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Growth, yields and economics of cumin (*Cuminum cyminum* L.) production as affected by weed management practices

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ABSTRACT

An experiment was conducted at S.D. Agricultural University, Sardarkrushinagar during *rabi* season of 2008-2009 to find economically viable method of weed control for cumin. Results revealed that at 30 DAS response of weed control method was not noticed significant on plant height but at 60 DAS and harvest, besides weed free treatment ,application of Oxadiargyl 50 g ha^{-1} 20 DAS + HW, exhibited the highest plant height being at par with all treatments except weedy check and application of Glyphosate @ 0.5 kg /ha. Similarly, besides weed free treatments the highest yield attributes and yield of cumin was recorded with post emergence application of Oxadiargyl 50 g ha^{-1} 20 DAS + HW, being statistically at par with rest of the treatments except weedy check and post emergence application of Glyphosphate @ 0.5 kg /ha. The highest net return (Rs.41081 /ha) and BCR (2.17) was recorded with application of Oxadiargyl 50 g /ha at 20 DAS which were higher over rest of the treatments. Thus, it can be inferred that application of Oxadiargyl 50 g ha^{-1}at 7DAS or 20 DAS + HW is best method of weed control for realizing higher yield

Key words : Cumin, Yield attributes, Growth,

INTRODUCTION

India occupies prime position in seed spice production and plays very important role in earning foreign exchange through export of seed spices. Among seed spice, cumin occupies first position in term of value and second in terms of production. In India cumin is mainly produced in Gujarat and India. Initial growth of cumin is slow and it takes time in germination and establishment. Therefore, it is more prone to crop weed competition. Extent of loss caused by weed is the highest among all the loss causing agent like insect pest and disease. Sowing of cumin is mainly done by broadcasting method in which manual control of weed is very difficult. Therefore, it is the need of the time to explore suitable alternative cost effective method of weed control in cumin. Therefore, the study on different method of weed control in cumin was conducted.

MATERIALS AND METHODS

A field experiment was carried out in the *rabi* season of 2008-09 on loamy sand soil of at Agronomy Instructional Farm of S.D Agricultural University, Sardarkrushinagar (Gujarat). The soil of experimental field having pH 7.7 and electrical conductivity 0.14 dSm$^{-1.}$ low organic carbon (0.18), low available nitrogen (159.1 kg / ha), medium in available P_2O_5 (38.9 kg /ha) and good in respect to available K_2O (185.1kg /ha). Ten weed control treatments (Pendimethalin 1.0 kg ha^{-2} PE,T_2 Fluchloralin 1.0 kg/ ha PE, Glyphosate 0.5 kg/ ha at 7 DAS, Glyphosate 0.5 kg/ ha at 7 DAS + HW), Oxadiargyl 50 g/ ha at 7 DAS, T_6 Oxadiargyl 50 g/ ha at 7 DAS + HW, Oxadiargyl 50 g/ ha at 20 DAS, Oxadiargyl 50 g/ ha at 20 DAS +HW, Weed free and, unweeded control were conducted in a randomized block design with four replications. Full dose of phosphorus (15 kg ha^{-1}) and half dose of nitrogen (15 kg ha^{-1}) was applied as basal just prior to sowing in the form of DAP and Urea. The remaining half dose of nitrogen (15 kg ha^{-1}) was applied in the form of urea at 35 DAS. The seeds of cumin variety GC-4 was treated with ceresan @ 3.0 g per kg seed to protect the crop against fungal diseases. The seeds were evenly broadcasted by @ 15 kg ha^{-1}. Seeds were covered with soil with the help of broom The required quantity of herbicides *viz.*, Pendimethalin, Fluchloralin, Glyph sate and Oxadiargyl was applied by Knapsack sprayer with flat fan nozzle using 500 liters of water per hectare. Weeding operation was carried out after 35 DAS in treatments T_4, T_6 and T_8. In weed free treatment weeds were removed at every seven day interval to keep it weed free through out the growing season. Recommended cultural practices were adopted for raising healthy crop. The statistical analysis of data was done as per standard procedure suggested by Panse and Sukhatme (5).

RESULTS ANS DISCUSSION

Growth parameters

Plant height at 25 and 50 DAS as well as at

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Table 1. Effect of different weed management practices on plant height and yield attributes of cumin

Treatments	Plant height (cm)			Yield attributes				
	30 DAS	60 DAS	At harvest	No. of umbels/ plant	No. of umbellate/ umbel	No. of Seed/ umbellate	No. of branches /plant	Test weight (g)
Pendimethalin 1.0 kg/ ha PE	7.5	16.6	22.5	13.55	5.45	4.75	7.50	4.00
Fluchloralin 1.0 kg/ ha PE	7.3	16.3	22.2	13.52	5.38	4.72	7.48	3.97
Glyphosate 0.5 kg/ ha at 7 DAS	6.7	14.4	20.7	11.76	4.75	3.98	5.82	3.65
Glyphosate 0.5 kg/ ha 7 DAS + HW	6.9	15.9	21.5	12.83	4.87	4.74	6.77	3.72
Oxadiargyl 50 g/ ha 7 DAS	6.8	15.5	21.5	12.69	4.79	4.63	6.75	3.70
Oxadiargyl 50 g/ ha 7 DAS + HW	7.6	16.7	22.6	13.58	5.48	4.89	7.52	4.05
Oxadiargyl 50 g/ ha 20 DAS	7.7	16.8	22.7	13.77	5.65	5.00	7.65	4.10
Oxadiargyl 50 g/ ha 20 DAS +HW	7.8	17.8	23.7	14.00	5.70	5.05	7.78	4.14
Weed free	7.9	18.7	24.6	14.45	5.82	5.09	7.89	4.15
Weedy check	6.5	12.9	18.1	7.80	3.90	2.92	4.15	3.37
SEm. ±	0.52	0.65	0.82	0.57	0.56	0.16	0.30	0.15
CD (P=0.05)	NS	1.88	2.37	1.64	1.63	0.48	0.87	0.42

