

New *Cattleya* orchid hybrid⁽¹⁾

GUILHERME AUGUSTO CITO ALVES⁽²⁾, RODRIGO THIBES HOSHINO⁽²⁾,
DOUGLAS JUNIOR BERTONCELLI⁽²⁾, RONAN CARLOS COLOMBO⁽²⁾,
VANESSA STEGANI⁽³⁾, RICARDO TADEU DE FARIA⁽²⁾

ABSTRACT

The hybrid, obtained by back crossing between (*Cattleya labiata* x *Cattleya forbesii*) x *Cattleya labiata* is a vigorous plant, bi- or unifoliate, features slender and cylindrical pseudobulbs and leathery dark-greenish leaves, with oblanceolate shape format of blunt tips with the first flowering four years after sowing. In Londrina, flowering occurred twice a year, between the months of April and May and October and November with 2-4 flowers per pseudobulb and durability ranging from 15 to 20 days. The flowers of the new hybrid were purple with a labellum with a yellow center and purple stripes.

Keywords: breeding, floriculture, Orchidaceae, selection.

RESUMO

Novo híbrido de orquídea *Cattleya*

O híbrido, obtido do retrocruzamento entre (*Cattleya labiata* x *Cattleya forbesii*) x *Cattleya labiata* é uma planta vigorosa, bi ou unifoliada, apresenta pseudobulbos delgados e cilíndricos e folhas coriáceas com tonalidade verde escuro, com formato oblanceolado, de pontas obtusas, apresentando o primeiro florescimento após quatros anos da sementeira. O florescimento em Londrina ocorreu duas vezes no ano, entre os meses de abril e maio e outubro e novembro com 2-4 flores por pseudobulbo e durabilidade entre 15 a 20 dias. As flores do novo híbrido possuem coloração lilás e labelo com um centro amarelo e listras roxas.

Palavras-chave: floricultura, melhoramento, Orchidaceae, seleção.

1. INTRODUCTION

The Orchidaceae family has about 26,500 species, distributed across all continents (KEW, 2011). Brazil holds one of the largest orchid diversity, with about 2,420 species distributed in 235 genera, out of which 1,620 are endemic (BARROS et al., 2010). Within the Orchidaceae family, the most prominent are the orchids of the genus *Cattleya* (AOS, 2013), characterized by flowers with three sepals and three well-defined petals, one of them modified, known as the labellum (TAKANE et al., 2010)

Interspecific and intergeneric hybridizations occur efficiently and may be obtained either by controlled pollination or by natural hybridization. However, complications regarded with cultivation, including a long juvenile period and the low durability of potted flowers and cut flowers, are the main factors that make the cultivation of *Cattleya* hybrids of little interest to producers (CARDOSO et al., 2010).

The objective of the backcrossing method is to recover some characteristic present in the genotype of the recurrent parent. The process involves two genetic materials, one of which has the characteristic of interest to be introduced (BORÉM, 1998). Hybridization followed by backcrossing is quite common, occurring even in nature. Backcrossing

allows the introduction of relevant genes such as shape, durability, color, and others into hybrids of orchids (WITHNER, 1988)

Breeding programs with *Cattleya*s are challenging due to their long juvenile period, which ranges from 3 to 7 years. In addition, most *Cattleya* hybrids flourish only once a year, limiting the production of flowers at different seasons. As a result, hybrids that bloom more than once receive special attention in the breeding programs of this species (Cardoso, 2010).

In addition, the main characteristics evaluated in hybrids obtained through improvement are the flowering period, color, morphology and durability of the flower, as well as the size of the plant. These characteristics may be achieved by the crossing of different *Cattleya* species (CARDOSO, 2010; CARDOSO et al., 2016), with the possibility of using the species *Cattleya forbesii* Lindley and *Cattleya labiata* Lindley, for the expressive importance in the Brazilian flower market.

2. ORIGIN

The hybrid was obtained from the Department of Agronomy of the Universidade Estadual de Londrina (UEL), by the Orchid Genetic Improvement Program.

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⁽²⁾Universidade Estadual de Londrina (UEL), Londrina-PR, Brazil. *Corresponding author: guilhermecito@hotmail.com.

⁽³⁾Instituto Federal do Paraná (IFPR), Campus Ivaiporã, Ivaiporã-PR, Brasil.

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Hybridization was performed by manual pollination, carried out in the morning between 08:00 and 10:00 a.m. with the help of a wooden toothpick. The anthers of the donor plant were collected and transferred to the stigma of the mother plant, immediately after the emasculation, which was accomplished by the removal of the polineas with the help of a wooden toothpick, 24 hours after the beginning of anthesis. The entire hybridization process was carried out under greenhouse conditions.

Pollineas of *Cattleya forbesii* were collected from recently-opened flowers (72 hours after anthesis) and transferred to the stigma of recently-opened flowers (24 to 48 hours after anthesis) from *Cattleya labiata*. Five years after sowing, 15 plants selected from this hybridization were submitted to a new crossing (backcrossing), where the pollineas of *Cattleya labiata* X *Cattleya forbesii* plant were collected from recently-opened flowers (72 hours after anthesis) and transferred to the stigma of recently-opened flowers (24 to 48 hours after anthesis) of *Cattleya labiata*.

