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Short Communication

INDUCED GENETIC VARIATION FOR SEED AND OIL YIELD FOLLOWING HYBRIDIZATION AND MUTAGENESIS IN INDIAN MUSTARD

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Designing efficient and desirable plant type requires the existance of genetic variability in the material. The mutagenesis may be applied to supplement the variation generated following hybridization [1]. An attempt has been made to induce variation for seed and oil yield following hybridization and mutagenesis in Indian mustard in the present investigation.

F_1 seed of 3 hybrids [H1 : DIR 45-8 × B-85, H3 : B-85 × RWC- 6(1/11), H5:DIR 45-8 × RWC-6 (1-11)] and their reciprocals (H2, H4 and H6, respectively) were irradiated with 25, 50, 75 and 100 kR gamma rays at Isotope laboratory (R & D), Sindri, Dhanbad, India, taking 100 seeds per treatment. F_1M_1 generation of 24 radiation treatments were raised with 6 F_1 generations, 3 parents and 3 checks Varuna, Pusa bold and Kranti at Tirhut College of Agriculture, Dholi Farm. Twenty four F_2M_2s with 6 F_2s, 3 parents and 3 checks were raised in augmented design in 50 cm apart 8-row plots. The recommended package of practices were followed to raise the crop. Seed yield per plant was recorded on 10 and 30 random plants from each treatment in F_1M_1 and F_2M_2 generations, respectively. Oil content was estimated in F_2M_2 generation.

The results obtained for yield per plant in F_1M_1 and F_2M_2 generations with other treatments indicated significantly higher yield for all untreated hybrids with an average yield capacity of 27.3g per plant averaged over all hybrids. There was a significant reduction in yield with the increase of the dose from 27.3g per plant to 19.0, 13.7, 19.1 and 5.6g per plant averaged over all hybrids under 25, 50, 75 and 100 kR, respectively. The results indicated that heterotic effects are much pronounced in hybrids, however, the gamma rays treatment diluted the effect of heterosis resulting in lower yield in F_1M_1 generation of all the hybrids. Nevertheless all hybrids registered significantly higher yield under 25 and 50 kR gamma rays treatment than their parents and better than the check variety under 25 kR gamma ray treatment. The results obtained in F_2M_2 clearly indicated the desired induced genetic variability for

this important economic attribute. The reduction in yield per plant in F_2 was to the tune of 64 percent over F_1. There was a significant increase in mean yield per plant over all the hybrids with the increase of gamma ray dose. The highest mean seed yield was recorded in 100 kR treatment signifying the efficiency of higher dose in inducing the desired variability for seed yield in Indian mustard. Increase in grain yield through gamma ray treatment is also reported in *Raya* [2]. Reciprocal differences were significant among all the hybrids over doses in F_2M_2 generation but only in one hybrid (H_1 and H_2) in F_1M_1 generation. It indicated that mutation events are affected by the cytoplasmic back ground of the genotype.

Table 1. Percentage of oil-content in F_2M_2 generation.

Treatment	Oil (%)		Treatment	Oil (%)	
	Lowest yielder plant	Highest yielder plant		Lowest yielder plant	Highest yielder plant
DIR 45-8	37.5	38.0	RWC-6(1/11) × B-85	36.7	37.4
B-85	37.0	37.5	25 kR	37.5	38.1
RWC-6(1/11)	35.5	36.0	50 kR	38.2	38.4
DIR 45-8 × B-85	37.6	38.2	75 kR	38.3	39.0
25 kR	39.0	39.2	100 kR	38.4	39.0
50 kR	39.2	39.3	DIR 45-8 × RWC-6(1/11)	37.3	37.7
75 kR	39.2	39.7	25 kR	38.0	38.2
100 kR	39.5	41.0	50 kR	38.3	38.5
B-85 × DIR 45-8	37.6	38.1	75 kR	39.0	39.2
25 kR	38.2	38.5	100 kR	39.5	40.0
50 kR	38.3	38.6	RWC-6(1/11) × DIR 45-8	36.7	37.0
75 kR	38.4	38.6	25 kR	37.0	37.0
100 kR	38.5	40.3	50 kR	37.3	37.7
B-85 × RWC-6(1/11)	37.2	37.6	75 kR	37.5	38.0
25 kR	38.5	39.0	100 kR	38.0	38.5
50 kR	39.0	39.5	VARUNA	40.2	41.0
75 kR	39.2	39.7	PUSA BOLD	40.0	40.5
100 kR	39.3	40.2	KRANTI	39.8	40.0

The results of oil estimation for the lowest and the highest yielder plant in F_2M_2 for all the hybrids in different doses revealed that there was a sharp increase in oil content in F_2M_2 of all the hybrids in different doses over their respective F_2 generation as well as their parents (Table 1). The oil content increases with the increase of gamma ray dose irrespective of hybrids and maximum oil content was recorded in 100 kR gamma ray treatment. On an average, 37.4 per cent oil was estimated in F_2 generation which increased to 39.3 per cent in F_2M_2 under 100 kR gamma-ray treatment. Results were in corroboration with earlier findings [2, 3]. However none of the segregant showed higher oil content than the best check Varuna (40.6%).

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