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Chemical weed control in cumin-pearl millet cropping system

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ABSTRACT

Pre-plant application of pendimethalin or fluchloralin or trifluralin 1.0 kg/ha was effective to control weeds in cumin. Seed yield of cumin was significantly higher with application of pendimethalin 1.0 kg/ha which was at par with application of fluchloralin or trifluralin 1.0 kg/ha and hand weeding twice (30 & 45 DAS). In cumin-pearl millet cropping system, trifluralin 1.00 kg/ha was effective for weed management in cumin without reducing yield of succeeding pearl millet. Whereas in cumin-transplanted pearl millet cropping system, pre-plant application of fluchloralin or trifluralin at 1.0 kg/ha was effective for weed management.

Key words : Cumin-pearl millet cropping system, Chemical control.

Cumin (*Cuminum cyminum* L.) is one of the most important spice crops grown in India. Gujarat and Rajasthan are leading states in production of cumin. It is cultivated on about 107400 hectares with a total production of 43100 tonnes having an average productivity of 401 kg/ha. Cumin is a short stature crop with slow growth at initial stage, which makes it incapable to offer competition with weeds. The weed infestation may lead to reduction in seed yield up to 92%. Manual removal of weeds in cumin field is tedious, labour consuming and expensive because of presence of mimicry weed of Jiri or Jirado (*Plantago psyllium*). This situation creates wide scope for use of herbicides. In widely adopted cumin-pearl millet cropping system, pendimethalin and fluchloralin were found effective against weeds of cumin crop but reported to have residual effect on succeeding pearl millet. Therefore, present experiment was planned to know efficient and effective weed management practices in cumin-pearl millet cropping system.

MATERIALS AND METHODS

A field experiment was carried out at Anand Agricultural University, Anand during the winter-summer season of 2002-03 and 2003-04. The soil of experimental field was sandy loam having pH 8.19 with 0.018% N, 31 kg P and 301 kg K/ha. The experiment was laid out in randomized block design with four replications. Treatments consisted of pre-plant application of pendimethalin (1.0 kg/ha), fluchloralin (1.0 kg/ha), trifluralin (0.75 & 1.0 kg/ha) along with weed free (2 hand weedings at 30 and 45 DAS) and weedy check. Herbicides were sprayed with Knapsack sprayer using 500 litre water/ha. Both the crops were raised according to the package of practices of the region. Population and dry matter of weeds were recorded at harvest in cumin crop. Pearl millet crop was sown after harvesting of cumin crop keeping layout as such. To assess the residual effect of herbicide on the succeeding transplanted and drill pearl millet in summer season just after the harvesting of cumin, the seeds of pearl millet and 30 days old seedlings of pearl millet were sown. For this purpose each plot was divided in to two parts. In half plot, four rows (30 cm apart) of seedlings of pearl millet were transplanted and in half plot four lines of drilled pearl millet were sown. Plant growth parameters were recorded at different stages of both the crops.

RESULTS AND DISCUSSION

Effect of herbicides on weeds

The major weeds in the experimental field were: *Chenopodium album* (79.0%), *Melilotus indica* (9.6%), *Asphodelus tenuifolius* (3.2 %), *Eragrostis major* (2.7 %), *Euphorbia hirta*, *Digera arvensis*, *Plantago psyllium* and *Cyperus rotundus*.

Significantly lower weed density (Table 1) was recorded in weed free treatment (hand weeding at 30 and 45 DAS) and was at par with application of pendimethalin, fluchloralin and trifluralin 1.0 kg/ha as pre-plant except application of trifluralin 0.75 kg/ha. Similar trend was noticed in weed dry weight recorded at harvest. Patel *et al*. (1999) observed less persistence of trifluralin as compared to application of pendimethalin and fluchloralin in onion-pearl millet cropping system. Rapid volatilization of trifluralin from the surface soil could be a reason for less weed control than pendimethalin and fluchloralin 1.0 kg/ha. Weed control efficiency varied from 86.3 to 97.9% (Table 1).

