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Chemical Weed Control in Onion (*Allium cepa* L.) Under Lateritic Belt of West Bengal

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Onion is one of the most important bulb crops grown as spice and vegetable. Generally, it is planted in January in the lateritic belt of West Bengal. High temperature (25°-35°C) during February to March together with frequent irrigations favours luxurious growth of weeds in onion crop. Onion is very poor competitor with weeds on account of its inherent characteristic traits as short stature, non-branching habit, sparse foliage, shallow root system and slow growth in initial stages (Sharma and Mehta, 1994). Weed competition reduced bulb yield of onion to the extent of 40-80% depending upon nature, intensity and duration of weed competition (Singh *et al.*, 1992 ; Verma and Singh, 1996). Weed control in onion is one of the prime factors to check the yield loss as well as quality of onion. Hand weeding, no doubt, is effective; but it is time consuming, cumbersome and under many situations becomes uneconomical. Hence, the present experiment was planned to study the effect of different herbicides on weeds, yield of onion and their economics.

The field experiment was conducted during **rabi** seasons of 2002 and 2003 at farmers' field (Khanjanpur, District Birbhum). The soil of the experimental field was red and lateritic, acidic (pH 6.2), sandy loam in texture with low in organic matter, phosphorus and medium in potassium. The experiment was laid out in a randomized block design with 10 treatments and replicated thrice. Pendimethalin, fluchloralin, oxyfluorfen and haloxyfop-methyl at two different doses were taken under test. Haloxyfop-methyl was applied at 14 days after transplanting (DAT), whereas all other herbicides were applied as pre-emergence. Lower doses were integrated with one hand weeding done at 25 DAT. Farmers' method of weed control (2 HW at 25 and 40 DAT) and weedy check were also included as treatments. The seedlings of onion (var. N-53) were transplanted during 1st week of January in both the years. All the package of practices except weed control were followed as per the recommendations.

The common weed species were : *Digitaria sanguinalis* (40.5%), *Echinochloa colonum* (4.0%), *Cynodon dactylon* (2.1%), *Alternanthera sessilis* (1.4%), *Eclipta prostrata* (19.6%), *Croton bonplandianum* (18.8%), *Chenopodium album* (2.2%) and *Polygonum plebeium* (11.2%). All the herbicides significantly reduced weed population as compared to unweeded control (Table 1). At 30 DAT, pendimethalin, fluchloralin and oxyfluorfen at higher doses showed better performance than at lower doses. Maximum weed reduction was recorded due to oxyfluorfen at 200 g ha^{-1} (96.3) followed by fluchloralin at 1500 g ha^{-1} (93.4%), oxyfluorfen at 100 g ha^{-1} (92.1%) and pendimethalin at 1500 g ha^{-1} (88.3%). But at 60 DAT, the weed population was reduced very effectively when lower doses of herbicides were supplemented with hand weeding and maximum weed reduction was observed due to oxyfluorfen at 100 g ha^{-1}+HW. The weed population in haloxyfop-methyl treated plots was comparatively higher because only grassy weeds were controlled by this herbicide. Similar trend was noticed on weed dry matter also.

Highest onion bulb yield was recorded in plots treated with oxyfluorfen at 100 g ha^{-1}+HW (13.1 t ha^{-1}) and it was at par with that of lower doses of fluchloralin+HW (12.8 t ha^{-1}) and pendimethalin+ HW (12.8 t ha^{-1}). Haloxyfop-methyl at 80 g ha^{-1}+HW recorded 12.4 t ha^{-1} bulb yield.

Table 1. Effect of treatments on weed and bulb yield of onion

Treatment	Dose (g ha^{-1})	Weed density (No. m^{-2})				Dry matter of weeds (g m^{-2}) at 60 DAT		Bulb yield (t ha^{-1})		
		30 DAT		60 DAT						
		2002	2003	2002	2003	2002	2003	2002	2003	Mean
Pendimethalin	1500	106	84	163	131	19.4	17.2	12.1	12.3	12.2
Pendimethalin fb HW	750	128	100	32	32	4.2	3.3	12.8	12.8	12.8
Fluchloralin	1500	55	52	62	100	8.8	15.9	12.2	12.2	12.2
Fluchloralin fb HW	750	81	82	27	27	3.3	2.8	12.8	12.9	12.8
Oxyfluorfen	200	32	29	47	53	5.5	8.4	12.4	12.7	12.5
Oxyfluorfen fb HW	100	66	62	30	23	3.7	1.8	13.0	13.2	13.1
Haloxyfop-methyl	100	192	115	373	156	22.4	12.5	9.6	11.0	10.3
Haloxyfop-methyl fb HW	80	369	233	52	33	6.7	2.0	12.1	12.7	12.4
Hand weeding at 25 and 40 DAT		71	80	36	36	9.9	3.5	12.5	12.9	12.7
Weedy		843	789	963	827	127.3	126.7	4.9	5.3	5.1
LSD (P=0.05)		14	12	9	10	2.7	3.3	0.4	0.4	

Table 2. Economics of different treatments in onion (Rs. ha^{-1})

Treatment	Dose (g ha^{-1})	Treatment cost	Other cost	Total cost of production	Gross return	Net return	Benefit/ cost ratio
Pendimethalin	1500	3100	29400	32500	61000	28500	0.9
Pendimethalin fb HW	750	3150	29400	32550	64000	31450	1.0
Fluchloralin	1500	2033	29400	31433	61000	29567	0.9
Fluchloralin fb HW	750	2617	29400	32017	64000	31983	1.0
Oxyfluorfen	200	1700	29400	31100	62500	31400	1.0
Oxyfluorfen fb HW	100	2450	29400	31850	65500	33650	1.0
Haloxyfop-methyl	100	-	-	-	51500	-	-
Haloxyfop-methyl fb HW	80	-	-	-	62000	-	-
Hand weeding at 25 and 40 DAT		4500	29400	33900	63500	29600	0.9
Weedy		0	29400	29400	25500	(-) 3900	(-) 0.1

Price of onion–Rs. 5000 t^{-1}, Wage of labour–Rs. 50/manday, Price of herbicides (Trade product) : Basalin (fluchloralin)–Rs. 550 l^{-1}, Stomp (pendimethalin)–Rs. 580 l^{-1}, Oxygold (Oxyfluorfen)–Rs. 1800 l^{-1}.
The market price of haloxyfop-methyl is not known.

The maximum net return was obtained when lower dose of oxyfluorfen (100 g ha^{-1}) was supplemented with one hand weeding at 25 DAT (Rs. 33650 ha^{-1}) followed by fluchloralin at 750 g ha^{-1}+HW (Rs. 31983 ha^{-1}), pendimethalin at 750 g ha^{-1}+HW (Rs. 31450 ha^{-1}) and oxyfluorfen at 200 g ha^{-1} (Rs. 31400 ha^{-1}). There was net loss of Rs. 3900 ha^{-1} under weedy check (Table 2).

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