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Integrated weed management in blackgram

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ABSTRACT

An on farm testing (OFT) was conducted in the farmer's field of Daloda Rail village, Mandsaur district, Madhya Pradesh in kharif season of 2014, 2015 and 2016 to assess the effect of integrated weed management treatments on weed management and yield of blackgram (*Vigna mungo* L.). Application of imazethapyr 75 g/ha at 18 days after seeding (DAS) and hand weeding at 40 DAS gave 36.91% mean higher blackgram grain yield as compare to farmer's practice (0.88 t/ha). Further, this treatment also resulted in significantly higher blackgram plant height, pods/plant, net return and B:C ratio as compared to all other tested treatments and significantly reduced the weed density and biomass as recorded at 45 DAS as compared to all other treatments tested.

Blackgram (*Vigna mungo* L.) is one of the important pulse crops of India. It is cultivated mostly on the marginal lands, under rainfed situations. Majority of farmers in rainfed regions are unaware about new varieties and improved package of practice of cultivation. In India, blackgram are grown in 3.75 million ha area with a total production of 2.49 million tonnes and productivity of 664 kg/ha out of which 1.82 million ha area with a production of 1.35 million tonnes and productivity of 739 kg/ha is under Madhya Pradesh with first rank (Anonymous 2018). The productivity of blackgram can be increased by adopting improved package of practices in a systematic manner with high yielding varieties of blackgram. Among different constraints to attain higher productivity and production of blackgram, weeds pose a serious problem during *Kharif* season and weeds cause losses up to 50-60% (Das *et al.* 2014). Weeds can be managed mechanically by one hand weeding at 20 DAS followed by another hand weeding at 40 DAS (Bhowmick *et al.* 2015), but hand weeding is labour intensive. Further, continuous rainfall during the initial growth period of crop makes the manual weeding impracticable and Therefore, chemical herbicide becomes cost effective. Thus, it is a major challenge to maximize the productivity of blackgram during *Kharif* season. Under these situations, integrated weed management practice involving both chemical and agronomic practice is an effective tool to increase the productivity of crop (Kavad *et al.* 2016). Keeping all these in mind, an on-farm trial (OFT) was conducted to assess the efficacy of integrating post-emergence herbicides with other weed management practices for effectively control weeds in blackgram in Mandsaur district of Madhya Pradesh.

An on-farm testing was conducted using randomized black design technique during three consecutive *Kharif* seasons of 2014, 2015 and 2016 in the adopted village Daloda Rail by Krishi Vigyan Kendra, Mandsaur. This OFT was conducted at 10 farmer's fields with '*JU 86*' variety of blackgram during all the years. Each treatment was laid out in 2000 sqm area. The treatments were farmer practice (hand weeding at 15, 30 and 45 days after seeding [DAS]), imazethapyr 75 g/ha at 18 DAS and imazethapyr 75 g/ha at 18 DAS and hand weeding at 40 DAS. The herbicides were applied manually by knapsack sprayer fitted with flat-fan nozzle using spray volume of 500 L/ha. Blackgram was sown in the second week of July and harvested in first week of October. Recommended package of practices was followed to raise the crop. The observation on weed biomass and density were recorded at 45 DAS using quadrate (0.5 x 0.5 m), placed randomly at two places in each plot. Economics of weed management treatments were worked out by using current market price of inputs and blackgram. All the data recorded were analyzed statistically as per the methods suggested by Gomez and Gomez (1984).

Effect on weeds

The predominant weeds noticed in blackgram field were *Cyperus rotundus*, *Cynodon dactylon* Pers., *Echinochloa colona*, *Commelina benghalensis*, *Euphorbia hirta* and *Parthenium hysterophorus*. Imazethapyr 75 g/ha at 18 DAS and hand weeding at 40 DAS was found to be significantly superior to all

Table 1. Effect of weed management treatments on blackgram plant height and associated weeds density and biomass

Treatment	Plant height (cm)				Weeds density/m^2				Weeds biomass (g/m^2)			
	2014	2015	2016	Mean	2014	2015	2016	Mean	2014	2015	2016	Mean
Farmer's practice (HW at 15, 30 and 45 DAS)	51.0	37.0	41.0	43.0	15.0	20.4	18.0	17.80	13.80	17.88	15.46	15.71
Imazethapyr 75 g/ha at 18 DAS	60.7	41.8	47.0	49.8	7.0	7.2	6.2	6.80	2.10	1.91	3.78	2.59
Imazethapyr 75 g/ha at 18 DAS and HW at 40 DAS	64.1	49.5	52.5	55.4	2.0	5.1	4.0	3.70	1.57	1.33	2.91	1.94
LSD (p=0.05)	4.67	8.76	6.70	3.52	0.66	0.54	0.88	0.36	0.501	0.541	0.414	0.248

