

Response of Mustard to Irrigation and Fertilization.

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Investigations on mustard were conducted during rabi seasons of 1979-80 and 1980-81 to study the effect of levels of irrigation and fertilizer on seed yield and its quality. Scheduling irrigation at preflowering stage (I_2) resulted significantly more seed and stover yield over control (I_1) during both years. Seed and stover yield reduced significantly with the reduction of recommended fertilizer dose. Oil content in seed increased with the increasing levels of irrigation and with decreasing levels of fertilizers. The mean quantum of oil production increased with increasing levels of irrigation and fertilization. 40-60-20 (full recommended) fertilizer dose along with two post sowing irrigations produced maximum oil yield. However, seed and oil produced by one and two post sowing irrigations were at par.

High cost of fertilizers and irrigation water it became the need of the day to develop suitable irrigation and fertilizer management practices for profitable farming. It is also necessary to determine the complementary and supplementary relationship between fertilizers and irrigation levels to get the maximum yield potential of crops. Under such a situation, cultivators need guidance on phasing a fixed quantity of fertilizer and irrigation levels for mustard crop to get reasonably high returns. Hence, the present field experiment on mustard was planned to determine production potential and its quality under graded levels of fertilizer and irrigations.

MATERIAL AND METHODS

A field experiment was conducted for two years in rabi 1979-80 and 1980-81 at Agriculture Research Station, Banswara to study the effect of

irrigation and fertilizer levels on yield and quality of mustard. Treatments for the experiment consisted of three levels of irrigation viz. control (I_1 =pre-planting irrigation only), one post sowing irrigation (I_2) at pre-flowering stage and two post sowing irrigations (I_3) at pre-flowering + pod filling stages and three levels of fertilizers viz., full recommended dose (F_1 =40-60-20), 2/3 rd of recommended dose (F_2 =66.6% of F_1) and 1/3rd of recommended dose (F_3 =33.3% of F_1). The treatments were replicated three times in a split plot design keeping irrigation levels in main plot and fertilizer levels in sub plot. 7.5 cm delta of water was applied in each irrigation.

During both years mustard variety Varuna (T-59) was sown in middle of November using seed rate of 9 kg/ha and 30 cm row spacing and harvested in March. Urea (46% N), single super-

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phosphate (16%P₂O₅) and muriate of potash (60%K₂O) were placed below the seed by bullock drawn seed drill. Half dose of nitrogen and full dose of phosphorus and potash were applied at sowing time except in control irrigation plots where full dose of nitrogen was also applied at sowing time. Remaining half dose of nitrogen was applied with 1st post sowing irrigation at pre-flowering stage. The soil of experimental field was clay loam, well drained and uniform intexture. The field capacity, permanent wilting point bulk density and pH of the soil were 16.20%, 8.64%, 1.44gm cm³ and 7.8, respectively. Values of organic carbon and available phosphorus and potash were 0.4% and 45 and 450kg/ha, respectively.

RESULTS AND DISCUSSION

The data on seed and stover yield, oil percentage and oil production as affected by different levels of irrigation and fertilization are summarised in table I.

SEED YIELD

One post sowing irrigation given at pre-flowering stage increased significantly 90 percent seed yield over control during both years. Seed yields obtained by one or two post sowing irrigations were at par during both year. Scheduling irrigation at pre-flowering stage can be attributed to more number of branches and subsequently more number of pods per plant which ultimately resulted in more number of

seeds and seed yield. Application of water at pod filling stage was not helpful in augmenting either the number of branches or pods per plant. Mustard responded to the application of fertilizers during both the years and any reduction in the recommended dose of fertilizer (40-60-20) resulted in a significant reduction in seed yield. Seed yield obtained by one or two post sowing irrigations along with full recommended fertilizer dose (I₂F₁ or I₁F₁) were at par and significantly superior over other treatment combinations during both years. Same pattern was observed in mean yield of two years data. These results are in confoirmity with the findings of Singh and Tomar (1971), Gupta *et al.* (1972) and Chahal *et al.* (1980).

The seed yields in general, in the first year was higher due to more favourable weather during the growth period of the crop.

Oil Content :

Data (Table I) show that irrigation tended to increase the oil content in seed but significant difference was only between control (I₁) and two post sowing irrigations (I₂) during both years. Increased oil content in toria was recorded by Wankhede *et al.* (1970) with increasing levels of irrigation. Oil content showed an increasing trend with the reduction in recommended fertilizer dose, however a substantially increase was observed only at 1/3rd of recommended fertilizer dose over full recommended dose. Maximum

oil content was recorded due to combined effect of two post sowing irrigations and 1/3rd of recommended fertilizer dose (1/3 F₂).

Nutrient response :

Nutrient response increased with decreasing levels of fertilizer. However, this higher nutrient response was not desirable on economic ground.

It may be concluded from present study that under limited water supply conditions mustard crop should be treated with one post sowing irrigation at pre flowering stage along with full recommended fertilizer dose.

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TABLE 1 Yields and quality of mustard as affected by different levels of irrigation and fertilization

Treatment	Seed yield (q/ha) 1.			Oil percentage 2.		Mean oil production cm of Water or per kg nutrient applied	
	1979-80	1980-81	Mean	1979-80	1980-81	Mean	
A. Irrigation levels							
I ₁ -control (7.5cm ppl)	6.6	5.63	6.20	33.46	33.58	33.52	27.68
I ₂ -Preflowering stage (7.5+7.5=15cm)	12.57	10.77	11.67	34.15	34.27	34.21	26.61
I ₃ Preflowering+ pod formation (7.5+7.5+ 7.5=22.5)	12.24	11.57	11.91	34.42	34.49	34.45	118.23
C D 5%	1.18	2.35	—	0.69	0.75	—	—
B. Fertilizer levels							
F ₁ -Full recommended 40-60-20)	12.82	12.07	12.45	33.72	33.80	33.76	3.50
F ₂ -2/3rd of recommen- ded dose (27-40-13)	11.08	9.43	10.26	34.04	34.19	34.11	4.37
F ₃ ± 1/3rd of recommen- ded dose (13-20-7)	7.68	6.46	7.07	34.27	34.35	34.31	6.06
C D 5%	0.57	1.16	—	0.48	0.51	—	—
Treatment	PPI = Preplanting Irrigation						
C. Irrigation Fertilizer levels.							
I ₁ F ₁	7.65	7.80	7.73	33.15	33.26	33.20	—
I ₁ F ₂	6.80	4.87	5.84	33.53	33.75	33.64	—
I ₁ F ₃	5.83	4.22	5.03	33.70	33.75	33.72	—
I ₂ F ₁	15.40	13.48	14.44	33.86	33.95	67.81	—
I ₂ F ₂	13.83	11.90	12.87	34.16	34.29	34.22	—
I ₂ F ₃	8.47	6.92	7.70	34.44	34.56	34.50	—
I ₃ F ₁	15.40	14.93	15.17	34.14	34.20	34.17	—
I ₃ F ₂	12.60	11.53	12.07	34.43	34.53	34.48	—
I ₃ F ₃	8.73	8.25	8.48	34.68	34.74	34.71	—
C D 5%	0.97	2.01	—	0.51	0.54	—	—