Kornkanok Panumpan 2008: A Study of Sugar Apple (*Annona squamosa* L.) Varieties in Thailand by Using Morphological and Molecular Characters. Master of Science (Economic Botany), Major Field: Economic Botany, Division of Science. Thesis Advisor: Assistant Professor Kunsiri Chaw Grubbs, Ph.D. 181 pages.

A study of sugar apple (*Annona squamosa* L.) varieties in Thailand by using morphological and molecular characters of 95 varieties conserved at the Pakchong Research Station, Nakonratchasima province, the analyses of morphological traits were based on leaf (arrangement, size, shape, margin, base, tip and length of petiole) flower (size, twisting of petal, tip, color and numbers of stamen and pistil, shape of pistil and length of pedicel or peduncle) fruit (size, weight, color and color of the fruitlet-crevice) and seed (number, color and shape). Although there was some variability among samples for each of the morphological features that were measured, there was extensive overlap between local varieties. One individual character could not be used to classify sugar apples into groups. Fruit color and seed characters could be used together to distinguish the local varieties apart, whereas size, color and texture of the leaf and shape of the flowers were used to classify hybrids from pure species. A phylogenetic tree based on the morphological features showed that by combining all of the traits together, it was possible to segregate the hybrids and mutants from the local varieties.

A molecular study using SSCP (Single Strand Conformation Polymorphism) technique, 95 samples of sugar apples and soursop (outgroup) was analyzed. After an initial screening of 11 candidate primer pairs (ABP, ADH, CAT, CHIT2, G3PDH, G6PDH, IDH2, LFY, PAT, PDR2 and SIN1), three were chosen based on the reliable amplification and presence of DNA bands. Those 3 primers were used for cloning and design of specific primers. A total of 6 pairs of specific primer pairs. (G3PDH1, G3PDH2, PDR1, PDR2, and SIN1) showed polymorphism among sugar apple samples, it was clear that GPDH2 showed the highest polymorphism. The band patterns showed clear separation between the hybrids and the mutants from the local varieties. The molecular data as well as the morphological features support the fact that the local varieties shared a highly similarity genetic makeup probably due to the same origin and the variations found among them arose after sugar apples were introduced into Thailand.

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