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A note on *Pandanus* (Pandanaceae) in Taiwan

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Abstract. The identical plates provided in Li's (1963) "Woody Flora of Taiwan" and in vol. 5 of the "Flora of Taiwan" (Li, 1978) illustrate an indigenous species, *Pandanus odoratissimus* var. *sinensis*. On analysis, however, it is apparent that the plate shows elements of two genera and three species, chiefly of *Pandanus utilis* Bory, an introduced species, with figures of a single phalange and leaf segments from *Pandanus odoratissimus* L. f., and an unripe berry from *Freycinetia formosana* Hemsl. The elements in the plate are identified. The nomenclature of the species is discussed, and it is shown that *Pandarus odoratissimus* var. *sinensis* (Warb.) Kanehira is essentially the same as *Pandanus odoratissimus* L. f. var. *odoratissimus*.

Keywords: *Pandanaceae*; *Pandanus ordoratissumus*; Flora of Taiwan.

Introduction

In two recent treatments of *Pandanus* in Taiwan (Li, 1963, 1978) the same illustration has been used for *Pandanus tectorius* (*sensu* Hayata; in Li, 1963, as f. 364) and later for *Pandanus odoratissimus* var. *sinensis* (Warb.) Kaneh. (in Li, 1978, as Pl. 1532), showing it to be a single species wild in Taiwan; only the name has been changed. In the course of studying the genus *Pandanus*, this illustration was scrutinized to ascertain exactly what it represents. The results are reported in this note, which has two purposes: to settle the nomenclature of this species of *Pandanus*, evidently the only one indigenous to Taiwan, and to identify the several figures in the illustration (reproduced here as Fig. 1).

Note that it shows — the items are numbered here for convenience only — **1**) a staminate spike, **2**) an enlarged view of a staminal phalange (flower) from it, **3**) a pistillate infructescence with a solitary cephalium, **4**) a single phalange of 10 carpels, **5**) the top view of a phalange, **6**) a fragment of a leaf showing the midrib (the dorsal side with prickles) and one margin (with prickles), and **7**) a cross-section of a leaf (inverted).

This plate is intended to display the characters of the pistillate, staminate, and foliar organs of a single species. In fact, it is an assemblage of parts representing two genera and three species. An explanation of these elements follows.

The staminate inflorescence (1) and the staminate phalange or flower (2) are from the introduced, cultivated Mascarene species *Pandanus utilis* Bory. It has not been possible to determine exactly the source of the specimen illustrated, but as this species is reported to be cultivated in Taiwan (Li et al., 1979, p. 73) the drawings could have been made from fresh or herbarium specimens collected in Taiwan, and simply misidentified. The subumbellate form of the staminate flower in *Pandanus utilis* is highly characteristic and entirely different from that found in *Pandanus tectorius* or *Pandanus odoratissimus*, both of which have racemosely arranged stamens.

The pistillate head (3) is also clearly that of *Pandanus utilis* Bory, as can be seen from the small paucilocular phalanges, and from the comparatively short, acicular prickles of the leaf margins. Again, the specimens used for preparing the drawing have not been traced, but could well have been from a cultivated example of this species growing in Taiwan.

The carpellate phalange (4) is, however, probably that of *Pandanus odoratissimus* L.f. (which is the correct name of the one wild Taiwan species) although the stigmas are depicted as ascending and subulate, unusual in this species. The phalange shown is probably unripe, as no 'shoulders' are visible, and the line showing interphalange contact is lacking.

The phalange apex with 6 stigmas (5) is apparently that of a single berry of *Freycinetia formosana* Hemsl., the only species of this genus in Taiwan. This illustration is almost identical with the view in Pl. 1531 in Li (1978). It is possible, however, that the figure is intended to be the apex of an immature phalange of *Pandanus utilis*.

The leaf details (6 and 7) probably show *Pandanus odoratissimus*; at any rate, the prickles (6) are sufficiently coarse to indicate that species. The cross-section

