs. 9232/ha.

Key Words : Herbicides, Weeds, Blackgram

How to cite this paper : Chaudhry, Sanjai, Verma, V.K., Singh, Vishram, Pyare, Ram and Singh, A.K. (2014). Studies on efficiency of herbicides against weeds of blackgram (*Vigna mungo* L.). *Adv. Res. J. Crop Improv.*, **5** (1) : 40-43.

Paper History : Received : 08.03.2014; **Revised :** 09.05.2014; **Accepted :** 22.05.2014

Food legumes constitute an important source of dietary proteins of the people in Asia, Africa, Latin America and other developing countries of the world. In India, the pulses have been called as "poor man's meat and rich man's vegetable". In India black gram is grown in all the states mainly in *Kharif* season on about 3.1 million hectare land with a production of 1.49 million tones (Hand Book of Agriculture, 2006). The major problem in pulses production particularly in *Kharif* season is infestation of weeds. Associated weeds of crop not only compete for nutrients, moisture and light but for space too. Due to non-availability and high prices of labour and incessant rains, it becomes difficult to remove weeds during critical period of crop growth. Which play an important role in deciding the productivity of crop. Therefore, under these circumstances, use of herbicides may be desirable for the control of weeds particularly at early stages, which will control the emerging weeds for a substantial period of time. Keeping in view above facts, the experiment was designed to use of herbicides like clethodium, quizalofop and fenoxaprop to control weeds of urd bean at early growth stages.

RESEARCH PROCEDURE

The field experiment was conducted during *Kharif* season of 2009-10 at Students' Instructional farm of C.S. Azad University of Agriculture and Technology, Kanpur. The soil of experimental field was sandy loam in texture, having organic carbon 0.40 per cent, available N 183 kg/ha, P_2O_5 18.0 kg/ha and K_2O 235 kg/ha. The experiment was laidout in Randomized Block Design with three replications. Three herbicides with different doses *viz.*, clethodium 24 EC @ 36 g, 48 g. 60 g ai/ha + NIS + AMS, 48 g ai/ha + NIS, 48 g ai/ha + AMS and 48 g ai/ha alone, quizalopop-ethyl 5 EC @ 50 g ai/ha and fenaxaprop-P-Ethyl 9.3 EC @ 100 g ai/ha compared with hand weeding twice and unweeded control treatment. (NIS-Non ionic) surfactant, AMS-Ammonium sulphate). The urd bean variety "Shekhar-2" was sown on 12th July, 2009. An uniform dose of 20 kg/ha nitrogen, 60 kg/ha P_2O_5 and 40 kg/ha K_2O was applied to all treatments. Two hand weeding were performed in hand weeding experiment at 17 DAS and 47 DAS to control weeds. Herbicidal foliar application was made as per treatment through knap sack sprayer fitted with flat fan nozzle.

Table 1: Mean table for weeds population /m² and dry weight of weeds (g) /plant

Treatments	*Weed population/m²*					*Dry weigat of weed (g/plant)*				
	P. hysterophorus	*C. rotundus*	*T. monogyna*	*D. arvensis*	*L. chinensis*	*P. hysterophorus*	*C. rotundus*	*T. monogyna*	*D. arvensis*	*L. chinensis*
Clethodium 24 EC @ 36 g a.i./ha + NIS + AMS	2.80	7.40	2.12	4.62	7.10	1.93	0.99	2.70	3.40	1.19
Clethodium 24EC @ 48 ga.i./ha + NIS + AMS	4.28	7.51	2.07	4.10	7.40	2.09	0.87	3.12	2.58	1.33
Clethodium 24 EC @ 60 g a.i./ha + NIS + AMS	2.71	7.87	1.85	3.93	5.92	1.87	1.22	3.29	2.84	1.20
Clethodium 24 EC @ 48 g a.i./ha + NIS	3.24	8.08	1.97	4.94	5.66	2.02	0.95	3.35	3.30	1.40
Clethodium 24 EC @ 48 g a.i./ha AMS	4.66	9.50	1.94	4.21	6.61	2.02	0.90	2.49	3.23	1.32
Clethodium 24 EC @ 48 g a.i./ha	3.02	8.68	2.06	4.25	7.05	1.93	0.88	2.89	3.16	1.44
Quizalofop-ethyl 5 EC @ 50 g a.i./ha	2.67	7.76	2.36	3.54	5.94	1.92	1.21	3.23	2.84	1.21
Fenoxaprop-P-ethyl 9.3 EC @ 100 g a.i./ha	4.21	7.44	2.21	4.06	7.21	1.89	0.80	3.17	2.54	1.21
Two hand weeding	2.31	7.39	1.55	3.52	4.27	1.74	0.86	2.47	2.49	1.19
Untreated control	6.23	11.92	2.83	4.98	7.76	3.10	1.28	3.39	3.78	1.72
S.E. ±	0.410	0.441	0.271	0.231	0.422	0.235	0.106	0.222	0.313	0.122
C.D. (P=0.05)	0.855	0.920	0.564	0.483	0.880	0.490	0.222	0.463	0.653	0.255

Table 2: Plant population (m²), number of branches/plant, number of pod/plant, number of grain/pod, test weight, grain yield (q/ha), straw yield (q/ha) and harvest index as influenced by different treatments

