International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(3): 2060-2062

Received: 18-03-2018
Accepted: 21-04-2018

TD Vaghela
Department of Agronomy, College of Agriculture, JAU, Junagadh, Gujarat, India

PD Vekariya
Main Dry Farming Research Station, JAU, Targhadia, Gujarat, India

BK Dharaiya
Department of Agronomy, College of Agriculture, JAU, Junagadh, Gujarat, India

BK Baladaniya
Department of Agronomy, College of Agriculture, JAU, Junagadh, Gujarat, India

Correspondence
TD Vaghela
Department of Agronomy, College of Agriculture, JAU, Junagadh, Gujarat, India

Weed management in summer cluster bean

TD Vaghela, PD Vekariya, BK Dharaiya and BK Baladaniya

Abstract
A field experiment was conducted during summer season of 2013-14 at Instructional farm, JAU, Junagadh where four pre & post-emergence herbicides either as integrated with hand weeding or sequentially applied were evaluated for efficacies of the herbicides on controlling weeds, their influences on growth, yield, quality and production economics on summer cluster bean variety GG-2 in randomized block design with three replication.

The results revealed that two hand weeding was the most effective method for weed control next to weed free. At harvest however, significantly lowest density and dry weight of all weed species were recorded with two hand weeding at 20 & 40 DAS followed by pendimethalin @ 0.75 kg/ha as pre-emergence + HW at 40 DAS that remained statistically at par with oxyfluorfen @ 0.15 kg/ha as pre-emergence + HW at 40 DAS and imazethapyr @ 0.075 kg/ha as post-emergence at 20 DAS + HW at 40 DAS. Significantly highest weed control efficiency (83.03%) was achieved under two hand weeding at 20 & 40 DAS with lowest weed index (5.49 %) closely followed by pendimethalin @ 0.75 as pre-emergence + HW at 40 DAS (80.84%) with weed index (6.93%) and significantly highest herbicidal efficiency index (66.03%).

Significantly highest values of growth parameters *viz*., plant height, number of branches per plant, number of leaves per plant and dry matter of plant and yield attributes *viz*., number of pods per plant, length of pod, number of seeds per pod and test weight along with seed and stover yield as well as protein content and protein yield were recorded under weed free over weedy check, which was comparable and significantly not different from two hand weeding at 20 & 40 DAS and pendimethalin @ 0.75 as pre-emergence + HW at 40 DAS.

The economics of weed management treatments also indicated that pendimethalin @ 0.75 kg/ha as pre-emergence + HW at 40 DAS was most profitable in terms of significantly higher net returns (₹ 27162/ha) and B: C ratio (1.94) with lowest weed index (6.93%) followed by two hand weeding at 20 & 40 DAS (₹ 27045/ha and 1.91) over weedy check (₹ 9092/ha and 1.36).

Keywords: cluster bean, herbicide, hand weeding, WCE, yield, economics

Introduction

Cluster bean (*Cyamposis tetragomoloba*) commonly known as guar, is a drought and high temperature tolerant, deep rooted, summer annual legume of high social and economic significance. Guar has experienced a remarkable journey from a traditional crop grown on marginal lands mainly for food, animal feed and fodder to a crop with various industrial usages ranging from textile, food processing, cosmetics, mining, explosive, oil and pharmaceutical industries, printing, toilet goods etc. India is the largest producer of guar and contributes 80% of total guar production in the world. During last three years, guar gum had topped the list of India's top agricultural export commodity in terms of value (Anonymous 2015) [1]. The significantly higher prices of guar in recent time have helped expand the crop to non-traditional regions and seasons. Guar crop is cultivated mainly in the north-western part of country during *kharif* and summer season where inadequate weed management is a major constraint in harnessing its production potential. Yield reduction due to weed infestation is to the tune of 53.7% has been observed (Saxena *et al.* 2004) [2]. Hence, the present investigation was undertaken to find out an effective and economical viable weed management practices for summer cluster bean.

India is the largest producer of guar seed (24.61 lakh tonnes) and contributing to about (92.3 %) of total guar produced in the world (25.95 lakh tonnes) in the year of 2012-13 (Nagaraj Meda, 2013) [3] due to higher production by good price realization. Pakistan. USA, South & North Sudan and Australia are other major producing countries. India is the leading exporter of guar seed and guar gum. The major importing countries of India guar products are Europe, USA, China, UK, South Africa and Japan.