Table 2. Effect of weed management treatments on number of pods, grain and straw yield of blackgram

Treatment	No. of pods/plants				Grain yield (kg/ha)				Straw yield (t/ha)			
	2014	2015	2016	Mean	2014	2015	2016	Mean	2014	2015	2016	Mean
Farmer's practice (HW at 15, 30 and 45 DAS)	24.4	22.4	22.8	23.2	667	520	820	669	1.51	1.17	1.84	1.51
Imazethapyr 75 g/ha at 18 DAS	30.4	26.4	28.0	28.3	712	630	1060	801	1.63	1.44	2.43	1.83
Imazethapyr 75 g/ha at 18 DAS and HW at 40 DAS	35.2	27.2	29.2	30.5	794	720	1130	881	1.84	1.68	2.63	2.05
LSD (p=0.05)	1.38	0.77	1.17	0.57	27	40	42	19	0.06	0.09	0.09	0.04

Table 3. Effect of weed management treatments on gross return, net return and B:C ratio of blackgram

Treatment	Gross return (x10^3 ₹/ha)				Net return (x10^3 ₹/ha)				B:C ratio			
	2014	2015	2016	Mean	2014	2015	2016	Mean	2014	2015	2016	Mean
Farmer's practice (HW at 15, 30 and 45 DAS)	30.01	23.40	57.40	36.94	13.51	6.90	40.90	20.44	1.82	1.42	3.48	2.24
Imazethapyr 75 g/ha at 18 DAS	32.04	28.35	74.20	44.86	14.54	10.85	56.70	27.36	1.83	1.62	4.24	2.56
Imazethapyr 75 g/ha at 18 DAS and HW at 40 DAS	35.73	32.40	79.10	49.08	16.93	13.60	60.30	30.28	1.90	1.72	4.21	2.61
LSD (p=0.05)	1.23	1.81	2.94	1.07	1.23	1.81	2.94	1.07	0.07	0.10	0.17	0.06

other treatments including farmers practice in reducing weed density and biomass. These results were in close conformity with those reported by Bhowmick *et al.* (2015) Chhodavadia *et al.* (2013) Das *et al.* (2014) Ramesh and Rathika (2016).

Effect on blackgram

Application of imazethapyr 75 g/ha at 18 DAS and hand weeding at 40 DAS found significantly superior over farmers' practice and imazethapyr 75 g/ha at 18 DAS. All weed control treatments significantly increased the plant height of blackgram as compared to farmer practice (**Table 1**). The maximum plant height, pods per plant and yield of blackgram (**Table 2**) observed with imazethapyr 75 g/ha at 18 DAS and hand weeding at 40 DAS (55.4 cm) and it was followed by treatment imazethapyr 75 g/ha at 18 DAS, which might be due to lesser weed competition as a result of better weed control by the herbicide combined with hand weeding as earlier reported by Kavad *et al.* (2016), Ramesh and Rathika (2016).

Economics

On the basis of pooled data (**Table 3**), imazethapyr 75 g/ha at 18 DAS and hand weeding at 40 DAS treatment fetched the significantly highest net return and B:C ratio (₹ 30277/ha and 2.61) followed by imazethapyr 75 g/ha at 18 DAS treatment. The lowest B:C ratio was observed under farmers' practice as compared to all other treatments tested. The lowest investment under imazethapyr 75 g/ha at 18 DAS and hand weeding at 40 DAS treatment coupled with good economic return of grain yield might be reason for highest net returns and B:C ratio. Similar findings were also reported by Chhodavadia *et al.* (2013) Ramesh and Rathika (2016).

Conclusion

On the basis of three years data, it was concluded that application of imazethapyr 75 g/ha at 18 days after seeding (DAS) and hand weeding at 40 DAS gave significantly higher blackgram grain yield as compare to farmer's practice and reduced the weed density and biomass as recorded at 45 DAS as compared to all other treatments tested.

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