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Research Article

Assessment of Integrated Weed Management in Green gram (*Vigna radiata* L.)

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ABSTRACT

A field experiment was carried out during rainy (Kharif) season of 2019-20 at the research farm of AKS University, Satna, Sherganj, Madhya Pradesh. The treatments comprised twelve mechanical and chemical weed control treatment as detailed in chapter III. The experiment was laid out in randomized block design with three replications. An uniform dose of 25 kg N and 50 kg P_2O_5 and 25 kg K_2O/ha was applied through urea, SSP and MOP, to all the experimental plots. Moongbean var. Shikha was sown on 13 July, 2019 keeping a seed rate of 25 kg/ha and row spacing of 30 cm. The plant to plant spacing of 10 cm was maintained by thinning. The weedicides were applied with or without hand weeding once or twice as per treatments. The crop was harvested on 17-23 September, 2019. Amongst the mechanical and chemical weed control method (IWM), hand weeding twice (weed-free condition) proved the best which enhanced significantly higher growth, yield attributes, yield and seed protein of green gram. The seed yield was up to 0.80 t/ha, net income up to Rs.29805 /ha and seed protein 24.46 %. Thereafter each of the herbicides applied along with hand hoeing proved for better than herbicide applied alone. Quizalofop-p-ethyl 700 g/ha with hand hoeing proved better than other three herbicide with hand hoeing. Therefore looking to the labour problem for hand weeding quizalofop + hand hoeing may be adopted to gain maximum benefit from green gram.

Keywords: *Green gram, Pendimethalin, imazethapyr, oxyfluorfen, Quizalofop-p-ethyl, HW, Integrated weed management (IWM).*

INTRODUCTION

Among the pulses, green gram (Vigna radiata L. Wilczek) is one of the most important and extensively cultivated crop. It is grown during rainy and summer season. Green gram is the third prerequisite pulse crop of India in precondition of area 3.77 million ha and production 1.52 million tons. It is the cheapest source of dietary protein.

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It can be grown in all seasons of the year as seed crop also as fodder crop. Green gram improves the soil health and maintains its environment. It contains about 25 % protein, 1.3 % fat, 3.5 % minerals, 4.1 % fibre and 56.7 per consumed as a whole grain as well as dal in variety of ways in homes.

Green gram is a short duration crop requires initial control of weeds for crop establishment. The initial 72-80% of crop growth is generally achieved during initial 20-40 days of crop. Hence, pre-emergence herbicides presume great important during initial growth period. The application of pre-emergence herbicide suppress the weed emergence hence, provide favourable environment to grow under weed free condition. The weed emerged during critical growth period also require indispensable attention to control weed flush, which can be controlled either by use of post –emergence herbicide or hand weeding or inter culture operations. So that all growth stages can be covered to achieve higher yield outcome within time frame.

The most commonly and effective herbicides for controlling weeds in green gram are pendimethalin, imazethapyr, oxyfluorfen, Quizalofop-p-ethyl (Chhodavadia et al., 2013 & Kaur et al., 2016). The combination of pre and post-Emergence herbicide or some ready-mix formulations achievable in the market help to manage complex weed flora and reduced crop-weed competition.

MATERIALS AND METHODS

The present investigation entitled **"Assessment of Integrated Weed Management in Green gram (*Vigna radiata* L.)"** was carried out on well protected field of the experimental farm, AKS University, Satna (M.P.). The field experiment was laid out during kharif (rainy) season of 2019 in a randomized block design. The soil of the experimental area was sandy-loam having pH 7.5 organic carbon 0.40 %, electrical conductivity 0.16 ds/m, available N, P_2O_5 and K_2O 176.6, 12.5 and 2.00 kg/ha, respectively. The total rains received during the crop season was 1164 mm. In all treatment were taken in each of three replication. The treatment details are given below: (T_1) Weedy check (control), (T_2) Weed free, (T_3) One hand weeding & one hand hoeing at 20 DAS & 40 DAS, (T_4) Pendimethalin @1.0kg/ha at pre-emergence, (T_5) Pendimethalin @1.0kg/ha + hand hoeing at 40 DAS, (T_6) Imazethapyr @ 100g/ha at 20 DAS, (T_7) Imazethapyr @100g/ ha at post-emergence + hand hoeing at 40 DAS, (T_8) Imazethapyr @ 150g/ ha at 20 DAS, (T_9) Oxyfluorfen @ 240g/ ha at 20 DAS, (T_{10}) Oxyfluorfen @ 240g/ ha + hand hoeing at 40 DAS, (T_{11}) Quizalofop-p-ethyl @ 700g/ ha at 20 DAS, (T_{12}) Quizalofop-p-ethyl @ 700g/ ha + hand hoeing at 40 DAS.

