Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(2): 1654-1656
Received: 17-01-2019
Accepted: 18-02-2019

Namrata Jain
OFR Centre, KVK, JNKVV, Umaria, Madhya Pradesh, India

Priyanka Prajapati
College of Agriculture, Tikamgarh, Madhya Pradesh, India

Alka Singh
College of Agriculture, Tikamgarh, Madhya Pradesh, India

Correspondence
Namrata Jain
OFR Centre, KVK, JNKVV, Umaria, Madhya Pradesh, India

Enhancing productivity and profitability through herbicidal weed control in blackgram

Namrata Jain, Priyanka Prajapati and Alka Singh

Abstract
Field experiment was conducted at College of Agriculture, Tikamgarh during 2015-16 to assess the effectiveness of different herbicides for weed control in blackgram. The experiment was laid out in randomized block design replicated thrice with ten treatments consisted of pre emergence pendimethalin at 1 kg/ha and alachlor at 1 kg/ha, post emergence imazethapyr at 60, 75, 100, 150 g/ha at 14 DAS, quizalofop ethyl at 75 g/ha at 14 DAS, hand hoeing at 30 DAS, hand weeding at 20 and 40 DAS and weedy check. The results revealed that hand weeding twice was most effective and recorded minimum weed density and dry weight among all the treatments. Application of imazethapyr at all the rates of application from 60 to 150 g/ha significantly reduced the weed intensity and weed dry weight and registered higher weed control efficiency as compared to quizalofop-ethyl followed by pendimethalin, alachlor and hand hoeing. Two hand weeding at 20 & 40 DAS recorded the highest seed yield (1410 kg/ha) among all the treatments followed by imazethapyr at all the rates of application. The net monetary return was maximum under hand weeding twice followed by imazethapyr at 150 g, 100 g and 75 g/ha but the benefit cast ratio was the highest under imazethapyr @ 75 g/ha. A strong negative correlation between weed dry weight and yield of blackgram clearly indicated that weed dry weight accounted for 73.20% variation in yield of blackgram.

Keywords: Alachlor, imazethapyr, pendimethalin, quizalofop, weed

Introduction
Blackgram is an important *kharif* pulse and is usually grown on marginal and sub-marginal lands without any management practices. In India blackgram is grown on an area of 30.6 lakh hectare area with an average production and productivity of about 17 lakh tonnes and 555 kg/ha, respectively. In Madhya Pradesh, the crop covers an area of 8.6 lakh hectares with total production of 3.5 lakh tonnes and productivity of 415 kg/ha (IIPR, 2014-15). Among the various constraints for achieving higher productivity of blackgram, weeds are one of them. Blackgram (*Vigna mungo*) is usually accompanied by luxuriant weed growth during rainy season owing to abundant rainfall received during monsoon leading to serious crop losses by weeds. Unchecked weeds have been reported to cause a considerable reduction in seed yield about 43.2-64.1%. (Rathi *et al.* 2004) [5]. The crop is most sensitive for weed competition during 15 to 45 days after sowing. In blackgram, weeds can be controlled by hand weeding, however, mechanical/manual weeding is laborious, time consuming, costly and tedious. Furthermore, weather conditions do not permit timely hand weeding due to wet field conditions in *kharif* season. Under these conditions, use of herbicides offer an alternative for possible effective control of weeds. Therefore, the present experiment was laid out to find out the efficacy of imazethapyr for weed control in blackgram.

Materials and methods
The experiment was carried out at Research Farm, College of Agriculture, Tikamgarh during *kharif*, 2015 to to assess the effectiveness of different herbicides for weed control in blackgram. The soil of the experimental area was clay loam in texture, medium in available N (290 kg/ha), medium in P_2O_5 (19 kg/ha) and K_2O (331 kg/ha) with pH 7.3. The experiment was laid out in randomized block design replicated thrice. Ten treatments consisted of pre emergence pendimethalin at 1 kg/ha and alachlor at 1 kg/ha, post emergence imazethapyr at 60, 75, 100, 150 g/ha at 14 DAS, quizalofop ethyl at 75 g/ha at 14 DAS, hand hoeing at 30 DAS, hand weeding at 20 and 40 DAS and weedy check. These treatments were replicated thrice in randomized block design. A uniform dose of fertilizer (20 kg N + 60 kg P_2O_5 + 20 kg K_2O/ha) was applied through urea, single super phosphate and muriate of potash, respectively, in all the plots. Variety AZAD-1 was sown with seed rate of 30 kg/ha at uniform row distance of 30 cm. Herbicides were applied with knapsack sprayer fitted with a flat-fan nozzle and water as a carrier at 500 litre/ha.

