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# *Xanthosoma blandum* Schott (Araceae) neotypification, a first report for Suriname with notes on its floral biology and on ethnobotany of the genus in the country

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## ABSTRACT

*Xanthosoma blandum* Schott is reported for the first time in Suriname and the species is redescribed. The species is neotypified with Schott Icones images. Observations on its biology are reported for the first time, and it is compared with similar, cultivated species of the genus *Xanthosoma* in Suriname.

**Key words:** *Xanthosoma*, phenology, flower visitors, cultivated plants, Suriname

## INTRODUCTION

Recently, a revision was published for *Xanthosoma* for the region of the Guianas, specifically for Guyana, Suriname and French Guiana (Croat et al., 2017). Subsequently, in June 2020, the second author discovered *Xanthosoma blandum* Schott, a species not included in that revision despite that it is now known from both Suriname and French Guiana. The species had already been reported for French Guiana in a paper discussing the cultivated species of *Xanthosoma* (Gonçalves, 2011) but this was overlooked by Croat & Delannay. This paper redescribes *Xanthosoma blandum* Schott and adds new details. The species is neotypified with illustrations from H.W. Schott's Icones. Although the species was not reported in Schott's 1860 *Prodromus systematis aroidearum* it was later published in an article in *Bonplandia* (Schott, 1862). Schott attributed the original material to a Wallis collection from Brazil in Pará, as was noted on some of the Schott Icones (# 3725 & 3726) but it must be presumed that all of the drawings were made from the same living material and these latter images incomplete, lacking leaves, so the first three drawings (Icones 3722, 3723 & 3724) have been selected to neotypify the species. Also reported in this paper are observations about phenology, flowering, flower visitors and the habitat of *Xanthosoma blandum* and discusses similar, cultivated *Xanthosoma* that occur in Suriname.

### Redescription and neotypification of *Xanthosoma blandum* Schott

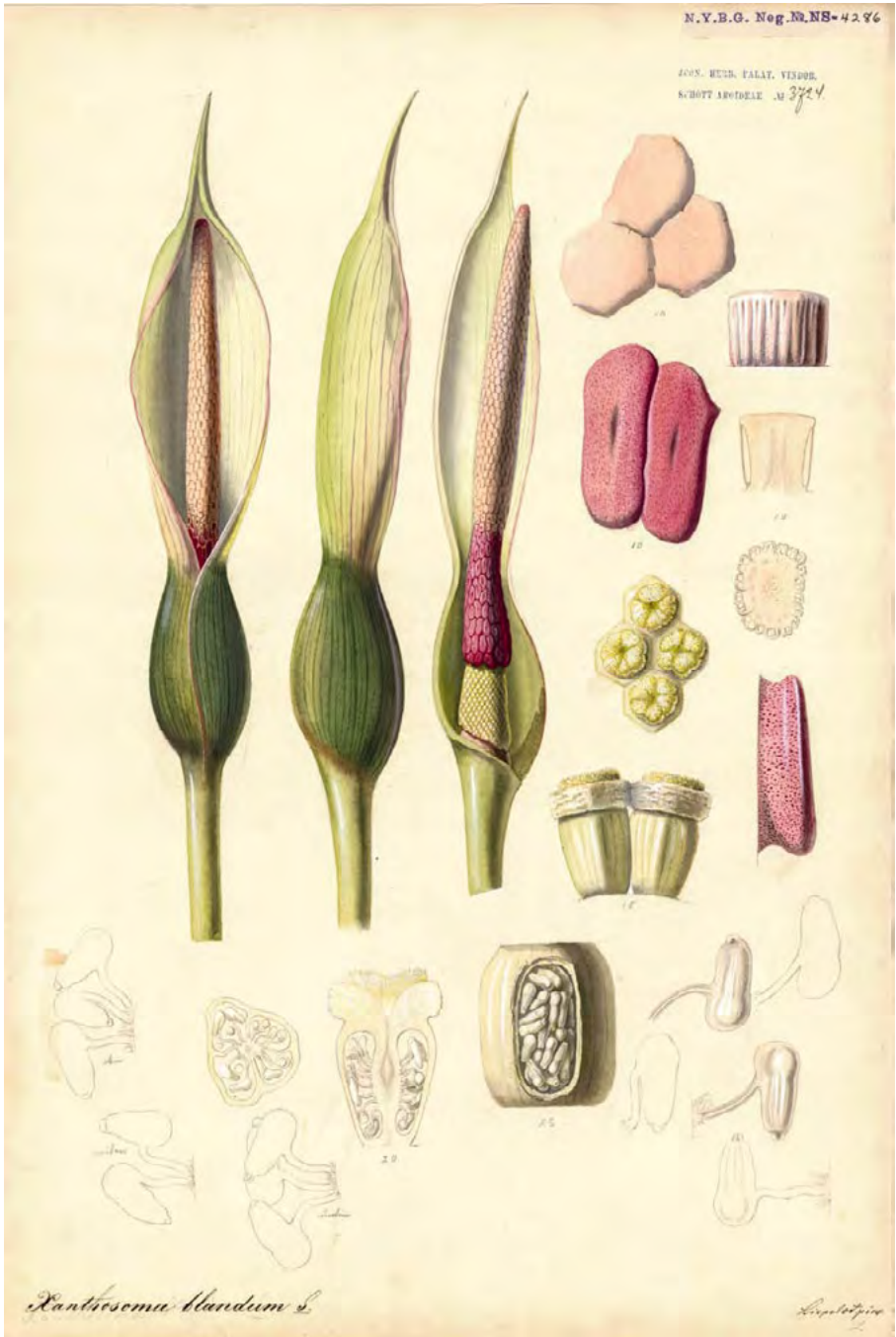
*Xanthosoma blandum* Schott, *Bonplandia* 10: 346–347. 1862. — *Xanthosoma mafaffa* var. *blandum* (Schott) Engl. in Martius, Fl. Bras. 3(2): 193. 1878. — Neotype: Schott drawings



