

## **Impact of Agronomic Management on Seed Yield of Rapeseed-Mustard Genotypes under Aphid Protected and Unprotected Conditions**

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### **Abstract**

Mustard variety Laxmi gave significantly higher seed yield (18.82 and 18.59 q/ha followed by RH 30 (17.36 and 17.25 q/ha), RH 7846 (17.04 and 16.86 q/ha) and the least seed yield was obtained with rapeseed variety BSH-1 (9.28 and 8.86 q/ha) under protected set irrespective of date of sowings and irrigations levels during two years trials. Seed yield of early sown rapeseed-mustard cultivars was maximum (15.52 and 15.31 q/ha) followed by normal sown (14.24 and 14.78 q/ha) and late sown (9.01 and 7.79 q/ha) irrespective of varieties and irrigation levels during two years. The reduction in average seed was maximum (20.67 to 22.12%) for BSH-1 followed by Laxmi (19.96 to 20.35%), RH-30 (15.09 to 17.31%) and RH 7846 (13.73 to 17.20%) during two years under unprotected set irrespective of date of sowings and irrigations levels. Reduction in seed yield under unprotected set was low (6.05% to 7.10%) irrespective of varieties sown at 10 October followed by normal sown (14.41 to 15.59%) and late sown (31.16 to 39.42%) irrespective of irrigation levels.

**Key words :** Varieties, Irrigation levels, Interaction, Rapeseed-mustard, Genotypes.

The edible oilseed crops play an important role in Indian economy. The oil from these crops not only form the essential part of human diet but also serve as an essential raw material for many agro based industries. In India, rapeseed-mustard crops are next to groundnut in the area and production. Out of several constraints responsible for low productivity, the insect-pests are important, of which mustard aphid, *Lipaphis erysimi* (Kalt) is major causing 35 to 73% reduction in yield (1—2). Extensive use of chemicals lead to the development of insecticidal resistant insect strains which contributes to the problem of ecological imbalance and various health hazards. Looking into the present concept of integrated pest management the present studies were undertaken to assess the impact of cultural practices on the seed yield of rapeseed-mustard genotypes and the interaction of mustard aphid incidence.

### **Methods**

Four varieties viz . RH 30, Laxmi, RH 7846 of In-

dian mustard (*Brassica juncea* Czern and Cosson) and BSH-1 of rapeseed (*B campestris* var Brown sarson) were included in the studies. The experiment was laid out in split plot design with a plot size of 1.8 m × 3.0 m and replicated thrice. The crop was sown on three dates viz. early (D<sub>1</sub> 10 October), normal (D<sub>2</sub> 25 October) and late (D<sub>3</sub> 9 November) following recommended agronomic practices. The dates of sowing were kept as main plots which were sub-divided into two sub-plots to each of which different levels of irrigation were allotted randomly. First irrigation was scheduled at 55 days after sowing and second irrigation was given at 85 days after sowing. These sub-plots were further sub-divided into eight combinations of four varieties in protected and unprotected sets randomly. The row to row and plant to plant spacing was 30 and 10–15 cm, respectively. After flower initiation, the protected plots were kept under constant observation for mustard aphid appearance. As and when the aphid infestation reached 20% on the central twigs, these plots were sprayed with

**Table 1.** Interaction between varieties and date of sowings on seed yield of different rapeseed-mustard varieties irrespective of irrigation levels under mustard aphid protected and unprotected conditions. Means with the same letter do not differ significantly (as per DMRT). D<sub>1</sub> = 10 Oct, D<sub>2</sub>=25 Oct, D<sub>3</sub> =9 Nov.

Variety	Average seed yield (q/ha)								Per cent reduction in yield
	1st year Protected				Unprotected				
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	Mean	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	Mean	
BSH-1	11.13	9.18	7.54	9.28 <sup>a</sup>	10.56	6.54	5.01	7.77 <sup>b</sup>	20.58
RH-30	18.52	18.95	14.60	17.36 <sup>a</sup>	17.51	16.41	9.95	14.62 <sup>a</sup>	15.73
Laxmi	19.38	20.61	16.47	18.82 <sup>a</sup>	17.76	17.18	10.05	15.00 <sup>a</sup>	20.30
RH-7846	17.06	18.76	15.31	17.04 <sup>b</sup>	16.24	16.83	11.02	14.70 <sup>a</sup>	13.73
Mean	16.62 <sup>a</sup>	16.87 <sup>a</sup>	13.48 <sup>b</sup>		15.52 <sup>a</sup>	14.24 <sup>a</sup>	9.01 <sup>c</sup>		

