

***TETRADIMUM DANIELLII* (KOREAN EVODIA; RUTACEAE)  
AS AN ESCAPE IN NORTH AMERICA**

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*Tetradium daniellii* (Benn.) T. G. Hartley (Korean evodia, Rutaceae) is native to Tibet and the Yunnan Province, China, northeast through China to North and South Korea (Hartley 1981). The species first came to the attention of western botanists in the mid-1800's, and was first described as a species of the genus *Zanthoxylum* by Bennett (in W.F. Daniell 1862). It was introduced into North America about 1905 (Rehder 1947). In the horticultural trade, the tree has been known as *Evodia daniellii* (Benn.) Hemsl. (Dirr 1997; Nelson 1997), though that generic name is apparently most correctly spelled "*Euodia*", since *Evodia* is considered an orthographic variant of the original spelling *Euodia* (Bean 1978; Mabberley 1997). The genus *Tetradium*, containing 9 species (Flanagan 1988), is probably most closely related to *Phellodendron* Rupr. and *Zanthoxylum* L. (Hartley 1981).

The genus *Tetradium* (as *Evodia*), especially fruit of *T. ruticarpum* (A.Juss.) T.G. Hartley (Evodiae Fructus), has been used medicinally in China to treat gastric and intestinal ailments for about 2000 years (Anonymous 2002a). It has also been used to treat headaches, to decrease blood clotting, and to reduce arthritis pain (Anonymous 2002b), and as a stimulant and antihelminthic (Mabberley 1997). Several bioactive alkaloids have recently been characterized from *E. ruticarpa*, and these may have use in treatment of obesity or ulcers (Ko et al. 2002). Fruits of other species have been used in chutney (Mabberley 1997) and other condiments (Daniell 1862). Several species are grown as ornamental trees (Rehder 1947).

Korean evodia (bebe tree, bee-bee tree, bee tree; Fig. 1) is a moderate-sized tree or large shrub, reaching 8–12(–20) m tall, with a similar spread of the crown. Its bark is smooth and gray to black. The young branches are pubescent, becoming glabrous as the growing season progresses; winter buds are naked. Leaves are 22–40 cm long, opposite to subopposite, odd-pinnately compound, with 5–11 leaflets; leaves are deciduous, dropping when green, or turning yellowish in autumn. The leaflets are 5–13 cm long, ovate to oblong, acuminate at the apex and acute to rounded at the base, short-petiollulate, with crenate margins; the upper leaf surface is glabrous, while the lower is somewhat pubescent, at least when young; there are prominent to inconspicuous oil dots on the lower surface. The small white to cream-colored unisexual flowers appear in June to August, and are borne on the current years' growth on 10–17 cm broad, somewhat flattened terminal corymbs. Flowers are usually 5-merous, though occasionally 4-merous; sepals are slightly pubescent, 0.5–1.5 mm long; petals are white to cream colored, glabrous adaxially and somewhat pubescent abaxially,