**Figure 1:** Part 1 of the neotype of *Xanthosoma blandum* Schott. Schott drawing No. 3722, of the leaf blade abaxial surface. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NhMW-AfW-HWSB0118); reproduced with permission].



**Figure 2.** Part 2 of the neotype of *Xanthosoma blandum* Schott, Schott drawing No. 3723, of the leaf blade adaxial surface. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NhMW-AfW-HWSB0119); reproduced with permission]



**Figure 3.** Part 3 of the neotype of *Xanthosoma blandum* Schott, Schott drawing No. 3724, analytical illustration of floral parts. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NhMW-AfW-HWSB0120); reproduced with permission]

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Nos 3722, 3723 & 3724 (W! inventory nos NhMW-AfW-HWSB0118, NhMW-AfW-HWSB0119 & NhMW-AfW-HWS0120 respectively, examined as digital scans, designated here).

**Note:** The three painted drawings designated as the neotype comprise images of the leaf abaxial surface, the leaf adaxial surface, and an analysis of the floral parts; they constitute complementary elements of a single entity for the purpose of typification. **Figures 1–3.**

### Description

Modestly large terrestrial herbs to 1.6 m tall, but often reaching just half of this size (**Figures 4, 5**). Stems subterranean, rhizomatous; internodes cylindrical, up to 7 cm diam., moderately covered by brown fibers, branching profusely in older plants, producing sparse globose-turbinate cormels. LEAVES 3–5 per plant; petioles 30–98 cm long, green, never conspicuously waxy, usually brownish at base, sheathed up to 1/3 of its length, sheath convolute; blades (**Figure 6**) 32–67 cm long, 19–40 cm wide, 1.2 times as long as wide, ovate-sagittate in both young and adult plants, semiglossy green above, paler and matte below, acuminate at apex, prominently lobed at base; anterior lobe broadly convex along margins; posterior lobes narrowly pointed, directed toward the base and slightly outward; posterior ribs naked 2–4 cm, basal lobes slightly extrose, acute at apex; midrib obtusely sunken and concolorous to paler than blade above, narrowly rounded and concolorous below; primary lateral veins 5–6 per side, obtusely sunken, arising at an angle of 50–60°, weakly sunken above, narrowly rounded below, color same as midrib. *Inflorescences* (**Figures 6–11**) 1–3 per axil; peduncle 30–45 cm long, 8–11 mm diam.; spathe 17–24 cm long, tube (4–)6–7 cm long, (2–)3–4 cm diam., green outside, tinged with reddish pink, green with coppery hue on inside, blade 13–17 cm long, (3–)5–6 cm maximum width (at anthesis) white with a pinkish tinge on especially the outer surface; spadix 15–17 cm long, fertile male portion white to pink, 7.5–9 cm long, 9–10 mm diam.; sterile male portion 5.5–6 cm long, 7–11 mm diam., markedly thickened at base, 7–8 mm diam. at apex, entirely pink during the female anthesis phase of the inflorescence (as in **Figure 11**), but varied in color during the male phase (as in **Figure 7**), the lowermost infertile male spiral initially whitish pink, turning grayish with black-purple blotches with staminodia 7 mm long, 13 mm wide; second spiral from base with staminodia trapezoidal to