

## Genetic Variation in a Biological Control Target Weed: The Strawberry Guava Species Complex

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### Abstract

Our objective is to characterize the genetic variation in strawberry guava populations in Hawaii, with the goal to inform biological control efforts currently being developed to counter this invasive species complex in native forests. Specimens collected on the islands of Hawaii, Maui, and Oahu were evaluated for fruit and vegetative morphology, ploidy as determined by flow cytometry, and microsatellite variation at three chloroplast SSR loci and three nuclear SSR loci. Results supported three previously recognized taxa and one new category. *Psidium littorale* Raddi was uniform with regard to fruit morphology (yellow, spindle-shaped), ploidy (8x), and SSR polymorphisms, suggesting that it may be a fertile allo-octoploid or a sterile apomict. Similarly, *P. lucidum* Hort. was uniform in fruit morphology (yellow, spherical fruits) and SSR genotype, but showed minor ploidy variation about 6x, suggesting a mostly fertile allo-hexaploid or an apomict with some residual sexual function. *P. cattleianum* Afzel. ex Sabine displayed a single uniform chloroplast and nuclear SSR genotype, but ploidy variation between 6.5x and 7.1x, and red fruit color of variable hue and intensity, suggesting that sexual reproduction is operative in this nominally heptaploid form and that it produces mainly aneuploid progeny. A fourth form (*Psidium* "X") with fruit color (orange) and ploidy range (6.4x to 6.8x) intermediate between those of *P. lucidum* and *P. cattleianum* originally suggested derivation through interspecific sexual crossing or possibly elimination of genetic material in the aneuploid sexual progeny of hybrids or of self- or sib-mated *P. cattleianum*. However, the presence of a unique chloroplast SSR allele found in the orange-fruited forms and not in either of the putative parent species indicates that it is not recently of hybrid origin or directly derived from *P. cattleianum*. The orange-fruited form represents a new taxon not previously described in Hawaii. The SSR uniformity within the four strawberry guava taxa may reflect predominantly apomictic seed production, or simply that our survey employed an inadequate number of marker loci to detect polymorphisms. This apparently modest level of genetic variation may suit the strawberry guava complex in Hawaii to target status for a host-specific biological control agent, such as *Tectococcus ovatus* Hempel.