# TAXONOMY OF *PERSEA* (LAURACEAE) IN THE SOUTHEASTERN USA

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ABSTRACT

Three species of *Persea* are native to the southeastern USA. Alternative classifications have been suggested, or, in some cases, implemented for *Persea* s.lat., placing these aforementioned three species in a different genus (e.g., *Farnesia*, *Mutisiopersea*, or *Tamala*). This article examines the nomenclature of potential segregate genera and takes a closer look at the names of Rafinesque. Two genera described by Fabricius (*Burbonia* and *Farnesia*) are the oldest available segregate genera. Combinations are made in *Farnesia* for the three species of the southeastern USA formerly in *Persea*.

RESUMEN

Tres especies de *Persea* son nativas del sureste de los Estados Unidos. Se han sugerido clasificaciones alternativas, o, en algunos casos, se han implementado para *Persea* s.lat., colocando estas tres especies mencionadas anteriormente en un género diferente (por ejemplo, *Farnesia*, *Mutisiopersea* o *Tamala*). Este artículo examina la nomenclatura de los posibles géneros segregados y analiza más detenidamente los nombres de Rafinesque. Dos géneros descritos por Fabricius (*Burbonia y Farnesia*) son los géneros segregados más antiguos disponibles. Se realizan combinaciones en *Farnesia* para las tres especies del sureste de los Estados Unidos que anteriormente pertenecían a *Persea*.

Key Words: avocado, *Borbonia*, *Farnesia*, Rafinesque, *Tamala*, taxonomy

## INTRODUCTION

Three species of *Persea* Mill. are native to the southeastern USA: *P. borbonia* (L.) Spreng., *P. humilis* Nash, and *P. palustris* (Raf.) Sarg. Although usually placed in the genus *Persea* (Chapman 1860; Small 1903; Wofford 1973, 1997), some studies have intimated that these species could be excluded from *Persea* s.str. and placed in a different genus, e.g., *Farnesia* Fabr. (Li et al. 2011), *Mutisiopersea* Kosterm. (Rohwer et al. 2009), or *Tamala* Raf. (Small 1913, 1933; Weakley 2023). The purpose of this article is to investigate the appropriate genus for these three species native to the southeastern USA.

As usually circumscribed (Kopp 1966; van der Werff 2002), *Persea* is a genus of ~110 species native to Macaronesia and the Americas (POWO 2025). Kopp (1966) recognized two subgenera, subg. *Persea* (with ~5–10 spp.) and subg. *Eriodaphne* (Nees) Nees (with ~100 spp.), the latter further divided into four sections. The most economically important species is *P. americana* Mill. (aguacate, avocado), the type species of *Persea*. In his original concept of *Eriodaphne* (as an unranked infrageneric group), Nees (1833a) included six species native to Brazil. The type of subg. *Eriodaphne* resides among these six species, and not *P. borbonia* as chosen by Kopp (1966) (Turland et al. 2018: Art. 10.2).

Studies based on morphology (Campos Rojas et al. 2007), plastid DNA (Song et al. 2019; Xiao et al. 2022), and nuclear DNA (Chen et al. 2009; Rohwer et al. 2009; Li et al. 2011) have generally found *Persea* to be polyphyletic, with subg. *Eriodaphne* forming a clade independent of subg. *Persea* and a few species placed outside of these subgeneric clades. Another study using plastid loci recovered the two subgenera in a polytomy (Cruz-Maya et al. 2018). Only one published tree using the nuclear loci ITS and *LEAFY* recovered a monophyletic *Persea* that included both subgenera, while separately the ITS tree and the *LEAFY* tree of the same study each recovered a polyphyletic *Persea* (Li et al. 2011). If members of the *Eriodaphne* clade were to be placed in a different genus, there are five relevant generic names: *Burbonia* Fabr., *Farnesia*, *Apollonias* Nees, *Mutisiopersea*, and *Tamala*.

