New Artificial Hybrids in *Chrysalidocarpus* (Arecaceae). Part 2. The Tri-Bana Palm: *Chrysalidocarpus* x *pembacaryi*

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Abstract

This article, the second in an occasional series about the hybrid palms in *Chrysalidocarpus* (Arecaceae) that co-author Justen B. Dobbs is developing in Florida, U. S. A., addresses the tri-bana palm, *Chrysalidocarpus* × *pembacaryi*, another handsome hybrid entering tropical and subtropical private collections and botanical gardens and is likely to become more popular in the trade. Thus, this new hybrid palm is formally named, described, and illustrated, compared to its parents, and its cultivation and landscape use discussed.

Introduction

We (Hodel at al. 2025) recently discussed co-author Dobbs's interest in producing hybrid palms, especially in the genus *Chrysalidocarpus*. In that article, we named, described, discussed, and illustrated the tri-bear palm, a hybrid of *C. leptocheilos* and *C. decaryi* that Dobbs has championed and produced, and that is now gracing collections and landscapes in Florida, California, and elsewhere.

Through his Seabreeze Nurseries in Fort Myers, Florida, Dobbs has been making numerous other *Chrysalidocarpus* hybrids, some of which have matured and will come into production. One of these is the tri-bana palm, *C.* × *pembacaryi* (**Fig. 1**).

Dobbs is the developer of the tri-bana palm and will distribute it through two nurseries, one in California and one in Florida. Because the tri-bana palm will become more common in palm collections in California, Florida, and elsewhere, here we formally name, describe, and copiously illustrate it, compare it to its parents, and discuss its landscape use and cultivation. The description is mostly from fresh, non-dried material of the type plant grown at Dobb's home in Fort Myers, Florida.

1. Co-author Justen Dobbs stands next to the type plant of *Chrysalidocarpus* × *pembacaryi* in his garden. One of the trunks was removed to have a solitary habit. All photos are © D. R. Hodel and of the type plant, *Hodel 4085*.

Taxonomy

Chrysalidocarpus × pembacaryi Hodel, J. B. Dobbs & R. H. Burtscher sp. hyb. nov.

[*Chrysalidocarpus pembanus* H. E. Moore × *Chrysalidocarpus decaryi* (Jum.) Eiserhardt & W. J. Baker]. Type: CULTIVATED. U. S. A., Florida, Lee County: Fort Myers, garden of Justen Dobbs, 24 April 2026, *D. R. Hodel 4085* (Holotype LASCA, Isotype BH). **Figs. 1–39**.

Diagnosis: *Chrysalidocarpus* × *pembacaryi* displays a range of characters with its parents (*C. decaryi* and *C. pembanus*), some greater or smaller or otherwise unique from its parents, some shared with one parent but not the other, or some it shares with both parents. For example, the type plant of this hybrid is unique from its parents in its hybrid vigor; the steeply ascending pinnae; the larger inflorescence; the infrafoliar infructescence; the longer and larger peduncle, prophyll, and rachis; the prophyll with reddish brown tomentum; the larger staminate petals; and the taller pistillode. It shares with *C. decaryi* the trunk diameter; the internode length, color, and indument; the quantity of pinnae; the open leaf base with reddish brown tomentum; the longer rachillae; and the ruminate endosperm. Although the type plant is decidedly more like *C. decaryi*, it shares with *C. pembanus* its clustered habit; the inflorescence with four orders of branching; and the peduncle and rachis with reddish to reddish brown pubescence or tomentum (**Table 1**).

Etymology: Because the pistillate or seed parent is typically listed first and the staminate or pollen parent second in a hybrid name, we have combined the first two syllables of the seed parent epithet *pembanus* and the last two of the staminate parent epithet *decaryi* to form the hybrid species epithet, *pembacaryi*.

Common Name: tri-bana palm, the “tri” derived from the common name of the staminate parent triangle palm, *Chrysalidocarpus decaryi*, and “bana” from the former botanical epithet of the pistillate parent, *Dypsis pembana* (now *C. pembanus*).

Habit: Clustered or solitary with 1–3 stems, moderate to robust, monoecious, unarmed, pleonanthic, tree palm to at least 15 m tall (**Fig. 1**).

Trunk/Stem: to at least 10 m tall, ca. 30 cm DSH, ringed internodes ca. 7 cm, smooth, green distally, tan proximally, leaf scars ca. 1.5 cm wide, tan (**Fig. 2**).

Leaves: 14–18 per stem, pinnate, strongly tristichous, ascending, straight but slightly recurved in distal 1 m (**Fig. 3**); **base/sheath** ca. 70 cm long, ca. 60 cm circumference, briefly tubular proximally, deeply open distally (**Figs. 4–5**) and there typically with an abrupt “shoulder” to 5 cm high (**Fig. 5**), thick-leathery (drying woody), abaxially green distally and yellow-cream proximally, den-

Table 1. Summary of some character differences among *Chrysalidocarpus* × *pembacaryi* (tri-bana palm) and its two parents: *C. decaryi* and *C. pembanus*[z].

Character	C. decaryi	C. × pembacaryi	C. pembanus
Habit	solitary	clustered	clustered
Trunk			
Diam. standard height (cm)	30–40	30	6-15
Internode length(cm)/color	3–10/gray with some white way	7/green distally, tan proximally, with some light white wax	to 24/green distally, brown proximally
Leaf			
Leaf base length (cm), form	30–45, open	70, open	50–60, tubular
Leaf base indument	white waxy with reddish pubescence	white waxy with reddish brown indument	waxy green
Rachis length (m)	2.2–3	3.6	2.4
Quantity of pinnae per each side of rachis	55–97	87	40–50
Pinnae disposition	moderately ascending, pinnae on opposite sides forming a 90° angle	steeply ascending, pinnae on opposite sides forming a 60° angle	moderately ascending, pinnae on opposite sides forming a 90° angle
Pinnae abaxial indument	scattered, minute, reddish scales on fainter veins	dense cover of small, white-waxy scales with minute, brown scale on veins	dense cover of minute waxy scales with small, glossy brown scales on veins
Inflorescence			
Size (cm)	125–178 × 120	260 × 180	70–90 x 90–120
Position	interfoliar	interfoliar in flower, infrafoliar in fruit	interfoliar
Orders of branching	3	4	3 or 4
Peduncle length (cm)	50–58	95	60
Peduncle indument	scattered scales	dense reddish brown tomentum	dense reddish tomentum
Prophyll length/width (cm)	25–63/6	75	>30/5

Table 1 (Continued).

