Phylogeographic insights of maize (*Zea mays* L.) dispersal through landrace plastome analysis

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Maize (*Zea mays* L.) was domesticated from the teosintes (*Z. mays* subsp. *parviglumis* and subsp. *mexicana*) approximately 9,000 years ago in Mexico, America, and was later disseminated to Europe and Asia. Compared with other major cereals, this domestication event occurred relatively recently, resulting in maize having a limited number of landraces. In this study, a total of 286 maize chloroplast genomes (plastomes), including 262 newly assembled and 24 publicly available plastomes, were analyzed to investigate worldwide landraces. Phylogenetic analysis based on the maternal inheritance of maize plastomes revealed four distinct clades. *'mexicana'* was not included in these clades, while *'parviglumis'* was identified as the direct cytoplasmic donor of maize. Landraces from different regions were distributed into distinct clades, with old American landraces clustering closely with '*parviglumis'*. In contrast, Asian landraces were grouped in the clade most distantly related to the origin species and exhibited the lowest genetic diversity. Among them, Korean landraces formed a separate subgroup within clade 4, indicating that they possess diverse maternal lineages. Furthermore, South American old landraces exhibited higher genetic diversity compared to recently introduced landraces. In summary, we identified four plastome-defined clades in maize, each showing clear geographic and genotypic differences. This study provides valuable insights into the genetic diversity of maize landraces and the global dispersal process of maize, which will contribute to the effective utilization of maize germplasm in breeding.

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