

Influence of irrigation, method and time of nitrogen application on growth, seed yield and water use of Indian mustard (*Brassica juncea*)

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Maximum benefits of irrigation and fertilizers can only be harvested when these are applied judiciously. Since Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson] has been recently introduced in rice-based cropping sequence in the coastal districts of Maharashtra, very limited information is available on these 2 aspects. Therefore the field experiment was conducted to study the effect of irrigation, method and time of nitrogen application on growth, seed yield and water use of Indian mustard.

The experiment was conducted at Wakawali during the winter (*rabi*) season of 1991–92. The treatments comprised 5 irrigation schedules based on cumulative pan evaporation (CPE) and physiological growth stages of crop (vegetative, branching, 50% flowering and seed-filling stages) as main-plot treatments and 4 combinations of method and time of N application as subplot treatments. These were replicated thrice in split-plot design (Table 1). The depth of irrigation water given was 60 mm. Quantity of water was measured by water meter. The crop received recommended dose of 90 kg N/ha and 50 kg P_2O_4 /ha. Full dose of P was applied through single superphosphate at the time of sowing. Mode and time of N application were as per the treatments. Grass mulching @ 6 tonnes/ha was done after final thinning (20 days after sowing).

The soil was lateritic sandy-clay loam

having pH 5.9, medium available nitrogen (325 kg/ha), low available phosphorus (9.17 kg/ha) and medium available potassium (245.80 kg/ha). The moisture at field capacity and permanent wilting point of 30 cm soil layer surface was 28.5 and 18.6% respectively. Seeds of 'Varuna' Indian mustard was sown on 2 November 1991 at the spacing of 45 cm x 15 cm. Thinning and plant-protection measures were carried out as per the recommendations. Harvesting was done on 10 February 1992.

Plant height, number of branches/plant, number of siliquae/plant, seeds/silique, 1,000-seed weight (g) and seed yield were significantly influenced by the different irrigation schedules (Table 1). Irrigations scheduled at different physiological growth stages, viz. vegetative (at 20 days), and at branching (35 days), 50% flowering (50 days) and seed-filling stage (75 days), significantly increased the plant height and seed yield over application of irrigation at 100 mm CPE with and without grass mulching. However, it was at par with irrigation applied at 60 and 80 mm CPE. Application of irrigation at 100 mm CPE with grass mulch was also significantly superior to irrigation at 100 mm CPE without mulch. The increase in seed yield was owing to significant improvement in number of siliquae/plant, seeds/silique and 1,000-seed weight. Prihar and Tripathi (1989) also reported

Table 1. Effect of irrigation, method and time of nitrogen application on growth, yield attributes, seed yield and water use of Indian mustard

Treatment	Plant height (cm)	Branches/plant	Siliquae/plant	Seeds/silique	1,000-seed weight (g)	Seed yield (kg/ha)	Consumptive use of water (mm)	Water-use efficiency (kg/ha-mm)
<i>Irrigation schedule</i>								
60 mm CPE	159.4	15.4	200.8	11.5	3.87	960	281 (5)	3.09
80 mm CPE	154.9	14.3	173.1	10.9	3.83	947	257 (4)	3.68
100 mm CPE	132.6	12.9	110.0	9.6	3.63	690	197 (3)	3.50
100 mm CPE + grass mulching	145.7	13.7	147.7	10.3	3.86	820	224 (3)	3.65
Physiological stages of growth	160.2	15.5	203.6	11.6	3.89	1,010	280 (5)	3.60
CD (P = 0.05)	11.3	0.28	17.47	0.58	0.08	74		
<i>Method and time of N application</i>								
Broadcasting (50% at sowing + 50% at 30 DAS)	135.1	10.1	93.0	9.2	3.66	619	221	2.80
Band placement (full dose at sowing)	160.2	11.1	119.1	10.8	3.79	832	253	3.29
Band placement (25% at sowing + 75% at 30 DAS)	153.5	19.9	230.1	11.2	3.95	1,078	274	3.94
Band placement (50% at sowing + 55% at 30 DAS)	153.5	16.2	221.0	11.9	3.83	1,013	269	3.76
CD (P = 0.05)	6.43	0.47	12.41	0.37	0.06	70		

DAS, Days after sowing

Figures in parentheses indicate number of irrigations

similar results. The consumptive water use increased with increase in frequency of irrigation, whereas water-use efficiency was maximum with irrigation applied at 80 and 100 mm CPE with grass mulch.

Application of 25% of recommended nitrogen at sowing and 75% at 30 days by band-placement method significantly improved all yield attributes and recorded the highest seed yield compared with broadcasting and application of whole dose at sowing by band placement (Table 1). However, it was at par with 50% at sowing and remaining 50% at 30 days by band-placement method. Thus Indian mustard crop responded more favourably to the split application of nitrogen by placement method than either application of whole dose at sowing through placement or split by broadcast method of application on lateritic soils. This could be ascribed to fact that under split application of nitrogen by band-placement method there was significant increase in number of siliquae/plant and seeds/siliquea

over broadcasting methods. These findings are in conformity with those reported by Singh (1992). Maximum water-use efficiency was also recorded when split application of nitrogen was done by band-placement method.

It was concluded that irrigation scheduled at different growth stages of crop (vegetative, branching, 50% flowering and seed-filling stages) and application of 25% recommended dose of nitrogen at sowing and 75% at 30 days after sowing by band-placement method on lateritic soils is more beneficial for getting higher seed yield of Indian mustard.

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Yield and economic analysis of weed-control practices in Indian mustard (*Brassica juncea*)

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A field experiment was conducted at Morena, during the winter season (*rabi*) of 1991-92 and 1992-93 to study yield and economics of weed-control practices in

Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson]. The soil was sandy loam, low in N, medium in P and high in available, K, with pH 7.3. Eleven treatments