**Table 1.** Continued.

Variety	Average seed yield (q/ha)								Per cent reduction in yield
	2nd year Protected				Unprotected				
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	Mean	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	Mean	
BSH-1	10.60	9.57	6.41	8.86 <sup>d</sup>	9.42	6.81	4.47	6.90 <sup>c</sup>	22.12
RH-30	18.76	19.76	15.02	17.85 <sup>b</sup>	18.09	17.18	9.00	14.76 <sup>a</sup>	17.31
Laxmi	19.97	10.59	15.21	18.59 <sup>a</sup>	18.37	17.65	8.62	14.88 <sup>a</sup>	19.96
RH-7846	16.58	19.20	14.80	16.86 <sup>c</sup>	15.35	17.48	9.06	13.96 <sup>b</sup>	17.20
Mean	16.48 <sup>b</sup>	17.28 <sup>a</sup>	12.86 <sup>c</sup>		15.31 <sup>a</sup>	14.78 <sup>b</sup>	7.79 <sup>c</sup>		

oxydemeton-methyl 0.025% and subsequent sprays were given at 15-day intervals (4). The utmost care was taken not to allow the insecticidal drifts to the unprotected plots by putting polythene barrier between the plots. The unprotected set was left exposed to aphid infestation till harvest. The yield per plot (kg) was recorded and computed to q/ha. The per cent yield reduction in each variety was calculated by the following formula.

$$\text{Yield (q/ha) under protected set} = Y_p$$

$$\text{Yield (q/ha) under unprotected set} = Y_{up}$$

$$\text{Percent reduction in yield for variety} = \frac{Y_p - Y_{up}}{Y_p} \times 100$$

### Results and Discussion

Table 1 reveals that the maximum seed yield (16.87 q/ha) was obtained under protected set, when the crops were sown on 25 October first year (D<sub>2</sub>) irre-

**Table 2.** Interaction between varieties and irrigation levels on seed yield of different rapeseed-mustard varieties irrespective of dates of sowings under mustard aphid protected and unprotected conditions. Means with the same letter do not differ significantly (as per DMRT). I<sub>1</sub> = One irrigation, I<sub>2</sub> = Two irrigations.

Variety	Average seed yield (q/ha)						Per cent reduction in yield
	1st year Protected			Unprotected			
	I <sub>1</sub>	I <sub>2</sub>	Mean	I <sub>1</sub>	I <sub>2</sub>	Mean	
BSH-1	8.85	9.72	9.28 <sup>c</sup>	6.99	7.775	7.37 <sup>b</sup>	20.67
RH-30	16.81	17.90	17.36 <sup>b</sup>	14.08	15.16	14.74 <sup>a</sup>	15.09
Laxmi	18.18	19.45	18.82 <sup>a</sup>	14.60	15.39	14.99	20.35
RH-7846	16.62	17.46	17.04 <sup>b</sup>	14.41	14.98	14.70 <sup>a</sup>	13.73
Mean	15.12 <sup>b</sup>	16.13 <sup>a</sup>		12.52 <sup>b</sup>	13.39 <sup>a</sup>		

**Table 2.** Continued.

Variety	Average seed yield (q/ha)						Per cent reduction in yield
	2nd year						
	Protected			Unprotected			
I <sub>1</sub>	I <sub>2</sub>	Mean	I <sub>1</sub>	I <sub>2</sub>	Mean		
BSH-1	8.66	9.06	8.86 <sup>d</sup>	6.88	6.92	6.90 <sup>c</sup>	22.12
RH-30	17.39	18.20	17.85 <sup>b</sup>	14.70	14.81	14.76 <sup>a</sup>	17.31
Laxmi	18.23	18.95	18.59 <sup>a</sup>	14.81	14.94	14.88 <sup>a</sup>	19.96
RH-7846	16.60	17.12	16.86 <sup>c</sup>	13.91	14.01	13.96 <sup>b</sup>	17.20
Mean	15.22 <sup>b</sup>	15.86 <sup>a</sup>		12.58 <sup>a</sup>	12.67 <sup>a</sup>		

