

REDISCOVERY IN SINGAPORE OF *SALACCA AFFINIS* GRIFF. (ARECACEAE)

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INTRODUCTION

Salacca affinis Griff. is a palm of the swamp forest and was considered extinct in Singapore (Tan et al., 2008). This discovery in the Nee Soon Swamp Forest (NSSF) establishes its status from “extinct” in Singapore to “critically endangered” sensu Davison (2008) and this paper discusses the extreme vulnerability of this palm species in relation to its habitat and only known locality, the freshwater swamp forest in Nee Soon, which is the last of its kind in Singapore.

Although it belongs to the subfamily Calamoideae that contains all the rattan species, *Salacca affinis* however, it is not a rattan but a clumping acaulescent palm of the swamps. *Salacca* is derived from the Malay name “salak” and is known in this region for its sweet, and slightly tart fruit flesh (sarcotesta) covered by a scaly skin — “buah salak”. Not all species of salak are eaten and mainly *Salacca zalacca* is cultivated for its excellent fruit while other species that are eaten may be very sour (Dransfield et al., 2008). The species *Salacca affinis* is also recorded as being eaten (Johnson, 1992).

There are about 20 species that are formally described in the genus (Dransfield et al., 2008) with taxonomic revision of the entire genus by Furtado (1949), and the four flabellate species by Mogeia (1980). The genus *Eleiodoxa* was separated from *Salacca* by Burret (1942) but Furtado (1949) had included *Eleiodoxa conferta* as *Salacca conferta* in his revision. However separation of *Eleiodoxa* from *Salacca* is supported by differences in the development of inflorescence and vegetative buds (Fisher & Mogeia, 1980).

Within the subfamily Calamoideae, the genus was previously grouped within the subtribe Calaminae with the following rattan genera — *Eleiodoxa*, *Daemonorops*, *Calamus*, *Calospatha*, *Pogonotium*, *Ceratolobus*, and *Retispatha* but using sequences of the nuclear ITS regions and chloroplast *rp16* introns, Baker et al., (2000), resolved the genus as sister to *Eleiodoxa* in a well-supported clade and into the newly circumscribed bigeneric subtribe Salaccinae, grouping the other taxa in the Calaminae clade. Morphologically, the subtribe Salaccinae “is recognized by the extremely short internodes and by the abaxial or adaxial splitting of the prophyll in the inflorescence”.

SALACCA AFFINIS IN SINGAPORE

The NSSF is probably the only locality where *Salacca affinis* can be found in Singapore since the swamp forest is the natural habitat. The plant is not difficult to identify as an individual can form a large, acaulescent clump of erect pinnate leaves to 2–4 m tall. (However, *Eleiodoxa conferta*, which forms a large stand there, makes it hard to single out.) The petioles are armed with spines that are borne on scattered combs of 2–4 yellow-orange spines up to 10 cm long, with spines longer at the base. The spines are densely arranged at the base of the petiole and more evenly spaced on abaxial surface of the rachis. The leaflets are grouped and fanned adaxially within the groups along the rachis. The inflorescence is short, axillary, and emerging from the abaxial surface of the sheath of the subtending leaf through a slit. The genus is dioecious with either staminate inflorescences or pistillate inflorescences that have sterile staminate flowers. The prophyll is partly enclosed within the leaf sheath slit, tubular and tattering irregularly. There are several peduncular bracts that are tubular at the base and tattering. The rachis bracts are similar to the peduncular bracts. The male inflorescences are 50–100 cm long, branched, armed with elongated and flattened spines, and bear male flowers on cylindrical catkin-like rachillae 4–6 cm long. Female inflorescences are shorter, growing to 50 cm long, crowded with short branches and female flowers borne on catkin-like rachillae, growing to 3 cm long, and subtended by leafy bracts. The fruit is ovoid, approximately 4 by 8 cm, tapering to both ends, covered in smooth reflexed scales, and contain up to 3 seeds each.

COMPARISON WITH *ELEIODOXA CONFERTA* (GRIFF.) BURRET — A CLOSELY ALLIED PALM SPECIES ALSO FOUND IN NSSF

In Singapore, the subtribe Salaccinae are represented by *Salacca affinis* and the monotypic genus *Eleiodoxa*. Biologically and morphologically, the two genera are distinct but the herbarium specimens surveyed showed that many

historical specimens of *Eleiodoxa conferta* collected from swamps (e.g., in Jurong) were mis-identified as *Salacca affinis*. It is not difficult to distinguish the two in the field (see Fig. 1 showing clearly the distinguishable traits in the spines and leaflet arrangement that can be easily utilized in the field). However, similarities in their acaulescent habit and the fact that they may be found side by side in their natural habitat may have caused *Salacca affinis* to be overlooked and listed as extinct locally. *Eleiodoxa conferta* is the more predominant of the two in their locality and I could only observe one individual of *Salacca affinis* among the many individuals of former.