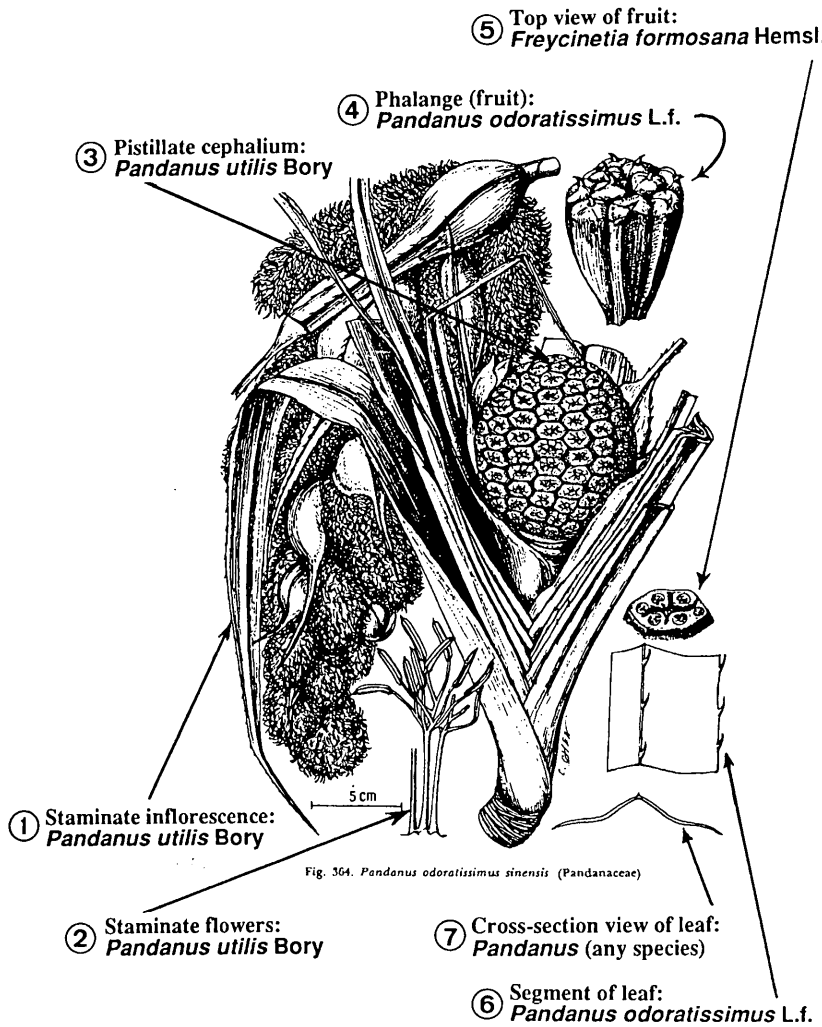

Fig. 1. Identification of the various components of Fig. 364 of "Woody Flora of Taiwan" and Fig. 1532 of "Flora of Taiwan" vol. 5 "*Pandanus odoratissimus* var. *sinensis*" (Pandanaceae). Two genera and three species are shown. The staminate inflorescence, staminate flowers, and pistillate cephalium all belong to *Pandanus utilis* Bory, a Mascarene species introduced into cultivation in Taiwan and elsewhere. The single fruit phalange is from *Pandanus odoratissimus* L.f., the one indigenous species of the genus in Taiwan, and the leaf segment and cross-section view of the leaf are probably also from this species. The small top view of a fruit is probably that of *Freycinetia formosana* Hemsl., a Taiwanese indigenous species in the same family.

view (7) could be that of almost any species of *Pandanus*.

Thus on analysis, the plate purporting to show *Pandanus odoratissimus* var. *sinensis* (Li, 1978) or *Pandanus tectorius* (Li, 1963) instead provides clearly identifiable views of organs of two different species of *Pandanus* — but chiefly of the introduced, cultivated species, *Pandanus utilis*. Moreover, *Freycinetia*, the other genus of Pandanaceae occurring in Taiwan, is possibly represented by one figure (5) in the plate. Only the leaf fragment views (4, 6) and the semi-ripe phalange (4) are definitely taken from *Pandanus odoratissimus*.

Taxonomy

Having clarified the elements in this illustration, it is necessary to discuss the taxonomic question of species identity. For the one species occurring naturally in Taiwan, the name *Pandanus odoratissimus* L.f. is, in my opinion, correct. The distinction of the variety, var. *sinensis* (Warb.) Kanehira, is unnecessary. Warburg established this variety as a subordinate taxon within *Pandanus tectorius* Sol. (now correctly cited as *P. tectorius* Park. ex Z.), basing it on material from Hong Kong and South China, but he regarded *P. odoratissimus* as a synonym of *P. tectorius*. When *P. odoratissimus* is maintained as a separate species, the variety becomes a synonym of *P. odoratissimus* var. *odoratissimus*. This question has been fully discussed earlier (Stone, 1967). Although the two species are very closely related, they can be distinguished. Matsumura and Hayata (1906) also identified the Taiwanese species as *Pandanus odoratissimus*. Later, however, Hayata (1919) and then Liu (1962) referred to it as *P. tectorius*, thus following the classification of Warburg (1900). The varietal status

of var. *sinensis* therefore makes sense only within a broader identity for which the name *P. tectorius* can be used. While nomenclaturally permissible, adoption of the name *P. odoratissimus* var. *sinensis* is redundant, as no morphological differences of any value appear to distinguish it from the typical variety, var. *odoratissimus*. Consequently, the Taiwanese plants are correctly designated as *Pandanus odoratissimus* L.f.

Pandanus utilis Bory is originally from the Mascarene Islands and has been in cultivation for at least 200 years, both as an ornamental and as an economic plant. Today it is found in many gardens in various parts of the world, including Asia, Africa, the Caribbean Islands, Brazil, Florida, etc. Formerly the leaves were used to weave bags for the export of sugar, a crop long grown in Mauritius. The red margins of the leaves, with reddish prickles, and the very glaucous undersides, are very distinctive features that allow this species to be readily distinguished from *P. odoratissimus*, which has white prickles of greater length, though the leaf undersurfaces may also be glaucous. Most probably, there are by now other species of *Pandanus* in cultivation in Taiwan (for example, various horticultural forms with variegated or striped leaves, most of which are referrable to *Pandanus tectorius*, and perhaps others also). A fuller account of these needs to be prepared.

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台灣露兜樹屬（露兜樹科）小註

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「台灣木本植物誌」和「台灣植物誌」（第五卷）附了同一張自生種林投 (*Pandanus odoratissimus* var. *sinensis* (Warb.) Kanehira) 的插圖，但該圖卻涵蓋了二屬三種植物的性狀，包括引進種麻露兜 (*Pandanus utilis* Bory) 的特徵，及林投 (*Pandanus odoratissimus* L.f.) 的核果和葉的片斷，與山露兜 (*Freycinetia formosana* Hemsl.) 的一個未成熟漿果。本文將該圖的各部份都重新予以標明，討論林投的命名，並指出 *P. odoratissimus* var. *sinensis* (Warb.) Kanehira 和 *P. odoratissimus* var. *odoratissimus* L.f. 是同一植物，所以台灣產的林投正確學名應爲 *P. odoratissimus* L.f.。

關鍵詞：露兜樹科；露兜樹屬；林投；台灣植物誌。