RESULT AND DISCUSSION

Growth parameters

The plant height as well as number of branches and trifoliate leaves/plant periodically at 25, 50 DAS and at harvest stages. The data presented revealed that all these growth parameters were, in general, enhanced steadily with the advancement of plant growth up to the maturity stage of crop irrespective of the treatments. The plant height ranged from lowest 14.11 cm to maximum 17.45 cm at 25 days stage, whereas the same was recorded from lowest 32.16 cm to highest 34.39 cm at harvest stage.

Similarly in case of number of branches/plant these were in the range of 3.40 to 5.33/plant at 25 days stage, whereas at harvest stage the branches were ranged from 3.20 to 5.07 /plant. In case of trifoliate leaves, these were ranged from 3.40 to 5.83/plant at 25 days stage of plant growth. Whereas at the 50 DAS stage, the leaves formation was in the highest range (3.80 to 6.13/plant). Thereafter the leaves were slightly decreased due to dessication (dryness) and leaves fall (ranging from 3.13 to 5.67/plant). The present findings are in close agreement with those of many research workers (Ali et al., 2011; Raj et al., 2012; Singh et al., 2015; Chaudhari et al., 2016; & Muthuram et al., 2017).

Root-nodules/plant

In the present findings, the root length and root nodulation was maximum under treatments T_2 and T_3 having maximum weed control and maximum weed competition with the crop plant for space, sunlight, moisture and nutrients. In both these treatments the maximum root length at 60 DAS was 17.93 to 17.97 cm and maximum root nodule at 40 DAS were 62.87 to 64.60/plant. The present findings are in close agreement with those of Raman et al. (2005), Mirjha et al. (2013).

Productivity characters

Amongst weed control treatments, T_2 (HW twice) and T_3 (one HW + one HH) registered significantly highest seed yield up to 0.74 to 0.80 t/ha seed, respectively. The maximum seed yield under hand weeding twice or HW once + one HH might be owing to great value of yield attributing parameters recorded in these treatments. The beneficial influence of hand weeding over chemical weeding has also been reported by many workers (Teja et al., 2016; Leva et al., 2018; & Gelot et al., 2018).

Table-1 Plant height (cm), branches and trifoliate leaves per plant of green gram as influenced by different integrated weed managements