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Fabricius (1763) described both *Burbonia* and *Farnesia* (non *Farnesia* Gasparini 1836, nom. illeg. [Fabaceae]). Fabricius credited *Burbonia* to Plumier (1703: 3, pl. 2), who spelled it as "*Borbonia*" to honor Gaston Jean Baptiste of Bourbon, for his love of botany and associated work at Blois and Paris with the artist Nicolas Robert. The only species included by Fabricius for his *Burbonia* was accomplished by the verbatim quote of the Linnaean phrase name for *Laurus borbonia* L. as well as the notation "L. Sp. 7" indicating the seventh species listed under *Laurus* L. by Linnaeus (Turland et al. 2018: Art. 10). In the same manner, the protologue of *Farnesia* included the species *Laurus indica* L. by the verbatim quote of the Linnaean phrase name and reference to "L. Sp. 5" (Kopp 1966), citing the illustrations in Aldini (1625: pl. 60; perhaps also authored by Castelli, see Caneva et al. 2020) and Barrelier (1714: pl. 877); the latter was also cited by Linnaeus in the protologue of *L. indica*. Lorenz Heister was credited for *Farnesia* by Fabricius, presumably deriving the name from the Farnese Gardens, for which Alidini was director and curator. I have been unable to locate the name *Farnesia* in Heister's publications. Although Holub (1970) argued Fabricius's genera were invalid, many of Fabrcius's protologues (including *Burbonia* and *Farnesia*) meet the criteria for valid publication under the current rules (see Britten 1898; Dandy 1967: 12; Stafleu & Cowan 1976: 810–811; Stirton 1981: 318). His accepted genera in use include *Bituminaria* Fabr., *Camphora* Fabr , and *Conringia* Fabr. Molecular studies placed *P. borbonia* (type of *Burbonia* Fabr.) and *P. indica* (L.) Spreng. (type of *Farnesia*) in the *Eriodaphne* clade (Chen et al. 2009; Rohwer et al. 2009; Li et al. 2011; Kondraskov et al. 2015; Cruz-Maya et al. 2018; Song et al. 2019; Xiao et al. 2022), except one phylogenetic tree based on the *LEAFY* locus placed *P. indica* near but apart from the *Eriodaphne* clade, albeit with poor support (Li et al. 2011).

The *Burbonia* of Fabricius (who referenced *Borbonia* of Plumier) could be confusable with *Borbonia* of Linnaeus (= *Aspalathus* L., Fabaceae) and *Borbonia* of Miller, nom. illeg., and they could be treated as homonyms (Turland et al. 2018: Art. 53). *Cephalotus* Labill. (Cephalotaceae) was conserved against *Cephalotos* Adans. (= *Thymus* L., Lamiaceae) (Turland et al. 2018: Art. 53.2, ex. 13) which similarly bears a change in spelling from an "o" to a "u". Miller's (1754) *Borbonia* accommodated three species of Lauraceae, two credited to Plumier (1703) putatively from Martinique and one to Houstoun from Cuba. He stated that one of Plumier's descriptions applied to plants of the Carolinas (e.g., *P. borbonia* or *P. palustris*). Miller's *Borbonia* (Lauraceae) of 1754 is an illegimate later homonym of Linnaeus's *Borbonia* (Fabaceae) of 1753. Presl (1825) combined eight species names under *Borbonia* and House (1922) combined four more under *Borbonia*, all names referring to species of Lauraceae. Both Presl and House credited the genus to Plumier but neither made reference to Fabricius.

*Apollonias* was established by Nees (1833b) with *A. canariensis* (Willd.) Nees (= *Apollonias barbujana* (Cav.) A. Braun; Kostermans 1952) as type. The phylogenetic placement of this species varied, recovered as sister to *Persea* subg. *Persea* in the *LEAFY* tree and combined ITS + *LEAFY* tree, and sister to subg. *Eriodaphne* in the ITS tree (Li et al. 2011; see also Kondraskov et al. 2015). Morphological studies have found *Apollonias* to be somewhat unique within the Lauraceae (Franco 1960; Kamel & Loutfy 2001; Loutfy 2001, 2009). Based on current data, there is support for recognizing *Apollonias* as a distinct genus (Rohwer et al. 2009; Li et al. 2025). Kostermans (1993) created *Mutisiopersea* to accommodate 32 species of the *Eriodaphne* clade with indurate fruiting tepals. The type of *Mutisiopersea* (*M. mutisii* (Kunth) Kosterm.) was placed within the *Eriodaphne* clade (Rohwer et al. 2009).

The genus *Tamala* (cf. Dalechamps 1586: 1777; Kostermans 1964: 1362; Ravindran et al. 2004) was established by Rafinesque in 1838, stating there were "several types once blended in *L. borbonia*." Rafinesque used the term "blend" repeatedly in his texts to indicate a taxon had been errantly conflated or lumped with another taxon. He then listed four species: *T. borbonia* Raf., *T. carolinensis* Raf., *T. palustris* Raf , and *T. acuminata* Raf., with himself listed as the sole author of each name, referencing no other specific works nor authors.

