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Development and Characterization of a Multiparent Advanced Generation Inter-Cross (MAGIC) Population of Jute (*Corchorus olitorius*)

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Abstract

Intermating of multiple founder lines is increasingly becoming a popular breeding method of choice for enhancing genetic diversity, developing mapping populations and breaking negative linkage drags. Low genetic diversity in the breeding populations is a major bottleneck for genetic improvement in jute (*Corchorus olitorius* L.). Here, we report the development of the first multiparent advanced generation inter-cross (MAGIC) population of jute. This MAGIC panel comprising 341 recombinant inbred lines was created by intermating 20 geographically isolated founder lines for four generations followed by six generations of inbreeding. We investigated the extent of phenotypic variabilities in four economically important traits using this permanent panel across two diverse locations. Significant trait variability, high broad-sense heritability (0.76–0.83) and transgressive segregation (up to 17.60%) revealed the potential of this MAGIC panel for genetic mapping and breeding for economic traits. Moreover, robust correlations of plant height and green biomass with bast fibre yield (r = 0.67–0.72) reinforced the importance of these two traits in selection for fibre yield in jute. While the major variance components were attributed to genotypic differences, significant non-heritable blockvariance for all the four traits indicated rather high influence of micro-environments on jute. Taken together, our study envisages the utility of the MAGIC population in jute and analogous crops constrained with a narrow gene pool.

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Contributions

DS and NKS contributed to conceptualization and supervision; AK, DD, and NAM contributed to methodology; DS, PS, and CSK contributed to data generation and analysis; PS contributed to writing—original draft preparation; DS, JM, GK, and NKS contributed to writing—review and editing; DS and NKS contributed to funding acquisition.

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Ethics declarations

Conflict of interest

The authors disclose that they have no conflict of interest.

Additional information

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