Character	C. decaryi	C. × pembacaryi	C. pembanus
Prophyll indument	scattered scales	white waxy with dense, reddish brown tomentum	glabrous, dull waxy
Rachis length (cm)	118	175	?
Rachis indument	flaking, densely scaly	reddish brown tomentum	reddish pubescent
Rachillae length (cm)	12–26	29	11–19
Flowers			
Staminate color	yellow to orange	white	cream/white
Pistillate color	green	green?	pale green to cream
Staminate petals (mm)	3.2–3.5 × 1.8–2.3	4.5 × 3	2.3–2.8 × 1.5–1.8
Pistillode (mm)	1.6 × 1	3.5 × 1.2	1.8–2.8 × 0.6
Fruit/Seed			
Fruit size (mm)/shape	15–22 × 12–19 mm/ovoid to subglobose	18–24 × 12.5–14 mm/globose-ovoid	12–15 × 5–7 mm/ oblong-ovoid
Seed size (mm)/shape	17–19 × 16–18 mm/subglobose to ellipsoid	16–22 × 9–11 mm/ellipsoid-ovoid	10.5–11 × 5–5.5 mm/oblong-ellipsoid
Endosperm	ruminate	ruminate	homogeneous
Eophyll	bifid	bifid	bifid

[z]Characters for both parents taken mostly from Dransfield and Beentje (1995).

sely covered with reddish brown tomentum throughout (**Figs. 4–7**), distally reddish brown tomentum overlying white-waxy indument (**Fig. 8),** adaxially mostly yellow-cream with green on distal margins (**Fig. 9**); **petiole** ca. 35 cm long, ca. 11 cm thick and 7 cm wide at base, ca. 5 cm thick and 5.5 cm wide at apex, narrowly rounded abaxially and green with white-waxy indument, laterally with dense reddish brown tomentum, adaxially prominently channeled (**Figs. 10–11**), to ca. 6.5 cm deep proximally and 1.5 cm deep distally, with moderate reddish brown tomentum (**Fig. 12**) and a raised triangular structure ca. 15 cm long (**Fig. 13**); **rachis** ca. 3.6 m long, straight but slightly recurved in distal 1 m (**Fig. 3**), tapering to 2 mm diam. at apex, abaxially rounded (**Fig. 14**), adaxially shallowly channeled proximally (**Fig. 15**) progressively transitioning to a flat, low, broad ridge (**Fig. 16**) and then a narrow, knife-like ridge distally (**Figs. 17–18**), green, abaxially and laterally with reddish brown tomentum in proximal 60 cm but transitioning to nearly glabrous at apex, adaxially glabrous; **pinnae** ca. 87 per side, regularly arranged (**Fig. 19**), erect to steeply ascending off rachis (**Fig. 20**) to form a V-shaped blade in transverse section with an interior angle

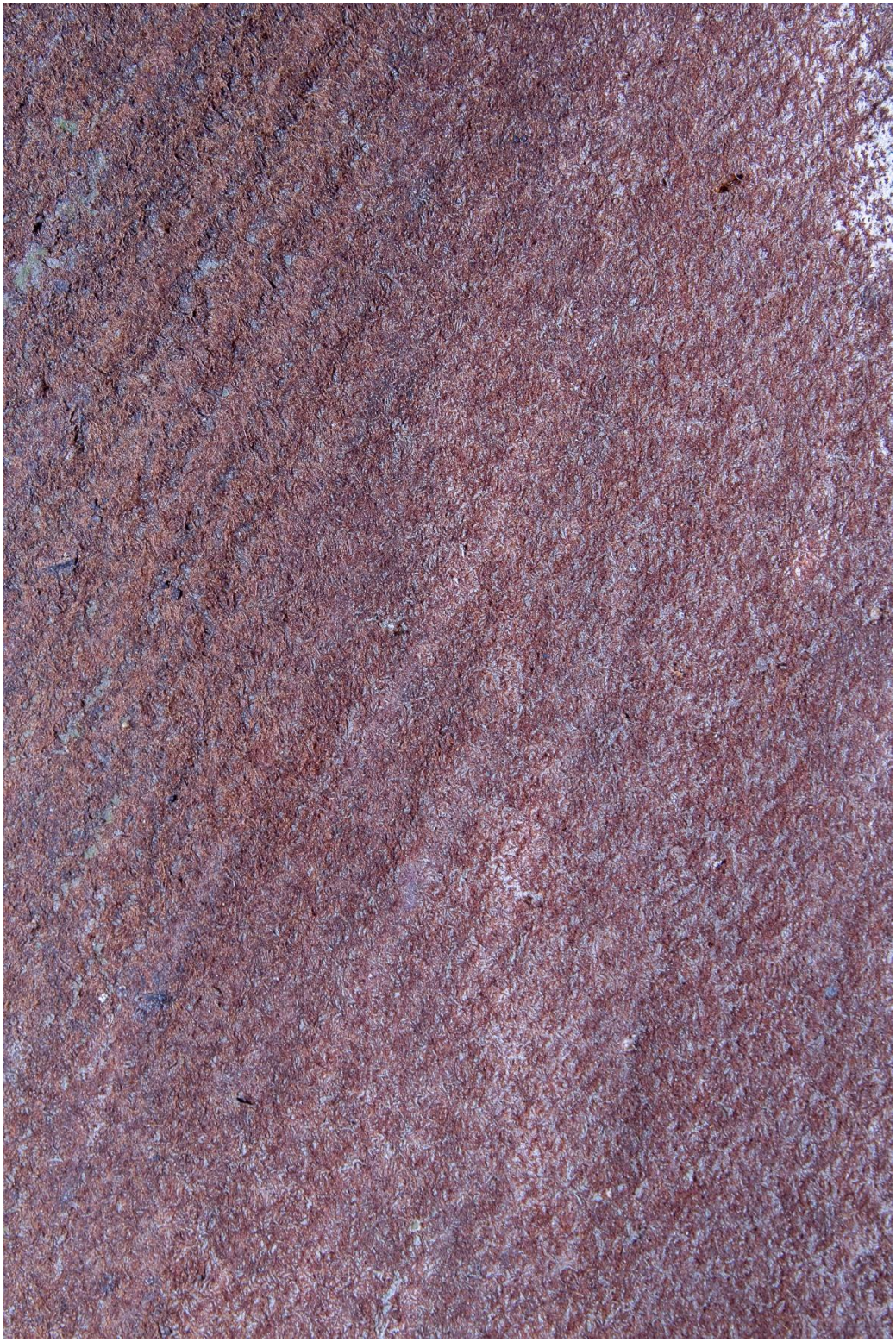
2. *Chrysalidocarpus* × *pembacaryi* has smooth, ringed stems about 30 cm DSH with internodes green distally and tan proximally.

3. Co-author Dobbs hold an entire leaf of *Chrysalidocarpus* × *pembacaryi*. Note the mostly straight rachis and numerous, regularly arranged, stiffly ascending pinnae.