oblong, obtusely acute at both ends, initially pink, turning dark red-purple, 7–8 mm long, 4 mm wide 3<sup>rd</sup> row from base with staminodia reddish pink, the remaining portion of the staminodial spadix ca. 4 cm long, thickened on both ends, narrowed to 4–5 mm at narrowest point, orange-pink to orange-red narrowing distally, with increasingly smaller florets, the entire axis markedly curved back toward the inner surface of the spathe and tapered upward until broadening again and merging with the fertile staminate portion of spadix, the entire sterile staminate spadix eventually oxidizing dark purple below the most constricted portion; female portion of spadix 1.5–2 cm long, (8)11–13 mm diam., yellow; pistils ca. 10 per spiral, 1–2 mm long, 1–2 mm diam.

Vernacular names: Taiobinha (Brazil), Tayer / Taya (Suriname).

**Distribution and ecology** — *Xanthosoma blandum* ranges from Suriname to French Guiana and northern Brazil. Gonçalves (2011) reported the species to be uncommon in cultivation



**Figure 4.** *Xanthosoma blandum* Schott, *in situ* forming dense patch along dirt road in abandoned plantation / secondary forest at Cultuurtuin, Paramaribo (Suriname), June–August 2020.

but common as weeds around Manaus in the upper Amazon. He also reported that the late Julius Boos, a naturalist from Florida and a native of Trinidad, had reported it from French Guiana. This paper reports the species for the first time from Suriname.

**Comments** — The species is characterized its branched underground cylindroid rhizomes often with globose-turbinate cormules, petioles which are sheathed to about a third their length with a convolute sheath, a modest ovate-sagittate acuminate leaf blade (32–67 × 19–40 cm) which is semiglossy above and matte below with prominent acute, spreading posterior lobes with basal veins about 6 pairs, the first of which is free to the base with the remaining basal veins mostly fused into a straight posterior rib that extends to the tip of the somewhat extrorse posterior lobes and with a naked portion only 2–4 cm long, in addition to 1–3 long-pedunculate inflorescences per axil with a usually pink sterile staminodial segment and often a pinkish staminodial section and a yellowish pistillate spadix.

#### ***Xanthosoma blandum* phenology, floral biology, and habitat**

Live plants were observed by the second author, *in situ* in an abandoned plantation / secondary forest at the Cultuurtuin (see **Figure 4**), a forested green space in Suriname's capital Paramaribo, and *ex situ* (transplanted) in the second author's garden nearby, also in Paramaribo. Herbarium specimens (in triplicate) were prepared for reference, using plants excavated from the Cultuurtuin location; these were deposited at the National Herbarium



**Figure 5:** *Xanthosoma blandum* Schott, at Cultuurtuin, Paramaribo (Suriname), excavated individuals (caliper of 22 cm length serves as size reference).



**Figure 6:** *Xanthosoma blandum* Schott, at Cultuurtuin, Paramaribo (Suriname), leaf blade (adaxial view).





**Figure 7:** *Xanthosoma blandum* Schott, at Cultuurtuin, Paramaribo (Suriname), inflorescence in male phase, artificially opened (note scale on caliper). Images by Bart De Dijn.



