DOI: 10.15740/HAS/AU/12.TECHSEAR(1)2017/140-144
Agriculture Update
Volume **12** | TECHSEAR-1 | 2017 | 140-144
Visit us : *www.researchjournal.co.in*
e ISSN-0976-6847

RESEARCH ARTICLE :

Economics of practicing integrated weed management in irrigated greengram (*Vigna radiata* L.)

T. MUTHURAM, R. KRISHNAN AND G. MURUGAN

ARTICLE CHRONICLE :
Received :
11.07.2017;
Accepted :
26.07.2017

SUMMARY : A field investigation was carried out during *Rabi* seasons of 2014 at Agricultural College and Research Institute, Tamil Nadu Agricultural University, Killikulamto study the Integrated weed management in greengram(*Vigna radiata* L.) Co 6 (Gg) under irrigated condition. The treatments consisted at three different spacing *viz.*, (25×25 cm, 30×30 cm and 30×10 cm) weed free plot and an weeded control. The results revolved that integration of chemical, mechanical and cultural methods of weed control markedly influence the yield and economics of green gram. The analysis of grain yield data revealed that pre-emergence application of pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) followed by early post-emergence application of quizalofop-ethyl and imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) in 30 × 30cm higher grain yield of 1006 kg ha^{-1} and highest benefit cost ratio, respectively.

How to cite this article : Muthuram, T., Krishnan, R. and Murugan, G. (2017). Economics of practicing integrated weed management in irrigated greengram (*Vigna radiata* L.) Karnataka. *Agric. Update*, **12**(TECHSEAR-1) **: 140-144; DOI: 10.15740/HAS/AU/12.TECHSEAR(1)2017/140-144.**

KEY WORDS :
Greengram, PE-Pendimethalin, EPOE-Quizalofop-ethyl, Imazethapyr, Rotary weeding, Hand weeding

Author for correspondence :

T. MUTHURAM
Agricultural College and Research Institute, Tamil Nadu Agricultural University, KILLIKULAM (T.N.) INDIA

See end of the article for authors' affiliations

BACKGROUND AND OBJECTIVES

Weed management at early stages of crop growth is essential onemerging weeds in pulses begins simultaneously with the crop, leading to severe competition between the crop and weeds (Kandasamy, 2000). When pulses are raised during monsoon season, weeds emerge in succession almost throughout the crop seasons because of favourable environmental condition and frequent rains (Singh, 1993). Weeds not only reduce the yield but also act as silent robbers of scare and essential nutrients and moisture. Weeds reduce grain yield of chickpea upto 60 per cent (IIPR, 1997). Weed infestation causes around 50 per cent yield reduction in blackgram (Sumachandrika *et al.*, 2002) Hence, there is a need to study the integrated effect of weed management practice. (Sheoran *et al.*, 2008) reported that the weed infestation if not checked within 20 DAS there would be a severe yield reduction to an extent of 38 per cent in contrast to 20 per cent yield reduction with unchecked weed infestation till 20 DAS in greengram.