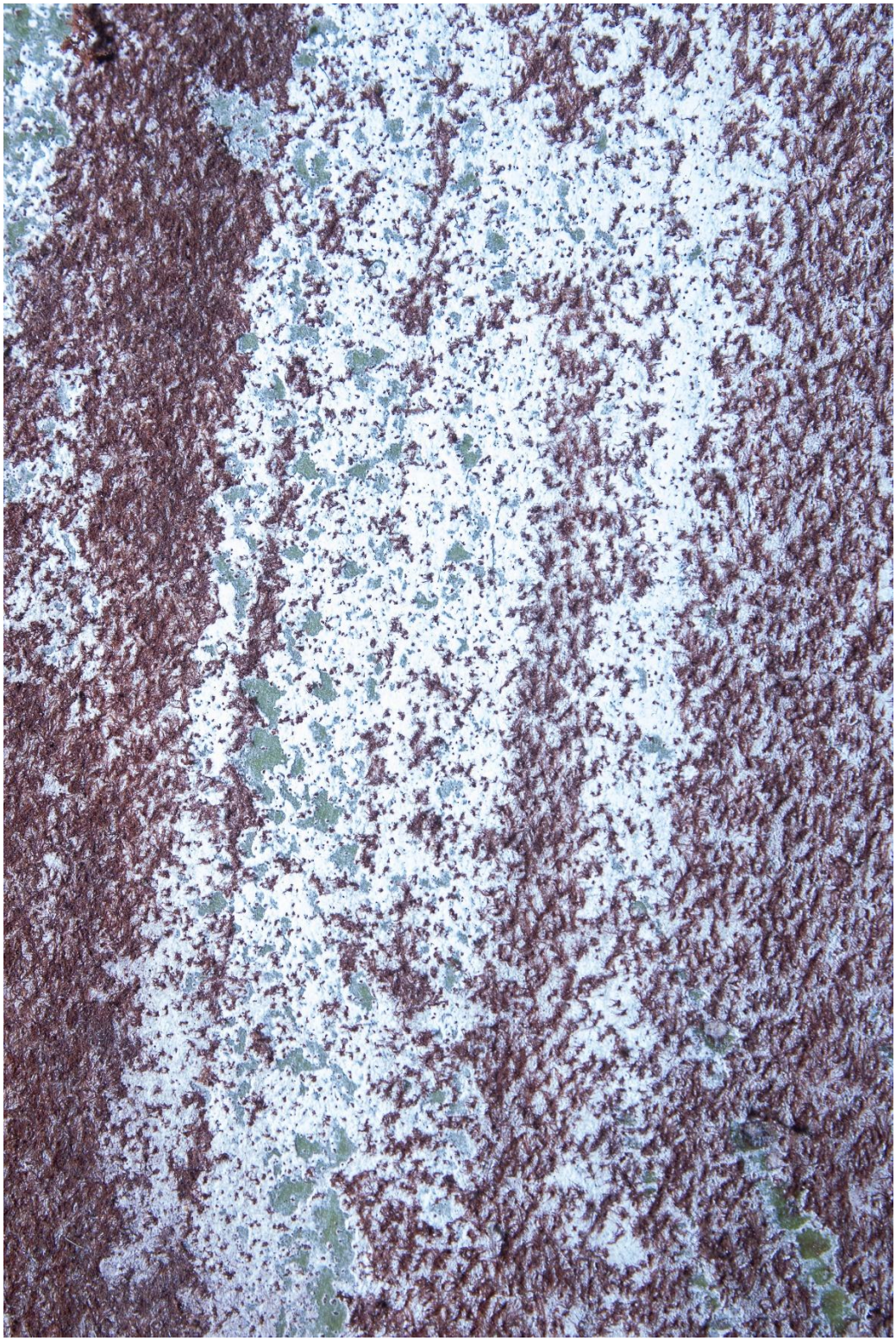
4. Leaf bases of *Chrysalidocarpus* × *pembacaryi* are briefly tubular proximally, deeply open distally. Note the reddish brown tomentum over white wax.

5. Abaxially, leaf bases of *Chrysalidocarpus* × *pembacaryi* are briefly tubular proximally, deeply open distally, green distally and yellow-cream proximally. Note the “shoulder” where the petiole attaches.

6. Abaxially, leaf bases of *Chrysalidocarpus* × *pembacaryi* are briefly tubular proximally, deeply open distally. Note the white wax covered by reddish brown tomentum throughout.



7. Abaxially, dense, reddish brown tomentum typically covers leaf bases of *Chrysalidocarpus* × *pembacaryi*.



8. Abaxially, the white wax of leaf bases of *Chrysalidocarpus* × *pembacaryi* is covered by dense, reddish brown tomentum.

9. Adaxially, leaf bases of *Chrysalidocarpus* × *pembacaryi* are mostly yellow-cream with green on distal margins.

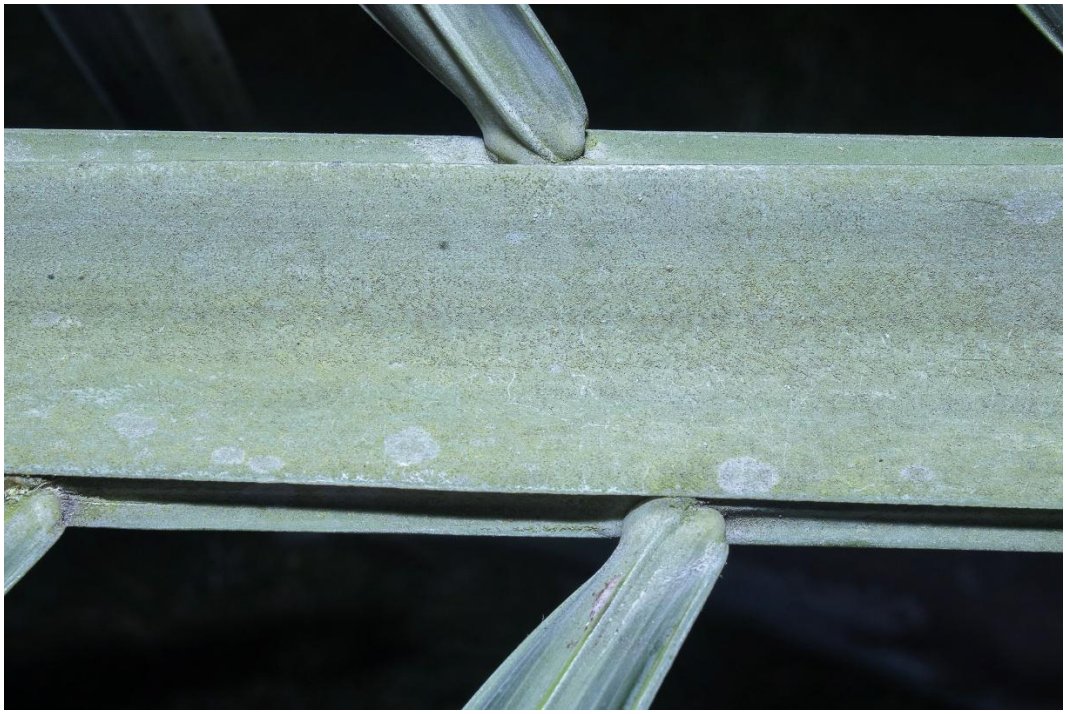
10. Petioles of *Chrysalidocarpus* × *pembacaryi* narrowly rounded abaxially and green with white-waxy indument, laterally with dense reddish brown tomentum.

