

Influence of Nitrogen and Weed Management Practices on Weeds and Coriander

R. H. Patel, Jagruti Shroff, V. P. Usadadia and S. N. Shah

Department of Agronomy

Gujarat Agricultural University, Anand Campus, Anand-388 110 (Gujarat), India

ABSTRACT

The weed density at 20 days after sowing was increased significantly upto 40 kg N ha⁻¹, whereas at 60 DAS they were significantly counted maximum only at 20 kg N ha⁻¹. Weed dry weight at harvest was not influenced due to increasing levels of N. Significantly the higher seed yield and yield attributes were recorded under the application of 60 kg N ha⁻¹. Pre-emergence application of oxadiazon at 0.5 kg ha⁻¹ was most effective in controlling weeds which enhanced growth and yield components and resulted in production of higher coriander seed yield (2599 kg ha⁻¹) and net monetary return of Rs. 42354. This treatment was at par with pendimethalin. The interaction effect of N and weed management treatments were not significant.

INTRODUCTION

Among the spices, coriander (*Coriandrum sativum* L.) is cultivated in India in about 5.46 lakh hectares and produces 2.9 lakh tonnes seed. It is cultivated as a commercial crop in many parts of the country. Area under this crop is increasing mainly due to industrial support with the growth of processing industry. It has been found to be a remunerative crop in rabi season and very economical crop in medicinal and aromatic plants base cropping systems. Nitrogen is one of the most important elements as well as expensive input in agriculture. An adequate supply of nitrogen is closely associated with growth and development of plant. Nitrogen also increases the competitive ability of the crop. It is well-established fact that for exploiting the yield potential of the coriander, heavy doses of fertilizer are required, but if weeds are not controlled, they also grow luxuriantly and take up the major portion of the added nutrients. Coriander is grown as an irrigated crop and suffered badly weed infestation. Moreover, coriander seed takes longer time for germination and also having slow early vegetative growth, the crop is very sensitive to early weed competition. Uncontrolled weeds can reduce coriander seed yield by as much

as 40% (Kothari *et al.*, 1989). The use of herbicides is one of the alternatives to eliminate crop-weed competition easily. Moreover, there is possibility to maintain high crop production under a lower level of nitrogenous fertilization by controlling the weed through herbicides. This indicated the opportunity for economizing the fertilizer use by herbicides.

MATERIALS AND METHODS

A field experiment was conducted during rabi season of 2001-02 and 2002-03 at Agronomy Farm, Gujarat Agricultural University, Anand Campus, Anand. The soil was sandy loam in texture, low in organic carbon, available nitrogen and phosphorus and rich in available potassium with pH 7.8. Treatments comprised combinations of three levels of nitrogen (20, 40 and 60 kg ha⁻¹) and six weed management practices (weedy check, one hand weeding at 20 DAS+one interculturing at 40 DAS, two hand weedings at 20 and 40 DAS and oxadiazon at 0.5 ha⁻¹, pendimethalin at 0.75 and oxyfluorfen at 0.15 kg ha⁻¹ as pre-emergence) replicated three times in a factorial randomized block design (Table 1). Herbicides were applied as pre-emergence in 500 litres of water per hectare by using flat fan nozzle.

Entire recommended dose of 40 kg P₂O₅ ha⁻¹ in all plots and half quantity of nitrogen as per treatment was applied as basal. The remaining half dose of nitrogen was applied at 30 DAS. Gujarat coriander-2 recommended variety was sown at 30 cm row spacing in first week of November and harvested in first week of March during both the years.

RESULTS AND DISCUSSION

Effect on Weeds

The weed flora of the experimental field consisted of *Chenopodium album* L., *Chenopodium murale* L., *Cyperus rotundus* L., *Dactyloctenium aegyptium* L., *Eleusine indica* L., *Phyllanthus niruri* L. and *Portulacastrum oleracea* L. Among these, *C. album* was dominant weed and constituted about 85% of total weed flora.

In general, total weed population decreased as the growth of crop advanced. Weed density at

20 DAS increased significantly with increase in nitrogen rate upto 40 kg ha⁻¹, thereafter they remained at par with 60 kg N ha⁻¹. At 60 DAS, weed density recorded significantly highest at 20 kg N ha⁻¹, while at 60 kg N level they were decreased significantly. At initial stage, higher weed density at higher level of N may be due to delay in germination of coriander seeds and slow initial growth of crop as well as stimulatory effect of N on weed germination and growth. But at later stage at higher level of N, crop developed more canopy area over the surface of soil which in turn suppressed the weed growth and later emerged weeds. Nitrogen levels did not have any significant effect on weed dry weight recorded at harvest (Table 1). This indicated that weed growth was not accelerated by more availability of nitrogen due to luxuriant growth of crop at higher levels of nitrogen which smothered the weeds.

