

Study of productivity and economics of cumin (*Cuminum cyminum* Linn.) in transitional luni basin plain zone of Rajasthan

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ABSTRACT

A field study was conducted during the winter season (*Rabi*) of 2008-09 on transitional luni basin plain zone of Rajasthan, to evaluate the effect of sowing method and weed management on productivity and economics of cumin. The results showed that crop sowing in row apart 20 cm produced significantly higher seed yield (8.11 q ha⁻¹), biomass yield (21.64 q ha⁻¹), harvest index (37.43 %), total return (Rs.101389/- ha⁻¹), net return (Rs.81786/- ha⁻¹) and cost benefit ratio (5.17). The pre emergence application of both pendimethalin at 1.0 kg ha⁻¹ and hand weeding at 30 DAS produced significantly higher productivity and maximum return as compared to alone hand weeding at 30 DAS pendimethalin at 1.0 kg ha⁻¹. However, pre emergence application of pendimethalin at 1.0 kg ha⁻¹ also increases productivity and economics significantly as compared to alone hand manual weeding at 30 DAS.

Key words : Productivity, economics, cumin, net return.

INTRODUCTION

Cumin (*Cuminum cyminum* Linn.) is an important seed spices crop of Rajasthan. Due to higher return from the crop, area under this crop is increasing rapidly in Rajasthan. It is sown in dry soil by broadcasting method, followed by two light irrigations to facilitate seedling emergence. Besides, the initial growth of the cumin is pretty slow. These two factors result in heavy weed infestation in the crop. Weed competes with the crop plants for the essentials of growth, interfere with the utilization of land and water resources, and thus adversely affect crop production. Weeds deplete 30-40 % of applied nutrients from the soil and compete with the crop plants for soil moisture and sunlight too (Mani, 1). Keeping a crop weed-free throughout the crop season is a laborious and cost intensive affair. In order to gate desirable degree of weed management, the operation has to be repeated but manual operation at several times become difficult. More over, hand-weeding is laborious, cumbersome and time consuming besides being costly and economically not feasible in today's intensive agriculture. Integration of manual and chemical weed management is reported to be more effective and economical than mechanical weed control. The arable land is a precious and scarce resource so, among the options to increase production, the crop intensity and efficient utilization of available resources seem more feasible over increasing area under cultivation.

In suitable plant density, plants completely use environmental conditions (water, air, light and soil) and inter or intra- specific competition is minimum. The present investigation was therefore carried out to increase the production of cumin through integrated weed management and row spacing of crop.

MATERIALS AND METHODS

The study was conducted at different location of the district at progressive farmers field who were growing cumin crop and instructional farm of Krishi Vigyan Kendra, Keshwana, Jalore during *Rabi* 2008-09 having salty loam soil with pH 8.2, EC 0.17 dS m⁻¹, organic carbon 0.25 %, available phosphorus 8.6 kg P ha⁻¹ and available potassium 279.7 kg Kha⁻¹. The treatments comprised of three sowing methods (broad casting, 30 cm row spacing and 20 cm row spacing) in main plot and three weed management methods (Hand weeding at 30 DAS, pendimethalin @ 1kg ha⁻¹ PE and pendimethalin @ 1kg ha⁻¹ PE +Hand weeding at 30 DAS) in sub plot were laid out in split plot design with three replication, located at two farmers fields and instructional farm of Krishi Vigyan Kendra. Each location has one replication. The cumin crop variety RZ-19 was sown in rows spaced at 20 and 30 cm apart through '*Kera*' methods and broadcasting as per treatment on 20 October to 8 November, 2008. Herbicide was applied as pre-emergence and hand weeding was done as per treatments. Seed yield, biomass yield, cost

of cultivation and net return of crop per ha. were taken.

