

Genetic diversity of nuts traits and fatty acids of pecan (*Carya illinoensis*) germplasm resources

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Abstract: Pecans (*Carya illinoensis*) are the most economically valuable nut tree growing in many countries of the world. 10 nut quantitative traits and 15 fatty acid component of 112 *C. illinoensis* accessions were determined to analyze the morphometric and fatty acids genetic diversity in this study. The measured nuts traits of single nut mass, nut transverse, longitudinal and lateral diameter, nut aspect ratio, single nuts kernel mass, kernel yield and shell thinness were found highly variable. 15 fatty acids were detected among 36 tested fat acids in the nuts of *C. illinoensis*, and 14 fatty acids were found high variation except for the C12:0. Plenty of these traits are of significant economic importance and could be used as breeding targets to improve the pecan variety. The positive correlations were observed between each pair of single nut mass, nut transverse diameter, nut longitudinal diameter and nut lateral diameter. Single nuts kernel mass is significantly positively correlated with single nut mass, nut transverse diameter, nut longitudinal diameter and nut lateral diameter. The 2D PCA plot successfully grouped the samples according to their phenotypic resemblance and morphological characteristics. 112 accessions were grouped into 4 and 3 major clusters according to the nut quantitative traits and fatty acids components and contents, respectively. Based on these results, we suggest multidisciplinary research team should be set for genetic breeding of pecan to promote the conservation of local genetic diversity and improve the nuts production and commercialization in China.

Keywords: *Carya illinoensis*, Nut quantitative traits, Fatty acid component, Genetic diversity, Breeding.