Development of Indian mustard [Brassica juncea (L.) Czern.] core collection based on agro-morphological traits

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Abstract:
Indian mustard [Brassica juncea (L.) Czern.] is a major edible oil crop of India. The Indian Council of Agricultural Research—National Bureau of Plant Genetic Resources (ICAR-NBPGR) and ICAR—Directorate of Rapeseed Mustard Research (DRMR) together conserve one of the largest global collection of Indian mustard germplasm comprising 5950 accessions which includes indigenously collected landraces, exotic accessions, breeding lines, Improved/released cultivars, registered genetic stocks and other type of material of unknown origin. However, only a small fraction of this huge collection has been deployed in the breeding programme due to lack of information on majority of accessions. The objective of this study was to develop a core collection of Indian mustard to enhance utilization of conserved germplasm in crop improvement programme. For this purpose, the accessions were characterized at one ideal site (Bharatpur) using 14 agro-morphological traits and the resultant data was analysed using three state-of-the-art core collection construction tools—MSTRAT, Power Core and Core Hunter 3 (CH3), to obtain three core sets each with 595 accessions. The quality of these core sets was evaluated and compared using two genetic distance based metrices (E-NE & A-NE), several summary statistics, Shannon diversity index, phenotypic correlations etc. The core collection generated using CH3 which optimized simultaneously for both representativeness and diversity was found the best in capturing the genetic variation existed in the base collection for all the 14 traits. The diversity represented in the core collection will therefore, be a guideline to breeders for a wider use of the Indian mustard genetic resources available in the genebank for identification and introgression of new useful traits, as well as for delineation of their genetic basis particularly through marker-trait association.