Table 2. Effect of different weed managements treatments on seed and straw yield (kg ha-1) as well as harvest index (%) of cumin

Treatments	Seed yield (kg /ha)	Straw yield (kg /ha	Harvest Index (%)	Gross return (Rs./ha)	Cost of cultivation (Rs./ha)	Net return (Rs. /ha)	BCR
Pendimethalin 1.0 kg/ ha PE	555	980	34.45	56970	19540	37430	1.92
Fluchloralin 1.0 kg/ ha PE	549	975	34.28	56363	19263	37100	1.93
Glyphosate 0.5 kg/ ha at 7 DAS	375	768	33.20	38652	18738	19914	1.06
Glyphosate 0.5 kg/ ha 7 DAS + HW	465	892	33.69	47838	19738	28100	1.42
Oxadiargyl 50 g/ ha 7 DAS	452	878	33.25	46517	18916	27601	1.46
Oxadiargyl 50 g/ ha 7 DAS + HW	578	989	34.85	59284	199916	39368	1.98
Oxadiargyl 50 g/ ha 20 DAS	585	998	35.37	59997	18916	41081	2.17
Oxadiargyl 50 g/ ha 20 DAS +HW	594	1025	35.39	60938	19916	41022	2.06
Weed free	605	1085	36.42	62128	222225	39903	1.80
Weedy check	75	189	32.82	7784	18225	-10442	-0.57
SEm. ±	20.52	20.85	39.41	-	-	-	-
CD (P=0.05)	59.53	60.49	NS	-	-	-	-

maturity was significantly inflenced with application of different weed control methods. Besides weed free treatments, the highest plant height at 25 and 50 DAS as well as at maturity was recorded with application of Oxadiargyl 50 g /ha at 20 DAS + HW followed by Oxadiargyl 50 g/ ha at 20 DAS, Oxadiargyl 50 g/ ha 7 DAS + HW, Pendimethalin 1.0 kg ha^{-1} PE and Fluchloralin 1.0 kg/ ha PE which were statistically at par with each other significantly higher over rest of the treatments. Plant height at 25 DAS was not influenced with different irrigation methods. Weeds were effectively controlled under these treatments and hence there was no severe competition by weeds for moisture and nutrients resulted into higher plant height. Similar results also reported by Rathore *et al.* (1990), Patel *et al.* (2002) and Mehriya *et al.* (4).

Yield attributes and yield

Critical examination of data (Table 2) revealed that besides weed free treatment, the highest number of umbels per plant (14.0), number of umbellates per umbel(5.70), number of seeds per umbellates (5.05) ,1000- seed weight (4.14), seed yield (594 kg /ha) and straw yield (1025 kg /ha) were recorded with application of Oxadiargyl 50 g /ha at 20 DAS + HW followed by Oxadiargyl 50 g/ ha at 20 DAS, Oxadiargyl 50 g/ ha 7 DAS + HW, Pendimethalin 1.0 kg ha^{-1} PE and Fluchloralin 1.0 kg/ ha PE which were statistically at par with each other significantly higher over rest of the treatments. However, harvest index was not significantly affected with application of different weed management practices. Higher yield attributes, seed and straw yield under these treatments might be due to effective control of weeds which in turn of significantly reduced crop – weed competition resulting in better congenial condition for growth and development of the crop which in turn increase the values of growth and yield attributes under these treatments. In addition to this the least weed population and dry weight of weeds were recorded under these treatments was also responsible for better seed and straw yield . Application of Oxadiargyl 50 g/ha at 7 DAS and Glyphosate 0.5 kg/ha at 7 DAS failed to improve the seed yield of cumin compared to treatment Oxadiargyl 50 g/ha 20 DAS This might be due to the emergence of major flush of weeds after 7 DAS in these treatments. Yadav *et al.* (7), Yadav *et al.(* 8) and Mehriya *et al.* (4) also reported that Oxadiargyl 50 g/ha applied at 20 DAS significantly improved seed and straw yield of cumin. These findings are in conformity with those reported by Mali and Suwalka (3) and Patel *et al.* (6).

Economics analysis

Data presented in Table 2 revealed that the maximum net realization of Rs.41,081 ha^{-1} was secured with Oxadiargyl 50 g/ha 20 DAS, closely followed by application of Oxadiargyl 50 g/ha 20 DAS + HW with Rs.41,022 /ha. Weed free. Application of Pendimethalin 1.0 kg/ha PE and (Fluchloralin 1.0 kg/ha PE under which net realization recorded were Rs.39,903, 37,430 and 37,100 ha^{-1}, respectively. The higher seed yield under treatments as a result of better weed control is responsible for higher net realization per hectare. Similar trend was observed in Benefit : Cost Ratio value. The highest BCR value was recorded with treatment T_7 (2.17) which was closely followed by treatment T_8 having 2.06. Similar trend was also observed by Mehriya *et al.* (4).

Thus it can be inferred that application of Oxadiargyl 50 g /ha at 20 DAS + HW is better for ensuring effective weed control for realizing higher seed and straw yield of cumin in semi arid region.

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