

The Quarterly Journal of the Florida Native Plant Society

# Palmetto



*Fig. 1*



*Fig. 2*



*Fig. 3*



*Fig. 4*



*Fig. 5*



*Fig. 6*



*Fig. 7*



*Fig. 8*



*Fig. 9*

# The “False Pawpaws”

## History, Biology and Conservation of *Deeringothamnus*

By Eliane M. Norman

*John Kunkel Small, a pioneer explorer of the southeast, especially Florida, started his botanical explorations to the southern states as early as 1891, before his appointment as curator at the New York Botanical Garden. For the next four decades, he spent some weeks or sometimes months of most years in the south.*

Fortunately for him (and for us) he was able to get sponsors for this travel, as he never learned to drive. Thus on April 28, 1923, while he was botanizing with his friends, C. A. Mosier and J. DeWinkler in the “uninhabited pineland wilderness between Punta Gorda and Fort Myers,” Charlotte County – an odor that wafted in the air alerted him to the fact that he was about to encounter a new plant, even

before he had an opportunity to examine it.

He went on to name (1924) this plant *Deeringothamnus pulchellus*, meaning “beautiful little Deering’s shrub,” quite a mouthful. Charles Deering was Small’s friend and patron, son of the founder of the Deering Harvesting Machine Co. and International Harvester, who owned a large estate south of Miami. Small mentioned that *Deeringothamnus* resembled *Asimina*, but differed from it in having narrow petals, all the same size, with no floral chamber around the sex organs and with a flat receptacle.

*Deeringothamnus pulchellus* – photo by Kate Goodrich



A few years later, when he was exploring the east coast of Florida, Small came upon another species of this genus. This time the flowers were smaller, yellow and lacked the scent that had led to the discovery of its congener. However this species had already been discovered in May 1848 by a German pharmacist-botanist, Ferdinand Rugel. This collection was sent to his English sponsor, J. B. Shuttleworth and laid there until the American botanist, B. L. Robinson studied and named it *Asimina rugelii*. Small (1930) made the new combination, *D. rugelii* (B. L. Rob.) Small.

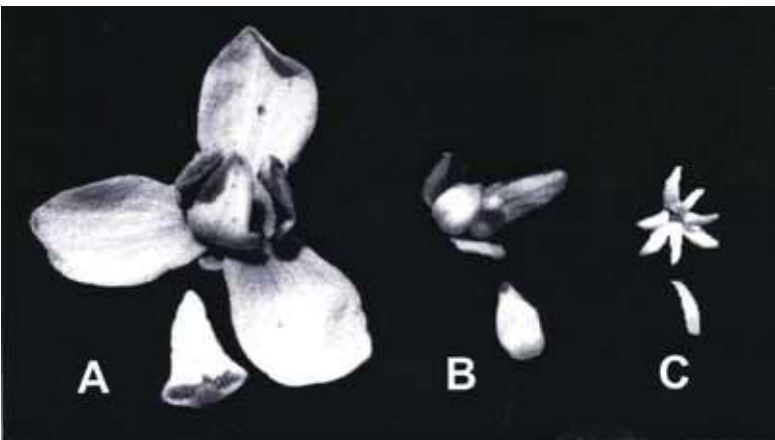


FIG. 1. A. *Asimina reticulata*. B. putative hybrid. C. *Deeringothamnus pulchellus*. Photo by Ed Norman enhanced by John Weishampel. (from Taxon 2003)

The question remains, is *Deeringothamnus* different enough from *Asimina* to be recognized as a distinct genus? In the past some have said yes, such as Kral (1960), who wrote his thesis on the two genera and Fries (1939, 1959), a world-wide authority on the family Annonaceae. Others were in favor of lumping them together (Wood 1958, Wilbur 1970). It should be pointed out that none of these authors were aware of the existence of hybrids between the two genera. We have seen three plants that most likely reflect this mixed parentage. One was a potential hybrid of *D. rugelii* and *A. pygmaea* and the other two of *D. pulchellus* and *A. reticulata*. [Fig. 1] Details are given in Norman, 2003. The main morphological differences between the two genera are listed in the Table and will be commented on

briefly. Certainly at the morphological level, the two are quite distinct but it may be that molecular studies will not support these distinctions (Abbot and Neubig, per. com.).

The presence of stomates on both leaf surfaces is an unusual situation found in almost no other member of this family. In other groups this feature has been associated with xeric conditions which may have prevailed when *Deeringothamnus* evolved. The diminutive stature may have been associated with the fire regime present during its development. The small flowers with less specialized petals accompanied by fewer sex organs, especially stamens, are traits difficult to explain. The much lower pollen to ovule ratio indicates a trend to more self-pollination. This characteristic is accompanied by a very low level of pollinators.