RESOURCES AND METHODS

A field experiment was conducted on

integrated weed management in Irrigated Greengram (*Vigna radiata* L.) during *Rabi* seasons of 2014 at Agricultural College and Research Institute, Tamil Nadu Agricultural University, Killikulam. The soil of the experimental field is sandy clay loam, slightly alkaline in reaction pH of 8.0, EC of 0.47 dsm^{-1}organic carbon content of 0.52%, low in available N and high in available P and K nutrients. The experiment was laid out in Randomized Block Design with three replications. The treatments included were; closer spacing of 25×25 cm T_1 PE- Pendimethalin @ 1.0 kg a.i. ha^{-1}(3 DAS) *fb* One Hand Weeding (25 DAS), T_2 PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* EPOE Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS), T_3 PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* Rotary Weeding (15-20 DAS), T_4 EPOE- Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) *fb* Rotary Weeding (30 DAS), T_5 Hand Weeding twice at 15 and 30 DAS, T_6 Rotary Weeding twice at 15 and 30 DAS, same treatment followed in wider spacing 30×30 cm $T_7$to T_{12}, normal recommended spacing 30×10 cm, T_{13} Farmers practice: PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* One Hand Weeding (25 DAS), T_{14} Weed free plot and T_{15} Weedy check. The recommended dose of fertilizer *viz.*, 25:50:25 NPK kg.$ha^{-1}$was applied as basal application. The weed control treatments were imposed as per the schedule. The crop was irrigated at critical stages. Need based plant protection measures were given as per the Crop Production Guide (2012). The data on grain yield were recorded and analysed. The economic implication of integrated weed management practices was evaluated using benefit cost ratio is calculated by taking ratio of gross return to total cost of cultivation the BC ratio to compare the economic benefits arising from weed management treatments.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Grain yield :

Grain yield recorded with various treatments clearly denoted the significant effect of various weed control treatments on crop yield. The weed free plot (T_{14}) recorded the highest grain yield of 1048 kg ha^{-1}. This was followed by the treatments T_8 PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* EPOE Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) and T_2 which recorded 1006 and 992 kg ha^{-1}, respectively and were statistically on par with T_{14} (Table 1). This might be due to the combined action of pre-emergence application of herbicide which did suppress the initial weed growth and EPOE herbicide application at 15 DAS, control the emerged weeds later stage of the crop growth. Further under this treatment, there was better utilization of the available resources such as water, sunlight and essential nutrients by the crop otherwise it would have been utilized by the weeds. The results are in accordance with the findings of Singh *et al.* (2003) in chickpea. The lowest grain yield was recorded with the weedy check treatments. This was mainly due to higher weed population.

Effect of different weed management practices on bhusa yield :

Bhusa yield was significantly influenced by weed control practices compared to control (Table 1).All the weed management practices exerted significant effect on bhusa yield as that of grain yield compared to unweeded control. The weed free plot significantly recorded the highest bhusa yield of 493 kg ha^{-1}. The treatments T_8 and T_2 recorded at 486 and 471 kg ha^{-1} and were on par with T_{14}. Weedy check (T_{15}) registered the lowest bhusa yield of 193 kg ha^{-1}.

Effect of different weed management practices on haulm yield :

Haulm yield differed significantly due to the various weed control treatmentsat harvest (Table 1). Here again the weed free treatment (T_{14}) produced maximum haulm yield of 3982kg ha^{-1}.The treatments T_8 and T_2 where in pre-emergence application of pendimethalin@ 1.0 kg a.i. ha^{-1} (3 DAS) followed by early post-emergence herbicide quizalofop-ethyl and imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) was done under different spacing recorded haulm yield of 3895 and 3860 kg ha^{-1} and were at par with T_{14}. The weedy check (T_{15}) recorded the lowest haulm yield of 1560kg ha^{-1}.

Economic parameters :

Harvest index :

The harvest index did not vary between the treatments significantly (Table 1). There were only

numerical differences (0.20 - 0.23) in harvest due to the various weed management treatments.

Effect of weed management practices on economics:

Economic efficiency and the viability of crop cultivation are mainly the outcome of the yield of crop. Higher crop productivity with lesser cost of cultivation could result in better economic parameters *viz.*, cost of cultivation, gross return, net return and B:C ratio. The results of economic parameters worked out for the present study are presented in Table 2.

The highest cost of cultivation (Rs. 34,592 ha^{-1}) in treatment T_{14} was due to frequent hand weeding to keep weed free environment throughout. The treatment involving only herbicide application (T_8 and T_2) recorded an amount of Rs. 28,458 and Rs. 28,560, respectively as cost of cultivation. While only manual and mechanical methods (T_5, T_6, T_{11} and T_{12}) of weed control registered a higher cultivation cost of Rs. 30,762, 30,762, 30,660 and 30,660, respectively. The existing farmers method accounted Rs. 29,892.

