



## Effect Of Integrated Weed Management Practices On Yield Attributes And Yield Of Black Gram (*VIGNA MUNGO* (L.) Hepper In Kharif Season

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### Abstract

The demonstrate On Farm Trail was conducted through Krishi Vigyan Kendra, Lahar, during kharif season of 2015 and 2016 were conducted on 4.0 ha at 10 farmer's field in , Block – Lahar, Distt – Bhind(M.P.) to study the effect of integrated weed management on yield attributes and yield of black gram (*vigna mungo* (L.) hepper) in kharif season. The demonstration were comprised 5 weed control treatment – Farmer;s practices (weedy check), weed free, application of pendimethalin @ 1 lit.ha<sup>-1</sup> as pre-emergence , Imazaethapyr + pendimethalin (Ready mix) 900 and 800 ml.ha<sup>-1</sup> as pre – emergence applied to black gram in R.B.D.. Weed free plot (two hand weeding at 20 and 40 DAS) resulted in its lowest weed count of broad leaf weeds , grassy weeds and dry matter at maturity stage.It also recoreded significantly the highest no of branches plant<sup>-1</sup> , pods plant<sup>-1</sup> , seeds pod<sup>-1</sup> , grain yield Q ha<sup>-1</sup> and stover yield Q ha<sup>-1</sup> over other treatments. Among the different weed control treatments , the highest weed control efficiency was recorded with the application of emergence Imazaethapyr + pendimethalin (Ready mix) @ 900 ml ha<sup>-1</sup> 86.80% and lowest weed index (4.30%) was recorded in Imazaethapyr + pendimethalin (Ready mix) @ 800 ml ha<sup>-1</sup>

**Key words:** Varieties, weed control measures, yield attributes and yield .

### Introduction

Black gram is especially unnoticed crop in India because of its cultivation as paira crop in rice follows and as catch crop for catching the season where the main crop fails. Weeds due to their competition with crop plants for nutrients, moisture, light and space cause yield reduction in pulses to greater extent. Unchecked weed have been reported to cause a considerable reduction in the grain yield of black gram which in case of summer and kharif black gram could be 41.20 and 41.60% respectively (Singh 2011) Traditionally weeds in black gram are controlled by manual weeding and hoeing at appropriate growth stage. Manual weeding is time consuming and expensive therefore not possible due to intermittent rain during rainy season. Under such a situation use of appropriate weedicide with suitable dose remains the pertinent choice for timely control of weeds.

Keeping in view the diverse weed flora can't be controlled by a single weedicides, hence sequential weedicides may be more effective. Many scientist have reported the effect of Imazethpayr and pendimethalin on weed control and productivity of black gram pulses (Kaur et.al. 2010).This investigation was planned and implemented to find out effect of integrated weed management of yield attributes and yield of black gram.

### Material And Methods

To demonstrate( On Farm Trial),was conducted during rainy (kharif) season of 2015 and 2016 were conducted on 4 ha at 10 farmers field in Bhind district of Madhya Pradesh by Krishi Vigyan Kendra, Lahar.The treatment comprised pre-emergence application of pendimethalin@ 1 liter ha<sup>-1</sup> and pendimethalin + Imazaethapyr



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(company made) @ 1000 ml, 900 ml and 800 ml  $\text{ha}^{-1}$ , weed free (two hand weeding at 20 and 40 DAS), and farmer practices (weedi check) in black gram. The treatments were evaluated in RBD with 10 farmers repeated, the soil of farmer yield site was sandy loam having 0.05 to 0.09 % organic carbon, 7.5- 8.21 pH, 210-215  $\text{kg ha}^{-1}$  available N, 10-15 available  $\text{P}_2\text{O}_5$  and 140-180 available  $\text{K}_2\text{O}$  respectively both years. Black gram variety PU-31 was sown on 17 July 2015 and 18 July 2016 at 30 cm row to row spacing and 10 cm plant to plant using seed rate 20  $\text{kg ha}^{-1}$  and was harvested on 03 October 2015 and 05 October 2016 respectively. Recommended dose of fertilizer (20 kg N + 40 kg  $\text{P}_2\text{O}_5$  + 40 kg  $\text{K}_2\text{O}$   $\text{ha}^{-1}$ ) was applied as basal. Application of pendimethalin and pendimethalin + Imazaethapyr (company made) as pre-emergence with knap-sack sprayer. Weed density was recorded by using quadrat of 0.25  $\text{m}^2$  at maturity stage in all the treatments and then converted into no. of weed  $\text{m}^{-2}$ . The weeds were sun dried till a constant weight was observed and then converted into  $\text{gm}^{-2}$ . The data on total weed count and dry weight were subjected to square root transformation to normalize their distribution (Gomez & Gomez, 1984). Weed control efficiency was calculated on the basis of transformed values of the total weed dry weight.