RESULTS AND DISCUSSION

Effect of sowing method

Result of the study recorded that crop sowing in rows apart 20 and 30 cm had significant impact on yield and economics of cumin as compared broadcasting method of sowing (Table 1). Cumin crop sowing in row apart 20 cm produced significantly higher seed yield (8.11 q ha⁻¹), biomass yield (21.64 q ha⁻¹), harvest index (37.43 %), total return (Rs.101389 ha⁻¹), net return (Rs.81786 ha⁻¹) and benefit : cost ratio (5.17) and increased by 12.50, 11.23, 11.08, 0.90, 12.48 and 15.62 percent as compare to sowing in row apart 30 cm and 19.83, 31.74, 17.19, 2.72, 19.83 and 31.24 percent as compare to broadcasting, respectively. In suitable plant density, plants completely use environmental conditions and inter or intra specific competition is minimum. Under optimum plant density, plants show efficient use of available water, light and nutrient while under high plant density, there is competition among plants. The results obtained are in close conformity with the findings of Sadeghi *et al* (3) in black cumin.

Effect of weed management

The chemical weed control measures significantly increase the yields and economical attributes over mechanical weed control (Table 1). The pre emergence application of both pendimethalin at 1.0 kg ha⁻¹ and hand weeding at 30 DAS produced significantly higher

productivity and maximum return as compared to alone hand weeding at 30 DAS as well as pendimethalin at 1.0 kg ha⁻¹. The pre emergence application of pendimethalin at 1.0 kg ha⁻¹ and hand weeding at 30 DAS produced significantly higher seed yield by 10.03 and 8.83 per cent, biomass yield by 13.60 and 0.82 per cent, harvest index by 7.63 and 6.46 percent, total return by 2.51 and 2.55 percent, net return by 10.03 and 8.83 per cent and cost: benefit ratio by 14.31 and 9.14 per cent as compare to hand weeding at 30 DAS and pendimethalin at 1.0 kg ha⁻¹, respectively. However, pre emergence application of pendimethalin at 1.0 kg ha⁻¹ also increase productivity and net return significantly as compared to alone hand weeding at 30 DAS. The increase in productivity of cumin was due to deduction in weed population at early stage because pendimethalin absorbed by germinating weeds inhibits cell division in the meristematic tissues resulting in death of most of the weeds within a few days of their emergence, disruption of microtubule and inhibits synthesis of seedlings followed by chlorosis and inhibition of elongation of leaves therefore most of weeds died within a few days of their emergence. This herbicide gave almost season long control of weeds obviously due to their persistence in soil for a sufficient long time. The results are in conformity with those reported by Ram *et al*. (2) and Singh *et al* (4) in blond psyllium.

Thus, sowing of cumin at 20cm row spacing with weed management by pre-emergence application of Pendimethalin @ 1.0 kg/ha + hand weeding at 30 DAS is better for releasing higher yield, net returns and BCR.

Table1. Yield, biomass production, harvest index and economics of cumin crop

Treatments	Seed yield (qt/ha)	Bio mass (qt/ha)	Harvest Index (%)	Total Return (Rs./ha)	Net Return (Rs./ha)	B:C Ratio
Sowing methods						
Broad casting	6.02	16.63	36.12	75222	53901	3.53
30 cm row spacing	7.21	19.48	37.10	90139	70739	4.64
20 cm row spacing	8.11	21.64	37.43	101389	81786	5.17
SEm±	0.205	0.506	0.518	2557.517	2557.517	0.128
CD	0.80	1.99	2.03	10042.06	10042.06	0.50
Weed management methods						
Hand weeding at 30 DAS	6.47	17.92	35.97	80889	60881	4.06
Pendimithelin @ 1kg ha ⁻¹ PE	7.12	19.29	36.87	89000	69592	4.62
Pendimithelin @ 1kg ha ⁻¹ PE+	7.75	20.54	37.81	96861	75953	4.65
Hand weeding at 30 DAS						
SEm	0.201	0.474	0.385	2515.640	2515.640	0.123
CD at 5%	0.62	1.46	1.19	7751.46	7751.46	0.38

*Selling price of Cumin-12500/-per quintal

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