The data on weed count and dry weight was recorded at 30 days after herbicide spray. The data on weed count and dry weight were subjected to square root transformation √x+0.5 to normalize the distribution. Weed control efficiency was worked out as the efficiency of treatment expressed in percentage for controlling weeds in comparison to unwedded control and worked out on the basis of the formula suggested by Mani *et al.* (1973) [4] whereas, Weed index was calculated as the ratio of the percent reduction in the seed yield under a particular treatment due to the presence of weeds as compared to the seed yield determined in weed free plot (Hand weeding at 20 and 40 DAS plot) as suggested by Gill and Kumar (1969) [3].

Results and Discussion

Effect on weeds

The dominant monocot weeds in the field were *Cyperus rotundus*, *Echinochloa colona*, *Cynodon dactylon* and *Commelina benghalensis* whereas among the dicot weeds, *Digera arvensis*, *Phyllanthus niruri* and *Corchorus olitorious* were present. There was prevalence of monocot weeds in experimental field with relative density of 77.20 per cent.

The weed intensity was significantly declined in hand weeded plots as compared to herbicidal treatments and weedy check because weeds were exterminated in hand weeding from inter and intra row spaces physically by *khurpi*, consequently, the crop attained luxuriant growth and suppressed the future weed flushes effectively. Similar results on hand weeding was obtained by Shrivastav and Shrivastav (2002) [7]. Application of imazethapyr at all the rates of application (60, 75, 100 and 150 g/ha) significantly reduced the weed intensity and weed dry weight as compared to quizalofop-ethyl followed by pendimethalin, alachlor and hand hoeing. Hand weeding twice at 20 and 40 DAS and imazethapyr equally reduced the density of weeds than post emergence application of quizalofop-p-ethyl @ 75 g/ha being a grass weed killer it was not effective against broad leaved weeds. The maximum weed dry weight was recorded under weedy check as compared to other treatments. The application of imazethapyr was as good as treatment two hands weeding which recorded lowest dry weight of weeds.

Weed control efficiency was the highest under two hand weeding treatment (96.55%), followed by imazethapyr at 150, 100, 75 and 60 g/ha. Greater reduction in weed biomass might have increased the weed control efficiency under these treatments. The results are in close conformity with the findings of Singh *et al.* (2015) [8].

Yield and Economics

Seed yield was significantly higher under all the weed control practices over weedy check. Two hand weeding at 20 & 40 DAS recorded the highest seed yield (1410 kg/ha) among all the treatments followed by imazethapyr at all the rates of application. Post emergence application of imazethapyr at 75, 100 and 150 g/ha (1104, 1118 and 1136 kg/ha, respectively) was found at par with respect to seed yield however, significant differences was observed in imazethapyr at 150 g/ha and imazethapyr at 60 g/ha. All the rates of application of imazethapyr recorded significantly higher seed yield over pre emergence application of pendimethalin (845 kg/ha), alachlor (818 kg/ha) and post emergence grass weed killer quizalofop-ethyl (913 kg/ha). The effectiveness of imazethapyr for controlling weeds in blackgram was also reported by Aggarwal *et al.* (2014) [1]. Weed index varied in proportion to seed yield in herbicide treated plots as against hand weeded plots this was in accordance with the degree of weed control under these treatments. The yield loss was relatively lower under hand weeding twice 20 and 40 DAS followed by post emergence application of imazethapyr. The highest value of weed index in weedy check (53.35%) was mainly on account of greater competitional stress, which intern, resulted in sharp decline in seed yield. A strong negative correlation between weed dry weight and yield of blackgram clearly indicated that weed dry weight accounted for 73.20% variation in yield of blackgram (Figure 1).

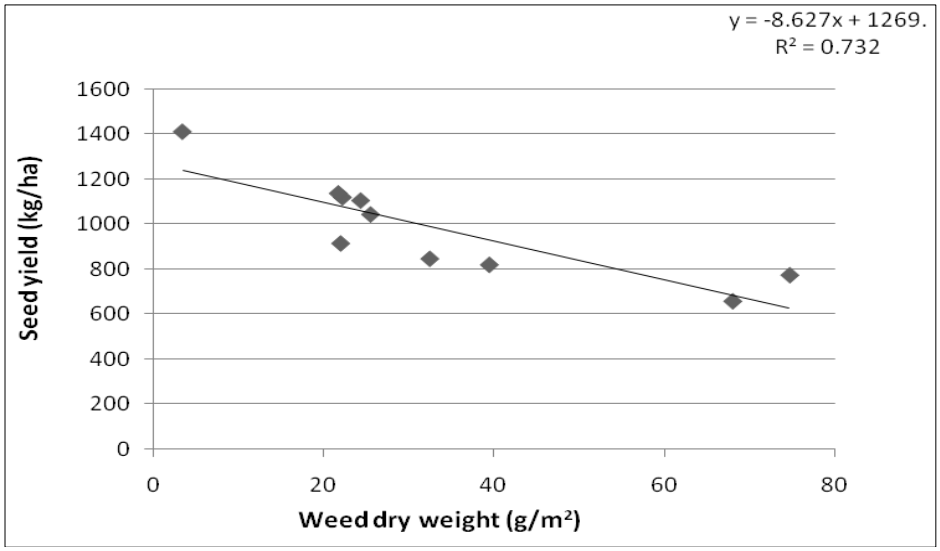

Fig 1: Relationship between weed dry weight (g/m^2) and seed yield (kg/ha) of blackgram

