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"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

Characterisation of Indian mustard germplasm for agro-morphological traits and biotic stress tolerance

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Abstract

Oilseed Brassicas have become the third important edible oilseed crop next to soybean and palm in the world. The four main Brassica oilseed species, *B. napus*, *B. rapa, B. juncea* and *B. carinata* are widely cultivated for oil, condiment and vegetable purposes. *B. juncea* (L.) Czern, commonly referred as Indian mustard is a major oilseed crop in South Asia. We conducted an experiment to give a comprehensive account of the diversity characterisation using >2000 accessions of Indian mustard germplasm collected from 9 different agro-ecological zones of India and evaluated for 15 quantitative traits during the year 2020 to 2023. These accessions showed presence of highest variation for 1000 seed weight (coefficient of variation 48.57 %). PCA exhibited that plant height, silique length, length of main fruiting branch, 1000 seed weight, days to 50 % flowering and maturity were among the most important traits and accounted for more than 50 % phenotypic variation. Correlation studies indicated that plant height, leaf length, leaf width, days to 50 % flowering along with days to maturity should be considered while performing selection in segregating generations intended to improve seed yield/plant. Donors for various traits were identified e.g., IC426383, IC426386 for dwarf type (<70 cm); IC343199, IC589691, EC766320, IC426386 for early maturity (<95 days); IC491546, IC426322, IC355371 for seeds/siliqua (>22) and IC 383489 for oil content (45.2 %). New sources of resistance effective against multiple races of white rust (*Albugo candida*) e.g. EC766192, EC766164, IC265495, IC443623, EC766061, EC766193, EC766595 and for sclerotinia rot (*Sclerotinia sclerotiorum* (Lib.) e.g. IC491577, EC766532, EC766516, EC766189 were identified with PDI=0 at different developmental stages of the plant. These novel sources of agronomic traits and host resistance will play vital roles to establish a strong genetic and molecular foundation for the mustard improvement program.

Keywords: *Albugo candida*, biotic stress, *Brassica juncea*, characterisation, *Sclerotinia sclerotiorum*

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