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Impacts of genome size and ploidy level on the morphological traits of Okra (*Abelmoschus esculentus* L.) Moench

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Polyploidy has played a significant role in the evolution of vascular plants and about 80 % of angiosperms are estimated to be polyploid. The knowledge of nuclear DNA content in plants (either in relative or absolute units) is used to estimate genome size and the ploidy level. Genome size (C-value or the haploid nuclear DNA content) is used to explain evolutionary patterns and adaptation mechanisms of plants. Genome size varies to about 2400 folds across the angiosperms. Flow cytometry (FCM) is commonly used to estimate genome size and ploidy level in plants. Okra *Abelmoschus esculentus* L. (Moench), is an economically important vegetable crop grown in tropical and sub-tropical as well as in the Mediterranean region. Ploidy level has been determined mostly by counting the chromosomes of stained root tips but studies on genome size of the genus *Abelmoschus* are rare. Due to smaller chromosome size, variable chromosome number and high ploidy levels existing within the species the visual counting is laborious and can potentially lead to errors. In this study FCM was used to determine absolute DNA content, genome size, relative chromosome number and ploidy level of 170 genotypes of okra by employing CyStain PI Absolute P kit and CyStain UV Precise P (DAPI) kit. CyStain UV Precise P (DAPI)

proved to be a better choice for the determination of ploidy level and relative chromosome number. This was a base specific kit and data obtained showed low CV. Results indicated that relative number of chromosomes varied from 84-189 for *Abelmoschus moschatus* and 115-170 for *Abelmoschus esculentus*. Eight groups were formed based on basic set of chromosome i.e., $x=12$. The ploidy $2n$ for *A. moschatus* was 7x, 11x, 13x, 15x and 16x whereas for *A. esculentus* it ranged 10x-14x. The 2CDNA value for *A. moschatus* ranged from 2.42pg-6.90pg and genome size in Mbp ranged from 2362.92Mbp-6794.86Mbp. For *A. esculentus* 2CDNA value ranged from 2.34pg-4.13pg while genome size in Mbp ranged from 2292.31Mbp-4042.30 Mbp. The genome size data was found inadequate to accurately indicate the number of chromosomes and further studies were needed to optimize the protocol to determine the precise chromosome count using the genome size data. Negative correlation between relative ploidy and genome size showed a downsizing of the genome size with increased ploidy level. Correlations among traits showed that increased vegetative growth (more number of branches) reduced reproductive growth in okra under heat stress.

Biography

Misbah Safdar has completed her Masters of Honors in Agriculture at the age of 25 years from PMAS Arid Agriculture University Rawalpindi and pursuing PhD at University of Sydney, Australia. She worked as Research Officer in Barani Agricultural Research Institute, Government of Punjab, Pakistan. She has published four papers in reputed journals and is in last semester of PhD.

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