

# Report under the Project entitled 'Development of Improved Varieties and Hybrids of Mustard (*Brassica juncea*) and Stabilization of Yield through Disease and Pest Resistance'

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The project aims at developing high seed and oil yielding varieties and hybrids of Indian mustard and stabilization of yield through incorporation of resistance against the major diseases such as *Alternaria* and white rust and pest, namely aphid. Summary of the progress under different objectives is given.

## 1. Exploitation of cytoplasmic genetic male sterility for hybrid production.

The cytoplasmic genetic ms is available in five different *juncea* backgrounds of improved cultivars namely Parkash, Varuna, Pusa Bold, Pusa Barani and RLM-198. During the rabi season 1988, the materials had to be sorted out, because these had undergone some level of open-pollination during the previous two seasons. It may be mentioned that A lines in general appeared to be taller in height, slightly later in maturity and sparsely fruiting as compared to B lines. CMS line of Pusa Bold appeared to be promising and more like its B line.

During 1988-89 winter season, the previously maintained ms plants of the respective A lines were given another back-cross dose with the five respective B lines.

The ms plants were also hybridized with diverse sources of germplasm to find out suitable restorer lines. F1 of one cross, namely CMS RLM 198x16 showed some level of restoration. Search for restorers has been further intensified by using diverse germplasm obtained from NBPGR (National Bureau of Plant Genetic Resources) in India during the past year. Efforts are under way to find out suitable restorers. Simultaneously, testing of materials for combining ability and level of heterosis, has been initiated.

Cytoplasmic genetic male sterile lines in all the five backgrounds have shown a higher incidence of *alternaria* disease than the fertile counterpart (B lines).

## 2. Breeding for disease and pest resistance :

### (a) White Rust Resistance :

As a result of extensive screening of available breeding materials in advance generations and the germplasm under heavy incidence of disease, white rust resistant lines were isolated from selections of DIRA-313, a promising yellow-seeded line developed earlier which involves Polish background. This is being extensively utilized in breeding white rust resistant varieties with high yield and oil content.

### (b) Resistance to Alternaria :

Materials with relative tolerance to Alternaria brassicae have been identified both in the germplasm and in the breeding nurseries. Artificially synthesized B. juncea have revealed higher level of tolerance/resistance to alternaria. Some of these have been incorporated into resistance breeding programme of the project.

### (c) Aphid resistance :

No immunity to aphids has been reported in Indian mustard (B. juncea) from anywhere so far. Experience with the limited materials involving newly isolated selections of DIRA-313 and DIRA-326 and germplasm (about 800) has revealed presence of relative tolerance to aphid under very heavy natural infestation of Brassica aphid (Lipaphis erysimi Kalt). These lines have also showed better tolerance to aphids than the standard checks Varuna, Pusa Bold and Pusa Barani.

Variation for level of aphid infestation appears to be quantitative in the number of lines of DIRA-313 and 326. There are significant differences in yield of susceptible and tolerant genotypes. A programme of recurrent selection is being initiated to accumulate the genes for resistance/tolerance in high seed yielding backgrounds. Studies are in progress to collect information on the inheritance of resistance to diseases, pest and economic characters related to grain yield.