None are here interpreted as combinations since he did not reference any specific basionyms explicitly or indirectly (Turland et al. 2018: Art. 41.3) and I can find no evidence that it was Rafinesque's "presumed intent" (Turland et al. 2018: Art. 41.4) to apply his names of *Tamala* to the same taxon as prior basionyms with the same or similar specific epithets. In the front matter of the publication where these *Tamala* were published, Rafinesque described the contents as "800 Genera and 1000 species new or rectified, improved and classified"

[…] "omitted or mistaken by the Botanical Authors and Compilers, or not properly classified" (Rafinesque 1838), expressing similar sentiments in other publications (Rafinesque 1836–1838, 1837). From the context of his publication, Rafinesque described these *Tamala* names as new species and did not adopt or apply the taxonomy of a particular author (e.g. Turland et al. 2018: Arts. 41.3, ex. 6 and 41.4, ex 9). Otherwise, it would be speculative to attempt to pin down what reference(s) Rafinesque used to borrow or repurpose these epithets. However, there are other cases when he referenced a basionym which may be interpreted as a new combination, e.g., several *Agalinis* Raf. names (Rafinesque 1836–1838, see Barnhart 1907 for publication dates).

Of course, interpreting Rafinesque's names can be challenging, and very little material from Rafinesque's herbarium has survived (Pennell 1945; Merrill 1943, 1949; Stuckey 1971), much of it at DWC, G, NY, P, and PH (Moore 2024). No original material has been located so far for these four names of *Tamala*. The implication is that Rafinesque had personally studied specimens for his *Tamala* species (Rafinesque 1840: 3, 85), and elsewhere he had stated "all the plants I described have been met alive […] unless I otherwise state the facts […] When plants have not been seen actually alive or dry, I quote as usual the books, authors or figures, that have imparted their knowledge" (Rafinesque 1836–1838).

Rafinesque's *T. borbonia* was ascribed to plants in the Antilles (i.e. Caribbean islands, Dick 1977). Merrill (1949:128) and Kostermans (1952) placed Rafinesque's *T. borbonia* as a synonym of *Nectandra antillana* Meisn., this a synonym of *N. hihua* (Ruiz. & Pav.) Rohwer, a widespread species of the Neotropics including the Greater Antilles (Rohwer 1993). Merrill further annotated the Rafineseque name with "*Laurus borbonia* sensu Sw., non Linn." and Swartz (1798: 714) had made mention that *Laurus membranacea* Sw. (= *N. membranacea* (Sw.) Griseb., another widespread species in the Neotropics including many Caribbean islands) was similar to *Laurus borbonia* as he knew it ("L. Borboniae proxíma"). Lunan (1814: 220) had applied *Laurus borbonia* to the flora of Jamaica, probably based on species of *Damburneya* Raf. and/or *Nectandra* Rottb. Rafinesque may have been partly following Plumier's "*Borbonia*" who must have observed his plants in the Caribbean Islands (Moroni et al. 2018). For the description, Plumier wrote both fructu "nigro" and in the addenda "fructu ex auro virescente" (Plumier 1703), the latter approaching Rafinesque's description "drupis aureis." Perhaps following Plumier's use of *Borbonia* in the Caribbean, Michaux (1803) stated Linnaeus was in error to apply *L. borbonia* to the plants of the southeastern USA. Although the Linnean protologue of *L. borbonia* did not reference Plumier, Linnaeus (1737) had earlier cited Plumier's account with a question mark. Nonetheless, as applied by Linnaeus in 1753 and so typified, *P. borbonia* refers to a plant native to the southeastern USA. Rafinesque's *Tamala borbonia* is based on a plant of the Caribbean and it is not a combination from the Linnaean basionym *Laurus borbonia*. Again, Rafinesque's only mention of this name was to say that his concept of *Tamala* included species that were "blended" or conflated with *Laurus borbonia*. He also did not clarify if he was referring to *L. borbonia* of Linnaeus or that of other authors.

The specific epithet of Rafinesque's *T. carolinensis* would appear to be borrowed from Catesby's (1731: 63, t. 63) *Laurus carolinensis* and/or Michaux's (1803) slightly differently spelled *L. caroliniensis*; however, Rafinesque's description bears notable distinctions, e.g., "supra lucidus" […] "coriaceis" […] "Florida, fifty feet high, flowers pale yellow." Perhaps both are referable to *P. borbonia* (Kostermans 1952; Kopp 1966), although, like Catesby (Reveal et al. 2014), Michaux probably conflated *P. borbonia* and *P. palustris*. Michaux's *Laurus caroliniensis* would have priority over *T. palustris* Raf. if they were determined to be conspecific. Among potential original material for Michaux's *L. caroliniensis*, there are two sheets of *P. borbonia* (P00128505, P01752178), and two of *P. palustris* (P01752133, P01752118). One of the *P. palustris* sheets (P01752133) bears the name *Laurus caroliniensis* on the label, tying more directly to the protologue. Michaux attributed his name directly to Catesby, and thus Catesby's illustration may be presumed original material. Here Catesby's illustration is selected as the type of Michaux's name and the epitype of *L. borbonia* is chosen as type for Rafinesque's *T. carolinensis,* to maintain them both as synonyms of *P. borbonia* (Kopp 1966; Wofford 1973).

