

## THE STATUS AND DISTRIBUTION IN SINGAPORE OF *CALANTHE PULCHRA* (BL.) LINDL.

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### INTRODUCTION

This paper documents the distribution and status of *Calanthe pulchra* (Fig. 1) in Singapore. *Calanthe* is a widely distributed genus of about 150 species, occurring in Africa, Madagascar, islands of the Indian Ocean, India, China, Japan, through Southeast Asia to New Guinea, Australia, and the Pacific islands (Comber, 1990, 2001; Seidenfaden & Wood, 1992). In Southeast Asia, there are 16 *Calanthe* species occurring in Thailand, three of which are endemic; 21 species in Peninsular Malaysia, seven of which are believed to be endemic; 13 species in Java, with two endemics; 21 species in Borneo, with nine endemics, and 27 species in Sumatra, with 10 endemics (Comber, 2001). In Singapore, only *Calanthe pulchra* has been recorded, with the last specimen being collected from the Nee Soon Swamp Forest in 1957. This species was considered nationally extinct until discovered again in 2005 during forest surveys carried out the National University of Singapore (NUS) and is now listed as nationally critically endangered (Tan *et al.*, 2008).

The generic name *Calanthe* is derived from the Greek words “kalos”, which means “beautiful”, and “anthos”, which means “flower” (Comber, 1990). The genus is further divided into three sections: *Preptanthe*, *Styloglossum*, and *Calanthe* (Comber, 2001). The members of the genus are characterized by being mostly terrestrial, bearing pseudobulbs that are only distinct in old leafless growths (Comber, 2001). Leaves of the species are often plicate (pleated) and evergreen, with the exception of some deciduous species in the section *Preptanthe*.



Fig. 1. *Calanthe pulchra* plant growing in thick leaf litter in the understory of the Nee Soon Swamp Forest. Plant height = 75 cm. (Photograph by: Alvin Francis Lok Siew Loon).



Fig. 2. Many-flowered inflorescence. (Photograph by: Alvin Francis Lok Siew Loon).

The inflorescence arises from the base of the plant, is erect, many-flowered, and has a long stalk and an unbranched rachis. Flowers in most species are resupinate, with free sepals and petals, and a spurred lip (developed from one of the petals) often with a callus joined to the column. The column lacks a foot and has eight pollinia in two groups of four.

Throughout their range, *Calanthe* species are particularly vulnerable to increasing development, owing to over collection for the ornamental trade as well as habitat destruction (Comber, 1990). As *Calanthe* species grow in rich soils, their habitats are often cleared for growing crops. Unlike other terrestrial orchid genera such as *Eulophia*, *Calanthe* species have no underground storage parts. Hence, they are unable to survive frequent forest clearing, disturbances, as well as fires that are becoming rampant throughout their distributions.

*Calanthe pulchra* (= *Calanthe curculigoides*) is a large terrestrial orchid growing up to 75 cm tall. The pseudobulbs are small and close to one another, with each bearing five to six leaves (Fig. 1). The leaves are elliptic, acuminate, and plicate, 40–70 cm long and 5–10 cm wide, with a 10–18 cm long stalk (Fig. 1). The inflorescence is usually shorter than the leaves. The inflorescence stalk is about 35 cm long and bears 40–60 resupinate flowers on the slightly shorter rachis (Fig. 2). The floral bracts are large, lanceolate, acuminate, and longitudinally concave upwards, usually falling off before the opening of the flowers (Fig. 2). The orange flowers do not open wide and possess a ventral lip that shows a deeper orange or red at the side lobes (Fig. 3). The sepals are concave, elliptic, acuminate, measuring about 1.5 cm long by 7 mm wide, with the lateral sepals being smaller than the dorsal sepal. The petals are similar to the sepals but differ in that they are not as concave and acuminate, and are 1.3 cm by 6.6 mm. The lip, like that in most *Calanthe* species is trilobed, with the side lobes spreading outwards and partially erect, obtuse and nearly truncate, about 3 mm long, with the mid-lobe rectangular, obtuse with its apex either shortly apiculate or indented, with a distinctly hooked spur. The column is 5 mm long and rather thick, possessing a very distinct hooked tip at the flower stalk (Fig. 4) (Comber, 1990, 2001; Keng et al., 1998; Seidenfaden & Wood, 1992). *Calanthe pulchra* occurs in Thailand, Peninsular Malaysia, Java, Borneo and the Philippines in wet, lowland forests to hills up to 1000 m (Comber, 1990, 2001; Seidenfaden & Wood, 1992).