Methodology

A field experiment was conducted at College of Agriculture, Junagadh Agricultural University, Junagadh during the summer 2013-14. Twelve treatments comprising pendimethalin @ 0.750 kg/ha PE +HW at 40 DAS, oxyflurofen@ 0.150 kg/ha PE + HW at 40 DAS, quizalofop-ethyl @ 0.045kg/ha at 20 DAS+HW at 40 DAS, imazethapyr @ 0.075 kg/ha at 20 DAS+HW at 40 DAS, pendimethalin @ 0.750 kg/ha PE +quizalofop-ethyl @ 0.045kg/ha at 40 DAS, pendimethalin @ 0.750 kg/ha PE +imazethapyr @ 0.075kg/ha at 40 DAS, oxyflurofen@ 0.150 kg/ha PE + quizalofop-ethyl @ 0.045kg/ha at 40 DAS, oxyflurofen@ 0.150 kg/ha PE + imazethapyr @ 0.075kg/ha at 40 DAS, one HW at 20DAS, two HW at 20 &40 DAS, weed free and unweeded control were tried in randomized block design with three replications. Gross and net plot size was 4.80 m x 2.70 m and 3.60 m x 1.80 m, respectively. Cluster bean variety 'Gujarat Guar-2' was sownwith recommended package of practices except weed management. Fertilizers were applied@ 20 kg N and 40 kg P_2O_5/ha uniformly through urea and DAP. Data on weed growth, yield performance and economics were recorded.

Results

The minimum dry weight of weed was recorded in two hand weeding at 20 &40 DAS followed by pendimethalin @ 0.750 kg/ha PE+ HW at 40 DAS which was significantly lower than all other treatments except oxyflurofen @ 0.150 kg/ha PE + HW at 40 DAS and imazethapyr @ 0.075 kg/ha at 20 DAS + HW at 40 DAS(Table 1). Maximum weed index was recorded in unweeded check. The lowest weed index and highest weed control efficiency was observed when two HW at 20 &40 DAS followed by pendimethalin @ 0.750 kg/ha PE+ HW at 40 DAS. The highest seed and stover yield was recorded with weed free and the lowest was under unweeded check. The yield loss due to uncontrolled growth of weeds as compared to weed free was 77.27%. Among the weed management treatments, two HW at 20 &40 DAS recorded maximum seed yield, which was at par with pendimethalin@ 0.750 kg/ha PE + HW at 40 DAS, oxyflurofen@ 0.150 kg/ha PE + HW at 40 DAS and imazethapyr @ 0.075 kg/ha at 20 DAS + HW at 40 DAS. While, maximum stover yield was also recorded in two HW at 20 & 40 DAS but, it was at par with all other treatments except one HW at 20 DAS. The net returns(Rs.27162/ha) and B: C ratio (1.94)was found maximum with pendimethalin @ 0.750 kg/ha PE + HW at 40 DAS which was at par with two HW at 20 &40 DAS, oxyflurofen @ 0.150 kg/ha PE + HW at 40 DAS and imazethapyr @ 0.075 kg/ha at 20 DAS + HW at 40 DAS.

The effect of different weed management treatments was found significant on gross returns, net returns and B: C ratio of cluster bean (Table 18 to 19 and Fig. 16 to 17). Significantly highest gross returns and net returns was accrued under the weed free treatment (T_{11}) (Rs 60075 and 28405/ha) followed by two hand weeding at 20 & 40 DAS (T_{10}) (Rs 56764 and 27045/ha), pendimethalin @ 0.75 kg/ha as pre-emergence + HW at 40 DAS (T_1) (Rs 56042 and 27162/ha), oxyfluorfen @ 0.15 kg/ha as pre-emergence + HW at 40 DAS (T_2) (Rs 52767 and 23753/ha) and imazethapyr @ 0.075 kg/ha as post-emergence at 20 DAS + HW at 40 DAS (T_4) (Rs 522248 and 23046/ha), being statistically at par with each other, but significantly superior to weedy check (T_{12}) (Rs 34162 and 9092/ha). Whereas, significantly highest B: C ratio (1.94) was obtained under pendimethalin @ 0.75 kg/ha as pre-emergence + HW at 40 DAS (T_1) followed by two hand weeding at 20 & 40 DAS (T_{10}), weed free treatment (T_{11}), oxyfluorfen @ 0.15 kg/ha as pre-emergence + HW at 40 DAS (T_2) and imazethapyr @ 0.075 kg/ha as post-emergence at 20 DAS + HW at 40 DAS (T_4) with B:C ratio of 1.91, 1.90, 1.82 and 1.79, respectively compared to weedy check (T_{12}) (1.36). This might be due to effective and efficient control of weeds by integration of hand weeding and pre-emergence and post emergence of herbicides. The higher benefits obtained under these treatments were also due to comparatively less cost of herbicides than hand weeding as well as higher seed and stover yield of cluster bean. These finding are in agreement with those of Reager *et al.* (2003[b]) [4], Saras *et al.* (2014) [5], Yadav *et al.* (2011) [6].

