Hyphaene guineensis

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1. Regenerating uneven-aged stand *Hyphaene guineensis* in coastal forest.

The subject of this paper is a handsome, easily identified species of *Hyphaene*, *H. guineensis*, which, despite its very distinctive habitat and habit, has remained rather poorly known since its first description in 1827.

The present story started with one of us (JD) watching a television film "Wild Africa" on the BBC in Britain. At one point the film showed elephants and wild pigs feeding on *Borassus* fruits on the shores of the Atlantic in Gabon. Behind the elephants was a wall of tall unbranched fan palms and the beach seemed carpeted with fallen fruits. Despite being identified in the commentary as *Borassus*, the palm trees were clearly not *Borassus aethiopum* and the fruits similarly did not belong

to this species. The fruit obviously belonged to *Hyphaene*. The unbranched trunks suggested that the palm was *H. petersiana*, but the fruit were the wrong shape for that species; furthermore, *H. petersiana* seems to be a palm of alkaline semi-waterlogged soils in inland southern Africa rather than along the coast. JD had a hunch that the palm was probably the poorly known *H. guineensis*, described in 1827 from the West African coast in Gold Coast (Ghana), and a palm that seems to have been forgotten in most local floras. The day after the screening of "Wild Africa," JD's student, Ross Bayton, who is monographing *Borassus*, came into Kew saying "Did you see the program last night? – that wasn't *Borassus*, was it?" Then JvV was appointed to the position of Head of the Herbarium at Libreville in Gabon, and JD alerted him to the possible presence of an interesting and distinctive palm. Shortly after reaching Gabon, JvV was in the field on the Atlantic Coast. At the first boat stop of his trip to the Loango National Park at Sette Cama, he found just what he hoped he would find (Back Cover). No mistake was possible – the numerous stands of 20 m tall fan palms in the National Park were the very species he was looking for (Figs. 1, 2). However, 20 m tall palms are somewhat complicated to collect and it was not until he found an individual flowering and fruiting while still only 8 m tall that he was able to make good collections. These were dried and distributed to the National Herbarium in Libreville, to the National Herbarium of the Netherlands in Wageningen, to Kew and several other herbaria. In Kew they were subsequently matched up with the neotype of *Hyphaene guineensis*.

The history of *Hyphaene* taxonomy

Hyphaene is a seriously over-described palm genus, with well over 90 names published at one time or another. Yet in the field in tropical Africa in a given locality it is often possible to recognize one or two distinct forms of *Hyphaene* that can easily be designated as species. It is finding the correct name for these species that proves to be challenging. The over-description of *Hyphaene* species is almost certainly a result of the way in which material of the genus reached European botanists. Furthermore, most of the botanists who described species in *Hyphaene* had no field experience and so were unaware of the plasticity of fruit form. *Hyphaene* is a prominent feature of many of the drier landscapes in Africa and early travelers could not fail to be impressed by the living palms that often displayed spectacular dichotomous branching and were so important in the local economy. It is thus not surprising that fragments of *Hyphaene* palms soon reached European herbaria. The genus was first described and named based on a single fruit of *Hyphaene coriacea* Gaertn. from coastal Kenya. Subsequent collections of the genus were often very incomplete, and botanists were forced to account for the variation in fruit form by describing ever more species (Beccari 1924). This was compounded further when fruits of *Hyphaene* reached Europe as samples for the vegetable ivory trade for button manufacturing. Eventually, over 90 names were published in the genus. So variable is fruit form that it is sometimes possible in the field to find examples of several "species" within the same infructescence. After fieldwork in East Africa it was possible to reduce the number of names in *Hyphaene* in the region from 75 to three (Dransfield 1986). Broad ranges of fruit form are linked with significant habit differences and the current concept of three variable taxa does seem to work for the most part in East Africa.

The research on *Hyphaene* for the Flora of Tropical East Africa also involved looking at the genus throughout the continent of Africa. Based on the concepts of variation in East African *Hyphaene* it was possible to make suggestions of how many taxa there might be elsewhere in Africa, but for lack of new field information it was felt that a full monograph was premature.

