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Short communication

Integrated weed management in rice bean

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Rice bean (*Vigna umbellata*) is an underutilized minor pulse crops which is nutritionally rich with multiple uses. In India, its distribution is mainly confined to the tribal regions of North Eastern hills and hilly tracts of Western and Eastern Ghats in North Eastern states. It is grown on a limited scale in Eastern peninsular tracts (parts of Orissa and Chotanagapur) and Western peninsular tracts of Southern hills. Though, rice bean is one of the potential crops, its benefits have not been harnessed to fuller extent. Considering the labour crisis in cultivation of any crop including rice bean, application of herbicides for weed management is gaining more importance in recent days. The potential yield losses due to weeds can be as high as about 65% depending on the crop, degree of weed infestation, weed species and management practices (Yaduraju *et al*. 2006). Weeds compete with crops for natural and applied resources besides being responsible for reducing quantity and quality of agricultural productivity (Rao and Nagamani 2013, Rao *et al*. 2015). In this context, the present study was carried out to find out an effective herbicide for weed control in rice bean.

The experiment was conducted at Main Research Station, Hebbal, University of Agricultural Sciences, Bangalore, India for three consecutive *Kharif* seasons during 2012, 2013 and 2014 in a randomized block design with 11 treatments replicated thrice. The experimental site is situated at an altitude of $12^0$58' North, longitude of 77^0 35' East and altitude of 899 meters above mean sea level. The normal annual rainfall is 862.95 mm. The soil type was red sandy loam with a pH of 6.55 and electrical conductivity of 0.26 dS/m. Among the treatments, the pre-emergence herbicides were oxyflurofen 50 g/ha, oxyflurofen 50 g/ha + one hand weeding at 5 weeks after sowing (WAS), pendimethaline at 1 kg/ha and pendimethaline1 kg/ha + one weeding at 5 WAS, post-emergence application of fenoxaprop-p-ethyl 50 g/ha, quizlofop-p-ethyl 50 g/ha and oxadiargyl at 50 g/ha. In addition, weedy check (control), weed free control, two manual weeding at 3rd and 5th week and one manual weeding at 30 days after sowing were also included. A newly developed early maturing and high yielding variety of rice bean *'KBR-1'*,was used under the study. The crop was sown in 30 cm x 10 cm spacing and raised with protective irrigation. The weed count (no/m^2) and dry weight (g/m^2) were recorded by putting a quadrate of 0.25 m^2 at two random spots in each plot and working out the mean values. Weed control efficiency (WCE) was calculated by using the formula

To calculate B:C ratio, prevailing market prices for rice bean seeds, the price for different inputs and farm operations were considered.

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Effect on weeds

The predominant weeds observed were *Digitaria margineta, Cyperus rotundus, Amaranthus virdis, Commelina benghalensis, Spillanthus acmella, Parthenium hysteroporus, Ageratum conyzoides, Eleusine indica, Euphorbia* spp. Three hand weeding (weed free check) resulted in the lowest weed count (11.11/m^2), dry weight of weeds (10.6 g/m^2) and higher weed control efficiency (95.3%) (**Table 1**). Sootrakar *et al*. (1995) reported that 3 hand weeding at (25, 40 and 55 DAS) resulted in the lowest weed counts and the highest weed control efficiency (98.8%). This treatment was found at par with pre-emergence application of pendimethaline 1.0 kg/ha in combination with one hand weeding at 5 WAS in case of weed count, weed dry weight and weed control efficiency. Yadav (2004) also reported the lowest weed dry matter and the highest weed control efficiency under pre-emergence application of pendimethalin at 0.5 kg/ha + 1 hand weeding at 40 DAS.

Among integrated weed management practices, pendimethaline 1.0 kg/ha + 1 hand weeding at 5 WAS produced lower weed population which was significantly superior over remaining treatments. Weed control efficiency of treatments varied from

Table 1.Effect of weed management practices on weeds, seed yileld and economics (pooled data)