Nine months after backcrossing, the capsule containing the seeds was ripe. The seeds were collected and sterilized in 10% sodium hypochlorite solution (2.5% active chlorine) for 20 minutes. Then, they were washed five times in sterile distilled water to remove excess of chlorine.

Seed germination occurred *in vitro* in MS medium (Murashige and Skoog, 1962), with half the macronutrient

concentration added with 1.0 g L⁻¹ of activated charcoal, 30.0 g L⁻¹ of sucrose and 7.5 g L⁻¹ of agar, and pH adjusted to 6 ± 0.2. The medium was autoclaved at 120 °C for 25 min. The sown media were maintained at 23 ± 1 °C, with light intensity of 25 µmol m⁻² s⁻¹ and photoperiod of 16 h, in 600 mL glass jars containing 50 mL of culture medium. The seedlings obtained were subgrown in new culture media, prepared in the same manner already described, under the same conditions.

The total length of the *in vitro* phase was nine months, and in the first three months, germination occurred. Subcultivations were performed every three months, and in each subculture, only the seedlings with rapid growth were used for the next subcultivation.

3. MORPHOLOGIC DESCRIPTION

From the occurrence of gene segregation, 15 plants with similar phytometric characteristics of the vegetative and reproductive part were selected. The characteristics used for this selection were early flowering and number of flowers, which are desired in orchids (CARDOSO, 2010).

The selected hybrid of (*Cattleya labiata* x *Cattleya forbesii*) x *Cattleya labiata* is a vigorous bi- or unifoliate plant with thin, cylindrical pseudobulbs with 12 ± 3 cm in length and 1.4 cm in diameter (Table 1).

Table 1. Vegetative morphological traits of *Cattleya labiata*, *Cattleya forbesii* and the hybrid resulting from the crossing between these species after the backcrossing with the female parent. Pseudobulb length (PL), pseudobulb diameter (PD), leaf length (LL), leaf width (LW).

	PL (cm)	PD (cm)	LL (cm)	LW (cm)
<i>C.labiata</i>	20-25	3.0 ± 0.5	35-45	5.0 ± 0.5
<i>C.forbesii</i>	15-20	0.7 ± 0.2	8-13	4.0 ± 0.5
Hybrid	9-15	1.4 ± 0.3	12-16	5.5 ± 0.5

The leaves are coriaceous with a dark green color, and may vary according to the incidence of sunlight. They are erect, oblanceolate with obtuse tips with a

length of 14 ± 2 cm and a width of 5.5 cm (Table 1). The flowers were 9.6 cm in width, 11.0 cm in length with 14cm long stems (Table 2).

Table 2. Flower morphological traits of *Cattleya labiata*, *Cattleya forbesii* and the hybrid resulting from the crossing of those species after backcrossing with the female parent. Floral stem length (FSL), flower width (FW), flower length (FL), number of flowers (NF) and flower durability (DF).

	FSL (cm)	FW (cm)	FL (cm)	NF	FD (days)
<i>C.labiata</i>	20.0 ± 3.0	13.0 ± 1.0	13.0 ± 2.0	2-4	15-20
<i>C.forbesii</i>	10.0 ± 2.0	8.0 ± 0.5	8.0 ± 1.0	2-5	15-20
Hybrid	14.0 ± 5	9.6 ± 0.6	11.0 ± 2.0	2-4	15-20

The flowers show flower whorls symmetrical and curved forward in relation to the plane of the flower, of light color with lilac tonality (Figure 1). The labellum is 5.6 ± 0.3 cm in length 3.2 ± 0.6 cm in width with a tubular shape on the

column, waved margins, and a yellow innerside with deep purple stripes. The sepals have a length of 5.6 ± 0.3 cm and a width of 3.2 ± 0.6 cm, displaying coloration similar to the petals.