The highest net monetary return was recorded under hand weeding twice (Rs. 42654/ha) followed by imazethapyr @ 150 g/ha(Rs. 35224/ha) and the marginal profit of (Rs. 17897/ha) was recorded under weedy check. Benefit cost ratio was recorded the highest under post emergence application of imazethapyr @ 75 g/ha followed by 100 g/ha than all herbicidal treatments. The lowest B:C ratio was recorded under hand weeding at 20 and 40 DAS (2.90) compared to other herbicidal treatments due to higher cost of cultivation.

Table 1: Effect of pre and post emergence herbicides on weed intensity, dry weight and weed control efficiency

S. No.	Treatment	Total weed intensity	Total weed dry weight	Weed Control efficiency	Seed yield (kg/ha)	Weed Index (%)	Net monetary return (Rs./ha)	B:C Ratio
T_1	Imazethapyr at 60 g/ha	8.63 (73.98)	5.08 (25.52)	63.49	1042	26.00	32524	3.24
T_2	Imazethapyr at 75 g/ha	8.25 (67.64)	4.98 (24.35)	65.57	1104	21.54	34836	3.41
T_3	Imazethapyr at 100 g/ha	7.93 (62.41)	4.75 (22.22)	70.23	1118	20.59	35092	3.33
T_4	Imazethapyr at 150 g/ha	7.77 (59.91)	4.69 (21.73)	71.91	1136	19.33	35224	3.16
T_5	Pendimethalin at 1 kg/ha	9.62 (92.08)	5.72 (32.47)	32.28	845	40.05	24042	2.29
T_6	Alachlor at 1 kg/ha	10.38 (107.22)	6.32 (39.46)	23.35	818	41.93	23704	2.43
T_7	Quizalofop-ethyl at 75 g/ha	8.79 (76.97)	4.72 (22.01)	70.28	913	35.16	26754	2.53
T_8	Hand hoeing at 30 DAS	14.83 (219.44)	8.63 (74.73)	29.26	772	45.14	20689	1.90
T_9	Hand weeding at 20 and 40 DAS	3.63 (12.71)	1.97 (3.43)	96.55	1410	0.00	42654	2.90
T_{10}	Weedy check	14.97 (225.10)	8.25 (68.03)	0.00	656	53.35	17897	1.99
	LSD (P=0.05)	1.03	1.08		94.47			

*values in parenthesis are original values

References

1. Aggarwal Navneet, Singh Guriqbal, Hari Ram, Khanna Veena. Effect of post-emergence application of imazethapyr on symbiotic activities, growth and yield of blackgram (*Vigna mungo*) cultivars and its efficacy against weeds. Indian Journal of Agronomy. 2014; 59(3):421-426.
2. Chand R, Singh NP, Singh VK. Effect of weed control treatments on weeds and grain yield of late sown blackgram. Indian Journal of Weed Science. 2004; 36(1&2):127-128.
3. Gill GS, Kumar Vijay. Weed Index. A new method of reporting weed control trails. Indian Journal of Agronomy. 1969; 14:96-98.
4. Mani VSML, Mala KC, Gautam, Bhagavandas. Weed Killing Chemicals in Potato Cultivation. Indian Farming, 1973, 23.
5. Rathi JPS, Tewari AN, Kumar M. Integrated weed management in black gram (*Vigna mungo* L.). Indian Journal of Weed Science. 2004; 36:218-220.
6. Rajput Kavita D, Bhale VM, Kamble AS, Sonawane RK. Response of herbicides and cultural practices on growth and yield of blackgram. In: Extended summary in Biennial conference on emerging challenges in weed management. 15-17 February 2014, DWSR, Jabalpur, 2014, 96.
7. Shrivastav G, Shrivastav VC. Effect of weed management and levels of diammonium phosphate on grain yield of blackgram (*Vigna mungo*). Journal of Research. 2002; 14(1):69-71.
8. Singh SP, Singh Pratap V, Pratap Tej, Banga A, Kumar A, Bisht Neema. Efficacy of different herbicides for controlling weeds in blackgram. In: 25th Asian-Pacific Weed Science Society Conference on "Weed Science for Sustainable Agriculture, Environment and Biodiversity", Hyderabad, India. 13-16 October, 2015. Hyderabad, 2015.