**Figure 8.** *Xanthosoma blandum* Schott, timed series photographs of the inflorescence during anthesis, with female phase starting on the evening of day 1 and male phase on that of day 2. Recorded 23–25 September 2020 at Paramaribo, Suriname. Images by Bart De Dijn.



**Figure 9:** *Xanthosoma blandum* Schott, at Cultuurtuin, Paramaribo (Suriname), December 2020 – January 2021: Inflorescence in female phase cut open in vivo, visited by Ceratopogonidae (Diptera) midges.

of Suriname (BBS). Observations were started in July 2020 and continued opportunistically at 1–2 weekly intervals into February 2021. *Xanthosoma blandum* was observed flowering *in situ* during the entire period, except October–November 2020 (peak of “long dry season”) and February 2021 (onset of “short dry season”). During these two relatively dry periods, vegetative growth was observed to also cease or at least slow down considerably; as a result, in November 2020, most *Xanthosoma blandum* individuals observed were entirely leafless and inconspicuous.

The development of three inflorescences was observed closely *ex situ* in Paramaribo in September 2020, from first emergence of the budding inflorescence until the end of anthesis 8–11 days later. The following sequence of events was observed (illustrated in **Figure 8**):

- on the first day of anthesis (female phase) the blade of the inflorescence opened around 5 and 7 pm and stayed open till the next evening (day 2); a strong aromatic fragrance was emitted by the inflorescences on this first day of anthesis only, most pronounced between 7 and 9 pm when the spathe blade was open wide;
- on the second day of anthesis (male phase), pollen release was observed shortly after 6 pm; at this time the inflorescence (at least the spathe blade) already showed first or advanced signs of wilting; and
- by the beginning, or at least the end of the next / third day, the spathe blade was closed / semi-closed and obviously wilting; at this time a new developing inflorescence was observed to start emerging from the subtending petiole.

The look and smell of the *Xanthosoma blandum* inflorescences was similar to that of other plants – in particular several Araceae species – heavily visited by Cyclocephaline beetles in



**Figure 10:** *Xanthosoma blandum* Schott, at Cultuurtuin, Paramaribo (Suriname), December 2020 – January 2021: Detail of spathe with midge.

the Paramaribo area. Such beetles were only rarely observed on *X. blandum* (opportunistic observations done by second author *in situ* over an 8-month period at various times of day between 7 am and 7 pm): at only 2 out of an estimated total of 20 inflorescences Cyclocephaline visitors were observed, in both cases *Cyclocephala amazona* (see **Figure 11** identified by second author), on January 23<sup>rd</sup> and 29<sup>th</sup>, 2021, both around 6 pm (resp. 1 beetle on a male phase, and 2 on a female phase inflorescence). Earlier, in August 2020, small Diptera in flight were observed *in situ* on one occasion around 7 pm near an *X. blandum* inflorescence in female phase. On December 26<sup>th</sup>, 2020, a window was cut out of an inflorescence in female phase (on a live plant *in situ*), to better observe the female part of the spadix (see **Figure 9**). Between 6:00 and 6:30 pm several small Diptera were observed on both the spathe and the female and male parts of the spadix; these were *Ceratotopogonidae* (**Figure 10** identified by second author). Whether or not the two visitor taxa observed can be effective pollinators of *X. blandum* was not investigated. This said, the second author did observe that the 2 inflorescences visited by *C. amazona* did not develop into infructescences; not a single infructescence was observed *in situ* during the entire 8 months of observation. *Ceratotopogonidae* are known as visitors / pollinators of some Araceae, but have not been previously recorded as visitors (let alone pollinators) of *Xanthosoma* or other Caladieae; on the other hand, such plants have been shown to be



**Figure 11:** *Xanthosoma blandum* Schott, at Cultuurtuin, Paramaribo (Suriname), December 2020 – January 2021: Inflorescence in female phase visited by *Cyclocephala amazona* (Coleoptera: Scarabeidae). Images by Bart De Dijn.

