



Chemical weed management in castor

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Castor (*Ricinus communis* L.) is an important non-edible oilseed crop of India, having immense industrial and commercial value. India is the world leader in castor production followed by China and Brazil. Castor plant is very sensitive to competition with weedy plants. Weeds are able to grow quickly because of slow initial growth of castor. Chlorimuron-ethyl herbicide is selective to castor plants when applied as post-emergence (Sofiatti *et al.* 2012) and this ALS inhibiting herbicide is commonly used only in soybean. Hence the present investigation has been carried out to evaluate post-emergence herbicides namely chlorimuron-ethyl and quizalofop-ethyl in castor over pre-emergence herbicides, hand weeding and power operated weeding.

A field experiment consisting of nine treatment in three replication was conducted at farmers' field of Yethapur Salem to evaluate suitable integrated weed management practices for improving productivity and profitability in castor hybrid under irrigated condition during Rabi 2013-14. Experimental field was clayey in texture. "YRCH 1" castor hybrid was raised at a plant spacing of 1.2 x 1.2 m. Plot size is 7.2 x 7.2 m. Fertilizers were applied at the rate of 90: 45:

45 NPK kg/ha. Pre-calibrated quantity of herbicides has been applied per plot using knapsack sprayer fitted with flat fan nozzle as per the technical programme.

Among the grasses, *Chloris barbata*, *Dactyloctenium aegyptium*, *Bracharia reptans* and *Panicum flavidum* were predominant. *Cyperus esculentus* was the predominant weed among sedges. Among the broad-leaved weeds, *Boerhaavia diffusa*, *Digera arvensis*, *Corchorus olitorius*, *Cyanotis cucullata*, *Cleome viscosa*, *Commelina bengalensis*, *Croton sparsiflorus* and *Parthenium hysterophorus* were predominant weeds. Total weed density was significantly lowered with pre-emergence application of pendimethalin 1.0 kg/ha at 30 DAS. Since major weed population was broad-leaved weeds, application of chlorimuron-ethyl has recorded lowered weed density at 30 DAS. The same trend was observed at 60 DAS (Table 1).

Pre-emergence application of pendimethalin 1.0 kg/ha followed by mechanical weeding twice at 20 and 40 DAS recorded lower weed density with higher weed control efficiency (84 and 81%) at 30 and 60

Table 1. Effect of weed control treatments on weed density (no./m²) and weed control efficiency (%) at 30 and 60 DAS during Rabi'13- 14

Treatment	Weed density (no./m ²) at 30 DAS			Weed density (no./m ²) at 60 DAS			Weed control efficiency (%)	
	Grasses and sedges	Broad-leaved weeds	Total Weed density	Grasses and sedges	Broad-leaved weeds	Total Weed density	30 DAS	60 DAS
Pendimethalin + HW twice at 20 and 40 DAS as PE	2.83 (7)	2.65 (5)	3.61 (12)	3.16 (9)	3.74 (7)	4.12 (16)	82	80
Pendimethalin + quizalofop-ethyl PE	2.00 (3)	5.74 (32)	6.00 (35)	2.83 (7)	6.93 (47)	7.42 (54)	54	50
Pendimethalin + chlorimuron-ethyl	3.00 (8)	2.65 (6)	3.87 (14)	3.74 (13)	3.00 (8)	4.69 (21)	75	67
Quizalofop-ethyl alone	2.24 (4)	8.48 (71)	8.72 (75)	3.60 (12)	9.22 (84)	9.85 (96)	37	33
Chlorimuron-ethyl alone	5.09 (25)	3.87 (14)	6.32 (39)	5.65 (31)	3.32 (10)	6.48 (41)	52	56
Pendimethalin + MW twice at 20 and 40 DAS as PE	2.83 (7)	2.24 (4)	3.46 (11)	3.16 (9)	2.83 (7)	4.00 (15)	84	81
MW alone twice at 20 and 40 DAS	3.16 (9)	2.45 (5)	3.87 (14)	3.87 (10)	3.00 (8)	4.36 (18)	77	71
HW twice at 20 and 40 DAS	3.00 (8)	2.65 (6)	3.74 (13)	3.60 (9)	4.00 (8)	4.24 (17)	78	71
Unweeded control	8.00 (61)	10.39 (107)	13.08 (170)	9.38 (87)	11.49 (131)	14.79 (218)	-	-
LSD (P=0.05)	1.29	1.35	1.37	1.21	1.39	1.43		

*Figures in parentheses are original values

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Table 2. Effect of weed management practices on growth and yield of castor