In the case of gross return,the maximum return of Rs.73,853 ha^{-1} was obtained with weed free treatment (T_{14}) followed by the treatment (T_8) with wider spacing 30 × 30 cm and pre-emergence application of pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) followed by early post-emergence herbicide quizalofop-ethyl and imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) which recorded gross income of Rs. 69,559 and (T_2) closer spacing of 25 × 25 cm pre-emergence application of pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) followed by early post-emergence herbicide quizalofop-ethyl and imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) recorded a gross income of Rs. 65,260 ha^{-1}. While it was as low as Rs. 28,893 only in unweeded control.

The highest net return of Rs. 41,101 was realized in treatment $T_{8,}$ while it was Rs. 39,261 in weed free plot (T_{15}). The treatments involving manual labour (T_5, T_6, T_{11} and T_{12}) registered a low income as compared to chemical method. As compared to pre-emergence herbicide usage, early post-emergence herbicide registered a low net return ranging from Rs. 15,686 to 17,759 (T_5, T_6, T_{11} and T_{12}).

Table 1 : Effect of weed management practices on grain yield, bhusa yield and haulm yield (kg ha^{-1}) and harvest index of irrigated greengram

T. No	Spacing	Treatments	Grain yield	Bhusa yield	Haulm yield	Harvest index
T_1	25×25 cm	PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* One Hand Weeding (25 DAS)	825	381	3443	0.22
T_2		PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* EPOE Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS)	992	471	3860	0.23
T_3		PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* Rotary Weeding (15-20 DAS)	817	372	3421	0.22
T_4		EPOE- Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) *fb* Rotary Weeding (30 DAS)	578	249	2512	0.21
T_5		Hand Weeding twice at 15 and 30 DAS	674	296	2993	0.20
T_6		Rotary Weeding twice at 15 and 30 DAS	689	291	2984	0.21
T_7	30×30 cm	PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* One Hand Weeding (25 DAS)	842	400	3466	0.22
T_8		PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* EPOE Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS)	1006	486	3895	0.23
T_9		PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* Rotary Weeding (15-20 DAS)	839	392	3451	0.22
T_{10}		EPOE - Quizalofop- ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) *fb* Rotary Weeding (30 DAS)	590	254	2561	0.21
T_{11}		Hand Weeding twice at 15 and 30 DAS	658	286	2976	0.20
T_{12}		Rotary Weeding twice at 15 and 30 DAS	680	308	3005	0.21
T_{13}	30×10 cm	Farmers practice: PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* One Hand Weeding (25 DAS)	790	340	3212	0.22
T_{14}		Weed free plot	1048	493	3982	0.23
T_{15}		Weedy check	410	193	1560	0.23
S.E.±			28	12	93	-
C.D. (P=0.05)			62.4	27	201	-

Table 2 : Economics of different weed management practices of irrigated greengram

