

Primary hybrid of *Cattleya forbesii* x *Cattleya loddigesii*, a new brazilian orchid

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Abstract: *The hybrid of Cattleya forbesii x Cattleya loddigesii has a short stature and early flowering, a light lilac tending to white color and a labellum with a velvety purple lobe and corrugated edges. The flower lifetime lasts approximately 20 days.*

Keywords: *breeding, floriculture, mass selection, Orchidaceae.*

INTRODUCTION

The flower and ornamental plant market is an important segment of the Brazilian agribusiness. According to the Instituto Brasileiro de Floricultura, activities of the flower-related agribusiness increase by an annual average of 8%. The return of the sector was R\$ 5.7 billion in 2014, and generated an estimated R\$7.2 billion in 2017 (IBRAFLO 2017).


Another important growth indicator of the segment is the quantity of cultivars on offer, currently approximately 3500 varieties and 350 species. Therefore, the development of new cultivars contributes to expand this market, which is demanding and innovation-dependent (Neves and Pinto 2015).

Among pot flower species, orchids have a particularly outstanding ornamental value. The orchidaceae family is the largest in terms of number of species. It comprises 25.000 species distributed in 900 genera. Of these, 2.430 species that belong to 236 genera can be found in Brazil (Menini Neto et al. 2010).

The purpose of national orchid production is to commercialize flowering plants in pots. Brazil depends on imports of these seedlings, mainly from Japan and Thailand (Junqueira and Peetz 2011). In view of this scenario, genetic breeding has become an important strategy to make the segment self-sufficient in the production of seedlings and new varieties (Cardoso 2013).

Studies related to hybridization between different genera in the family Orchidaceae are recent and little significant in view of the high number of representatives of this botanical family. Hybrids derived from the genera *Dendrobium* sp., *Oncidium* sp., *Laeliocattleya* sp. and *Cattleya* sp. have been described by Faria et al. (2009), Cardoso (2010), Faria et al. (2011), Faria et al. (2013), Faria et al. (2015) and Colombo et al. (2017).

The genus *Cattleya* Lindl. consists of approximately 120 species and numerous hybrids. Most of them are epiphyte, bifoliate or unifoliate and

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have sympodial growth. Floral stems grow on top of fully developed pseudobulbs, with large and conspicuous flowers, occurring exclusively in the neotropics (Pabst and Dungs 1975). This genus has high quality hybrids with good market acceptance (Takane et al. 2010).

Cattleya forbesii Lindl. is a bifoliate plant, around 20 cm tall. The plants have two to four light brown to yellowish flowers with a pink to golden yellowish labellum and a flower diameter of 8 cm. Flowering lasts 15 - 20 days and occurs between December and January.

Cattleya loddigesii Lindl. is 30 cm tall, bifoliate, has three to six pink flowers and a slightly yellowish labellum. The flower size is 8 x 7 cm. Flowering occurs between June and September. Flowers have attractive colors and a satisfactory durability, ranging from 20 to 25 days (Cardoso and Israel 2005).

This study described the characteristics of the hybrid derived from the cross between *C. forbesii* and *C. loddigesii*.

BREEDING METHOD

Plants of *Cattleya forbesii* and *C. loddigesii*, with vigorous growth and no symptoms of phytosanitary problems were selected in the orchid garden of the Londrina State University, to be used as parents.

Pollen of *Cattleya loddigesii* was artificially transferred to the stigma of recently-opened *C. forbesii* flowers by hand pollination. Capsules containing mature seeds were collected eight months after cross-pollination. Seeds were germinated *in vitro*, in half-strength MS culture medium (Murashige and Skoog 1962), under addition of 1.0 g L⁻¹ activated charcoal, 30.0 g L⁻¹ sucrose and 7.0 g L⁻¹ agar and pH correction to 6.2. After germination, the plantlets were sub-cultured *in vitro* in the same culture medium for 12 months, under a 16-h light photoperiod, 52 µmol m⁻² s⁻¹ irradiance and a temperature of 25 ± 2 °C.

The plantlets were left to grow in plastic trays with sphagnum moss as substrate for approximately 2 months. After this acclimatization period, the plants were transplanted separately into black polypropylene pots (diameter 10.2 cm; height 7.8 cm; volume 415 mL). A sieved (1.5 and 0.5 cm sieves) mixture of pine bark and wood charcoal (1:1; v:v) was used as substrate. After 24 months of initial growth, the plants were transferred to larger pots (diameter 13 cm; height 9.8 cm; volume 1.000 mL), filled with the above substrate, and left to grow until the beginning of the first flowering.