Now that we have excellent material of *Hyphaene* from West Africa we can sort out the identity of *Hyphaene guineensis*, leaving the *Hyphaene* spp of the Horn of Africa as the last major problem in the genus.

The confusion surrounding *Hyphaene guineensis*

Confusion in the botanical literature concerning the identity of *Hyphaene guineensis* as described by Thonning has led to an immense entanglement of names and misinterpreted identities. An elaborate account is given by Furtado (1970). The problem is partially caused by the loss of Thonning's type specimen and the subsequent denial of the presence of *Hyphaene* in lowland humid regions of West Africa. All this ignores the detailed account in the report of the German Loango expedition, where Guessfeldt (1879) and Peschuel-Loesche (1882) clearly mentioned the occurrence of *H. guineensis*, an erect, unbranched, single-stemmed fan palm that grows either alone or in open groups, or in extensive groves in sandy places along the sea-coast and never occurs in forest (fig. 3). The palm is reported to occur from the eastern part of Liberia eastward to the Niger delta and southward to Angola at 9º08' S at Barra de Cuanza (*Bamps et al. 4642* in BR). Subsequent requests from Furtado for material resulted in fruit

This page: 2 (top). Even-aged stand of *Hyphaene guineensis* at 'Jardin des Elephants,' Gabon. 3 (bottom). Juvenile at the seaward fringe of the beach vegetation.

Facing page: 4 (upper left). Stem covered in petiole bases. 5 (upper right). View of the crown showing young and old infructescences. 6 (lower left). Costapalmate leaf as seen from below. 7 (lower right). Carpet of fruits and seedlings at 'Jardin des Elephants.'

collections from a single-stemmed *Hyphaene* from coastal Ghana, whence *H. guineensis* was first described by Thonning. This allowed Furtado to assign a neotype and confirmed the coastal habitat of Thonning's *H. guineensis*. The remaining overrated importance of aberrant fruit forms still obscured the true identity of *H. guineensis*.

The newly collected material of *Hyphaene* in Gabon has allowed us to assess the type specimens of several names in *Hyphaene* and we are now able to circumscribe *H. guineensis* and to show how it can be distinguished from other species in the genus. Because it has such an unusual habitat and seems confined to a rather precise geographical area where other species of *Hyphaene* are unknown, there should be no difficulty in identifying it in the field.

Hyphaene guineensis Schumach. & Thonn., in H.C.F. Schumacher, Beskr. Guin. Pl.: 445. 1827. *Chamaeriphes guineensis* (Schumach. & Thonn.) Kuntze, Rev. Gen. Pl. 2: 728.1891. Neotype: West Africa: Ghana, loc. incert., *Colonial & Indian Exhibition of 1886 No. 92* (K) (see Furtado 1970).

Hyphaene depressa Becc., Palme Borass.: 48. 1924. Type: Congo River, *Naumann s.n.* (Holotype B†; drawing in FI), **synon. nov**.

Hyphaene mateba Becc., Palme Borass.: 47. 1924. Type: Angola, Benguela, *Gossweiler s.n.* (Holotype FI), **synon. nov.**

?*Hyphaene nephrocarpa* Becc., Palme Borass.: 48. 1924. Type: Congo, *fruit received from Colonial Museum, Marseille* (Holotype FI).