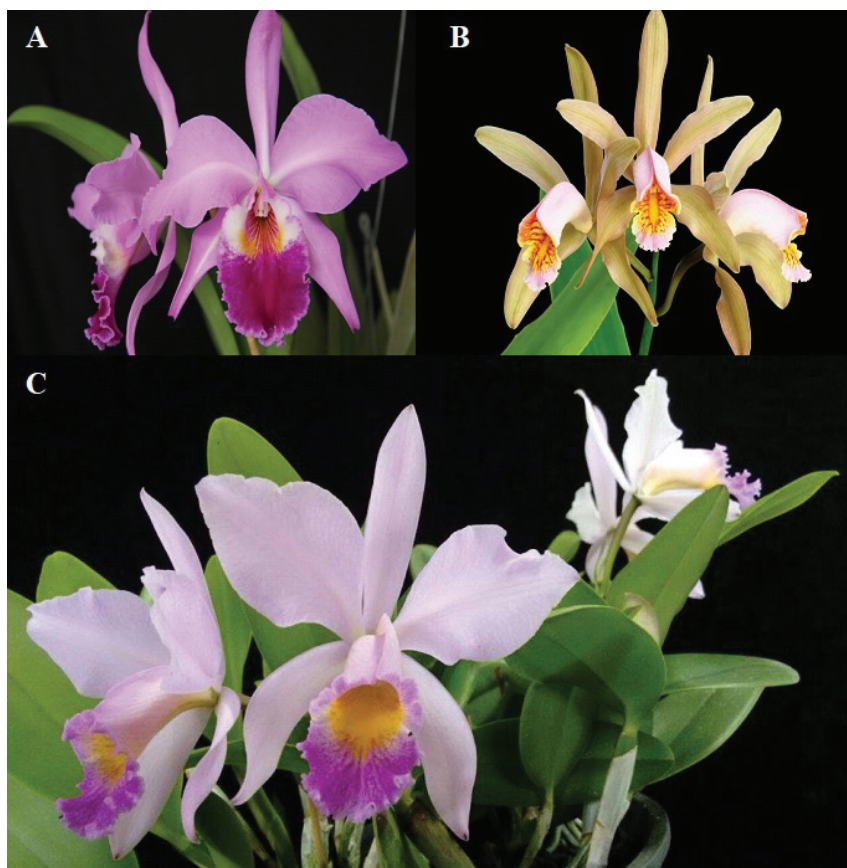


Figure 1. Flowers of the parents *Cattleya labiata* (A), *Cattleya forbesii* (B) and the hybrid (*Cattleya labiata* x *Cattleya forbesii*) x *Cattleya labiata* (C). Source: Google images (A); Google images (B); authors (C).

4. ADAPTABILITY

The new hybrid was evaluated under protected cultivation conditions at Londrina State University, located in the city of Londrina, state of Paraná, at $51^{\circ}11'$ W longitude and $23^{\circ}23'$ S latitude, at 566 m above sea level. The climate in the area is a subtropical humid (Cfa), according to Köppen classification.

The plants were kept in greenhouse covered with transparent polyethylene film and black plastic screen (Sombrite®) with 70% of light retention at room temperature ($18-30^{\circ}\text{C}$), luminosity of $50-25 \mu\text{mol m}^{-2} \text{s}^{-1}$, with $60\% \pm 20\%$ of relative humidity.

5. GROWING CONDITIONS

The acclimatized seedlings of the new hybrids were transplanted into black polypropylene pots with a diameter of 10.2 cm, height of 7.8 cm and volume of 415 mL, in which they remained for 12 months. After this period,

they were again transplanted to black plastic pots with a diameter of 17 cm and a height of 15 cm and a volume of 1,000 mL. As substrate, a mixture of pine bark and charcoal was used, at the proportion of 1:1 part of coal to pine bark ($v v^{-1}$), sifted between 1.5- and 0.5- cm mesh sieves.

During growth in the pots, the plants were fertilized by means of manual irrigation with nutrient solution containing urea, simple superphosphate and potassium chloride, formulating nutrient solution containing the equivalent of 600 mg L^{-1} of N, P_2O_5 and K_2O . Fertilization was performed every 15 days by applying 50 mL of nutrient solution per pot. Irrigation was done manually every day in the morning by applying a 6-mm water depth, except for the days when the plants were fertirrigated.

6. PERFORMANCE

Early flowering, which occurred four years after sowing, was observed in this work. Such fact is a commercial target characteristic. Flowering occurred twice in the year

in Londrina, between the months of April and May and October and November with 2-4 flowers per pseudobulb. The flowers showed durability ranging from 15 to 20 days. The flowers are similar in shape to *Cattleya labiate*.

7. PROPAGATION

Perennial plant, whose multiplication may preferably be done by *in vitro* cloning since it is where it is possible to obtain a large number of plants in a certain period of time. They can also be propagated by dividing plants, but with low efficiency because the plant presents slow growth.

8. USES

The greatest economic interest for these hybrids is their use as a potted flower, which can be grown in greenhouses and intended for sale in flower shops and markets.

9. AVAILABILITY

Plants resulting from (*Cattleya labiata* x *Cattleya forbesii*) x *Cattleya labiata* backcrossing are micropropagated and maintained in a greenhouse by the Department of Agronomy of the State University of Londrina, Rodovia Celso Garcia Cid, Pr 445 km 380, Campus Universitário, C. Postal 10.011, CEP 86057-970, Londrina, Paraná State, Brazil.

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AUTHORS CONTRIBUTIONS

G.A.C.A.: Creation of the idea, experiment installation and conduction at the greenhouse, phytotechnics analysis and data collection, statistical analysis of data, manuscript preparation. **R.T.H.:** Experiment installation and conduction at the greenhouse, phytotechnics analysis and data collection. **D.J.B.:** phytotechnics analysis and data collection, manuscript preparation. **R.C.C.:** phytotechnics

analysis and data collection, manuscript preparation. **V.S.:** Orientation of the work, important suggestions incorporated to the work. **R.T.F.:** Orientation of the work, important suggestions incorporated to the work.

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