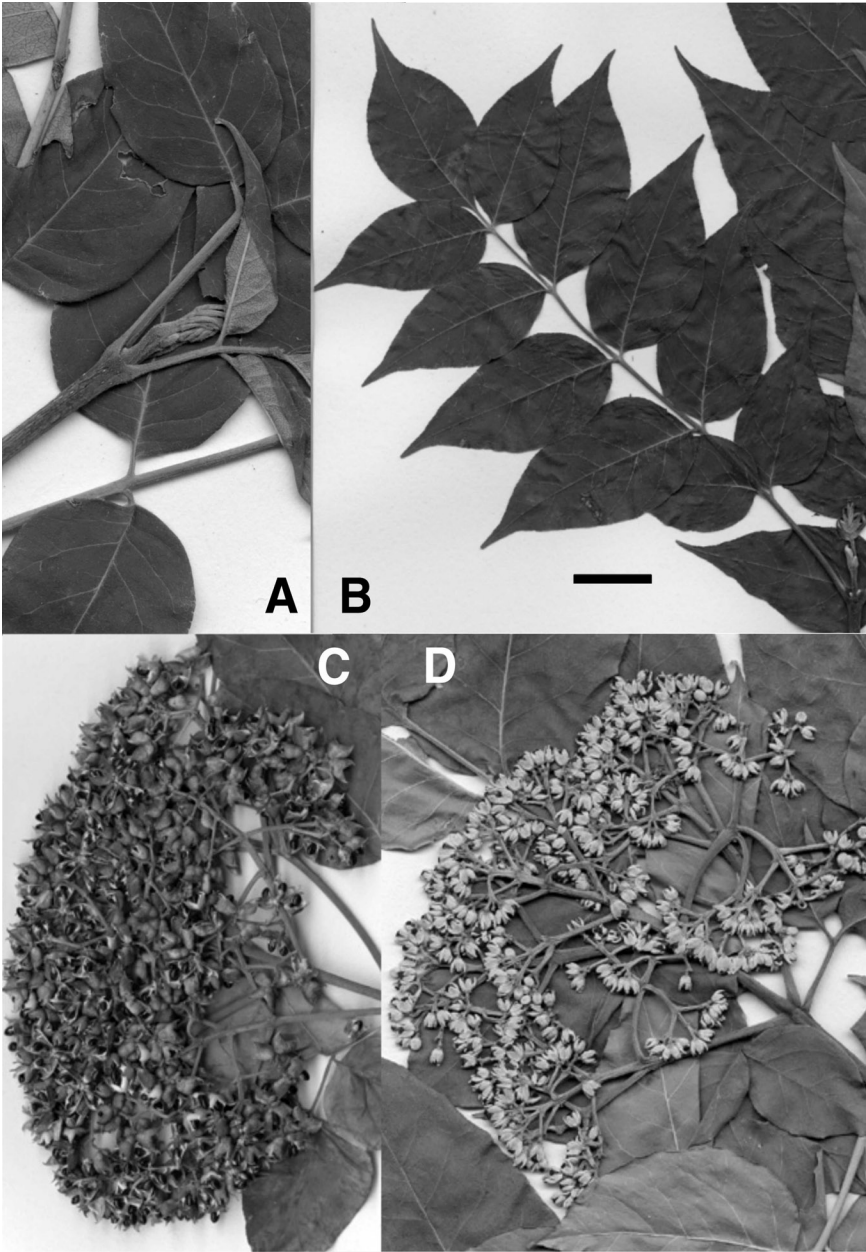


FIGURE 1. *Tetradium daniellii*. A. Young branch with naked terminal bud (*Wilson s.n.*, 8 Oct 2002 [MU]). B. Mature leaf (*Wilson s.n.*, 11 Apr 1986 [MU]). C. Infructescence with open fruits and seeds (*Wilson s.n.*, 7 Oct 1986 [MU]). D. Inflorescence (*Vincent 6300* [MU]). The scale bar represents 1 cm for A, and 2 cm for B, C, and D.

3–5 mm long; the pistil is 4–5 carpellate, pubescent, with 2 ovules per carpel; the ovary is superior. Fruits are brown, pinkish, dull red, or black follicles containing 2 brown to black seeds, one of which is usually sterile (Hartley 1981; Sargent 1913).

*Tetradium daniellii* is highly prized as a nectar source for honeybees (Anonymous 1974; Hayes 1977; Lohmüller 1977; Lovell 1969). Indeed, when the plants are in flower, an incredible number of bees can be seen (and heard) visiting the flowers. Hayes (1977) describes the tree as valuable for beekeepers because it flowers prolifically from mid-July through mid-August, when little else is blooming. The heavy seed production has been cited as a potential food source for wildlife (Hayes 1977). The species is becoming more popular as an ornamental tree (Coombes 1992; Dirr 1997; Gilman & Watson 1993), though it can be susceptible to wind and ice damage due to its weak wood (Flint 1983; Gilman 1997). Propagation is usually by seeds (Dirr 1990). It is relatively tolerant of many soil conditions (Flanagan 1988), but does not tolerate extreme drought or overly wet soils (Schnelle 1992). The species is described as hardy in USDA zones 4 through 8A (Dirr 1997; Gilman & Watson 1993), but Schnelle (1992) reported that freeze damage and die-back have been seen on young trees at Kansas test sites. Korean *evodia* is a relatively short-lived tree (15–40 years; Dirr 1990; Poor 1997).

In this paper, I present the first report *Tetradium daniellii* as a documented escape from cultivation in Ohio. The plants found (immature saplings ranging from 1–2 m in height) were growing in a weedy fencerow within 20m of a pair of large trees in cultivation, with *Lonicera maackii* (Rupr.) Maxim. There are no previous reports of the species as an escape in Ohio (Cooperrider et al. 2001).

Rhoads & Block (2000) mention that *Euodia daniellii* may be present in Pennsylvania as an escape, in a description of *Euodia hupehensis* Dode. Since *E. hupehensis* has been synonymized with *Tetradium daniellii* in the most recent monograph (Hartley 1981), all Pennsylvania records should be considered the latter. Documentation was seen for two Pennsylvania counties (Lancaster and Montgomery). The species has also been seen as an escape in Bucks County, Pennsylvania, though not documented (T. A. Block, pers. comm.). Korean *evodia* has recently been reported as an escape in Missouri (Bowe & Redfearn 2002). No other reports are known from the botanical literature for North America, and the species is not listed in Kartesz and Meacham (1999).

As discussed for *Eucommia ulmoides* (Vincent 2002), *Tetradium daniellii* does not seem to be overwhelmingly invasive, though its heavy fruit and seed set make it more likely that it may spread very effectively. In Pennsylvania, the species is spreading rapidly (T. Block, pers. com.). The species has been removed from one botanical garden because of fears of spread, due to the tremendous fruit set (K. Conrad, pers. comm.).

Specimens examined: MISSOURI: Green County, 22 Oct 2002, *Bowe 90-02* (SMS), and 6 Nov 2002, *Bowe 99.02* (SMS). OHIO: Butler County, 8 Oct 2002, *B.B. Wilson s.n.* (MU, MO, NA, OSH). PENNSYLVANIA: Lancaster County, Flourtown, 9 Aug 1996, *A.F. Rhoads & T.A. Block s.n.* (MOAR); Montgomery County, New Danville, 2 Aug 1998, *T.A. Block s.n.* (MOAR).

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