Treatment	Weed count (no./m^2)	Weed dry weight (g/m^2)	Weed control efficiency (%)	Seed yield (t/ha)	Gross returns (x10^3`/ha)	Net returns (x10^3`/ha)	B:C ratio
Fenoxaprop-p-ethyl 50 g/ha at 3 WAS	32.8	110.4	49.5	0.83	41.51	20.44	1.97
Quizlofop-p- ethyl 50 g/ha at 3 WAS	31.9	100.7	55.7	0.84	42.09	20.14	1.92
Oxyflurofen 50 g/ha as pre-emergence	31.4	113.8	49.7	0.79	39.41	18.79	1.91
Oxyflurofen 50 g/ha as pre-emergence + one hand weeding at 5WAS	25.2	55.8	74.6	1.23	61.75	38.13	2.61
Oxadiargyl 50 g/ha at 3 WAS	42.2	166.8	24.5	0.57	28.54	7.92	1.38
Pendimethaline 1 kg/ha as pre-emergence	30.2	88.2	60.6	0.89	44.37	22.43	2.02
Pendimethaline1 kg/ha as pre-emergence + one weeding at 5 WAS	23.0	36.1	83.86	1.31	65.37	40.43	2.62
Two manual weeding at 3rd and 5thWAS	28.3	53.6	75.8	1.05	52.36	26.06	1.99
One manual weeding at 30 DAS	29.1	74.6	65.3	0.88	44.16	20.86	1.90
Weedy check	58.0	221.4	-	0.38	19.04	-0.81	0.96
Weed free check	11.1	10.6	95.3	1.42	71.16	41.86	2.43
LSD (p=0.05)	0.52	1.101	-	0.18	-	-	-

24.5 to 95.3%. Weed free check resulted in higher value of weed control efficiency followed by pendimethalin + 1 hand weeding at 5 WAS (**Table 1**). Weed control treatment may be attributed to kill and check the growth of weeds due to application of herbicides resulting in reduction in dry matter and increased weed control efficiency. Similar, findings was also reported by Chauhan and Gurjar (1998).

Effect on yield

Among the integrated weed management treatments, pre-emergence application of pendimethaline 1.0 kg/ha + one weeding at 5 WAS and oxyflurofen 50 g/ha + one hand weeding at 5WAS recorded significantly higher seed yield (1.31 and 1.23 t/ha, respectively) (**Table 1**). Oxadiargyl 50 g/ha post-emergence (3 WAS) recorded the lowest seed yield (0.57 t/ha).

Economics

The higher B:C ratio of 2.62 was recorded with pendimethaline 1.0 kg/ha + hand weeding at 5 WAS followed by oxyflurofen 50 g/ha + hand weeding at 5 WAS (2.61), whereas the weed free check recorded the B:C ratio of 2.43 (**Table 1**). This might be due to increased cost of cultivation of rice bean in weed free check treatment due to higher labour wages. This cost was reduced in the pendimethaline 1.0 kg/ha + hand weeding at 5 WAS followed by oxyflurofen 50 g/ha + hand weeding at 5 WAS by using herbicides.Weedy check recorded the lowest gross monitory returns (` 19,505/ha), net monitory returns (` 811/ha) and B:C ratio of 0.96. Hand weeding treatments, though significantly reduced weed biomass and improved the grain yield, it gave less benefit: cost ratio owing to higher cost of farm labour.

SUMMARY

The experiment on weed control in rice bean was conducted at Hebbal, Bengaluru for three years 2012, 2013 and 2014 using pre- and post-emergent herbicides along with manual weeding. Results revealed that the weed free control treatment recorded the lower weed count (11.11/m^2), weed dry matter (10.6 g/m^2) with higher weed control efficiency (95.3%) and seed yield (1.42 t/ha). The higher B:C ratio of 2.62 was recorded with pre-emergence application of pendimethalin 1.0 kg/ha + one hand weeding at 5 weeks after sowing (WAS) followed by pre-emergence application of oxyflurofen 50 g/ha + one hand weeding at 5 WAS (2.61).

REFERENCES

Chauhan DVS and Gurjar BS. 1998. Mechanical and chemical weed control in sesame (*Sesamum indicum*). *Indian Journal of Agronomy* **43**(3): 480-483.

Rao AN and Nagamani A. 2013. Eco-efficient weed management approaches for rice in tropical Asia. pp. 78-87. In: *Proc. 4thTropical Weed Science Conference Weed Management and Utilization in the Tropics* held during January 23-25.

Rao AN, Wani SP, Ramesha M and Ladha JK. 2015. Weeds and weed management of rice in Karnataka state, India. *Weed Technology* **29**(1): 1-17.

Sootrakar BP, Namdeo KN and Tomar RKS. 1995. Effect of weed control methods on weed growth and yield of sesame (*Sesamum indicum*) varieties. *Crop Research Hisar* **9**(1): 16–21.

Yadav SS. 2004. Integrated weed management in sesame (*Sesamum indicum* L.) under rainfed conditions of Rajasthan. *Haryana Journal of Agronomy* **20**: 120-121.

Yaduraju NT, Prasad Babu MBB and Poonam Chandla. 2006. HerbicideUse. pp. 192-210.In: *Agriculture and Environment.* (Eds. Swaminathan MS and Chadha KL). Malhotra Publishing House, NewDelhi, India.