Table 1. Differences between *Salacca* and *Eleiodoxa* (Dransfield et al., 2008)

	<i>Salacca</i>	<i>Eleiodoxa</i>
Life history	Pleonanthic (except <i>Salacca secunda</i> and <i>Salacca</i> sp. nov. Henderson)	Hapaxanthic
Inflorescence	Inflorescence short, in bud enclosed within the subtending leaf sheath, at anthesis emerging from a vertical groove on the abaxial surface of the sheath	Inflorescence not enclosed in a vertical groove in the surface of the sheath
Terminal leaflets	Terminal leaflets compound	Terminal leaflets simple
Sarcotesta	Sarcotesta easily separable from the rest of seed	Sarcotesta adhering to rest of seed



Fig. 1. *Salacca affinis* — Base of the acaulescent clump in swampy forest floor and note the orange-yellow spines and arrangement of the spines (a); leaf showing the leaflets that are grouped and fanned within the group (b); the compound nature of the terminal leaflets (c). *Eleiodoxa conferta* — The base of the clump showing the white spines that are neatly arranged in groups (d); leaflets that are not grouped and are in two rows (e); the terminal leaflets are not compound (f). These two species share the same habitat in Nee Soon Swamp Forest but *Eleiodoxa conferta* is more common of the two acaulescent palms.

HERBARIUM SPECIMENS OF NATIVE SALACCINAE

An undated herbarium specimen of *Salacca affinis* (Kew Barcode: K000667486; Collector: G Rajasegar, Collector no: s.n.) was collected probably in 2000 for DNA fingerprinting but was not reported.

Table 2. Herbarium specimens of Native Salaccinae — *Salacca affinis* and *Eleiodoxa conferta*.

S/No.	Species	Collector	Collector's No.	Barcode	Date of Collection	Locality
1.	<i>Salacca affinis</i>	G. Rajasegar	s.n.	Kew Barcode: K000667486	c. 2000	Nee Soon Swamp Forest
2.		H. N. Ridley	s.n.	SING 0014924	1898	Bukit Timah
3.		H. N. Ridley	4421	SING 0014925	N.A.	Chan Chu Kang FR, FRNS
4.	<i>Eleiodoxa conferta</i>	J. Sinclair	10653	SING 0090756	1961	Mandai Forest
5.		Ridley, H.N.	3502	SING 0090757	1892	Chan Chu Kang FR, FRNS
6.		E. J. H. Corner	26200	SING 0090758	1933	Jurong
7.		H. N. Ridley	3143	SING 0090759	1891	Chan Chu Kang FR, FRNS
8.		I. Ngadiman	37933	SING 0090760	1949	Jurong
9.		C. X. Furtado	37923	SING 0090761	1948	Jurong
10.		I. Ngadiman	37934	SING 0090762	1949	Jurong
11.		I. Ngadiman	37934	SING 0090763	1949	Jurong
12.		I. Ngadiman	37934	SING 0090764	1949	Jurong
13.		H. N. Ridley	4622	SING 0090765	1892	Chan Chu Kang FR, FRNS
14.		I. Ngadiman	37933	SING 0090766	1949	Jurong
15.		I. Ngadiman	37933	SING 0090767	1949	Jurong
16.		I. Ngadiman	37933	SING 0090768	1949	Jurong
17.		I. Ngadiman	37933	SING 0090769	1949	Jurong
18.		C. X. Furtado	37923	SING 0090770	1948	Jurong
19.		C. X. Furtado	37923	SING 0090771	1948	Jurong
20.		C. X. Furtado	37923	SING 0090772	1948	Jurong
21.		C. X. Furtado	37923	SING 0090773	1948	Jurong
22.		D. Liew	SING 2008-13	SING 0043099	2008	Nee Soon Swamp Forest
23.		D. Liew	SING 2008-13	SING 0043147	2008	Nee Soon

CONCLUSIONS

Salacca affinis is the second palm species to be rediscovered in Singapore with *Pinanga simplicifrons* being discovered earlier in 2010 (Ang et al., 2010). Both were discovered in the NSSF in forest fragments on opposite sides of a road. The discoveries may be described as incidental and a more considered survey of this last remnant swamp forest may unravel a more accurate status of native species of palms and other flora and fauna.

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