11. Petioles of *Chrysalidocarpus* × *pembacaryi* are narrowly rounded abaxially and deeply channeled adaxially.

12. Petioles of *Chrysalidocarpus* × *pembacaryi* are and prominently channeled adaxially, greenish yellow, and with scattered, reddish brown tomentum.

13. Adaxially, petioles of *Chrysalidocarpus* × *pembacaryi* have a raised triangular structure near the attachment to the leaf base.

14. Leaf rachises of *Chrysalidocarpus* × *pembacaryi* are rounded abaxially and shallowly channeled adaxially and proximally.



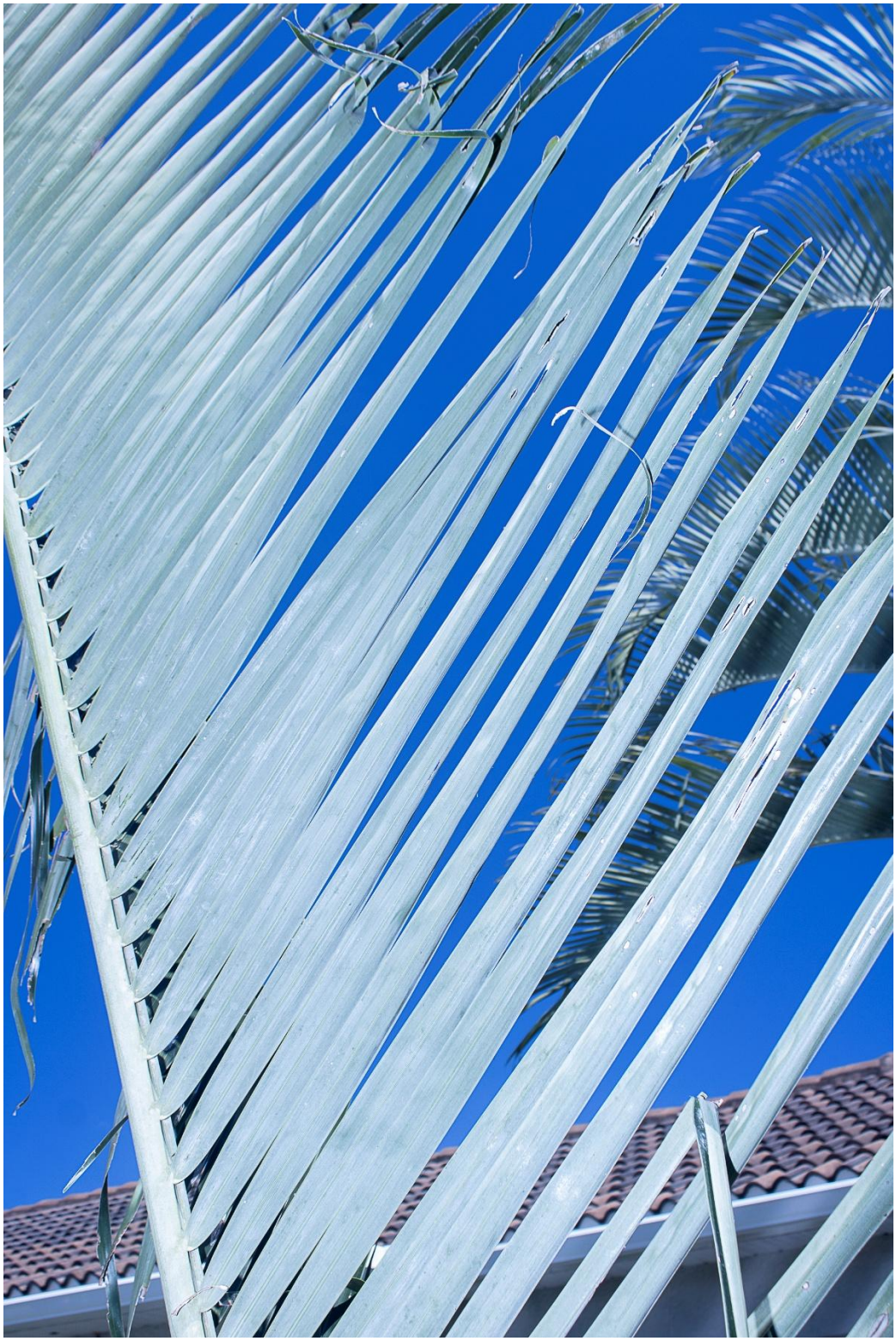
15. Leaf rachises of *Chrysalidocarpus* × *pembacaryi* are shallowly channeled adaxially and proximally.

16. Leaf rachises of *Chrysalidocarpus* × *pembacaryi* progressively transition to a flat, low, broad ridge.

17. Leaf rachises of *Chrysalidocarpus* × *pembacaryi* then progressively transition to a narrow, knife-like ridge.

18. Leaf rachises of *Chrysalidocarpus* × *pembacaryi* then progressively transition to a narrow, knife-like ridge.

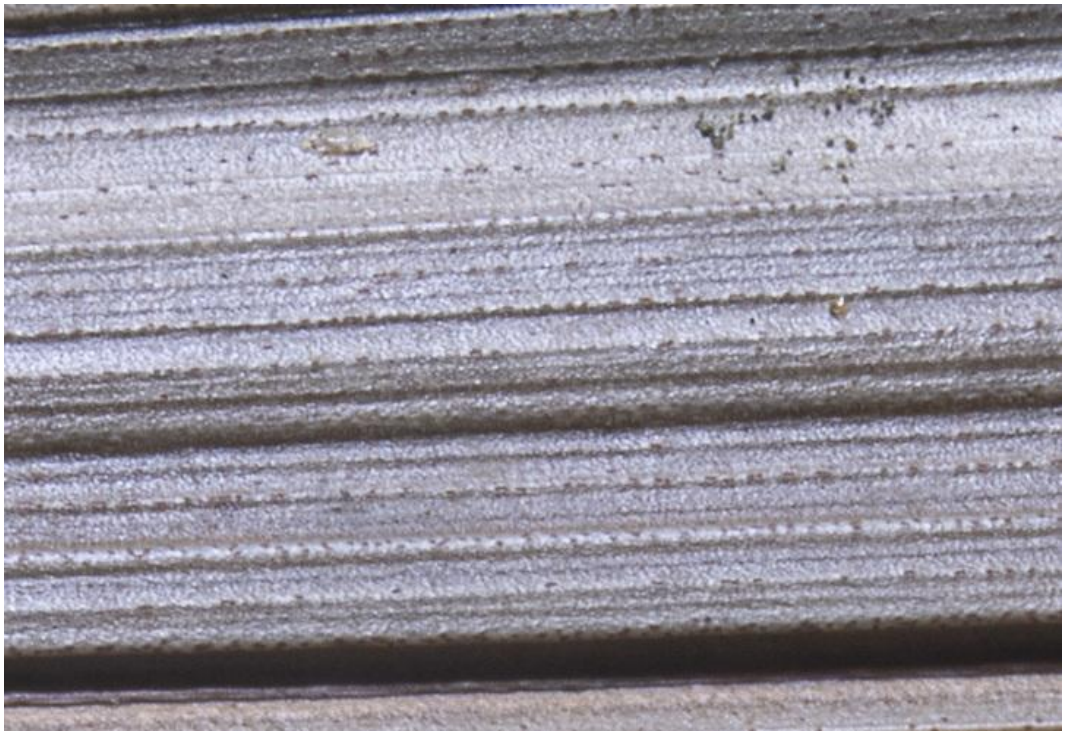
19. Pinnae of *Chrysalidocarpus* × *pembacaryi* are regularly arranged, close set, straight, and gray abaxially from a dense layer of waxy scales.



