



Weed management effect on weeds, crop, nutrients uptake and soil physico-chemical properties in blackgram

Raj kumar*, R.S. Singh, Deepak Pandey and Manoj Kumar

Department of Agronomy, NDUAT, Kumarganj, Faizabad, Uttar Pradesh 224 229

*Email: rkpnduat@ gmail.com

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ABSTRACT

Field experiment was conducted during *Kharif* season 2015-16 at N.D. University of Agriculture and Technology, Kumarganj, Faizabad, (UP) to assess the weed management effect on weeds, crop, nutrients uptake and soil properties in black gram. The result of the investigation revealed that application of imazethapyr + imazamox 80 g/ha PE was found superior in controlling weeds, increasing blackgram yield and nutrient uptake and recorded maximum benefit: cost ratio. Next best treatments were pendimethalin 1000 g/ha and metribuzin 200 g/ha PE.

Weeds are the major threat in harnessing the full potential of applied and native plant nutrients as they remove considerable amount of nutrients and adversely affect the yield of the leguminous crops which have greater requirement of phosphorus for symbiotic nitrogen fixation (Kumar *et al.* 2015). Blackgram (*Vigna mungo* L.) is less competitive against many weeds during early stage of the crop and the most sensitive period of crop weed competition is between 15 to 45 days after sowing. Herbicides *e.g.* imazamox and imazethapyr individually as well as in ready mixed combination have been tried in various pulse crops and found convincing results. Information on weed management practices on nutrient uptake and soil fertility in blackgram is meagre, hence, the present investigation was undertaken.

The field experiment was conducted during *Kharif* season 2015-16 at N.D. University of Agriculture and Technology, Kumarganj, Faizabad (UP) with 10 treatments in three replications. The soil of the experimental field was silt loam in texture having pH 8.1 low in available nitrogen (125 kg/ha) and medium in available phosphorus (15 kg/ha) and potash (240.5 kg/ha). The pre-emergence herbicides were applied in soil on next day of sowing, while post-emergence spray was done at 3-4 leaf stage (20 DAS). Soil and plant samples were collected from each plot for soil and plant parameter studies by using standard methods.

Effect on weed density, growth, yield and economics

At 60 days after seeding (DAS), highest weed density was recorded in weedy check and lowest under in imazethapyr + imazamox (RM) at 80 g/ha PE treatment, which was significantly superior with other treatments. This might be due to its better solubility and effectiveness. Similar result was also reported by Meena *et al.* (2011). At 60 DAS, taller plant was recorded with pre-emergence application of imazethapyr + imazamox (RM) 80 g/ha PE (42.25 cm), which was at par with two hand weeding (40.65 cm) and significantly better than other treatments. Minimum plant height was recorded (25.60 cm) in weedy check plot. Application of different type of herbicides like pre-emergence and post-emergence influenced the number of nodules per plant at 60 DAS of crop growth. At 60 DAS, imazethapyr + imazamox (RM) 80 g/ha PRE application significantly increased the number of nodules per plant (37.96) as compared to rest of the treatments, however, it was at par with hand weeding (36.96) at 60 DAS. Highest dry weight of nodules (30.45 mg) was recorded under T₃ treatment, which was at par with hand weeding, metribuzin at 200 g/ha PE and pendimethalin at 1000 g/ha PE (29.60, 28.24 and 28.73 mg), respectively but significantly superior to rest of the treatments.

The maximum grain yield (1.21 t/ha) of blackgram was recorded with imazethapyr + imazamox (RM) at 70 g/ha PE, which was at par with hand weeding (1.19 t/ha), pendimethalin at 1000 g/ha

Table 1. Effect of weed management practices on weed density, growth, yield and economics of blackgram