TABLE

Differences Between <i>Asimina</i> and <i>Deeringothamnus</i>		
	<i>Asimina</i>	<i>Deeringothamnus</i>
HABIT	Shrubs-trees	Dwarf shrubs
LEAF EPIDERMIS Stomates	Lower surface only	Both surfaces
BRACTS	Two-one	None
FLOWER SIZE	Medium-large	Small
PETALS Shape Sculpturing Chamber	Two distinct series On inner petals Yes	All the same None No
RECEPTACLE	Hemispheric	Flat
STAMENS Number Connective (tip)	70-200 Knob-like	16-34 Tongue-like
POLLEN Perforations To ovule ratio	4-5 $\mu$ m 1240 - 3200 : 1	Up to 9-12 $\mu$ m 325 - 413 : 1
POLLINATORS	Primarily beetles (flies, thrips, beetles)	Very infrequent

CONTINUED ON PAGE 6

Both species of *Deeringothamnus* are rare, and are listed as federally endangered (USFWS 1886, Coile 2000). Ward (2001), without critical study, concluded that there are intermediates between the two species of *Deeringothamnus* and based on this erroneous supposition, combined them into one species with two varieties. This is doubly unfortunate, since these new combinations were adopted by Wunderlin and Hansen (2003).

*Deeringothamnus rugelii*, known commonly as Rugel's pawpaw or yellow squirrel banana, has never been found outside a narrow corridor in eastern Volusia County from the Lake Ashby area to Tiger Bay State Forest. Approximately 15 populations are known and a fourth of these are on public lands. Most populations occur on Immokalee fine sands which are poorly drained soils with some organic matter in the upper 5-8 inches. They grow in flatwoods with an open canopy of longleaf or slash pine and an understory of wiregrass and shiny blueberry, dwarf huckleberry, common pawpaw and saw palmetto.

Typically the plants die back each winter. In some cases plants may overwinter but then their woody branches tend to produce only leaves the following season. Flowers are produced chiefly on new shoots which develop from the upper portion of thick tap roots.

Rugel's pawpaw flowers from mid-April to early June. In a population which has not been recently disturbed by fire or mowing, only 3-15% of plants can be expected to flower in a particular year. If the population is disturbed, many of the plants can be expected to bloom within six weeks of the disturbance (Helkowski & Norman 1997). The nodding flowers mature from the base upward, and have six or more linear subequal fleshy yellow petals in two whorls. [Fig. 2A] Rarely, plants with purple-red flowers are found. [Fig. 2B] As in other members of the custard apple family, the female organs mature first. This can be observed when the one to four stigmas glisten with a sticky exudate. Then the 15-25 short-stalked stamens turn whitish-grey and dehisce revealing (with a hand lens) small worm-like columns of pollen tetrads. There is often an overlap of at least one day between the two sexual phases (Norman 2003). Fruiting is rare; in several hundred flowers studied in two separate years, less than 2% set fruits (Norman 2003). The fruit is made up of one or