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pollinated by Cyclocephaline beetles (based on recent reviews: Gibernau, 2003; 2011; 2016). In Suriname, *Xanthosoma blandum* is at present known only from the Paramaribo metropolitan area, more specifically the main forested part of the Cultuurtuin (05°50'42.0"N, 055°09'33.9"W). The Cultuurtuin contains an about 35 ha secondary forest remnant located on the marshy to dryland sandy soil that is typical of the fossil Holocene beach ridges of the Suriname Young Coastal Plain (generally no more than 2 m above sea level) (De Dijn *et al.* 2018). It is a former plantation (17–19<sup>th</sup> century; e.g. plantain cultivation) that was abandoned, and in the early 19<sup>th</sup> century transformed into an experimental garden (with e.g., a substantial section with different cultivars of cacao, *Theobroma cacao*, as well as *Erythrina poeppigiana* shade trees). The garden has been poorly maintained for many decades, and part has reverted to mature secondary forest dominated by *Hura crepitans*, but includes invasive exotic species such as *Castilla elastica*, *Elaeis guineensis* and *Bambusa vulgaris*.

### Notes and discussion on cultivated *Xanthosoma*

Whether *Xanthosoma blandum* is native to Suriname, or a cultivated species that has naturalized, is unclear. Similar terrestrial aroid species of the genus *Xanthosoma* that are cultivated in Suriname are easily confused with it (see below), and this is likely why *X. blandum* has escaped earlier detection. No species-specific local name or current use has been recorded for *X. blandum*; the local name “tayer” or “taya” is widely used in Suriname to designate any terrestrial aroid.

In the Cultuurtuin and elsewhere in the Paramaribo metropolitan area, a set of cultivars we tentatively group here under the name *Xanthosoma* cf. *taioba* (*sensu* Gonçalves, 2011) also occurs; they are quite variable vegetatively and may resemble *X. blandum*. The two species can best be distinguished based on the presence or absence of a naked section of posterior rib. With *Xanthosoma* cf. *taioba* the posterior rib has no naked section at all, while in *X. blandum* there is an about 2–4 cm long naked section.

Stature, leaf size and petiole color is quite variable in *Xanthosoma* cf. *taioba*. The most widely cultivated variety of *X. cf. taioba* in Suriname is known locally as “tayerblad” or “tayawiri” (about 50–70 cm tall with strongly waxy, dark petioles and leaf blades of about 10–30 × 20–50 cm). Another popular one in Suriname is called “boterblad” or “botrowiri”; it is very similar but entirely plain green, and often smaller. For both of these cultivars the leaves and petioles are minced, cooked and eaten in Suriname. Both have only been observed in garden plots or abandoned garden plots, and very rarely produce inflorescences. They are mentioned as cultivars of *Xanthosoma sagittifolium* in an old monograph of useful and ornamental plants of Suriname (Ostendorf, 1962). Another *Xanthosoma* cf. *taioba* variety has been observed by the second author in Suriname that is distinctly larger (stature up to 1.2 m with the leaf blades up to 40 × 65 cm) and entirely green (leaves, including petioles). It can be differentiated from the above mentioned cultivars based on the rhizome, which in mature plants is about 4 cm wide and 6–8 cm long, and not entirely hypogeous, typically exposed, lying flat on the soil. It is also referred to as “tayerblad” by the few people that opportunistically eat the leaves. We have found no prior reference to this variety, which was observed in marshy secondary habitat outside of gardens, including in the Cultuurtuin. It is unclear if this is a cultivar or a wild form; no fertile individuals were observed.

A species that resembles *Xanthosoma sagittifolium* (*sensu* Gonçalves, 2011) is another one

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cultivated in Suriname, but less so in the Paramaribo metropolitan area. It is known locally as “pomtayer” or “pontaya”. The leaves are very similar to those of *Xanthosoma* cf. *taioba*, but they are much larger (length of leaf blade often well over 80 cm) with the mature plant as a whole also much larger (about 2 m tall). Contrary to both *Xanthosoma* cf. *taioba* and *X. blandum*, mature *X. cf. sagittifolium* individuals have a thick (ca. 10 cm diam. or larger) exposed, upright rhizome. The rhizome is harvested when the plant becomes fertile. It is grated, treated with citrus juice, braised chicken meat is added, and the mix is baked in an oven like a brisket. The finished dish is called “pom” and is considered Suriname’s national dish.