Table 1: Weed growth, yield and economics of cluster bean as influenced by weed management treatments

Treatments	Dry weight of weeds (kg/ha)	Weed index	Weed control efficiency (%)	Seed yield (kg/ha)	Stover yield (kg/ha)	Net return (Rs/ha)	B:C ratio
Pendimethalin @ 0.750 kg/ha PE+HW at 40 DAS	285	6.93	80.84	1494	3740	27162	1.94
Oxyflurofen @ 0.150 kg/ha PE + HW at 40 DAS	386	12.03	74.23	1404	3616	23753	1.82
Quizalofop-ethyl @ 0.045 kg/ha at 20 DAS +HW 40 DAS	437	19.08	70.79	1294	3457	19632	1.67
Imazethapyr@ 0.075 kg/ha 20 DAS + HW at 40 DAS	401	13.09	73.15	1389	3547	22956	1.79
Pendimethalin @ 0.750 kg/ha PE +Quizalofop –ethyl @ 0.045 kg/ha at 40 DAS	653	21.88	56.40	1232	3189	17594	1.61
Pendimethalin @ 0.750 kg/ha PE+ Imazethapyr @ 0.075 kg/ha at 40 DAS	568	19.73	62.01	1281	3202	19220	1.67
Oxyflurofen @ 0.150 kg/ha PE+ Quizalofop-ethyl @ 0.045 kg/ha at 40 DAS	777	27.89	48.10	1139	3061	14090	1.49
Oxyflurofen @ 0.150 kg/ha PE+ Imazethapyr @ 0.075 kg/ha at 40 DAS	671	24.15	55.00	1196	3089	16001	1.55
One HW at 20 DAS	913	33.54	39.07	1047	2855	11873	1.43
Two HW at 20 & 40 DAS	255	5.49	83.03	1515	3742	27045	1.91
Weed free	0	0.00	100.00	1605	3902	28405	1.90
Unweed Check	1497	42.68	0.00	905	2474	9092	1.36
LSD (P=0.05)	118	11.08	7.67	215	696	7732	0.26

Conclusion

On the basis of the results of the present one year field study, it can be concluded that effective and economically viable weed management in summer cluster bean on clayey soil under South Saurashtra Agro-climatic Zone can be achieved by application of pendimethalin @ 0.75 as pre-emergence + one hand weeding at 40 days after sowing. Alternatively, maintaining the crop weed free throughout crop growth period OR adopting two hand weeding at 20 and 40 days after

sowing can be employed according to availability of labourers.

References

1. Anonymous. Three year export statement of principal products of India. 2014. (Source: http://agriexchange.apeda.govt.in).
2. Saxena A, Singh YV, Singh R. Crop weed competition in cluster bean in arid region. Journal of Arid Legumes. 2004; 1:41-43.
3. Nagaraj Meda. Mapping the market thought of guar and guargum markets. Paper presented in the Guar International Conference-2013 held on 6 to7th at Jaipur Marriott Hotel, Jaipur, India. 2013. (source: www.guarinternational.com).
4. Reager ML, Choudhary GR, Dahama AK. Effect of weed control and phosphorus on growth and quality of cluster bean (*Cyamopsiste tragonoloba* L.). Ann. Agric. Res. New Series. 2003b; 24 (3):563-566.
5. Saras P, Patel BD, Parmar SK. Weed management by cultural and chemical practices and their effect on phytotoxicity and growth, quality and yield parameters of cluster bean *(Cyamopsis tetragonoloba* (L.) Taub). Trends in biosciences. 2014; 7(24):4196-4199.
6. Yadav SL, Kaushik MK, Mundra SL. Effect of weed control practices on weed dry weight, nutrient uptake and yield of cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.] under rainfed condition. Indian Journal of Weed Science. 2011; 43(1, 2):81-83.