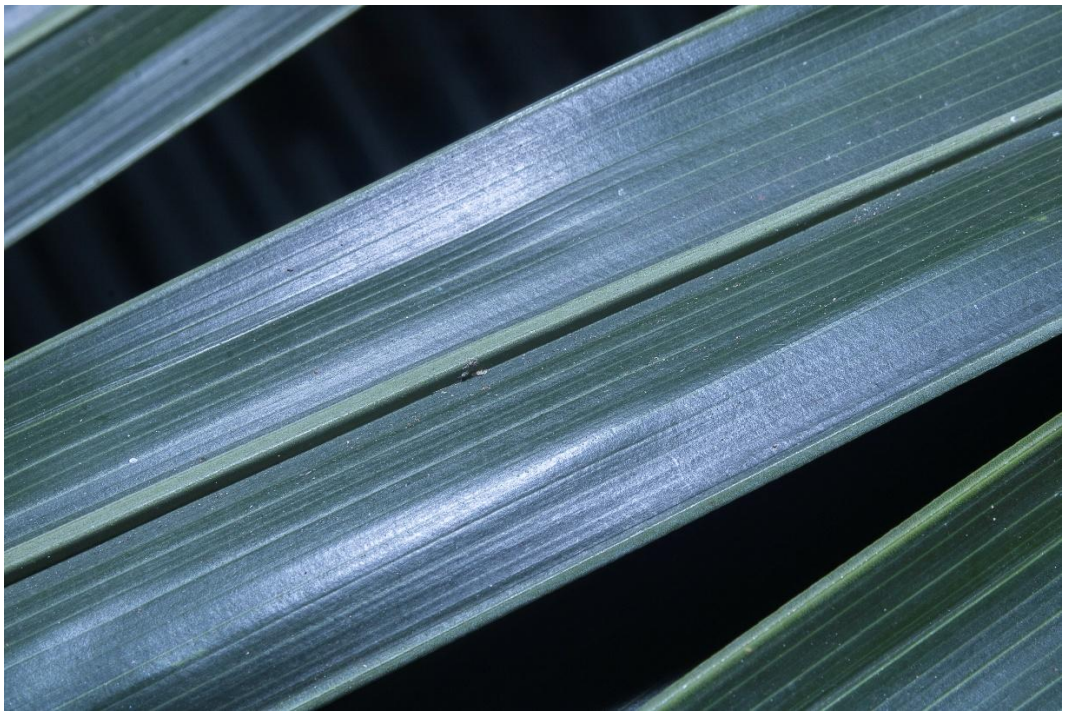
20. Pinnae of *Chrysalidocarpus* × *pembacaryi* are regularly placed and steeply ascending off the rachis, close set, straight, and gray abaxially from a dense layer of white-waxy scales.

of 60°, spaced ca. 7 cm apart proximally, 2.5 cm apart mid-blade, and 1.5 cm apart distally, pinnae imbricate ca. mid-blade to apex, most proximal ca. 73 × 2 cm, proximal mid-blade largest, these ca. 93 × 3.5 cm, most distal 12–14 × 0.5–2 cm, all leathery, stiff, straight, tips eventually drooping, constricted at attachment point to ca. 1.5 cm wide, abaxially with a dense cover of small, white-waxy scales (**Figs. 19–20, 24**) with minute, brown scales on veins (when dry) (**Fig. 21**), midrib prominent with other veins of lesser orders inconspicuous and/or obscured by indument, glossy dark green adaxially with light green, elevated, prominent midrib, 5–6 primary veins on either side of midrib (**Fig. 22**), veins of lesser orders inconspicuous, light green marginal veins conspicuous, 1–2 ramenta on abaxial midrib (**Fig. 23**) mostly within ca. 5 cm of rachis, these with a green, bi-lobed, anvil-like base 3-4 mm long and 2 arms 2–3 mm long (**Fig. 24**), with tan scurfy indument (**Fig. 23**), sometime 1–2 additional ramenta within ca. 20 cm of rachis, these smaller with less prominent base, scurfy, tan.

Inflorescences: 4–5 per stem, interfoliar in flower (**Fig. 25**), infrafoliar in fruit, ca. 2.6 × 1.8 m (**Fig. 26**), ascending, spreading with drooping rachillae, branched to 4 orders (**Fig. 27**); **peduncle** ca. 95 cm long (**Fig. 28**), base 56 cm long/wide where clasping but not encircling trunk in its entirety (**Fig. 29**), 13–15 cm wide and ca. 2 cm thick at base, ca. 3 cm thick prophyll attachment, tapering to ca. 6 cm wide and 3 cm thick at apex, green but densely covered with thick, reddish brown tomentum (**Fig. 28**); **prophyll** ca. 75 cm long **(Fig 28)**, ca. equaling peduncle, attached ca. 19 cm distal of peduncle base and there ca. 14 cm wide and completely encircling peduncle, lanceolate, acute-acuminate, obliquely open apically, leathery, abaxially creamy yellow with dense, reddish brown tomentum and distally with white-waxy indument (**Fig. 28**), adaxially green distally with reddish brown tomentum medially and creamy yellow proximally, bicarinate with proximal margins aging to saw-toothed (**Figs. 30–31**), teeth ca. 1.5 cm high, triangular, bicarinate margins extending proximally ca. 10 cm beyond point of prophyll attachment; **peduncular bract** similar to and ca. equaling prophyll but not prominently bicarinate, attached ca. 22 cm distal of prophyll attachment, ca. 55 cm long, indument and color similar to that of prophyll; 2nd peduncular bract attached ca. 60 distal of prophyll attachment, not completely encircling peduncle, ca. 13 cm long, ca. 6.5 cm wide at base; **rachis** ca. 1.75 m long, tapering to 4 mm diam. at apex, green but clothed with reddish brown tomentum throughout (**Fig. 32**), this thick and dense proximally becoming scattered distally; ca. 25 **branches** and 15 simple rachillae, most proximal branches largest and most complexly branched (**Fig. 33**), ca. 1.25 m long, sub-peduncle ca. 22 × 4 × 1.5 cm, tapering to ca. 1 × 1.4 cm at apex, sub-rachis ca. 89 cm long, tapering to 2–3 mm diam. at apex, ca. 15 branches and 9 simple rachillae, most proximal branch largest, ca. 60 cm long, sub-sub-peduncle ca. 11 cm long, ca. 2 × 0.5 cm at base, tapering to ca, 3 mm diam. at apex with ca. 10 simple rachillae; branches and rachillae subtended by **rachis bracts**, most proximal largest, these ca. 6 cm wide and 2 mm high except for central, median tip to 4 mm high (**Fig. 34**), bracts becoming smaller distally, eventually barely discernable distally; **rachillae** ca. 29 cm long, ca. 4 × 3 mm at



21. When dry the minute, brown scales are visible along the abaxially primary veins of *Chrysalidocarpus* × *pembacaryi*.