This species is also known to be an allotetraploid, forming polyploid spores possibly caused by premeiotic disturbance, faulty anaphase disjunction, failure in meiosis I or II, or co-orientation of the two spindles during the second metaphase (Arditti, 1993). Higher ploidy in orchids has been associated with an increase in size of plant parts, such as thicker wider and darker leaves as well as sturdier flowers which last longer. Hence, tetraploidy may be a reason for the large stature of this species.

### PAST AND PRESENT RECORDS

*Calanthe pulchra* was previously collected at Ang Mo Kio, Bukit Mandai, Bukit Timah, Choa Chu Kang, Nee Soon, Seletar and Toa Payoh with the last collection being on 5 Mar.1957 by Chew Wee Lek at Nee Soon Swamp Forest. It was also said to be common in the swamp forests at Jurong and Mandai (Corner, 1978). Since it was not recorded or collected for a long time, it was presumed nationally extinct (Turner et al., 1994), until it was rediscovered at Nee Soon

Table 1. Previous Singapore collections of *Calanthe pulchra* (Bl.) Lindl. deposited in the Herbarium, Singapore Botanic Gardens (SING).

S/No.	Bar Code No.	Collector	Collector's No.	Date Collected	Locality
1.	0010584	H. N. Ridley	s.n.	1892	Ang Mo Kio
2.	0010582	H. N. Ridley	s.n.	1892	Bukit Mandai
3.	0010586	C. F. Baker	s.n.	29 Oct.1917	Bukit Mandai
4.	0010583	H. N. Ridley	s.n.	1898	Bukit Timah
5.	0010580	H. N. Ridley	s.n.	1891	Chan Chu Kang
6.	0010581	H. N. Ridley	s.n.	11 Sep.1889	Chan Chu Kang
7.	0010578	H. N. Ridley	s.n.	1892	Chua Chu Kang
8.	0010587	W. L. Chew	s.n.	5 Mar.1957	Nee Soon
9.	0010579	H. N. Ridley	s.n.	Nov.1889	Seletar
10.	0010585	H. N. Ridley	s.n.	1892	Toa Payoh



Fig. 3. Close up of flowers. Right lowermost flower width = 1.2 cm. (Photograph by: Alvin Francis Lok Siew Loon).



Fig. 4. Side view of the flower (before undergoing resupination) showing a long, hooked column. (Photograph by: Alvin Francis Lok Siew Loon). (Length of flower = 2.3 cm)

Swamp Forest near the Public Utilities Board (PUB) pipeline by AFSLL in 2005. No specimen was collected, but the information was incorporated into the 2<sup>nd</sup> Edition of the Singapore Red Data Book where it is recorded as being critically endangered (Tan et. al., 2008). More recently, this rare orchid was encountered again in Nee Soon Swamp

Forest at a different locality—this time in the swampy ground just behind the Executive Golf Course Driving Range on 9 Feb.2010. The plant was found growing in thick leaf litter, under closed canopy forest, near a shaded stream. On previous trips to the same locality, the specimen was overlooked, because of its vegetative similarity to *Molinieria latifolia* (= *Curculigo latifolia*) which is very common in the locality.

Today, the last stronghold for this species is at Nee Soon Swamp Forest, where it is very rarely encountered growing in the thick leaf litter, in the dense growth of the understorey. Moisture is very important to this species, because of its lack of distinct pseudobulbs as water storage organs and possessing leaves with thin cuticles that are characteristic of most terrestrial orchids. As such, this species is often found growing close to streams, where there is a constant supply of soil moisture and humidity throughout most of the day.

## CONCLUSIONS

The impact of increasing human settlement and activities in Singapore resulted in the loss of more than 90% of the primary forests by the early 20<sup>th</sup> Century (Corlett, 1991). Primary freshwater swamp forest, which was estimated to occupy 27.2 km<sup>2</sup> of Singapore (Corlett, 1991; Turner et al., 1994), has sadly now been reduced to a mere 5 km<sup>2</sup> (Ng & Lim, 1992). The last existing stronghold of this vegetation type is Nee Soon Swamp Forest which used to be part of a much more extensive swamp forest zone, covering much of Mandai (Corner, 1978). Hence, a detailed study and total protection of this remnant patch is utterly critical for the preservation of this habitat as well as the biodiversity that resides in it. Unfortunately, this is confounded by ownership issues as the forest is encroached upon by three military rifle ranges that belong to the Ministry of Defence (MINDEF), and a pipeline belonging to the Public Utilities Board (PUB) that cuts right through it (Ng & Lim, 1992). Lastly, the recent change to a seemingly more seasonal climate in Singapore, with longer periods of drought partly because of the more frequent El Niño Events, has also reduced moisture in the Nee Soon Swamp Forest as well as other forest patches in Singapore, so adding one more stressor onto the already beleaguered *Calanthe pulchra*.

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