During the acclimatization and growing periods, the plants were maintained in an environment protected with agricultural canvas and a 75% shade net. Irrigation was applied manually and according to the plant needs during each cultivation phase and season. Fertilization was applied fortnightly after acclimatization, consisting of 50 mL NPK 20-20-20 (Peters®) at 3 g L⁻¹.

Four years after seeding, 20 plants of this hybridization were selected for earliness, plant vigor and health, and were evaluated for the vegetative and floral biometric characteristics: pseudobulb length and diameter, leaf length and width; floral stem length, flower width and length, flower number and durability (days), as well as length and width of: labellum, petals and sepals.

HYBRID TRAITS

A typical feature of hybridization is the genetic segregation. Considering the variability that segregation can confer to plants, a batch of hybrids consisting of 50 plants was selected. Despite the genetic variability, the plants had similar vegetative and floral traits, such as: plant size, early flowering and flower durability after anthesis.

Table 1. Morphological descriptions of the hybrid resulting from *Cattleya forbesii* x *Cattleya loddigesii* cross, pseudobulb length (PL), pseudobulb diameter (PD), leaf length (LL), leaf width (LW) and pseudobulb number (PN)

Variable	PL (cm)	PD (cm)	LL (cm)	LW (cm)	PN
Range	15 - 8.5	1.42 - 0.76	10 - 6.6	4.5 - 3.2	12 - 4.0
Mean	13.0	1.0	8.6	3.7	8.5
Standard error	0.82	0.07	0.36	0.16	1.07

Table 2. Morphological description of the flower of the hybrid resulting from the cross *Cattleya forbesii* x *Cattleya loddigesii*; flower width (FW) and length (FL); labellum length (LL) and width (LW); petal length (PL) and width (PW); sepal length (SL) and width (SW)

Variable	FW (cm)	FL (cm)	LL (cm)	LW (cm)	PL (cm)	PW (cm)	SL (cm)	SW (cm)
Range	13.9 -10.5	14.8 - 9.7	6.4 - 4.6	3.7 - 2.5	6.6- 5	1.9 - 1.3	7.2 - 5.2	1.9 - 1.5
Mean	12.2	11.9	5.4	3.1	5.8	1.6	6.2	1.7
Standard error	0.26	0.31	0.12	0.11	0.11	0.04	0.14	0.03

The plants resulting from hybridization were shorter, similar to the parent *C. forbesii*, which is desirable for commercial pot plants. They were vigorous, with a thin cylindrical pseudobulb (mean length 13.0 ± 0.82 cm, mean diameter 1.0 ± 0.07 cm). The pseudobulbs are bifoliate and the leaves coriaceous and oblanceolate (mean length 8.6 ± 0.36 cm and mean width 3.7 ± 0.16 cm) (Table 1).

Other essential traits of the hybrid derived from *C. forbesii* were early flowering and the possibility of more than one flowering per year. Plants from this cross bloomed for the first time four years after *in vitro* seeding. Flowering occurred between March and October, with two to three flowers per pseudobulb and more than one pseudobulb, flowering simultaneously.

The cross conferred durability to the hybrid and the flower color of parent *C. loddigesii*, was inherited. On the other hand, *C. forbesii* does not have an attractive flower color. Petals and sepals have a light lilac color, tending to white. The labellum has the same color as the other floral parts, curved on the column, with corrugated edges and a velvety purple lobe. The lobe varies in color intensity and has white stripes (Figure 1). The flowers are symmetric (approximately 12.2 ± 0.26 cm) and bloom for 20 days after anthesis (Table 2).

During the cultivation period, no symptoms of the main insect pests and diseases associated with orchid cultivation were observed.

PLANT MAINTAINANCE AND DISTRIBUTION

Since 2017, the developed hybrids are being maintained and micro-propagated by the Agriculture Department of the Londrina State University, Postal Code 6001, 86051-990, Londrina, PR.

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Figure 1. Parents *C. forbesii* x *C. loddigesii* (a), hybrid traits (b) and variation in flower shape and color (c).

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