Treatments		Plant height (cm)			Branches/ plant			Trifoliate leaves/plant		
		25	50 DAS	At harvest	25	50 DAS	At harvest	25	50 DAS	At harvest
T_1	Weedy check (control)	14.11	26.97	32.16	3.40	4.20	3.20	3.40	3.80	3.13
T_2	Weed free	17.45	30.84	34.39	5.33	5.67	5.07	5.86	6.13	5.67
T_3	One hand weeding +one hand hoeing(20&40DAS)	17.36	30.28	34.29	5.26	5.13	4.60	5.47	4.87	4.67
T_4	Pendimethalin@1.0kg/ha at pre-emergence	15.73	29.67	33.83	4.53	4.53	4.13	4.73	4.40	4.27
T_5	Pendimethalin@1.0kg/ha +hand hoeing (40 DAS)	16.81	30.11	34.34	4.93	5.07	4.47	5.13	4.80	4.53
T_6	Imazethapyr @100g/ha (20 DAS)	15.48	28.58	33.12	4.60	4.47	3.93	4.53	4.20	3.73
T_7	Imazethapyr @100g/ ha at post-emergence + hand hoeing (40 DAS)	16.43	29.97	34.15	4.80	4.93	4.40	5.40	4.73	4.40
T_8	Imazethapyr @150g/ha (20 DAS)	15.53	29.31	33.65	4.66	4.60	4.00	4.67	4.27	3.93
T_9	Oxyfluorfen @240g/ha (20 DAS)	15.31	27.68	32.38	4.00	4.07	3.73	4.46	4.26	3.87
T_{10}	Oxyfluorfen @240g/ha + hand hoeing (40 DAS)	15.94	29.69	34.05	4.67	4.73	4.27	4.87	4.47	4.07
T_{11}	Quizalofop-p-ethyl @700g/ha (20 DAS)	15.33	28.53	32.97	4.40	4.27	3.87	4.60	4.33	3.94
T_{12}	Quizalofop-p-ethyl @700g/ha + hand hoeing (40 DAS)	16.26	29.75	34.08	4.73	5.00	4.33	4.93	4.60	4.13
S.Em+		**0.140**	**0.170**	**0.242**	**0.250**	**0.301**	**0.217**	**0.302**	**0.329**	**0.180**
CD (P=0.05)		**0.406**	**0.491**	**0.701**	**0.722**	**0.871**	**0.628**	**0.827**	**0.951**	**0.520**

DAS= days after sowing

Table-2 Growth & Yield & yield-attributes of green gram as influenced by different integrated weed managements

Treatments		Root nodules/ plant		1000-Seed weight (g)	Seed yield/ plant (g)	Seed yield (t/ha)	Stover yield (t/ha)
		20	40 DAS				
T_1	Weedy check (control)	47.87	54.67	39.24	3.75	0.44	1.49
T_2	Weed free	54.33	64.60	44.44	9.23	0.80	1.83
T_3	One hand weeding +one hand hoeing(20&40DAS)	53.80	62.87	42.34	8.95	0.74	1.90
T_4	Pendimethalin@1.0kg/ha at pre-emergence	50.80	61.07	40.93	7.65	0.57	1.63
T_5	Pendimethalin@1.0kg/ha +hand hoeing (40 DAS)	53.53	62.53	42.14	8.71	0.67	1.82
T_6	Imazethapyr @100g/ha (20 DAS)	49.33	59.06	40.82	7.51	0.52	1.53
T_7	Imazethapyr @100g/ ha at post-emergence + hand hoeing (40 DAS)	53.33	62.27	42.09	8.68	0.62	1.63
T_8	Imazethapyr @150g/ha (20 DAS)	49.87	59.33	40.83	7.61	0.53	1.51
T_9	Oxyfluorfen @240g/ha (20 DAS)	47.67	55.13	40.37	7.36	0.50	1.62
T_{10}	Oxyfluorfen @240g/ha + hand hoeing (40 DAS)	51.20	61.13	41.86	8.34	0.61	1.69
T_{11}	Quizalofop-p-ethyl @700g/ha (20 DAS)	48.87	57.80	40.48	7.41	0.51	1.60
T_{12}	Quizalofop-p-ethyl @700g/ha + hand hoeing (40 DAS)	51.33	61.63	42.03	8.47	0.63	1.71
S.Em+		**0.870**	**0.713**	**0.402**	**0.106**	**0.029**	**0.058**
CD (P=0.05)		**2.507**	**2.056**	**1.160**	**0.217**	**0.059**	**0.168**

DAS= days after sowing

SUMMARY AND CONCLUSION

Amongst the mechanical and chemical weed control method (IWM), hand weeding twice (weed-free condition) proved the best which enhanced significantly higher growth, yield attributes, yield and seed protein of green gram. The seed yield was up to 0.80 t/ha, net income up to Rs.29805 /ha and seed protein 24.46 %.

Thereafter each of the herbicides applied along with hand weeding proved for better than herbicide applied alone. Quizalofop-p-ethyl 700 g/ha with hand hoeing proved better than other three herbicide with hand hoeing. Therefore looking to the labour problem for hand weeding quizalofop + hand hoeing may be adopted to gain maximum benefit from green gram.

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