IMPROVED QUALITY OF OIL AND MEAL IN INDIAN MUSTARD

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ABSTRACT

The high priority objectives in quality improvement of Indian mustard (Brassica juncea L.) include development of varieties with higher oil content, erucic acid free oil and low glucosinolate meal. Zero erucic lines and low glucosinolte lines are now available in Indian mustard and are being utilized to breed canola quality varieties.

INTRODUCTION

The new thurst on agro exports as a result of GATT has apparently made agriculture big business in India. There is a good international market for Indian mustard, seed as well as oil, provided it is of canola quality. So efforts are being made to breed canola quality varieties of Indian mustard.

RESULTS AND DISCUSSION

The ruling variety of Indian mustard, Varuna, having erucic acid level of 44 %, was crossed with line S-906, a zero erucic line of Indian mustard developed by selection from the progeny of a cross Donskaja X Zem-1 backcrossed to Donskaja. Anthers from F_1 plants were cultured to recover haploid plants. Self-seed was obtained from plants in which spontaneous chromosone doubling had occured. Three double haploid lines (DH13111, DH13112 and DH13113) were develpoed (Tiwari et al. 1988).

The erucic acid content of the parents, the F_1, and the double haploid lines determined by half-seed analysis method is given in Table 1. The parents S-906 and Varuna were found to contain 0% and 44% erucic acid, respectively. The analysis of F_1 seeds gave a mean value of 25.8% erucic acid. Among the three double haploid lines, the line DH13112 was found to be zero erucic. The

results are consistent with a model of two genes acting in an additive manner with each allele contributing about 11% erucic acid. The genotypes of the parents, the F_1 and the double haploid lines, according to the model, are presented in Table 1.

Table 1. Erucic acid content and proposed genotype of parents, F_1 and double haploid lines of *B. juncea*.

Line	Generation	Erucic acid	Proposed genotype
S906	P_1	0.0	$e_1 e_1 e_2 e_2$
Varuna	P_2	44.0	$E_1 E_1 E_2 E_2$
S-906 X Varuna	F_1	25.8	$E_1 e_1 E_2 e_2$
DH13111	DH	21.5	$E_1 E_1 e_2 e_2$ $e_1 e_1 E_2 E_2$
DH13112	DH	0.2	$e_1 e_1 e_2 e_2$
DH13113	DH	42.5	$E_1 E_1 E_2 E_2$

The zero erucic double haploid line DH13112 is late in maturity (160 days) as compared to Varuna (120 days). Efforts are being made to induce earliness in this line by backcrossing it to Varuna.

The zero erucic mustard lines developed by Kirk and Oram (1981) have been used by Indian scientists for transferring zero erucic trait to other varieties of Indian mustard (Kumar 1990). Efforts have also been made to transfer low erucic trait from *B. napus* to *B. juncea*. Segregates from the cross between the Indian mustard RLM 198 and the *B. napus* variety Oro showed good variation in erucic acid content. One derivative contained 18% erucic acid and combined early ripening with high yield (Ahuja 1990). Segregates with 0.5% glucosinolate have been isolated from a cross between the Indian mustard variety RLM 619 and the *B. campestris* variety Tobin (Ahuja 1990).

Attempts have been made to develop low glucosinolate lines of *B. juncea*. Cohen et al. (1983) reported a *B. juncea* line that had glucosinolate contents as low as 4.3 µMol/g of defatted meal. This line was derived from single plants selected from the Chinese lines of *B. juncea*. Love et al. (1990) succeeded in transferring low glucosinolate trait from *B. campestris* to *B. juncea*. They developed a *B. juncea* line that contained 10 µMol/g meal of total aliphatic glucosinolates.

As levels of erucic acid and glucosinolates are inherited independently of each other, agronomically acceptable canola quality cultivars of *B. juncea* could be developed by utilizing the available zero-erucic and the low glucosinolate lines of *B. juncea* in breeding programmes.

ACKNOWLEDGEMENT

The author is thankful to Dr. P.M. Gaur, Associate Professor, Department of Plant Breeding and Genetics, Jawaharlal Nehru Agril. Univ. Jabalpur for his help.

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