Hyphaene doreyi Furtado, Trab. Centro Bot. Junta Invest. Ultramar 15: 451. 1967. Type: Angola, Luanda, Caxito, *d'Orey 3* (Holotype LISC), **synon. nov.**

Hyphaene gossweileri Furtado, Trab. Centro Bot. Junta Invest. Ultramar 15: 452. 1967. Type: Angola, Luanda, Pangila, *Gossweiler s.n. A* (Holotype LISJC), **synon. nov.**

Hyphaene welwitschii Furtado, Trab. Centro Bot. Junta Invest. Ultramar 15: 459. 1967. Type: Angola, *Gossweiler s.n.* (Holotype LISJC), **synon. nov.**

Solitary dioecious pleonanthic tree palm; stems 6–20 m tall, very rarely branched (see illustration in Guessfeldt 1879, description in Pechuel-Loesche 1882) ca. 20–40 cm diam., covered with a lattice of old leaf bases (Fig. 4), later becoming bare, closely ringed with slightly raised leaf scars. Leaves induplicate, costapalmate (Fig. 6), marcescent, later abscising under their own weight, sheath soon becoming open, densely tomentose, later with a conspicuous triangular cleft below the petiole, margins fibrous; petiole robust up to 150 cm long, adaxially channelled, abaxially rounded with central dark bands, young parts covered with pale brown indumentum, the margins armed with robust triangular upward or downward pointed spines, adaxial hastula sometimes symmetrical sometimes oblique, erose, fringed, the prominent costa arching downwards, blade up to 180 cm long, ca. 200 cm wide, the segments up to 110 cm long, divided up to 2/3 their length, interfold filaments conspicuous, blade surface slightly glaucous, waxy, bearing minute dot-like scales and caducous indumentum particularly along the ribs. Staminate inflorescences interfoliar, branched to 2 orders, rachis up to 120 cm long, stalks waxy, covered in caducous rufous tomentum intermixed with stellate hairs; rachillae (Fig. 8) solitary or 2–5 together, up to 50 cm long, ca. 1.5 cm diam.; bracts on rachis silvery outside densely covered with red brown tomentum; bracts of the rachillae blackish brown with a red-brown fringe, densely stellate hairy (exposed upon drying). Staminate flowers with sepals imbricate, 2.5–3 × 1–1.5 mm, narrowly obovate with a rounded apex; corolla bright green, the tube ca. 2 mm high, the lobes 2–2.5 × 1.2–1.5 mm, spathulate and hooded; stamens with filaments pale yellow, connate by their fleshy bases, anthers yellow, dorsifixed, versatile. Pistillate inflorescences (Fig. 5) interfoliar, branched to 2 orders; rachis up to 100 cm long, stalks waxy, covered in caducous rufous tomentum intermixed with stellate hairs; rachillae solitary or 2–3 together, up to 35 cm long, 1–1.5 cm diam.; bracts on rachis silvery outside densely covered with red brown tomentum; rachilla bracts blackish brown with a red-brown fringe below the tepals, densely stellate hairy (exposed upon drying). Pistillate flowers only buds and young fruits observed. Fruit obliquely depressed, obovate/pyriform, flattened at the apex, rounded or obtusely trigonous (Fig. 9), 5–6.5. cm high, 6–7 cm diam., epicarp shining bright orange to red-brown, pitted; mesocarp fibrous; endocarp hard woody and fibrous. Seed irregularly shaped roughly following the outline of the fruit, up to 3 cm diam.; endosperm homogenous with a central hollow.

SPECIMENS EXAMINED: GHANA, loc. incert. (Colonial & Indian Exhibition of 1886 No. 92 (K, P) neotype; Tema Paradise Beach, March 1968, *Hossain GC 37578* (K). GABON. Ogoouè-Maritime, Petit Loango National Park, Oct 2002, *Van Valkenburg & Thomas 2500, 2501, 2502* (K, LBV, MO, P, WAG); Iguela, May 2003, *Van Valkenburg 2512*(K, LBV, MO, P, WAG); between Gamba and Sette Cama, March 2003, *Thomas s.n.* (K, LBV, WAG); between Gamba and Sette Cama (Jardin des Elephants), June 2003, *Van Valkenburg 2513, 2514*. (K, LBV, MO, P, WAG); Sette Cama, 1894,