### Result And Discussion

The density of both leaf and grassy weeds and their total dry weight recorded at maturity stage significantly reduced by all the weed control treatments compared to weedy check (Table 1). However, 2 hand weeding recorded the lowest number of broad leaf grassy and total weeds compared to rest of the weed control treatments. Among different herbicides, pre-emergence application of Imazaethapyr + pendimethalin 1,000  $\text{ml ha}^{-1}$  was the most effective in reducing the density of both broad-leaf and grassy weeds and total dry weight of weeds, followed by its lower doses (Imazaethapyr + pendimethalin 900  $\text{ml ha}^{-1}$  and 800  $\text{ml ha}^{-1}$ ). Pendimethalin is a versatile pre-emergence herbicide which is rapidly absorbed by germinating weeds and inhibits

cell-division and cell elongation in the root and shoot meristem of the susceptible plant/weeds. The growth of susceptible plants/weeds is inhibited directly following absorption through hypocotyls and shoot region. The present results confirm the findings of Yadav *et al.* (2011)

Hand weeding twice remove the weed completely and created condition which were more favorable for crop growth, and ultimately resulted in the lowest density for later-emerged weeds and their lowest biomass during the crop growth period. The results confirm the finding of Punia *et al.* (2011). Lower density of weeds by Imazaethapyr + pendimethalin in reducing weed dry matter may be ascribed to broad spectrum activity of herbicidal combination, particularly on emergence of both broad-leaf and grassy weeds and its greater efficiency to retard cell-division of meristems causing rapid drying of weeds. In earlier study, Kanter *et al.* (1999) reported about 84.6% control of weed biomass with application of pendimethalin. It is reported that, Imazaethapyr application inhibited acetohydroxy acid synthase and the synthesis of branched chain amino acids and was effective for weed control in legumes. The highest weed-control efficiency was recorded with application of Imazaethapyr + pendimethalin (ready mix) 900  $\text{ml ha}^{-1}$  and the lowest weed index was recorded in Imazaethapyr + pendimethalin (ready mix) 800  $\text{ml ha}^{-1}$

### Effect of black gram

All weed management options resulted in significant increases in number of branches/plant over the weedy check (Table 2). The highest number of branches/plant recorded with 2 hand-weeding was at par with all the doses of Imazaethapyr + pendimethalin (800, 900 and 1000  $\text{ml ha}^{-1}$ ). This might be owing to better availability of resources of the crop in absence of weeds. The lowest number of branches/plant under recorded under weedy check might be due to severe competition by weed to crop for resources.

The number of pods/plant, seeds/plant and seed and straw yield were significantly increased under various weed control treatments as compared to weedy check (table 2) and the effect was more pronounced with 2 hand weeding treatment, closely followed by pre-emergence application of Imazaethapyr + pendimethalin (800,900 and 1000 ml ha<sup>-1</sup>) and pendimethalin(1.0 liter ha<sup>-1</sup>). This was attributed to minimum infestation of weeds and consequently corroborates with the finding of Singh et.al.(2006) and Yadav et.a.;(2014). Reduced crop-weed competition during critical phase of crop growth better regulates the complex process of yield formation owing to better availability of resources to the crop plant. Reduced crop weed competition under different weed control treatments might have influenced the 'source' by virtue of higher photosynthetic and metabolic activity which in turn improved growth and consequently yield components of crop. The adverse effect of weed competition under present investigation is clearly reflected under weedy check where in dense population of weeds reduced crop growth compared to 2 hand weeding treatment as well as other treatments and ultimately resulted in reduced number of pods/plant and seeds/pod. Among different treatments, application of imazethapyr+ pendimethalin 800 ml ha<sup>-1</sup> resulted in higher seed and straw yields over weedy check and was at par with its higher doses and 2 hand-weedings (Table 2) Kanter et al. (1999) observed 63.6% higher seed yield of chickpea over unweeded check with application of

imazethapyr. The reduced crop-weed competition caused significant increase in growth characters and yield, and ultimately led to the higher seed yield of blackgram. The significant improvement in seed as well as straw yield as a result of 2 hand-weedings and all herbicidal weed-control treatments could be ascribed to the fact that yield of crop depends on several yield components which are interrelated. Under weedy situation, at early crop growth stage a greater part of resources present in soil and environment were depleted by weeds for their growth. The crop plant thus, faced stress which ultimately affected its growth, development and yield. Upadhyay et al. (2013) also reported similar results in soybean.