Among the weed management practices, chemical weed control treatments showed

Table 1. Effect of treatments on weeds in coriander (Pooled for two seasons)

Treatment	Weed density m ⁻²		Dry weight of weed at harvest (Log x) (kg ha ⁻¹)
	20 DAS (Log x)	60 DAS [Log (x+1)]	
Nitrogen levels (kg ha⁻¹)			
20	2.3 (709)	2.3 (512)	5.7 (5062)
40	2.5 (865)	2.1 (385)	5.7 (4380)
60	2.6 (886)	2.0 (327)	5.6 (3717)
LSD (P=0.05)	0.12	0.04	NS
Weed management			
Weedy	3.2 (1459)	3.2 (1811)	7.2 (13564)
Hand weeding at 20 DAS and interculturing at 40 DAS	3.2 (1616)	2.0 (103)	5.7 (2303)
Hand weedings at 20 & 40 DAS	3.1 (1326)	1.9 (107)	5.3 (1514)
Oxadiazon	0.7 (12)	1.5 (46)	4.5 (675)
Pendimethalin	2.5 (334)	1.8 (108)	4.9 (943)
Oxyfluorfen	2.2 (174)	2.4 (272)	6.5 (7320)
LSD (P=0.05)	0.17	0.14	0.44

Figures in parentheses indicate original values. NS--Not Significant.

Table 2. Effect of treatments on yield, yield attributes and economics of coriander (Pooled for two seasons)

Treatment	Branches plant ⁻¹	Umbels plant ⁻¹	Umbellates umbel ⁻¹	Seeds umbellate ⁻¹	1000- seed weight (g)	Seed yield (kg ha ⁻¹)	Haulm yield (kg ha ⁻¹)	Net return (Rs. ha ⁻¹)
Nitrogen levels (kg ha⁻¹)								
20	5.3	21.3	3.9	3.4	15.3	1820	2200	26859
40	5.8	23.1	4.4	3.9	15.6	1833	2285	27390
60	6.7	23.5	4.6	4.3	16.2	2269	2847	35568
LSD (P=0.05)	0.23	NS	0.27	0.22	0.32	135.1	180.6	-
Weed management								
Weedy	4.5	7.3	3.2	2.9	15.2	461	622	221
Hand weeding at 20 DAS & Interculturing at 40 DAS	6.1	26.5	4.3	3.7	15.5	2298	2820	36277
Hand weeding at 20 & 40 DAS	6.2	28.8	4.3	3.8	15.5	2293	2828	35721
Oxadiazon	7.0	31.9	4.9	4.7	16.5	2599	3071	42354
Pendimethalin	7.0	28.5	5.0	4.5	15.8	2561	3029	41606
Oxyfluorfen	4.8	12.9	4.1	3.4	15.5	1632	2297	23159
LSD (P=0.05)	0.32	3.42	0.38	0.31	0.45	191.0	255.4	-

NS-Not Significant.

significantly lower weed density as compared to weedy check and cultural practices at 20 DAS. Weed density at 60 DAS and weed dry weight at harvest were recorded significantly higher in weedy check compared to all other weed control treatments. Pre-emergence application of oxadiazon at 0.5 kg ha⁻¹ caused maximum reduction in weed density and dry weight of weeds followed by pendimethalin at 0.75 kg ha⁻¹ and thus resulted in highest weed control efficiency of 95.0 and 93.1 %, respectively.

Effect on Crop

All the yield attributes barring umbels per plant were recorded significantly higher at 60 kg ha⁻¹ as compared to 40 and 20 kg ha⁻¹ of nitrogen. Application of 60 kg N ha⁻¹ gave the highest seed yield (2269 kg ha⁻¹) with an average increase of 23.8 and 24.7 % over 40 and 20 kg N ha⁻¹, respectively (Table 2). This was explicitly due to improvement in yield attributes at higher N level.

All yield attributes and seed yield were significantly influenced by weed control treatments. Oxadiazon at 0.5 kg ha⁻¹ recorded the maximum value of yield attributes and seed yield (2599 kg ha⁻¹) which was at par with pendimethalin at 0.75 kg ha⁻¹ (2561 kg ha⁻¹). Application of oxadiazon at 0.5

kg ha⁻¹ gave 461% higher seed yield than weedy check, whereas it was 455% higher with pendimethalin at 0.75 kg ha⁻¹ (Table 2). The higher seed yield in these treatments was due to better control of weeds as indicated by lower weed density and dry weight that might be also due to its prolonged persistence in the soil which resulted in weed-free situation for a long time and reduced weed competition. Senthivel (2001) also reported effective response of oxadiazon application in enhancing seed yield of coriander.

The interaction effect of rate of nitrogen and weed management treatments were found to be non-significant.

In term of monetary return, application of N at 60 kg ha⁻¹ recorded the highest net return worth Rs. 35568 ha⁻¹, while in case of weed control treatments, maximum net return was obtained with oxadiazon at 0.5 kg ha⁻¹ (Rs. 42354 ha⁻¹) followed by pendimethalin at 0.75 kg ha⁻¹ (Rs. 41606 ha⁻¹).

REFERENCES

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