22. Pinnae of *Chrysalidocarpus* × *pembacaryi* are glossy dark green adaxially with light green, elevated, prominent midrib, 5–6 primary veins on either side of this.

23. Pinnae of *Chrysalidocarpus* × *pembacaryi* typically have one to two ramenta on the abaxial midrib.

24. Ramenta of *Chrysalidocarpus* × *pembacaryi* have a green, bi-lobed, anvil-like base with two spreading arms (here devoid of tan, scurfy indument). Note the minute, dense, white-waxy scales on the pinna surface.

25. Inflorescences of *Chrysalidocarpus* × *pembacaryi* are interfoliar in flower, as shown here, but infrafoliar in fruit.

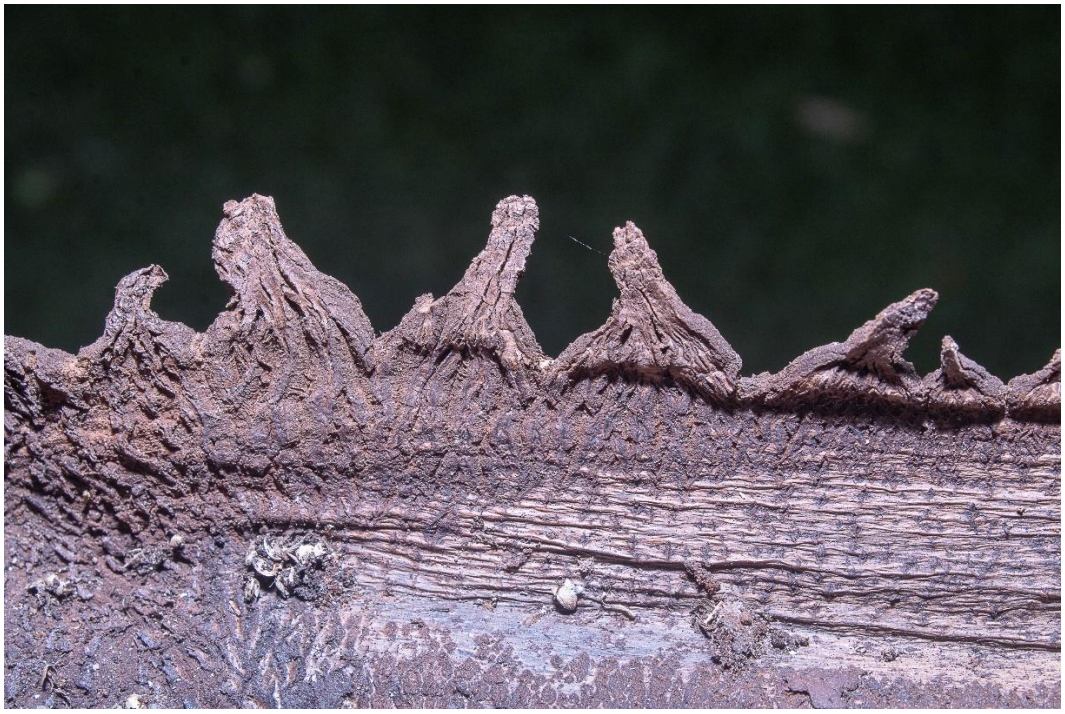
26. Co-author Dobbs holds an entire, relatively large inflorescence of *Chrysalidocarpus* × *pembacaryi*. Note the drooping rachillae.

27. This most proximal branch of the inflorescence of *Chrysalidocarpus* × *pembacaryi* shows that the inflorescence is branched to four orders.

28. Co-author Dibbs holds the peduncle of *Chrysalidocarpus* × *pembacaryi.* Note the peduncle (very top) and prophyll about equaling the peduncle, and both covered with reddish brown tomentum.

29. The base of the peduncle of *Chrysalidocarpus* × *pembacaryi* showing its attachment to the trunk.

30. The proximal, bicarinate margins of the prophyll of *Chrysalidocarpus* × *pembacaryi* become saw-toothed with age.



31. The saw-toothed, proximal, bicarinate margins of the prophyll of *Chrysalidocarpus* × *pembacaryi* can have formidable teeth, like those of a shark.

32. The inflorescence rachis of *Chrysalidocarpus* × *pembacaryi* is densely covered with reddish brown tomentum.

33. Co-author Dobbs holds an entire, proximal, first-order branch of the inflorescence of *Chrysalidocarpus* × *pembacaryi*, which are among the largest and most complexly branched.

34. The most proximal rachis bracts of *Chrysalidocarpus* × *pembacaryi* are the largest, typically low but wide with a central, median, pointed tip.

base, tapering to ca. 2 mm diam. at apex, drooping (**Fig. 26**), light green but minutely white-spotted.

Flowers: arranged in **triads** of a center, later-opening pistillate flower flanked on each of two sides by earlier-opening staminate flowers in proximal ca. 3/4 of rachilla, mostly solitary or paired staminate or less often a paired staminate and pistillate flowers distal ca. 1/4 of rachilla, triads in two spirals, each with 4–5 triads in 1 revolution, triads ca. 5 mm distant within a spiral proximally and 1.5–2 mm distant distally; triads and paired staminate flowers in dried state in shallow clefts ca. 3 mm long, 2 mm wide, and 0.5 mm deep, proximal lip prominent (when dry), 1.25 × 1.5 mm, broadly ovate, slightly ascending to ca. 45° (**Fig. 35**), thicker proximally, thin and knife-like distally along margins, bracteoles ca. 0.5 × 1.25 mm, crescent-shaped, imbricate, thin, white; **staminate flowers** 6–7 × 6–7 mm, white **(Fig. 36**); **calyx** ca. 1.5 × 3 mm, cup-like (**Fig 36**), **sepals** imbricate nearly to apex and there broadly rounded to truncate, bowl-like, white with slight green tinge especially proximally; **petals** ca. 4.5 × 3 mm, ovate, erect and free apically, valvate, white (**Fig 36**); **stamens** 6, 6–6.5 mm high, exceeding petals (**Fig. 36**), filaments 4.5–5 mm long, slightly exceeding petals and typically reflexed at petal tips, white, anthers ca. 2.3 × 0.8 wide, medifixed, white (**Fig 36**); **pistillode** ca. 3.5 × 1.2 mm, shorter than petals, ovoid-columnar, white, tip pointed, briefly trifid ; **pistillate flowers** (only seen in immature bud) 2 × 2 mm, greenish.