T.No	Spacing	Treatments	Cost of cultivation Rs. ha^{-1}	Gross return Rs. ha^{-1}	Net return Rs. ha^{-1}	B:C ratio
T_1	25×25 cm	PE- Pendimethalin @ 1.0 kg a.i. ha^{-1}(3 DAS) *fb* One Hand Weeding (25 DAS)	29530	58131	28601	1.97
T_2		PE- Pendimethalin @ 1.0 kg a.i. ha^{-1}(3 DAS) *fb* EPOE Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS)	28560	64132	36700	2.29
T_3		PE- Pendimethalin @ 1.0 kg a.i. ha^{-1}(3 DAS) *fb* Rotary Weeding (15-20 DAS)	29530	57562	28032	1.95
T_4		EPOE- Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) *fb* Rotary Weeding (30 DAS)	27174	40709	13535	1.50
T_5		Hand Weeding twice at 15 and 30 DAS	30762	47476	16714	1.54
T_6		Rotary Weeding twice at 15 and 30 DAS	30762	48521	17759	1.58
T_7	30×30 cm	PE- Pendimethalin @ 1.0 kg a.i. ha^{-1}(3 DAS) *fb* One Hand Weeding (25 DAS)	29428	59340	29912	2.02
T_8		PE- Pendimethalin @ 1.0 kg a.i. ha^{-1}(3 DAS) *fb* EPOE Quizalofop-ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS)	28458	68993	41101	2.44
T_9		PE- Pendimethalin @ 1.0 kg a.i. ha^{-1}(3 DAS) *fb* Rotary Weeding (15-20 DAS)	29428	59122	29694	2.01
T_{10}		EPOE - Quizalofop- ethyl and Imazethapyr @ 50 g a.i. ha^{-1} (15 DAS) *fb* Rotary Weeding (30 DAS)	27072	41554	14482	1.53
T_{11}		Hand Weeding twice at 15 and 30 DAS	30660	46346	15686	1.51
T_{12}		Rotary Weeding twice at 15 and 30 DAS	30660	47908	17248	1.56
T_{13}	30×10 cm	Farmers practice: PE- Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* One Hand Weeding (25 DAS)	29892	55640	25748	1.86
T_{14}		Weed free plot	34592	73853	39261	2.13
T_{15}		Weedy check	23418	28893	5475	1.23
S.E.±			-	-	823	0.04
C.D. (P=0.05)			-	-	1779	0.10

The highest B:C ratio of 2.44 was achieved in treatment T_8 followed bythe same treatment T_2 with a B:C ratio 2.29. While it was 2.13 only in total weed from free situation.

The study pointed out that integrated weed management with wider spacing of 30 × 30 cm PE-Pendimethalin @ 1.0 kg a.i. ha^{-1} (3 DAS) *fb* EPOE Quizalofop - ethyl and Imazethapyr @ 50 g a.i. ha^{-1}(15 DAS) this treatment to be effective treatment from the point of grain yield as well as B:C ratio to the *Rabi* season on Thoothukudi district. The results are in accordance with the findings of Velayudham (2007) in blackgram.

Authors' affiliations :

R. KRISHNAN, Agricultural College and Research Institute, Tamil Nadu Agricultural University, KILLIKULAM (T.N.) INDIA

G. MURUGAN, Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalai Nagar, CHIDAMBRAM (T.N.) INDIA

REFERENCES

Crop Production Guide (2012). Published by TNAU and Directorate of Agriculture, Chennai.

IIPR (1997). Annual Report, Indian institute of Pulse Research, Kanpur, pp.18-19.

Kandasamy, O.S. (2000). Cost effective weed management strategies in pulse production. Proc. Of CASon Recent Advances in pulse Production Technology, TNAU, Coimbatore. Sep. 13-Oct.30, pp.116-119.

Sheoran, P.,Singh, Sukhvinder, Sardana, Virender and Bawa, S.S. (2008). Studies on critical period of crop-weed competition in greengram in kandi region of Punjab. *Indian J. Dryland Agric. Res. & Dev.*, **23**(1): 19-22.

Singh, Govindra (1993). Integrated weed management in pulses. Proc.of Int. Symp. on integrated weed management for Sustainable Agriculture. Indian Soc. of Weed Sci., Hissar, Nov. 18-20, Vol. 1: 335-342.

Singh, R.V., Sharma, A.K. and Tomer, R.K.S. (2003). Weed control in chickpea (*Cicer arietinum*) under late-sown condition. *Indian J. Agron.*, **48**(2): 14-116.

Sumachandrika, D., Balineni, Venkateswarlu, Subbaiah, G. and Swarajyalakshmi, G. (2002). Efficiency and Economics of Weed

Management in *Kharif* blackgram. *The Andra Agric. J.*, **49** (3&4) : 271-273.

Velayudham, K. (2007). Economics of practicing integrated weed management in blackgram. *Madras Agric. J.*, **94** (1-6):55-60.