Treatment	Plant height (cm)	Number of nodes per plant	Number of spikes per plant	Kernal yield (t/ha)
Pendimethalin at 1.0 kg/ha + HW twice on 20 and 40 DAS	108	11	14	2.37
Pendimethalin + HW twice at 20 and 40 DAS as PE	87	12	14	2.28
Pendimethalin + quizalofop-ethyl PE	100	12	17	2.47
Pendimethalin + chlorimuron-ethyl	72	11	13	2.20
Quizalofop-ethyl alone	81	10	16	2.43
Chlorimuron-ethyl alone	105	12	15	2.57
Pendimethalin + MW twice at 20 and 40 DAS as PE	93	22	13	2.58
MW alone twice at 20 and 40 DAS	92	11	14	2.46
HW twice at 20 and 40 DAS	47	10	11	1.53
Unweeded control	8.4	NS	NS	0.50

LSD (P=0.05)

DAS. This treatment was followed by pre-emergence application of pendimethalin 1.0 kg/ha followed by hand weeding twice at 20 and 40 DAS (82 and 80%). Plant height was significantly higher with pre-emergence application of pendimethalin 1.0 kg/ha + HW twice on 20 and 40 DAS and was followed by pre-emergence application of pendimethalin 1.0 kg/ha + mechanical weeding twice. Mechanical weeding twice (2.58 t/ha), pre-emergence application of pendimethalin followed by mechanical weeding (2.57 t/ha), and post-emergence application of chlorimuron-ethyl 0.01 kg/ha (2.47 t/ha) recorded numerically higher yield (Table 2). Gross returns are higher with pre-emergence application of pendimethalin at 1.0 kg/ha followed by mechanical weeding twice (₹ 1,03,880/ha) and mechanical weeding twice alone (₹ 1,03,280/ha). Pre-emergence application of pendimethalin followed by chlorimuron-ethyl at 0.01 kg/ha has recorded more returns (₹ 98,960/ha) (Table 3). Mechanical weeding twice alone (4.4) and application of chlorimuron ethyl alone (4.4) has recorded higher benefit : cost ratio due to lesser cost of cultivation as well as higher yield over other treatments.

Table 3. Effect of weed management practices on Benefit cost ratio during Rabi 13- 14

Treatment	Common cost of cultivation per ha (x10 ³ /ha)	Additional cost on weeding (x10 ³ /ha)	Total cost of cultivation (x10 ³ /ha)	Gross returns (x10 ³ /ha)	Net returns (x10 ³ /ha)	B:C
Pendimethalin + HW twice at 20 and 40 DAS PE	20.63	11.27	32.29	94.84	62.55	2.9
Pendimethalin + quizalofop-ethyl PE	20.63	6.00	26.61	91.16	64.55	3.4
Pendimethalin + chlorimuron-ethyl PE	20.63	5.10	25.64	98.96	73.32	3.9
Quizalofop-ethyl alone	20.63	2.60	23.23	87.96	64.73	3.8
Chlorimuron-ethyl alone	20.63	1.60	22.26	97.36	75.10	4.4
Pendimethalin + MW twice at 20 and 40 DAS PE	20.63	6.35	26.98	103.88	76.90	3.9
MW alone twice at 20 and 40 DAS	20.63	2.95	23.58	103.28	81.12	4.4
HW twice at 20 and 40 DAS	20.63	8.25	28.88	98.28	69.40	3.4
Unweeded control	20.63	0	20.63	61.32	40.69	3.0

SUMMARY

A field experiment was conducted to study the effect of early post-emergence herbicide namely chlorimuron-ethyl and quizalofop-ethyl on weeds in castor and also to evaluate its weed control efficiency over hand weeding and power operated weeding. It was revealed that pre-emergence application of pendimethalin at 1.0 kg/ha followed by mechanical weeding twice at 20 and 40 DAS has recorded lower weed density with higher weed control efficiency. Mechanical weeding twice, pre-emergence application of pendimethalin followed by chlorimuron-ethyl at 0.01 kg/ha or mechanical weeding twice on 20 and 40

DAS have recorded higher yield and economics. Mechanical weeding twice (2.58 kg/ha), pre-emergence application of pendimethalin at 1.0 kg/ha followed by mechanical weeding twice at 20 and 40 DAS (2.57 kg/ha) or post-emergence application of chlorimuron-ethyl at 0.01 kg/ha (2.47 kg/ha) have recorded numerically higher yield and B:C ratio.

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