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RESEARCH PAPER

Effect of weed management practices on weed dynamics and yield in black gram *(Phaseolus mungo)*

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Abstract : A field investigation was carried out during *Kharif* season in 2010 at Agronomy Department Farm, Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola, to evaluate the effect of four herbicides (imazethapyr, pendimethalin, fenoxyprop-p-ethyl and quizalofop -p-ethyl) applied at different rates with different time of application (pre-emergence, post emergence and combination of both) and cultural practices i.e. hand weeding and hoeing on weed flora, growth and yield of black gram *(Phaseolus mungo* L.*)* .The experiment was laid out in randomized block design replicated three times with thirteen treatments in that chemical and cultural treatments were compared with weedy check and weed free control plots. The important predominant narrow leaved and broad leaved weeds observed were *Cyperus rotundus, cyanodon dactylon, Poa annua, Echinochlora crusgalli, Denebra arabica, commelina benghalensis* and *Digera arvensis , Acalypha indica, Euphorbia geniculata, Phyllanthus niruri, Euphorbia hirta and Alysicarpus rugosus respectively.* The results revealed that the application of Pendimethalin @ 1.5 kg a.i./ha as pre - emergence application recorded lowest weed dry weight (2.01), Higher Weed control efficiency (87.42), Lowest weed index (20.46) and significantly higher yield (10.02q/ha), followed by Pendimethalin @ 1.0 kg a.i./ha as pre-emergence application and twice hand weeding on 15 and 30 days after sowing (DAS).

Key Words : Weed flora, WCE, WI, Imazethapyr, Pendimethalin, Fenoxyprop-p-ethyl, Quizalofop-p-ethyl, Yield, Black gram

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INTRODUCTION

Black gram (*Phaseolus mungo*) is one of the important pulse crop grown in the rainfed farming system through out the India.It is the second most important pulse crop covering 31,00,000 ha (16.28 %) area in the country. It has high nutritive value and consist high content of proteins, vitamins and minerals. During *Kharif* (monsoon) season the weeds emerge along with the crop due to favourable environment condition and the crop suffers heavy loss from unchecked weeds particularly in the initial stage of its growth (Vats and Sawhney,1981).In the later stage, however, the black gram offers good competition (Ali *et al*., 1982). Overall effect is that the weeds caused grain yield losses up to 50% or even more (Sharma and Nayital, 1991).The

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conventional method of weed control through cultural practices *i.e.* Hand weeding , Hoeing is not only too expensive but at times it is not feasible due to wet soil conditions prevailing during rainy season . So, the use of new selective herbicides (pendimethalin,fenoxyprop-p-ethyl,Imazethapyr and quizalofop-p-ehtyl) with cultural practices in legumes can be effective and economical for controlling the broad spectrum of annual grassy and broad leaf weeds (Yadav *et al*.,1983). Apart from growth and yield attributes, the nature of yield response to weed management determines the feasibility of adoption of the technology by growers. With these objectives the present investigation was therefore undertaken to develop an effective and economical weed control schedule through chemicals and cultural practices in black gram raised under rainfed conditions.

MATERIAL AND METHODS

The experiment was undertaken (conducted) on the Research farm of Agronomy Department, Dr.Panjabrao Deshmukh Krishi Vidyapeeth (Dr.PDKV), Akola during *Kharif* season of 2010. The soil of the experimental field was clay loam with pH 7.8, 0.55% organic carbon , 234.58 kg/ha available N , 20.86 kg/ha available P_2O_5 and 322.94 kg/ha available K_2O. The experiment was conducted in a Randomised Block Design replicated three times with thirteen treatments comprising cultural and chemical weed control methods with weed free and weedy check treatments were also included. Total precipitation during crop growing season was 757.6 mm in 33 rainy days in 2010, respectively.

The number of weeds present in one square meter area and dry weight of weeds in each plot was counted and measured at 15, 30, 45, 60 DAS and at harvest. These weeds were further classified into sedges, grasses and broad-leaved weeds and their population was recorded. The weeds were uprooted from the destructive sampling area of one m2 and were oven dried to a constant weight at 60°C and the dry weight of weeds was expressed in g per m2. Weed control efficiency at harvest and weed index after harvest of different treatments were computed based on the formula suggest by Gautam *et al*.(1975) and Gill and Vijaykumar in (1969).

Weed control efficiency (%):

Weed control efficiency was calculated by the help of formula:

WCE= (X-Y/X)*100

where, X: Weed dry matter production in weedy plot.