Apart from the already mentioned *Xanthosoma* spp., additional species of this genus are cultivated in Suriname. Ostendorf (1962) mentioned most of them, and regarded all of them as varieties of *X. sagittifolium*, but taking into account Gonçalves (2011), Gonçalves *et al.* (2012) and Gonçalves pers. comm., this does not reflect the current / evolving state of taxonomy of the genus *Xanthosoma*. Since we have not been in a position yet to study them closely, we will suffice with a brief annotated list:

- *Xanthosoma* cf. *poecile*; a local cultivar called “tyongo-tyongo-taya” (also known as “finga-taya”) very much resembles *X. poecile* (formerly *Caladium poecile*; cf. Gonçalves *et al.* 2012) both in morphology (e.g. peltate leaves) and color (parts of leaf purple), as in use (large corms are cooked and eaten in stew or soup like potatoes).
- *Xanthosoma* sp. “su-taya”; resembles the previous one in many respects, incl. color, corms and use, but the leaves are not peltate.
- *Xanthosoma* sp. “weti-taya” (also known as “finga-taya”, like *X. cf. poecile*); resembles the previous one, but leaves are plain green (no purple parts).

In Suriname, these three species / cultivars are traditionally planted and seemingly exclusively used by Maroons (descendants of Africans that escaped from bondage and established independent nations in the interior of the country). Contrary to the other *Xanthosoma* mentioned earlier, these three produce large, starchy corms / cormules that are cooked. The local names recorded by Ostendorf (1962) for these species / varieties do not fully match the names the second author found currently in use, but current and Ostendorf’s reported use appear to be identical. It should be noted that Suriname is culturally and linguistically very diverse, which often results in arrays of alternative, sometimes equivocal plant names; the use of names also changes over time.

Further study of the *Xanthosoma* species / cultivars being used in Suriname seems warranted, not in the least those used exclusively by Maroons. An intriguing preliminary observation is that current use of *Xanthosoma* spp. by Indigenous (Amerindian) peoples in Suriname is very limited (similar to or less than that by the metropolitan population), while Maroons use additional species in at least one additional way. Given that *Xanthosoma* is an endemic Neotropical genus and that these Maroons are descendants of Africans that did not arrive in the New World until the 16–17th century, is it possible that they have preserved species / cultivars that their ancestors learned to use from now-extinct Amerindian nations, during the time of first contact? Also, could the ancestors of current Amerindian nations in Suriname have abandoned these cultivars or were they never used by them?

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## Conclusions

*Xanthosoma blandum* is redescribed in detail with new observations on the coloration, shape and disposition of the pistillate spadix, the fertile staminate spadix and the various parts of the sterile staminate spadix that have proven to be one of the best taxonomic characters to separate species of *Xanthosoma* (Croat et al., 2017a; Croat et al., 2017b).

Based on observations in Suriname from July 2020 till February 2021, *Xanthosoma blandum* produces new leaves and inflorescences during prolonged wet periods, but not during prolonged dry periods; by the end of the main dry season in 2020, most individuals lacked both fertile parts and leaves. Observations were made of inflorescences during anthesis over a 3-day period, denoting the timing and duration of scent production and the production of pollen. The species agrees in floral characteristics with other *Xanthosoma* species that are beetle-pollinated. We observed both *Cyclocephala amazona* and *Ceratopogonidae* as flower visitors *in situ* in Suriname.

*Xanthosoma blandum* was compared with cultivated species known from Suriname, *X. cf. taioba* Schott, *X. cf. sagittifolium* Schott., *X. cf. poecile* and other *Xanthosoma* species / varieties whose identity is also uncertain at this stage. Notes are added as to local names and usage in Suriname. It was concluded that *Xanthosoma* species / varieties used in Suriname merit further study, e.g. to adequately identify them, more fully document their local names and use, and understand their origins.

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