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# Morpho-physiological traits and SSR markers-based analysis of relationships and genetic diversity among fodder maize landraces in India

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## Abstract

**Background:** Maize is an excellent fodder crop due to its high biomass, better palatability, succulency, and nutrition. Studies on morpho-physiological and biochemical characterization of fodder maize are limited. The present study aimed to explore the genetic variation in fodder maize landraces for various morpho-physiological traits and estimation of genetic relationship and population structure.

**Methods and results:** The study on 47 fodder maize landraces revealed significant variation for all morpho-physiological traits except leaf-stem ratio. Plant height, stem girth, leaf-width and number of leaves showed positive correlation with green fodder yield. Morpho-physiological traits-based clustering grouped the landraces into three major clusters, whereas neighbour joining cluster and population structure analysis using 40 SSR markers revealed four and five major groups, respectively. Most landraces of Northern Himalaya-Kashmir and Ludhiana fall into a single group, whereas rest groups mainly had landraces from North-Eastern Himalaya. A total of 101 alleles were generated with mean polymorphic information content value of 0.36 and major allele frequency of 0.68. The pair wise genetic dissimilarity between genotypes ranged from 0.21 to 0.67. Mantel test revealed weak but significant correlation between morphological and molecular distance. Biochemical characterisation of superior landraces revealed significant variation for neutral detergent fibre, acid detergent fibre, cellulose and lignin content.

**Conclusion:** Interestingly, significant, and positive correlation of SPAD with lignin content can be explored to bypass the costly affair of invitro quality assessment for digestibility parameters. The study identified superior landraces and demonstrated the use of molecular markers in genetic diversity assessment and grouping of genotypes for fodder maize improvement.

**Keywords:** Biochemical; Diversity; Fodder; Landraces; Maize.

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