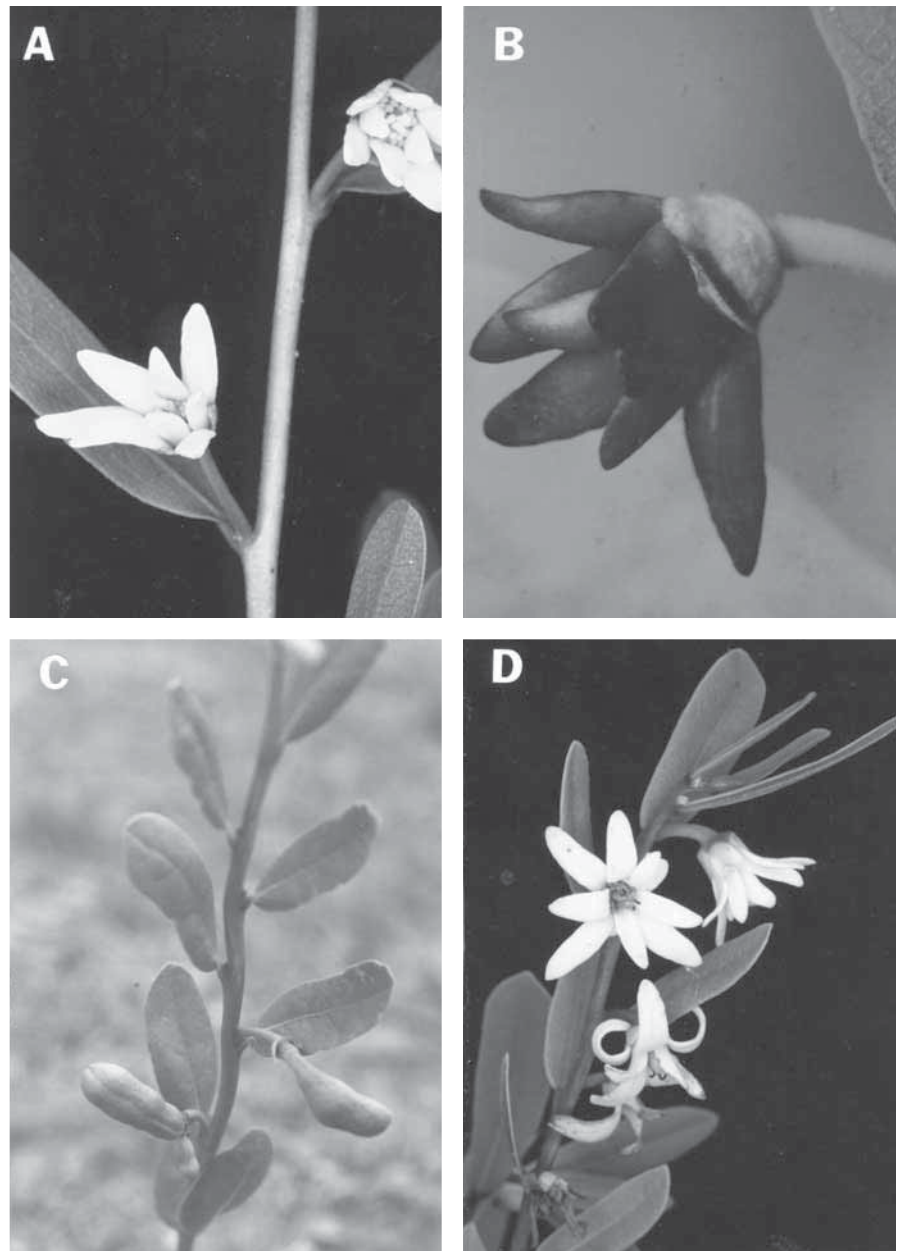


FIG. 2.

A. *Deeringothamnus rugelii*. B. red form of *D. rugelii*. C. developing fruits of *D. rugelii*. D. *D. pulchellus*. Photos A and D by Steve Shirah, B and C by Eliane Norman. (from Taxon 2003)

more yellowish-green, smooth-skinned, peanut-like structures, each with one to several large brown seeds embedded in a custard-like tissue. [Fig. 2C]

*Deeringothamnus pulchellus*, beautiful pawpaw has a wider distribution than its congener. It is known from Charlotte and Lee Counties in southwest Florida as well as from a few populations in eastern Orange County, a hundred and fifty miles away. A third of the 27 populations known from the west coast are on public land (Johnson 1999), none from the east coast is protected. The beautiful pawpaw occurs in poorly drained sandy soils, in flatwoods. In Orange County it is restricted to Pomello fine sand, while in Charlotte and Lee Counties, the largest number of populations grow in Wabasso soils. This soil has a clayey loam texture at a depth of over two feet (Johnson 1999). The associates of this species are similar to those of *D. rugelii*, namely slash or long leaf pine, wiregrass, saw palmetto, dwarf live oak, wax myrtle, common pawpaw and hatpins.

The beautiful pawpaw is a more highly branched shrub than Rugel's pawpaw. It blooms from mid-March to early May, and also reacts to fire by flowering. It differs from Rugel's pawpaw by having longer pedicels, longer, thinner sepals, and thinner and longer reflexed petals – often more than six. [Fig. 2D] Its very sweet scent is somewhat like confederate jasmine, an odor not found in other pawpaws, even ones with white flowers. The sex organs are similar, and there may be an overlap in the maturation of the reproductive organs. In a study of almost 500 flowers in a particular year, only 1.2% set mature fruits (Norman 2003). The fruits and seeds are similar to those of *D. rugelii*.

The fruits of *Deeringothamnus* take three to four months to mature. Over the years, we have seen a considerable number of dried seeds or fruits scattered around the base of plants of both species. When the fruit is mature, the seeds have a minute immature embryo and a thick seed coat. Even when planted under “good conditions,” (in an area where *Deeringothamnus* are already growing), it will take between six months to a year before they show any growth above ground (Norman 2003).

At least some of the reasons for the rarity of both species of *Deeringothamnus* are apparent: plants do not flower readily unless disturbed, the flowers are small and produce small amounts of pollen, they attract few pollinators and they have low fruit and seed production. The seeds need to be buried and kept reasonably moist for the embryos to grow and germination to occur. However once established the plants probably survive for several decades, if given enough living space. What can be done to keep these species from becoming extinct?

Ultimately, both species of *Deeringothamnus* can only be preserved through acquisition and proper management of their habitats. We need to learn more about maintaining and enhancing the populations. If fire is not feasible, roller chopping or mowing may be beneficial in suppressing competition and enhancing flower production (Helkowski and Norman 1997). Our experiments indicate that hand cross pollination enhances fruit and seed production (Norman 2003), but we also found that such seeds germinated only half as often as seeds from open-pollinated flowers (Norman 3003). Transplanting is a difficult process as *Deeringothamnus* have a large tap root. [Fig. 3] Plants must be removed quickly and not allowed to dry out before replanting. Success requires enough rain (but not too much), so plants can become established. Most successes in transplanting and seed germination have been obtained when *Deeringothamnus* are planted in a field



**FIG. 3.** Digging up *Deeringothamnus pulchellus* from a threatened area. Photo by Sandy Carnival.



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**The Palmetto**

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