Y: Weed dry matter production in treated plot.

Weed index (%):

Weed index indicates the extent of reduction in yield due to weed competition. It was worked out for different treatments by adopting the formula:

Weed index = (A-B/A)*100

where, A: seed yield of the best treatment, B: seed yield of the particular treatment for which the index is computed.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Weed flora:

The major weed flora observed in the experimental plots were *Cyperus rotundus, Eragrotis major, cyanodon dactylon, Poa annua, Denebra arabica, commelina benghalensis and Echinochlora crusgalli* among monocot leaved weeds ; *Digera arvensis, Acalypha indica, Euphorbia geniculata, Phyllanthus niruri, Euphorbia hirta and Alysicarpus rugosus* that of among broad-leaved weeds. Density of dicot weeds were more than of monocot weeds (grasses) during

Table 1: Floristic composition of weed flora in the experimental field

Sr. No.	Local Name	Botanical Name	Family
1.	Kena	*Commelina benghalensis*	Commelinaceae
2.	Nagarmotha	*Cyperus rotundus*	Cyperaceae
3.	Lona grass	*Denebra arabica*	Poaceae
4.	Pauna	*Poa annua*	Poaceae
5.	Barnyard grass	*Echinochloa crusgalli*	Poaceae
6.	Hariyali	*Cynodon dactylon*	Poaceae
7.	Kunjar	*Digera arvensis*	Amaranthaceae
8.	Deepmal	*Acalypha indica*	Euphorbiaceae
9.	Mothi dudhi	*Euphorbia geniculata*	Euphorbiaceae
10.	Chothi dudhi	*Euphorbia hirta*	Euphorbiaceae
11.	Hazardani	*Phyllanthus niruri*	Euphorbiaceae
12.	Shevara	*Alysicarpus rugosus*	Fabaceae

crop growing season.The maximum number of dicot weeds were observed in weedy check as compared to other treatments at all stages of crop growth and treatment weed free recorded weed free condition through out crop growth period. Kasar *et al.* (2009) also obtained similar observations in his experiment.

Weed dry weight:

All cultural practices and herbicidal application reduced the weed dry weight significantly compared with weedy check (Table 2). In all the weed control treatments among the herbicidal practices the least dry weight of weed was recorded significantly higher in pre-emergence application of pendimethalin at two different levels i.e@1.5 kg/ha (2.01)was more effective in controlling the broad spectrum of annual grassy and broad leaved weeds closely followed by pendimethalin @1.0 kg/ha (3.05) than weedy check (15.98) as compared to the other treatments. Pendimethalin also primarily control annul grassy and broad leaf weeds (Rao, 2000). Among, cultural practices of two hand weedings at 15 and 30 days after sowing (3.78) followed by hoeings at 10 and 20 days after sowing (5.99) significantly recorded the lowest dry weight of weeds than the weedy check and observed the higher values of weed control efficiency as compared to the others treatments and proved the most effective in controlling the weeds and kept the weed population at reduced level through out the crop growth stages.

At 30 DAS, pendimethalin at 1000 g ha^{-1} PE, 1500 g ha^{-1} PE and fenoxyprop-p-ethyl at 125 g ha^{-1} POE recorded significantly least weed dry matter which was on par with post-emergence application of fenoxyprop-p-ethyl at 100 g ha^{-1} and found comparable with two hand weeding at 15 and 30 day after sowing. Similar trend of observations was noticed at 60 DAS and at harvest.

The pre-emergence application of pendimethalin gave significantly lower weed dry weight as compared to Imazethapyr and post emergence application of quizalofop-p-ethyl and fenoxyprop-p-ethyl. Similar observation were recorded by Mishra and Bhanu (2006).

Weed control efficiency:

Weed control efficiency denotes, the control of weeds in respective treatments shows lower weed count and better weed practices. Weed free condition recorded higher weed control efficiency (97.06) among all the weed control treatments throughout the crop growth stages. In case of chemical weed control treatments

Table 2 : Effect of different weed control treatments on weed parameters and yield in black gram

