Efficient Weed Management in Coriander (*Coriandrum sativum* L.)

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ABSTRACT

A field experiment was conducted during rabi seasons of 2008 to 2010 at Junagadh (Gujarat, India) to study the integrated weed management in coriander. The results revealed that treatments viz., hand weeding (HW) at 15 & 30 DAS, fluchloralin @ 0.6 kg/ha as pre-plant incorporation + HW at 30 DAS, pendimethalin @ 0.6 kg/ha as pre-emergence + HW at 30 DAS and trifluralin @ 0.75 kg/ha as pre-emergence + HW at 30 DAS were found effective in increasing growth, yield attributes and yield of coriander along with higher net returns and reducing dry weight of weeds.

Keywords: Coriander, Fluchloralin, Pendimethalin, Trifluralin, Oxyfluorfen

1. INTRODUCTION

Coriander (*Coriandrum sativum* L.), commonly known as "Dhania" or "Dhana", is a well known spice crop for its uses as medicine, oil, perfumery and culinary purpose. It is consumed in large quantities and earns a large sum of foreign exchange every year through export. It is probably the first spice to be used by man as a common flavouring substance. India is a largest producer of coriander with a production of almost 90 per cent of the total world's supply. The crop occupies an area of 5.47 lakh hectares and contributes 2.90 lakh tonnes of seeds. In Saurashtra region, irrigation facilities are very meagre. Major source of irrigation is lift irrigation through wells due to non-availability of major irrigation projects. Coriander is remunerative and short duration crop cultivated in *rabi* season.

The low productivity of coriander in India can be ascribed to lack of improved agronomic practices. Among these, weed management is the most important one. Unrestricted weed growth reduced the seed yield of coriander by 37 to 40%. The conventional methods of weed control *i.e.* hand weeding is very laborious, expensive and inefficient particularly under narrow row spacing. Now a day, integrated weed management is the most efficient and acceptable approach to combat with the weed problems. Scientific information on integrated weed management in this crop is meagre for this region, hence, an experiment on integrated weed management in coriander was carried out.

2. MATERIALS AND METHODS

A field experiment was conducted at Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh (Gujarat, India) during 2008 to 2010. The soil of the experimental plot was clayey in texture and slightly alkaline in reaction (pH 7.9 and EC 0.31 dS/m) as well as low in available nitrogen (229 kg/ha), available phosphorus (23.5 kg/ha) and medium in available potash (235 kg/ha). The experiment comprising of 12 treatments *viz*., T_1- Fluchloralin @ 0.9 kg/ha as pre-plant incorporation (PPI), T_2- Fluchloralin @ 0.6 kg/ha as PPI + HW at 30 DAS, T_3- Trifluralin @ 0.75 kg/ha as pre-emergence, T_4- Trifluralin @ 0.75 kg/ha as pre-emergence + HW at 30 DAS, T_5- Pendimethalin @ 0.9 kg/ha as pre-emergence, T_6- Pendimethalin @ 0.6 kg/ha as pre-emergence + HW at 30 DAS, T_7- Oxyfluorfen @ 0.12 kg/ha as pre-emergence, T_8- Oxyfluorfen @ 0.12 kg/ha as pre-emergence + HW at 30 DAS, T_9- HW at 15 DAS, T_{10}- HW at 15 & 30 DAS, T_{11}- Weed free check, and T_{12}- Unweeded check were laid out in randomized block design with three replications. The coriander variety 'Gujarat Coriander 1' was sown at 30 cm row spacing. The crop was fertilized with 20-10-0 kg N-P_2O_5-K_2O/ha as basal. The PPI herbicide was done a day before sowing, while pre-emergence herbicides were applied to soil on the next day after sowing. The spray volume for herbicides application was 500 L/ha. The crop was raised as per the recommended package of practices. The weed flora of experimental site mainly comprised of *Cyperus rotundus* (33%), *Digera arvensis* (32%), *Eluropus villosus* (19%), *Dactyloctenium aegyptium* (4%) and rest of weed species (12%).

3. RESULTS AND DISCUSSION

Growth and yield attributes

Data presented in Table 1 showed that various weed management treatments significantly influenced the growth and yield attributes of coriander *viz*., plant height, branches/plant, umbels/plant and test weight. Significantly the highest values of these parameters were recorded under the weed free check (T_{11}); however it remained at par with HW at 15 & 30 DAS (T_{10}), Fluchloralin @ 0.6 kg/ha as PPI + HW at 30 DAS (T_2), Pendimethalin @ 0.6 kg/ha as pre-emergence + HW at 30 DAS (T_6) and Trifluralin @ 0.75 kg/ha as pre-emergence + HW at 30 DAS (T_4). Significantly the lowest values of these parameters were observed under unweeded check (T_{12}). Periodical removal of weeds (T_{11} and T_{10}) or herbicide application supplemented with weeding (T_2, T_6 and T_4) suppressed weeds, which in turn provided better weed free environment to the crop during critical period for growth and development. Nagar *et al.* (2009b) also reported similar results.