Dybowski s.n. (F6710 in carpological collections) (P). CONGO (BRAZZAVILLE). Kouilou, Pointe-Noire, June 1989, *Dechamps 13086* (BR). CONGO (KINSHASA). Bas-Congo, Ile du fleuve Congo downstream from Boma, July 1913, *Bequaert 516* (BR); Kanga, Jan 1949, *Donis 2380* (BR),Vista, Sept 1953; *Wagemans 610* (BR, K), Aug 1956, *Dubois 1551* (BR); Luki, April 1971, *De Troch 2* (BR). ANGOLA. Luanda, near Bengo and Dande river, *Welwitsch 6* (K); *Gossweiler 9778* (K); *Gossweiler 42-1902* (K); ?*Gossweiler 161-02* (K); Barra do Cuanza, April 1973, *Bamps et al. 4642* (BR).

LOCAL NAMES: GABON: Doum (Gamba, Sette Cama). CONGO (KINSHASA): N'teva (Kikongo), Mateba (Moansa-Vista). ANGOLA: Ngunza (Cabinda).

USES: Traditionally the leaf segments were used for making coarse bags (for packaging peanuts and oil palm nuts) in Angola and Congo.

Notes

Occurrence in Gabon

Apart from some odd individuals up to 10 km south of Port Gentil, the species occurs from Iguela (1º 54´S) southward in appropriate habitats. It can be found alone in scrub or forest and can be encountered as single aged stands, or even in an open row parallel to the coast as if planted (Fig. 2). Regenerating uneven aged stands appear to be somewhat limited (Fig. 1).

In Gabon so far, *H. guineensis* is reported from sandy soils near the sea subject to saline influences. From 20 m inland from the high tide level on sandbanks up to 100 m inland in mixed relatively open coastal forest with *Manilkara*, *Phoenix reclinata* and *Zingiberaceae*. Photographs and drawings from Congo and Angola show *H. guineensis* in coastal tall grass savannah habitat.

Ecology

Pechuel-Loesche (1882) noted that *H. guineensis* can survive savannah fires without lasting effects; the crown may be completely burned but recovers in six months.

Predation and dispersal

The fruits are a preferred food of elephant, buffalo, pigs and apes. The large mammals are reported to wander about in the vicinity of fruiting groves during the major fruiting season in March–April. The ground underneath the palms tends to be trampled, and elephants are reported to bump into the trees to make the fruits fall. In areas with high densities of buffalo and pigs (such as Loango National Park) the vegetation underneath the even-aged, often senescent stands of *Hyphaene* resembles a closely cropped lawn with old fruits scattered and seedlings up to a 2-leaf stage only (Fig. 7). In areas where hunting and poaching have resulted in a decrease in buffalo and pig, and in stands near human settlements, *Hyphaene* regeneration is abundant. Coconuts tend to disappear soon after human settlements have been abandoned, whereas *Hyphaene* persists.

Fresh fruits have a fruity fragrance, resembling ripe pineapple or by some described as smelling of gingerbread. No sign of fruits in elephant dung could be found, so it is not clear whether elephants merely nibble at the fruits and spit them out or swallow them after munching. Obviously it is the fibrous mesocarp that is consumed; the very hard endosperm of various *Hyphaene*, enclosed in the thick woody endocarp, was formerly used as palm ivory (Fig. 4).

Germination

Like all other members of the tribe Borasseae, *H. guineensis* has remote germination. During germination the young seedling is pushed down as far as 30 cm and 2-leaf stage seedlings dug up had roots over 50 cm long. This may well be an adaptation to the relatively dry habitat. Germination trials at Kew showed two out of five seeds germinating after 75 days.

Additional name

Hyphaene luandensis Gossw. (Bol. Serv. Agric. Comerc. Coloniz. Forest. 1935: 77. 1935) published without description and hence a nomen nudum without botanical standing, almost certainly refers to *H. guineensis*.

Acknowledgments

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8 (top). Detail of male inflor-escence showing rachillae and flowers. 9 (bottom). Fruits, outward appearance, cut to show mesocarp, endocarp and endosperm; and old decayed fruits showing endocarp structure/texture.

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