Treatments	Weed dry weight (g m^{-2})			Weed control efficiency (%)			Weed index (%)	Yield kg/ha
	30 DAS	60 DAS	At harvest	30 DAS	60 DAS	At harvest		
T_1 - Weed free	0.41	0.95	0.47	95.91	94.26	97.06	0.00	12.67
T_2 - Weedy check	10.10	16.60	15.98	-	-	-	59.13	5.14
T_3 - 2 HW15 to 30 DAS	1.57	4.12	3.78	84.34	75.33	76.35	26.77	9.31
T_4 - 2 H 10 to 20 DAS	3.86	6.55	5.99	61.51	60.20	62.52	45.82	6.81
T_5 - IMZ @ 50 g ha^{-1} PE at sowing	3.80	5.80	5.00	62.05	65.22	68.71	52.18	6.11
T_6 - IMZ @ 75 g ha^{-1} PE at sowing	2.10	4.67	3.95	78.99	71.56	75.28	33.43	8.28
T_7 - Pen @ 1000 g ha^{-1} PE at sowing	1.33	3.50	3.05	86.33	78.99	80.91	21.52	9.97
T_8 - Pen @ 1500 g ha^{-1} PE at sowing	1.21	2.63	2.01	87.94	83.88	87.42	20.46	10.05
T_9 - Fnxy @ 100 g ha^{-1} POE 15 DAS	3.00	4.30	3.88	70.76	74.12	75.72	29.46	8.83
T_{10} - Fnxy @ 125 g ha^{-1} POE15 DAS	1.36	3.80	3.15	86.44	76.81	80.29	22.49	9.86
T_{11} - QZF @ 50 g ha^{-1} POE15 DAS	7.60	11.40	10.02	24.16	30.82	37.30	36.57	7.78
T_{12} - QZF @ 75 g ha^{-1} POE15 DAS	3.00	5.50	4.95	70.56	66.54	69.02	31.54	8.55
T_{13} - IMZ @ 50 g ha^{-1} PE fb QZF @ 50 g ha^{-1} POE at sowing to 15 DAS	4.69	10.57	8.80	53.03	36.06	44.93	34.11	8.22
SE (m)±	0.35	0.55	0.45	-	-	-	-	0.86
C.D. at 5%	1.03	1.62	1.32	-	-	-	-	2.52
G.M.	3.39	6.18	5.46	66.31	62.60	65.81	31.80	8.58

HW: Hand weeding, H: Hoeing, IMZ: Imazethapyr , Pen: Pendimethalin , PE : Pre-emergence, Fnxy: Fenoxyprop-p-ethyl, QZF: Quizalofop-p-ethyl, POE : Post emergence, DAS : Days after sowing

among all the weed control treatments at all the crop growth stages, result of pendimethalin as pre-emergence application gave better WCE. Similar results were reported by Ahmed *et al.* (2008) in peanut crop. Pre-emergence application of pendimethalin @1.5kg/ha (87.42) recorded higher weed control efficiency followed by pendimethalin @1 kg/ha (80.91) and fenoxyprop-p-ethyl at 125 g ha^{-1} POE (80.29) in black gram as compared to weedy check (Malliswari *et al*., 2008).

Increased weed control efficiency and decreased weed dry matter were noticed with higher dose of herbicides. The highest weed dry weight were recorded with weedy check treatment could be due to its effectiveness in checking the intra row weeds than the rest of the all other treatments. These results are in conformity with those reported by Panwar *et al.* (1985) and Yadav *et al*.(1985).

Weed index :

Weed index was computed as the yield reduction comparative to the highest yielding weed free treatment. Among the weed management practices pre-emergence application of Pendimethalin @ 1.5 kg/ha recorded minimum weed index (20.46%). Better weed control in this treatments provided favorable condition for crop growth and less yield reduction than other treatments. Weedy check treatment recorded the maximum weed index (59.13%) among all the treatments. Rao and Rao (2003) also reported weed index of 49% due to uncontrolled weed growth during the crop season.

Grain yield :

Weed management practices significantly improved the grain yield over weedy check. Uncontrolled weeds on an average reduced black gram yield by 45%. Weed free treatment recorded significantly highest (12.67 Q/ha) grain yield among all the treatments and weedy check treatment recorded significantly lowest (5.14 q /ha) grain yield than rest of the weed control treatments (Table 3). Similar results were recorded by Sharma *et al.* (1988). In herbicidal treatments, pre-emergence application of pendimethalin @ 1.5kg/ha recorded maximum (10.05 q/ha) yield among rest of the herbicidal treatments followed by PE application of pendimethalin @ 1.0 kg/ha recorded (9.97q/ha) grain yield and remaining herbicidal treatments bring at par with each other. This treatments controlled the weeds efficiently and thus resulted in significant increased in grain yield. Pre-emergence application of pendimethalin at 1.5 kg/ha and 1.0 kg/ha gave significantly higher seed yield of black gram as compared to weedy check, Imazethapyr, quizalofop-p-ethyl and fenoxyprop-p-ethyl. Above results are in accordance with the findings of Malliswari *et al.* (2008) and Mishra and Bhanu (2006). Pre-emergence application of pendimethalin was selective and effective in controlling weeds and in increasing the seed yield of black gram. Similar above results in accordance with findings of Ali Mohammed and Durai (1987).