Treatments	Plant population	No. of branches/plant	No. of pod/plant	No. of grain/pod	Test weight 1000-grair (g)	Grain yield (q/ha)	Straw yield (q/ha)	Harvest index
Clethodium 24 EC @ 36 g a.i./ha + NIS + AMS	19.66	1.90	30.99	5.06	36.06	5.85	14.33	28.61
Clethodium 24 EC @ 48 g a.i./ha + NIS + AMS	22.00	2.00	27.66	5.73	37.40	6.33	13.00	28.41
Clethodium 24 EC @ 60 g a.i./ha + NIS + AMS	23.33	3.33	29.88	6.30	37.53	6.90	16.11	32.63
Clethodium 24 EC @ 48 g a.i./ha + NIS	18.66	2.33	29.88	5.86	36.57	5.72	15.42	31.92
Clethodium 24 EC @ 48 g a.i./ha AMS	21.33	3.00	28.77	6.20	37.46	5.85	12.36	31.94
Clethodium 24 EC @ 48 g a.i./ha	22.66	2.33	26.21	5.73	36.56	6.03	13.50	31.68
Quizalofop-ethyl 5 EC @ 50 g a.i./ha	16.66	4.00	29.66	5.33	36.33	6.00	16.00	28.53
Fenoxaprop-P-ethyl 9.3 EC @ 100 g a.i./ha	22.00	2.33	27.00	5.33	35.30	5.97	13.00	31.19
Two hand weeding	20.00	3.32	32.77	6.86	37.89	8.50	17.43	31.13
Untreated control	22.00	1.00	25.44	4.76	36.03	5.58	12.23	27.95
S.E. ±	1.788	0.357	1.811	0.531	0.546	0.334	0.866	0.800
C.D. (P=0.05)	3.730	0.745	3.779	1.109	1.139	0.986	1.808	1.669

Table 3: Cost of cultivation (Rs./ha), gross income (Rs./ha), net income (Rs./ha) and return/rupee as influenced by different treatments

Treatments	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net income (Rs./ha)	Return/ rupee
Clethodium 24 EC @ 36 g a.i./ha + NIS + AMS	16074	22664	5590	1.43
Clethodium 24 EC @ 48 g a.i./ha + NIS + AMS	16902	23129	6227	1.36
Clethodium 24 EC @ 60 g a.i./ha + NIS + AMS	17334	26566	9232	1.52
Clethodium 24 EC @ 48 g a.i./ha + NIS	16705	22357	5652	1.45
Clethodium 24 EC @ 48 g a.i./ha AMS	16650	22353	5703	1.34
Clethodium 24 EC @ 48 g a.i./ha	16300	24498	8298	1.49
Quizalofop-ethyl 5 EC @ 50 g a.i./ha	15336	21850	5664	1.47
Fenoxaprop-P-ethyl 9.3 EC @ 100 g a.i./ha	15674	23190	7183	1.45
Two hand weeding	18500	32416	13916	1.75
Untreated control	15050	21377	6327	1.41
S.E.±	-	1453.392	367.413	0.064
C.D. (P=0.05)	-	3031.708	745.547	0.135

RESEARCH ANALYSIS AND REASONING

The experimental findings obtained from the present study have been discussed in following heads:

Weed studies:

The major weed species *viz.*, *P. hysterophorus, C. rotundus, T. monogyna, D. arvensis* and *L. chinensis* were counted at 60 days after sowing and dry weight of weeds were also recorded. Abnoxium weed *C. rotundus* recorded maximum population while *D. arvensis* produced highest dry matter in all the treatments. Clethodium 24 EC @ 60 g ai/ha + NIS + AMS reduced weed population and dry weight in considerable amount compared to other herbicides though it was at par with hand weeding twice treatments (Table 1). Beneficial effect of different herbicides on weed control in urd bean were reported by Raman (2006) and Rao *et al.* (2010) under varied agro-climatic conditions.

Crop studies:

Growth in terms of plant height, fresh and dry matter of plant and yield attributes *viz.*, number of branches, number of pods/plant, number of seeds/pod and test weight of seed were influenced significantly by weed control treatments. All these yield components except number of branches/plant, recorded maximum value with hand weeding closely followed by clethodium 24 EC @ 60 g ai/ha + NIS + AMS though both being at par with each other (Table 2). Superiority of these treatments might be due to reduced crop weed competition because of efficient weed control. These results are in close conformity to those of Vijendra *et al.* (2006) and Pal and Debnath (2008). Biological yield, grain yield and straw yield of urd bean were recorded in similar order.

Gross income, net income and return/rupee were recorded significantly maximum under hand weeding treatment (Table 3). Though hand weeding treatment involved highest cost. Among herbicidal treatments, clethodium @ 60 g ai/ha + NIS + AMS earned highest gross income, net income and return/rupee investment. These results are supported by findings of Veerputhiran *et al.* (2008) and Rao *et al.* (2010).

Conclusion:

Among herbicidal treatments, application of clethodium 24 EC @ 60 g ai/ha + NIS + AMS controlled all weeds more effectively, increased growth, yield attributes, yield and income over other treatments of chemical weed control tried in blackgram field.

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