Fruit: (old, dried) 1.8–2.4 × 1.25–1.4 cm, globose-ovoid**; seed:** (old, dried) 1.6–2.2 × 0.9–1.1 cm, ellipsoid-ovoid (**Fig. 37**); endosperm ruminate (**Fig. 38**); eophyll bifid.

Discussion

Chrysalidocarpus × *pembacaryi* can be more like *C. decaryi*, its staminate parent, or closer to *C. pembanus*, its pistillate parent, as progeny within a grex typically "lean" more towards one of the parents although progeny can be within an intermediate range between both parents. Nonetheless, *C.* × *pembacaryi* typically has a clustered habit; in fact, most larger specimens in Florida and California have no more than three trunks. Thus, they do not produce as many trunks as *C. pembanus* but more than *C. decaryi*, which, of course, is a solitary species. It is possible that a small percentage of tri-bana specimens could remain solitary if they were to inherit the solitary trait of *C. decaryi*, but this has not yet been observed.

The leafy canopy of *Chrysalidocarpus* × *pembacaryi* (**Fig 39**) is especially similar to that of *C. decaryi*. Indeed, the type specimen of *C*. × *pembacaryi* can be likened to a clustered *C. decaryi*. The leaf canopies of both are gray, their leaf rachises are mostly straight except becoming moderately recurved in the distal one m or so, and their thick, sturdy, open leaf bases are similar in shape, color, and indument. However, the discerning eye might detect that the striking gray leaf canopy of *C*. × *pembacaryi* is grayer than that of *C. decaryi*, which is saying a lot because the can-

35. Floral triads of *Chrysalidocarpus* × *pembacaryi* have a prominent, proximal lip when dry.

36. Staminate flowers of *Chrysalidocarpus* × *pembacaryi* have white petals and stamens, the latter exserted above the petals. Note the greenish, cup-like calyx.

37. Seeds of *Chrysalidocarpus* × *pembacaryi* are ellipsoid-ovoid in shape.

38. Seeds of *Chrysalidocarpus* × *pembacaryi* have ruminate endosperm.

39. Leaf canopies of *Chrysalidocarpus* × *pembacaryi* are similar to those of its staminate parent *C. decaryi* but appear grayer from the dense layer of minute, white-waxy scales on the abaxial surface.

opy of the latter is also gray. The pinnae of *C.* × *pembacaryi* are so steeply ascending off the rachis that the abaxial pinna surface, which has a thick coating of white-waxy scales, is prominently displayed, enhancing its gray leaf color.

Minute, brown scales line the veins on the abaxial pinna surface. These are inconspicuous on fresh material, even under magnification, because they are obscured by the white-waxy scales but are conspicuous and readily viewed in dry material under magnification, perhaps because the heat of the drying process melted or altered the waxy scales, revealing the brown scales lining the veins (**Fig. 21**).

Seedlings of *Chrysalidocarpus* × *pembacaryi* are extremely difficult to discern from those of both parents, even for an experienced collector, mainly because both parents produce seedlings with bifid eophylls. Key hybrid traits can be seen once plants attain about 20 to 30 cm in height and include stiffly upright leaves, a thick sturdy stem, and deep green, leathery leaves. They some-

times have conspicuous tristichous leaf arrangements at this size but it depends on how much *C. decaryi* parentage was passed on in the hybrid.

Co-author Dobbs, who has been making many hybrids in *Chrysalidocarpus* for about 20 years, feels that most but not all hybrids in the genus are self-sterile. The tri-bana palm is self-sterile; it will not produce viable seeds when self-pollinated, a condition found in many hybrid plants. The reasons for hybrid self-sterility are several and are typically related to the chromosomes of each parent. One of the primary reasons is that the two parents of a hybrid have different chromosome numbers, which means that during meiosis they do not pair correctly, resulting in the failure to produce gametes with the correct number of chromosomes to produce viable offspring (Blackwell 2025, Velos 2022).

However, Dransfield et al. (2008) noted that nearly all species of *Chrysalidocarpus* (as *Dypsis*) have a chromosome number of 2n = 32, a common number in subfamily Arecoideae and the dominant number in the tribe Arecaceae in which *Chrysalidocarpus* is placed. Thus, differences in chromosome numbers do not seem to be the reason for tri-bear's self-sterility.

Another possible reason for hybrid sterility is the occurrence of micro- and macro-gene inversions, which reorder the genes, so they do not match up well. Other genetic discrepancies, aberrations, and mutations can also be responsible for self-sterility, and more work is needed to resolve this phenomenon.

Thus, to produce fruits with viable seeds of the tri-bana palm, pollen from another species (not a hybrid) must be used, and pollen from the hybrid's staminate parent, *Chrysalidocarpus decaryi*, seems to be the most compatible and effective. However, the resulting offspring will not be an authentic or true tri-bana palm but a back-crossed hybrid, which Dobbs has also produced but in extremely low quantities and given the common name "super tri-bana palm." If authentic tri-bana palm is desired, the original F1 cross must be made (pollen of *C. decaryi* placed on pistillate flowers of *C. pembanus*).

Through trial and error, Dobbs has also determined that tri-bana hybrids are only successfully produced if the pollen source is *Chrysalidocarpus decaryi*, not *C. pembanus*. He suspects that, for an unknown reason, *C. decaryi* has pollen that makes it a successful staminate or pollen parent in a hybrid, a suspicion that is borne out by other hybrids of *C. decaryi* that Dobbs has made. Similarly, in oil palms (*Elaeis guineensis*), Criollo-Escobar and Dominguez (2018) found that the genotype of the pollen provider determines pollen quality, especially viability and germinability, which are critical for proper pollination and fruit and seed development. More work is needed to resolve this phenomenon, too.

On the occasion that flowers of *Chrysalidocarpus* × *pembacaryi* self-pollinate, it develops fruit that inexorably aborts when about 0.5 cm in diameter, being either parthenocarpic or containing brown endosperm void of any embryo.

The tri-bana palm clearly exhibits hybrid vigor, surpassing both parents in its growth rate in Florida. Another possible byproduct of hybridization in tri-bana palms is yellow and brown splotching that might appear on lower or older leaves in the canopy. This splotching is more evident with a backlit leaf. One's first inclination might be to diagnosis this splotching as a nutrient disorder, such as potassium deficiency (Broschat et al. 2014, Hodel 2012), and, indeed, these symptoms can fit this potential disorder. Another explanation could be lesion mimic mutants, which are a result of the hybridization process and can become sufficiently severe to kill some palms, such as the mule palm (×*Butiagrus nabonnandii*) (Dhillon et al. 2024). Lesion mimic mutants do not respond to fertilizer or pesticide and fungicide applications because they are the result of genetic anomalies in the hybridization process. While we suspect that lesion mimic mutant might occur on the tri-bear palm, *Chrysalidocarpus* × *leptocaryi* (see Hodel at al. 2025 for illustrations), fortunately, we have not yet observed this yellow and brown splotching on older leaves of the tri-bana palm yet.

