

# Evaluation of Herbicides for Weed Management in Rice bean

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**Abstract:** 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<sup>2</sup>), weed dry matter (10.6 g/m<sup>2</sup>) 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).

## INTRODUCTION

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. Rice bean is one of the potential neglected underutilized crop species. Its cultivation is gradually extending in many parts of India. The extent of crop-weed competition for these pulses and reduction in crop yields are dependent on type and intensity of weed flora present in the field. Ali and Lal (1989) reported 23.6% reduction in yield in pigeonpea, 52.4% in Urdbean and 38.3% in Mungbean. Weeds compete with crops for natural and applied resources besides being responsible for reducing quantity and quality of agricultural productivity (Rao et al. 2015). Weed management through herbicides is gaining popularity due to scarcity of labour for weeding on time. Further, manual weeding is also expensive, less efficient and cannot be performed under adverse soil and

weather condition. Therefore, herbicides can be used as an alternative of manual or mechanical weeding. Previously, weed control through herbicides was considered a costly proposition. However, in recent times availability of low-dose, high potency, non-residual, broad spectrum herbicides has provided great opportunity to accomplish effective weed control at much lower cost than mechanical methods. Hence, application of weedicides for weed management is gaining more importance in recent days. In this context, the experiment on weed management study in rice bean was carried out to find out an effective pre and post emergence weedicides which can be used for weed control in rice bean crop.

## MATERIALS AND METHODS

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 12058' North, longitude

of 770 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 pendimethaline 1 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<sup>2</sup>) and dry weight (g/m<sup>2</sup>) were recorded by putting a quadrat of 0.25 m<sup>2</sup> at two random spots in each plot and working out the mean values. Weed control efficiency was calculated using the formula (Mani et al., 1973).  $WCE (\%) = \frac{WC - WT}{WC} \times 100$ . Where, WC = Weed in control plot; WT = Weed in treated plot. To calculate B:C ratio, prevailing market prices for rice bean seeds, the price for different inputs and farm operations were considered.

## RESULTS

### Effect on weeds

The predominant weeds observed were *Digitaria marginata*, *Cyperus rotundus*, *Amaranthus viridis*, *Commelina benghalensis*, *Spillanthus acmella*, *Parthenium hysteroporus*, *Ageratum conyzoides*, *Eleusine indica*, *Euphorbia hirta*. Three hand weeding (weed free check) resulted in the lowest weed count (11.11/m<sup>2</sup>), dry weight of weeds (10.6 g/m<sup>2</sup>) and higher weed control efficiency (95.3%) (Table 1). Anand et al. (2020) 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, pendimethalin 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 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 were 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 monetary returns (19,505/ha), net monetary returns (811/ha) and B:C ratio of 0.96. Hand weeding treatments, though significantly reduced weed biomass and

**Table 1: Effect of weed management practices on weeds, seed yield and economics (pooled data of 03 years)**

Treatment	Weed count (no./m <sup>2</sup> )	Weed dry weight (g/m <sup>2</sup> )	Weed control efficiency (%)	Seed yield (t/ha)	B:C ratio
Fenoxaprop-p-ethyl 50 g/ha at 3 WAS	32.8	110.4	49.5	0.83	1.97
Quizlofop-p-ethyl 50 g/ha at 3 WAS	31.9	100.7	55.7	0.84	1.92
Oxyflurofen 50 g/ha as pre-emergence	31.4	113.8	49.7	0.79	1.91
Oxyflurofen 50 g/ha as pre-emergence + one hand weeding at 5WAS	25.2	55.8	74.6	1.23	2.61
Oxadiazyl 50 g/ha at 3 WAS	42.2	166.8	24.5	0.57	1.38
Pendimethaline 1 kg/ha as pre-emergence	30.2	88.2	60.6	0.89	2.02
Pendimethaline 1 kg/ha as pre-emergence + one weeding at 5 WAS	23.0	36.1	83.86	1.31	2.62
Two manual weeding at 3rd and 5 th WAS	28.3	53.6	75.8	1.05	1.99
One manual weeding at 30 DAS	29.1	74.6	65.3	0.88	1.90
Weedy check	58.0	221.4	-	0.38	0.96
Weed free check	11.1	10.6	95.3	1.42	2.43
LSD (p=0.05)	0.52	1.101	-	0.18	-

improved the grain yield, it gave less benefit: cost ratio owing to higher cost of farm labour.

## CONCLUSION

Results revealed that the weed free control treatment recorded the lower weed count (11.11/m<sup>2</sup>), weed dry matter (10.6 g/m<sup>2</sup>) 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.

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