Table 1. Effect of treatment on weeds in cumin crop (mean of two years)

Treatment (kg/ha)		Weed density (No/m^2) at harvest	Weed dry weight (kg/ha) at harvest	Weed control efficiency (%)
Pendimethalin	1.0	2.42 (6.0)	102	97.6
Fluchloralin	1.0	2.62 (7.0)	89	97.9
Trifluralin	0.75	6.33(40.8)	574	86.3
Trifluralin	1.0	2.72 (7.9)	116	97.2
Weed free*		2.36 (5.7)	87	97.9
Weedy check		19.4 (378)	4179	--
LSD (P=0.05)		0.99 (26.0)	187	--

* Hand weeding at 30 and 5 days after sowing

Effect of herbicides on cumin

Plant density at 15 DAS and plant height at 30 DAS was not significantly influenced by application of various herbicides (Table 2). Number of branches/plant at 30 DAS was significantly higher in weed free treatment which was at par with all the herbicidal treatments. Seed yield of cumin recorded was significantly higher by all weed control treatments over check. However, trifluralin at 0.75 kg/ha recorded low cumin yield in comparison to other weed control treatments probably on account of poor control of weeds at this dose. Similar results have also been reported earlier by Patel and Mehta (1989) and Rathore *et al.* (1990).

Residual effect of herbicides on succeeding pearlmillet

Plant growth of drilled pearl millet (Table 3) in terms of germination, plant height, no. of tillers/plant and grain yield was significantly lower where pendimethalin or fluchloralin was applied at 1.0 kg/ha in preceding crop. There was no residual effect of fluchloralin applied even at 1.0 kg/ha in cumin on transplanted pearl millet. Grain yield of pearl millet was higher where trifluralin was applied at 1.0 kg/ha in cumin. Application of trifluralin or fluchloralin at 1.0 kg/ha was found effective to control weeds in cumin without showing residual effect on sensitive succeeding drilled pearl millet.

Table 2. Effect of treatment on plant growth of cumin (mean of two years)

Treatments (kg/ha)		Plant stand (No./m^2) at 15 DAS	Plant height (cm) at 30 DAS	Branches (No./ plant) at 30 DAS	Seed yield (kg/ha)	Weed Index (%)
Pendimethalin	1.0	368	34.6	4.8	440	--
Fluchloralin	1.0	400	34.7	4.6	435	1.1
Trifluralin	0.75	394	33.6	4.8	349	20.7
Trifluralin	1.0	420	33.9	4.5	427	2.9
Weed free *		391	33.1	4.9	413	6.1
Weedy check		367	29.1	2.8	17	96.1
LSD (P=0.05)		NS	NS	1.1	37	--

*Hand weeding at 30 and 45 DAS NS - Not Significant.

Table 3. Residual effect of herbicides applied in cumin on succeeding pearl millet (mean of two years)

Treatment (kg/ha)		Germination (%) at 15 DAS		Plant height (cm) at 30 DAS		Tillers (No./ plant) at 30 DAS		Grain yield (kg/ha)	
		Drill	TP	Drill	TP	Drill	TP	Drill	TP
Pendimethalin	1.0	28.2	82.8	32.5	87	3.0	3.2	725	2462
Fluchloralin	1.0	88.5	83.5	42.5	115	3.4	3.3	1012	4780
Trifluralin	0.75	93.2	88.3	54.0	128	3.7	3.8	2528	4810
Trifluralin	1.0	90.5	86.5	62.7	130	3.9	4.0	2575	5075
Weed free		91.0	92.5	54.5	125	3.7	3.9	2512	5050
Weedy check		88.2	92.0	38.5	85	2.2	3.2	775	1015
LSD (P=0.05)		9.1	NS	11.6	9.4	0.5	0.3	273	370

NS - Not Significant.

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