Because hybrids can be inadvertently produced in palm collections and nurseries with species-rich holdings of *Chrysalidocarpus* (and likely other genera) (Hodel 2023, 2025; Hodel et al. 2025), foreign pollen-exclusion techniques must be employed to ensure "pure" offspring are produced under such conditions. Otherwise, instead of being a typically, long-touted method to perpetuate and conserve species and genetic material, cultivation could result in just the opposite, inadvertent, largely undocumented, and mostly unwanted hybridization, diluting and mixing genetic material (Hodel 2023, Hodel et al. 2025).

In *Chrysalidocarpus*, inadvertent hybrids seem to occur in South Florida in the most commonly cultivated species, such as *C. lutescens*, which is grown by the millions for the nursery and landscape trades in Florida and for export. J & K Plant Distributors in Miami, Florida reported in 2024 (pers. comm.) that *C. lutescens* and *C. decaryi* will occasionally and inadvertently hybridize in their nursery; the hybridized nature of some open-pollinated, seed-grown plants will become evident as they grow and develop. These occasional hybrids are seen as a novelty by some nursery growers and sold to local collectors while others simply sell them unknowingly as "pure" species.

Cultivation

For comprehensive reviews of palm horticulture and landscape management, see Broschat et al. (2014) and Hodel (2012).

Although experiences cultivating tri-bana palms are few, they would seem well adapted to a variety of subtropical and tropical climates and regions around the world. They would seem adapted to tropical and warm subtropical, moist to wet conditions, like those of southern Florida, northern Australia, Thailand, and elsewhere. They would likely be tolerant and grow unusually well in warm or slightly cooler, drier, and more arid subtropical conditions, like the Mediterranean-climate regions of southern California, southern Europe, southern Africa, parts of Australia, and elsewhere. One of tri-bana's parents, *Chrysalidocarpus decaryi*, likely imparts heat, cool, drought, wind, and arid tolerance to tri-bana palms. Despite this drought tolerance, tri-bana palms perform best with occasional irrigation during dry, rainless periods (see later).

Tri-bana palms will tolerate hot temperatures, likely as warm as 45 C, especially if given some afternoon shade and occasional irrigation. They will also tolerate short, overnight periods of near-freezing and slightly sub-freezing temperatures to ¯2 C with little or no damage.

Propagation of tri-bana palms is by seed, which can be produced on *Chrysalidocarpus pembanus* whose pistillate flowers are pollinated with pollen from *C. decaryi*. Measures should be taken to emasculate the inflorescence. Remove staminate flowers of *C. pembanus* pre-anthesis to exclude unwanted pollen, which is critical to maximize hybrid fruit production and prevent self-pollination. To remove staminate flowers mechanically, simply rub them off with your fingers beginning at the distal end of each rachilla and moving toward the proximal end. Removal should be done well before staminate anthesis to eliminate the chance of stray pollen escaping the flower during removal and lodging on the pistillate flower. It is helpful to start by cutting off or removing the distal portion of each rachilla, which contains only solitary or paired staminate flowers anyway and no pistillate flowers. Then remove the staminate flowers in triads with a pistillate flower in the more proximal portion of the rachilla. Be careful not to damage pistillate flowers when removing staminate flowers. After removal of staminate flowers, spray the entire inflorescence with a mixture of water, a denaturing agent, and a surfactant to wash off any escaped pollen. Also, the now emasculated inflorescence must be protected to exclude unwanted, foreign pollen spread by wind and/or insects from adjacent or nearby individuals of *Chrysalidocarpus*, which can be done by emasculating or removing inflorescences on other palms or enclosing securely the just emasculated inflorescence in a protective bag of cheesecloth, poly screen mesh (**Fig. 29**), or specialized pollination bags used in the date and oil palm industries. The poly mesh bags also provide protection of the developing fruits against marauding herbivores. When pistillate flowers of *C. pembanus* have attained anthesis, which typically can be determined by petal and pistil color and sometimes the presence of a minute, clear dew-drop at the tip of the pistil, pollen collected from *C. decaryi* can be applied. Make repeated applications of pollen to the pistillate flowers of *C. pembanus* over several days to ensure successful pollination.

When fruits are mature and soft ripe, they can be collected from the palm, cleaned of their pulp, and planted in a clean, moist, porous, well aerated medium composed of about 25% organic matter like peatmoss or coir and 75% inorganic matter like perlite, pumice, or sand. Plant the seeds, barely covering them with about 5 to 10 mm of medium. Place the clean, planted containers off the ground and keep them clean. Keep the medium moist but not soggy wet and maintain temperatures of from 24 to 32 C.

When the first eophyll has appeared, pot up seedlings into appropriately sized, clean containers using the same or similar mix used for germination, only now incorporate dolomite lime and a palm-special fertilizer into the mix following recommended rates. Keep plants off the ground and in light shade, especially in the afternoon. As root fill out their containers, move up young plants into larger containers and gradually decrease any shade until they are in full sun. Keep the potting medium evenly moist.

When the plants are of sufficient size, they can be planted out into the ground. Tri-bana palms perform well in just about any type of soil as long as the soil environment is managed properly, especially as it pertains to irrigation.

Situate tri-bana palms in full sun or with some light, afternoon shade in the hottest, driest regions. Dig a whole as deep as the root ball is high and twice as wide. Place an appropriate amount of palm-special fertilizer in the bottom of the hole. Remove the container and place the palm in the hole. Backfill with the same soil that was dug out of the hole without amending it, tamp firmly, apply about five cm of good quality mulch from the palm's stem out to 60 cm, and irrigate thoroughly. If rain is insufficient, irrigate when the palm needs it by checking the original root ball, backfill, and surrounding site soil. Whichever one of these zones first dries out at a depth of about three to five cm under the soil surface (not counting the mulch), then immediately apply sufficient water to moisten the upper 30 cm of the root zone. Irrigate again only when the root zone dries out again to a depth of three to five cm and continue this irrigation regimen.

Fertilize with a palm-special fertilize following label recommendations. Yellow and dark splotching sometimes occurs on older or lower leaves in the canopy of tri-bana palms, which could indicate potassium deficiency or potentially the lesion mimic mutant disorder discussed earlier.

Tri-bana palms are sufficiently handsome and imposing to make a statement in any landscape. Their moderately robust trunk, reddish fuzzy crownshaft, and splendid canopy of grayish-looking leaves are sure to draw attention. Because it typically but sparsely clusters and is an unusually attractive palm, it is sufficiently powerful to stand alone as a single specimen. Companion plants should be kept at least 60 cm away from the trunk and low, so as not to hide or obscure the handsome, colorful trunk.

We feel that tri-bana palms have their maximum appeal and ornamental value when they have just initiated flowering and have about three to four m of trunk. They will continue to reward for many more years, but then unusually tall specimens tend to lose some of their allure and replacement becomes a consideration.

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