*Tamala acuminata* was described as "rufis pubescens" and found in Louisiana and Texas, most likely referring to forms of *P. palustris* that are conspicuously densely pubescent to the unaided eye. It probably was not based on *P. borbonia* which may have reddish hairs that are viewable only under microscopy (as Rafinesque,

1836–1838: 22, stated "microscopical observations are always useless for practical descriptive Botany"). The name is here typified on a Louisiana specimen of *P. palustris*.

*Tamala palustris* is an accepted species, the basionym of *P. palustris* (Raf.) Sarg., and neotypified by Kopp (1966). Rafinesque (1840) hesitantly added a fifth species to *Tamala*, *T. serrulata* Raf., stating it was "mixt" with *T. palustris*. Kostermans (1964) excluded *T. serrulata* from the Lauraceae, probably owing to the description of the serrulate leaf blades.

*Persea* is likely polyphyletic with respect to related extant genera (Li et al. 2025). To prevent confusion in the southeastern USA, the appropriate binomials should be clarified for its three taxa of the *Eriodaphne* clade. Further sampling to resolve relationships with strong support from nuclear data would still be desirable to confirm if *Persea* s.lat. is polyphyletic. The oldest generic names available for the *Eriodaphne* clade are *Burbonia* and *Farnesia*, which have equal priority. *Farnesia* has been identified as part of *Persea* previously (Kostermans 1952; Lanjouw et al. 1956; Kopp 1966; Li et al. 2011; de Moraes et al. 2014), while Fabricius's *Burbonia* has been generally overlooked. Choosing *Farnesia* to have priority over *Burbonia* is appropriate. As accepted here, the three species of *Persea* of the southeastern USA are transferred to *Farnesia*, and combinations are provided.

In keeping with prior treatments, *Farnesia humilis* is retained as a species (Wofford 1973, 1997), though there may not be a sharp morphological distinction (Kopp 1966). Intriguingly, including samples from throughout their distribution, Wofford (1973) found that quercetin galactoside was found only in the mature leaves of *F. humilis* (10 samples), but not found in *F. borbonia* (19 samples).

**Farnesia** Fabr., Enum. Pl. Hort. Helmstad., ed. 2, 400. 1763. Type: *Laurus indica* L.

= *Burbonia* Fabr., Enum. Pl. Hort. Helmstad., ed. 2, 389. 1763. Type: *Laurus borbonia* L.

**Farnesia borbonia** (L.) A.R. Franck, **comb. nov.** Basionym: *Laurus borbonia* L., Sp. Pl. 1:370. 1753. *Persea borbonia* (L.) Spreng., Syst. Veg. 2:268. 1825.

= *Laurus caroliniensis* Michx., Fl. Bor.-Amer. 1:245. 1803. Type: U.S.A. Carolina: (**lectotype, here designated:** Catesby, Nat. Hist. Carolina 1:pl. 63. 1731).

= *Tamala carolinensis* Raf., Sylva Tellur. 136. 1838. Type: U.S.A. South Carolina: Beaufort Co.: St. Helena Island, 12 Sep 1982, *Spongberg et al. 17194* (**neotype, here designated:** BM015153471; isoneotypes: CAS483767, NY02219081, TENN246900).

**Farnesia humilis** (Nash) A.R. Franck, **comb. nov.** Basionym: *Persea humilis* Nash, Bull. Torrey Bot. Club 22:157. 1895. *Tamala humilis* (Nash) Small, Fl. S.E. U.S. 822. 1913.

**Farnesia palustris** (Raf.) A.R. Franck, **comb. nov.** Basionym: *Tamala palustris* Raf., Sylva Tellur. 137. 1838. *Persea palustris* (Raf.) Sarg., Bot. Gaz. 67:229. 1919.

= *Tamala acuminata* Raf., Sylva Tellur. 137. 1838. Type: U.S.A. LOUISIANA. Natchitoches Par.: Kisatchie National Forest, 10 Oct 1980, *Thomas 74106* (**neotype, here designated:** NLU0211239 [at LSU]; isoneotypes: ASU0111992, CAS1124266, FLAS149459, LSU00021899, MEXU304658, NO0058719 [at LSU], NLU0211122 [at BRIT], SIU036234, WILLI).

*Tamala* Raf., Sylva Tellur. 136. 1838. **Type, here designated:** *Tamala borbonia* Raf.

***Note.*—**Rafinesque's *T. borbonia* has been interpreted as a synonym of *N. hihua* (Merrill 1949; Kostermans 1952), and *Tamala* would then be a later synonym of *Nectandra* Rottb. Viewing *L. borbonia* L. as the type of *Tamala* (e.g., House 1922), would render it an illegitimate, homotypic later name for *Burbonia* Fabr.

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