Application of Imazethapyr @ 0.050 kg/ha as pre-emergence produced phyto-toxic effect on crop , may be due to lack of moisture at the time of application result in low (6.11 q/ha) grain yield than Pendimethalin and Fenoxyprop-p-ethyl. Among all the treatments , cultural practices of hand weeding at 15 and 30 DAS recorded significantly higher (9.31 q/ha) grain yield than weedy check. This may due to satisfactory control of weeds and reduced crop weed competition which enabled the crop to utilize the available resources effectively resulted in higher yield.

Conclusion:

Due to cultural and chemical weed control methods and considering the scarcity of labour at many places, it was found that in herbicidal treatment pre-emergence application of pendimethalin@1.5 kg/ha was efficient and feasible which recorded higher WCI (87.42), lower WI (20.46) and higher yield (10.05).

REFERENCES

Ahmed, Y. M., Mustafa, A. S. , Reda, L. A.,Khozimy, A. M. and Mosteh, Y. Y. (2008). Efficiency of the selected herbicides in controlling weeds and their side effects on peanut. *J. Plant Protection Res.,* **48** (3) : 355-363.

Ali Mohammed and Durai, R. (1987). Control of *Triathema portulacastrum* L. in black gram. *Indian J. Weed Sci.,* **19** (1&2): 52-56.

Ali, M., Pandey, R.K. and Rawat, C.R. (1982). Studies on intercropping and weed management in piqeonpea under dryland conditions. *Madras. J. Agric. Sci.,* **69** : 474-478.

Gautam, K. C., Mani, V. S. and Sharma, R. K. (1975). A note on efficiency, Selectivity and residual toxicity of some soil applied pesticide in black gram. *Indian J. Weed Sci.,* **7**(1): 72-74.

Gill, H. S. and Kumar, Vijay (1969). Weed index a new Method for reporting with control trial. *Indian J. Agron.,* **14**(1): 96-98.

Kasar, B. A., Chavan, K. R., Nemade, S. U., More, G. B. and Apotikar, Varsha (2009). Efficacy of different herbicides for weed control in groundnut in combination with cultural methods of weed control. *Crop Res.,* **37**(1,2&3) : 46-48.

Malliswari, T., Reddy, M. P., Sagar, K. G. and Chandrika, V. (2008). Effect of irrigation on weed management practices on weed control and yield of blackgram. *Indian J. Weed Sci.,* **40**(1&2) : 85-86.

Mishra, J. S. and Bhanu, C. (2006). Effect of herbicides on weeds, nodulation and growth of *rhizobium* in summer blackgram. *Indian J. Weed Sci.,* **38**(1&2) : 150-153.

Panwar, R.S. *et al*.(1985) . *Annual Conf.Indian Soc.Weed Sci.* held at Varanasi, pp.53.

Rao, A. S. and Rao, R. S. N. (2003). Bioefficacy of clodinafop-propargyl on *Echinochloa* spp. In black gram. *Indian J. Weed Sci.,* **35** (3/4): 251-252.

Rao, V. S. (2000). *Principles of weed science* II[nd] Edn. Oxford and IBH Publishing Co., New Delhi.

Sharma, J. and Nayital, S. C. (1991). Crop-weed competition in maize +black gram intercropping system. *Indian J. Agronomy.* **36**: 64-67.

Sharma, K. K. and Rajkhowa, D. J. (1988). Performance of herbicides for weed control in black gram. *Pesticides 1988.* **22** (6): 39.

Vats, O. P. and Sawhney, J. S. (1981). Crop weed competition studies in black gram. Abstract of papers, *Annual Conference of Indian Society of Weed Science*, India. 8.

Yadav, S. K., Singh, S. P. and Bhan, V. M. (1983). Weed control in chickpea. *Tropical Pest Management.* **29** (3) : 297-398.

Yadav, S. K. *et al*.(1985).*Weed Abstract* ,**34** : 836 .