Treatment	Total weed density (m ²) at 60 DAS	Plant height (cm) at 60 DAS	No. of nodules/plant at 60 DAS	Dry weight of nodules/plant (g) at 60 DAS	Grain yield (t/ha)	B:C ratio (Re-invested)
Imazethapyrat 70 g/ha PE	12.63 (159.2)	37.10	30.10	24.10	1.02	1.95
Imazethapyrat 80 g/ha PE	12.00 (143.7)	38.75	33.55	26.85	1.09	2.11
Imazethapyr + imazamox (RM) at 70 g/ha PE	9.91 (97.8)	42.25	37.96	30.45	1.21	2.29
Metribuzin at 200 g/ha PE	11.17 (124.6)	39.85	35.25	28.24	1.13	2.18
Pendimethalin at 1000 g/ha PE	11.31 (127.6)	40.28	35.90	28.73	1.13	2.17
Imazethapyrat 70 g/ha PoE	14.50 (209.9)	36.77	27.45	21.98	0.99	1.84
Imazethapyrat 80 g/ha PoE	13.98 (195.2)	35.88	25.80	20.67	0.98	1.80
Imazethapyr + imazamox (RM) at 80 g/ha PoE	11.62 (134.6)	37.80	32.25	26.12	1.07	1.92
Hand weeding	10.27 (105.1)	40.65	36.96	29.60	1.19	1.52
Weedy check	16.11 (259.1)	25.60	20.45	16.53	0.64	1.03
LSD (p=0.05)	0.60	1.72	2.21	3.00	0.17	-

Table 2. Effect of weed management on nutrients uptake in blackgram and physico-chemical properties of soil

Treatment	Nutrients uptake by blackgram (kg/ha)			Physico-chemical properties of soil						
	N	P	K	Bulk density (Mg/m ³)	Soil pH	EC (dS/m)	O.C. (g/kg)	Available Nitrogen kg/ha	Available Phosphorus kg/ha	Available Pottash kg/ha
Imazethapyrat 70 g/ha PE	70.46	5.37	85.23	1.43	8.18	0.29	3.6	180.5	12.2	209.1
Imazethapyrat 80 g/ha PE	73.21	7.21	92.23	1.43	8.18	0.28	3.7	185.7	13.6	211.8
Imazethapyr + imazamox (RM) at 70 g/ha PE	82.15	9.81	101.42	1.41	8.16	0.27	3.8	195.3	15.1	215.0
Metribuzin at 200 g/ha PE	75.34	7.98	95.28	1.42	8.17	0.28	3.7	189.6	14.3	211.8
Pendimethalin at 1000 g/ha PE	78.57	8.75	95.86	1.42	8.17	0.27	3.8	192.1	14.9	213.5
Imazethapyrat 70 g/ha PoE	66.21	5.16	82.98	1.45	8.19	0.29	3.6	180.1	12.8	208.4
Imazethapyrat 80 g/ha PoE	61.35	4.98	80.76	1.45	8.19	0.30	3.5	179.7	12.3	207.4
Imazethapyr + imazamox (RM) at 80 g/ha PoE	71.88	6.12	75.38	1.43	8.18	0.29	3.6	182.4	13.5	210.3
Hand weeding	81.74	9.08	97.96	1.40	8.15	0.26	4.0	196.2	15.4	217.0
Weedy check	53.20	3.12	65.90	1.46	8.20	0.30	3.5	166.0	10.1	206.9
LSD (p=0.05)	2.10	1.92	3.31	NS	NS	NS	NS	5.52	1.90	5.86

PE (1.13 t/ha), metribuzin at 200 g/ha PE (1.13 t/ha). Among different herbicides treatments, imazethapyr + imazamox (RM) 80 g/ha PE was recorded highest benefit-cost ratio (2.29) followed by metribuzin 200 g/ha (2.18) and pendimethalin 1000 g/ha (2.17) respectively. The minimum benefit-cost ratio (1.03) of blackgram was recorded in weedy check plot. The better net returns and B:C ratio might be mainly due to higher grain and straw yields to a greater extent as compared to lesser increase in cost of cultivation with these treatments. This is in agreement with Meena *et al.* (2011).

Effect on nutrients uptake and physico-chemical properties of soil

The maximum uptake of nitrogen (82.1 kg/ha), phosphorus (9.8 kg/ha) and pottash (101.4 kg/ha) were recorded with imazethapyr + imazamox (RM) 80 g/ha PE which was at par with two hand weeding and significantly superior with rest of all treatments (Table 2). Minimum uptake of nitrogen (53.2 kg/ha),

phosphorus (3.12 kg/ha) and potash (65.9 kg/ha) was recorded under weedy check plot. The results are in agreement with Sharma *et al.* (2016).

The soil properties (bulk density, pH, EC and OC) recorded after harvest of crop (Table 2) indicates non-significant influence of herbicides on soil properties.

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