spective of varieties and was statistically at par with the crops sown on (D<sub>1</sub>), i. e. 16.52 q/ha. Mustard variety Laxmi yielded with BSH-1 (9.28 q/ha) and irrespective of dates of sowing and irrigation levels during first year. Under unprotected set crop sown on D<sub>1</sub> yielded maximum (15.52 q/ha) followed by D<sub>2</sub> (14.24 q/ha) and D<sub>3</sub> (9.01 q/ha) irrespective of varieties and irrigation levels. Per cent loss in yield due to mustard aphid infestation was maximum i.e. 20.58 and 22.12% in the rapeseed variety BSH-I for 2 years irrespective of dates of sowing and irrigation levels. However, for mustard varieties the yield losses ranged between 13.73 to 20.30% which were comparatively lower than BSH-1.

Table 2 reveals that mean seed yield under protected set was significantly more (18.82 and 18.59 q/ha) of mustard variety Laxmi and less (9.28 and 8.86 q/ha) of rapeseed variety BSH-1 during both the years, irrespective of sowing dates and irrigation levels. Likewise, mean seed yield was also significantly more

under twice-irrigated crops, irrespective of sowing dates against once irrigated under both sets except under unprotected set in first year where yield levels were at par. Per cent reduction in seed yield was maximum i. e. 20.69 and 22.12% for rapeseed variety BSH-1 followed by Laxmi (20.35 to 19.96%), RH-30 (15.09 to 17.31%) and RH-7846 (13.73 to 17.20%) for first and second year respectively.

Table 3 reveals that the crops irrespective of varieties under protected set yielded more when sown at D<sub>2</sub> (25 October) and D<sub>1</sub> (10 October), and significantly low at D<sub>3</sub> (9 November) during first year. The seed yield was significantly more when the crops were grown under two irrigation levels than in once irrigated during both the years under protected and unprotected sets except under protected set during second year where yield levels were at par. The reduction in seed yield was significantly low (6.05 and 7.10%) in the crops sown on D<sub>1</sub> followed by D<sub>2</sub> (15.59 to 14.41%) and still higher in D<sub>3</sub> (31.16 to 39.42%) for

**Table 3.** Interaction between date of sowings and levels irrigation on seed yield of rapeseed mustard varieties irrespective of variety under mustard aphid protected and unprotected conditions. Means with the same letter do not differ significantly (as per DMRT). I<sub>1</sub> = One irrigation, I<sub>2</sub> = Two irrigations.

Date of sowing	1st year						Per-cent reduction in yield	2nd year						Per-cent reduction in yield
	Protected			Unprotected				Protected			Unprotected			
	I <sub>1</sub>	I <sub>2</sub>	Mean	I <sub>1</sub>	I <sub>2</sub>	Mean		I <sub>1</sub>	I <sub>2</sub>	Mean	I <sub>2</sub>	I <sub>2</sub>	Mean	
10 Oct	16.02	17.03	16.52 <sup>a</sup>	15.15	15.88	15.52 <sup>a</sup>	6.05	16.06	16.90	16.48 <sup>b</sup>	15.16	15.46	15.31 <sup>a</sup>	7.10
25 Oct	16.29	17.35	16.87 <sup>a</sup>	13.94	14.53	14.24 <sup>b</sup>	15.59	17.01	17.55	17.28 <sup>a</sup>	14.81	14.76	14.79 <sup>b</sup>	14.41
9 Nov	12.94	14.02	13.48 <sup>b</sup>	8.47	9.55	9.01 <sup>c</sup>	33.16	12.59	13.13	12.86 <sup>c</sup>	7.77	7.81	7.79 <sup>c</sup>	39.42
Mean	15.12 <sup>b</sup>	16.13 <sup>a</sup>		12.52 <sup>a</sup>	13.32 <sup>a</sup>			15.22 <sup>a</sup>	15.86 <sup>a</sup>		12.58 <sup>a</sup>	12.78 <sup>a</sup>		

two years irrespective of varieties and irrigation levels. The present findings are in accordance with the earlier findings (2—6).

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