

# The Hawaiian Endemic `Āla`a (*Planchonella sandwicensis*) Represents Two Distinct Taxonomic Entities

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## Endemic Hawaiian *Planchonella*

Background:

*Planchonella* (Sapotaceae) in Hawai`i is currently recognized by the polymorphic endemic *P. sandwicensis* (`Āla`a). `Āla`a has previously been separated into 6 species and multiple forms.



*Planchonella sandwicensis* growing in dry forest.

Swenson *et al.* (2019) recently conducted a global phylogeny of *Planchonella* which revealed that the genus in Hawai`i is represented by two well-supported clades distinguished by fruit color.



Phylogeny of Hawaiian *Planchonella* (Swenson *et al.*, 2019).

Purpose:

We conducted a thorough molecular and morphological study of endemic Hawaiian *Planchonella* to further define boundaries between distinct species in Hawai`i.

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## Revised Phylogeny

Our expanded phylogeny supports the two-clade phylogeny earlier reported by Swenson *et al.* (2019). Leaf, pedicel, corolla, and fruit characteristics contribute to the separation between the two clades. The purple-fruited clade is distributed on Kaua`i, O`ahu, and Maui Nui while the yellow clade is distributed on all islands, but seems to be rare on Kaua`i. The purple-fruited clade is composed of two well-supported subclades on Maui Nui and Kaua`i/O`ahu. There is not a morphological difference between these two subclades of purple-fruited *Planchonella*.



Maximum Clade Credibility Tree for Hawaiian *Planchonella*. Thick black branches indicate posterior probability of 1.0.

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## New Species Boundaries

Our results clearly support the presence of two endemic *Planchonella* species in Hawai`i. The boundaries between these species will primarily follow four morphological characters:



Morphological characters to be used to distinguish between *P. sandwicensis* and *P. spathulata*.

The purple-fruited clade corresponds to *Planchonella sandwicensis* while the yellow-fruited clade corresponds to the type material of *P. spathulata*, currently in synonymy with *P. sandwicensis*. Morphology of *P. spathulata* is very variable across its range, even within islands like Maui, but there is no molecular or morphological support for additional subdivision of the species.

Amended descriptions of *Planchonella sandwicensis* and *P. spathulata* are currently being drafted. It is our hope that this reevaluation of Hawaiian *Planchonella* will establish a strong foundation for the understanding of species differences within this genus to aid and inform future conservation efforts.

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## Methods

Forty-two *Planchonella* specimens from across its range in Hawai`i were incorporated into the current survey. For each, *rpb2*, ITS, and ETS regions were sequenced. Over 50 reproductive and vegetative traits, if available, were scored for each specimen.



Approximate locations of *Planchonella* specimens utilized in the current survey. A. Maui Nui; B. O`ahu; C. Kaua`i; D. Hawai`i. Colors of dots indicates observed or inferred fruit color.

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