Coriander yield

A perusal of data furnished in Table 1 revealed that different weed management treatments tried in this experiment did cause their significant influence on seed yield and stalk yield of coriander.

Significantly the highest seed yield (1250 kg/ha) and stalk yield (1778 kg/ha) were registered under the weed free check (T_{11}), which remained statistically at par with treatments viz., HW at 15 & 30 DAS (T_{10}), Fluchloralin @ 0.6 kg/ha as PPI + HW at 30 DAS (T_2), Pendimethalin @ 0.6 kg/ha as pre-emergence + HW at 30 DAS (T_6) and Trifluralin @ 0.75 kg/ha as pre-emergence + HW at 30 DAS (T_4). On pooled basis, the treatments viz., weed free check (T_{11}), HW at 15 & 30 DAS (T_{10}), Fluchloralin @ 0.6 kg/ha as PPI + HW at 30 DAS (T_2), Pendimethalin @ 0.6 kg/ha as pre-emergence + HW at 30 DAS (T_6) and Trifluralin @ 0.75 kg/ha as pre-emergence + HW at 30 DAS (T_4) increased seed yield by 157, 145, 134, 124 and 118% over unweeded check (T_{12}). Improved growth and yield attributes owing to efficient weed control under these treatments ultimately reflected in increased yield of coriander. Similar results were also reported by Patel *et al.* (2004) and Tewari *et al.* (2005).

Weed parameters

The weed free check (T_{11}) recorded significantly the lowest dry weight of weeds (37 kg/ha) with the highest WCE of 98% (Table 1). The next best treatments were HW at 15 & 30 DAS (T_{10}), Fluchloralin @ 0.6 kg/ha as PPI + HW at 30 DAS (T_2), Pendimethalin @ 0.6 kg/ha as pre-emergence + HW at 30 DAS (T_6) and Trifluralin @ 0.75 kg/ha as pre-emergence + HW at 30 DAS (T_4) in respect of dry weight of weeds which recorded higher WCE of 96, 91, 86 and 83%, respectively. The superiority of fluchloralin (Chaudhary, 2000), hand weeding and pendimethalin (Nagar *et al.,* 2009) was also reported earlier.

Net returns

Application of Fluchloralin @ 0.6 kg/ha as PPI + HW at 30 DAS (T_2) gave the highest net returns of Rs. 29880/ha, followed by Pendimethalin @ 0.6 kg/ha as pre-emergence + HW at 30 DAS (T_6), HW at 15 & 30 DAS (T_{10}) and Trifluralin @ 0.75 kg/ha as pre-emergence + HW at 30 DAS (T_4), which accrued net returns of Rs. 28860, 27660 and 26580/ha, respectively (Table 1). Nagar *et al.* (2009a) also reported similar results.

4. CONCLUSION

On the basis of results of three-year field experimentation, it is logical to conclude that effective control of weeds in coriander along with higher yield can be obtained by application of fluchloralin @ 0.6 kg/ha as PPI + HW at 30 DAS or pendimethalin @ 0.6 kg/ha as pre-emergence + HW at 30 DAS or HW at 15 & 30 DAS or trifluralin @ 0.75 kg/ha as pre-emergence + HW at 30 DAS under south Saurashtra agro-climatic conditions.

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Table 1. Effect of integrated weed management on growth, yield attributes and yield of coriander, weed parameters and economics (pooled over three years)

Treatment	Plant height (cm)	Branches/ plant	Umbels/ plant	1000-seed weight (g)	Seed yield (kg/ha)	Stalk yield (kg/ha)	Weed dry weight (kg/ha)	WCE (%)	Net returns (Rs/ha)
T_1 - Fluchloralin	40.5	3.65	5.44	19.64	890	1192	596	68	23580
T_2 - Fluchloralin + HW	48.6	3.90	6.13	21.48	1139	1669	173	91	29880
T_3 - Trifluralin	36.5	3.36	5.03	18.83	711	1400	646	65	17700
T_4 - Trifluralin + HW	45.6	3.83	5.97	20.53	1063	1528	324	83	26580
T_5 - Pendimethalin	38.3	3.53	5.32	19.29	764	1063	618	67	18660
T_6 - Pendimethalin + HW	46.9	3.91	6.01	21.10	1091	1566	255	86	28860
T_7 - Oxyfluorfen	35.4	3.17	4.70	17.97	636	957	700	63	14100
T_8 - Oxyfluorfen + HW	43.6	3.83	5.86	20.15	983	1350	407	78	24360
T_9 - 1 HW	41.7	3.84	5.60	20.10	935	1285	469	75	22320
T_{10} - 2 HW	51.6	4.08	6.26	21.88	1194	1736	75	96	27660
T_{11} - Weed free	53.9	4.20	6.39	22.18	1250	1778	37	98	25260
T_{12} - Unweeded control	34.6	2.92	3.88	16.99	487	781	1865	0	10080
LSD (P=0.05)	8.0	0.54	0.62	2.15	233	330	248		