New evidence on the origin of mangosteen (Garcinia mangostana L.) based on morphology and ITS sequence

Abstract

Mangosteen (Garcinia mangostana L.), known as one of the most desirable tropical fruits of Southeast Asia, has been considered as an obligate agamospermous hybrid, thought to have arisen from two wild species, G. celebica L. (syn. G. hombroniana Pierre) and G. malaccensis Hook. f. However, this putative origin was based on a misidentification of G. malaccensis, which was confused for G. penangiana Pierre. Intensive field studies and molecular investigations based on internal transcribed spacer (ITS) sequence data of 22 samples were conducted, which included six samples of true G. malaccensis. Morphological observation shows that mangosteen highly resembles G. malaccensis, particularly in its vegetative and fruit characters, even sharing similar taste of ripe fruits. ITS data revealed that mangosteen shared more than 99 % of its sequence with G. malaccensis with a few accessions identical with wild populations in Peninsular Malaysia. Phylogenetic analysis revealed that clades of mangosteen are paraphyletic per se, but monophyletic if both mangosteen and G. malaccensis are grouped together. This show that mangosteen and G. malaccensis are so closely related that they should be combined together as one species. I propose two theories on the origin of mangosteen, first, that it is a hybrid of different varieties of G. malaccensis, and second, that it may be a product of multiple, superior selections from different populations of female trees of G. malaccensis originating in Peninsular Malaysia.

Keyword: Garcinia malaccensis; Garcinia mangostana; Peninsular Malaysia; Wild relatives