### Economics

All weed control treatments recorded higher net returns and benefit : cost ratio over the weedy check ( Table2) However, the highest net returns and benefit: cost ratio were obtained with 2 handweedings. Among different herbicidal treatments, application of imazethapyr + pendimethalin 800 ml ha<sup>-1</sup> recorded the highest mean net returns Rs.25403ha<sup>-1</sup> and benefit: cost ratio (2.47), closely followed by its higher doses. Among other treatments imazethapyr + imazemox 60 ml ha<sup>-1</sup> resulted in higher net returns (21,411 ha<sup>-1</sup>), with a benefit cost ratio of 2.37 despite the higher cost involved. The higher seed yield recorded with this treatment might be responsible for higher net returns. These findings are in close vicinity with those reported by Yadav et al. (2014).

**TABLE – 1 Effect Of Integrated Weed Management Practices On Total Weed Population, Total Weed Dry Weight, Weed Control Efficiency And Weed Index On Black Gram. (TWO YEARS POOLED DATA)**

SN	Treatment	Total Weed population 0.50 m <sup>2</sup> at maturity			Total weight dry of weed (g.m <sup>-2</sup> )	W.C.E (%)	Weed Index (%)
		Broad leaf weed	Grassy Weed	Total			
1	Famer's Practices (weedy check)	8.72(80.32)	3.12(5.17)	8.20(85.49)	7.35(53.35)	--	31.93
2	Weed Free(Two hand weeding at 20 & 40 DAS)	0.81(0.00)	0.81(0.00)	0.81(0.00)	0.81(0.00)	89.20	--
3	Application of pendimethalin@ 1	6.18(30.56)	0.86(0.18)	5.53(30.74)	5.78(33.20)	21.01	18.70

	liter ha <sup>-1</sup> as PE.						
4	Application of pendimethalin + Imazaethapyr (company made) @ 1000 ml, ha <sup>-1</sup>	1.00(0.65)	0.81(0.00)	1.00(0.65)	1.30(1.40)	81.30	7.10
5	Application of pendimethalin + Imazaethapyr (company made) @ 900 ml ha <sup>-1</sup>	1.98(1.82)	0.81(0.00)	1.98(1.82)	1.10(0.40)	86.80	5.80
6	Application of pendimethalin + Imazaethapyr (company made) @ 800 ml ha <sup>-1</sup>	2.10(2.30)	0.81(0.00)	2.10(2.30)	1.20(0.60)	84.20	4.30
	SE(m) <sup>+</sup>	0.65	0.10	0.29	1.71	--	--
	CD(at0.5%) <sup>+</sup>	1.52	0.22	0.57	3.93	--	--

**TABLE – 2 effects of integrated weed management practices on yield attributes and yield of black gram. (TWO YEARS POOLED DATA)**

SN	Treatment	No. of Branches Plant <sup>-1</sup>	No. of Pod Plant <sup>-1</sup>	No. of Seed Pod <sup>-1</sup>	Weight of 1000 seeds (gm.)	Grain yield (q.ha <sup>-1</sup> )	Stover yield (q.ha <sup>-1</sup> )	Net Return (Rs. ha <sup>-1</sup> )	B:C
1	Famer's Practices (weedy check)	2.82	43.20	3.65	23.75	6.18		15426	2.04
2	Weed Free(Two hand weeding at 20 & 40 DAS)	3.81	64.38	4.88	25.15	9.05		26103	2.48
3	Application of pendimethalin@ 1 liter ha <sup>-1</sup> as PE.	3.26	55.46	4.31	24.41	7.51		20170	2.21
4	Application of pendimethalin + Imazaethapyr (company made) @ 1000 ml, ha <sup>-1</sup>	3.50	60.67	4.48	24.75	8.50		23872	2.36
5	Application of pendimethalin + Imazaethapyr (company made) @ 900 ml ha <sup>-1</sup>	3.56	61.97	4.57	24.79	8.58		24427	2.41
6	Application of pendimethalin + Imazaethapyr (company made) @ 800 ml ha <sup>-1</sup>	3.63	63.91	4.73	24.87	8.72		25403	2.47
	SE(m) <sup>+</sup>	0.12	2.69	0.11	0.87	23		--	--
	CD(at0.5%) <sup>+</sup>	0.33	7.71	0.30	NS	65		--	--

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