

**BREEDING SYSTEM IN *Schlumbergera truncata*
(How) Mor. (CACTACEAE), JUNDIAÍ-SP**

**SISTEMA DE COMPATIBILIDADE EM *Schlumbergera truncata*
(How.) Mor. (CACTACEAE), JUNDIAÍ-SP**

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ABSTRACT

The breeding system of the epiphytic cactus are little known. This study was the first made in Brazil, to verify the existence of self-incompatibility in Schlumbergera truncata. This cactus is used ornamentally and the study was carried out in a urban district in Jundiaí – SP. Hand pollination was done to test self-pollination and outcrossing, and flowers were maintained as control. None of the self-pollinated flowers did developed fruits and seeds; while 92.3% of outcrossed flowers only one control flower developed fruit, indicating that in urban habitats the pollination is difficult. Truncata shows self-incompatibility; the breeding system being obligatorily outcrossed. The reproduction of S. truncata inside cities would only be possible through cross-pollination mediated by hummingbirds.

Key words: Schlumbergera truncata, Cactaceae, breeding system, Brazil, morphology.

RESUMO

O sistema de compatibilidade de cactáceas epífitas ainda é pouco conhecido. Este estudo é o primeiro no Brasil a verificar a existência de incompatibilidade em Schlumbergera truncata, a flor-de-maio. Esta cactácea é usada como ornamental e o estudo foi realizado em bairro urbano da cidade de Jundiaí - SP. Foram feitas polinizações artificiais testando a auto-polinização e a polinização cruzada, tendo sido mantidas flores para controle. Em 100% das flores auto-polinizadas não houve desenvolvimento de frutos e sementes, enquanto que 92,3% das flores submetidas à polinização cruzada desenvolveram frutos e sementes. Somente uma das flores controle desenvolveu fruto e a ausência do fruto indica que em regiões urbanas é dificultada a ocorrência de polinização natural da flor-de-maio, que apresenta características da síndrome da ornitofilia e é possivelmente polinizada por beija-flores. Schlumbergera truncata apresenta auto-incompatibilidade, sendo seu sistema reprodutivo, obrigatoriamente, cruzado. A reprodução de S. truncata no interior das cidades somente seria possível através da polinização cruzada mediada por beija-flores.

Palavras-chave: Schlumbergera truncata, Cactaceae, sistema de compatibilidade, sudeste brasileiro, morfologia.

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INTRODUCTION

Schlumbergera truncata (How) Mor. (Cactaceae), known in Brazil as “flor-de-maio”, is a small/medium epiphytic plant, which can reach 60 cm length. *Schlumbergera truncata* is a native of the Rio de Janeiro highland forest (Palazzo & Both, 1993). Due to its attractiveness and easy cultivation, this cactus is commonly used as ornamental plant. Its flowering period happens between May and July (Brazilian Autumn/Winter). The solitary flowers have colors varying from reddish to creamy pink, and develop in extremity of the bunch. *Schlumbergera truncata* was the first species of this genus to be known in Europe 100 years ago and, since then, has been cultivated in several countries (Corrêa, 1952; Lorenzi & Souza, 1995).

In Brazil, there are few studies on Cactaceae reproduction (Figueiredo & Alvares, 1992; Lombardi, 1993, Silva & Sazima, 1995; Schlindwein & Wittmann, 1997), and *S. truncata* wasn't studied in Brazil up to now.

This study aims to verify the breeding system of the *Schlumbergera truncata* in urban cultivate and describe the morphological characteristics his flowers.

MATERIALS AND METHODS

Two cultivated *S. truncata* were studied in a residential district in Jundiaí – SP (23°10' S, 45°55' W, 765m alt.), southeastern Brazilian, between April to July 1997. The site of study is characterized by few green areas, with only some trees and ornamental shrubs. The Jundiaí region shows subtropical climate, with two seasons a very well defined rainy season between September and March and a dry season between April and August. The temperatures vary between 5°C minimum and 32°C maximum. The average rainfall in the area reaches 1000 mm. In period the study, the medium temperature was 18,6°C, the rainfall was 72,1 mm and relative humidity of the 80,25%. The vegetation of preserved areas around the city is constituted by semideciduous forest and altitudinal forest at Serra do Japi (Morelato, 1992; Morelato & Leitão Filho, 1995). Other two individuals of *S. truncata*, were used as pollen donors and to outcrossing tests. Hand pollination were done to test self-pollination (N=28) and cross-pollination (N=33), and 25 flowers were maintained as control.

The flowers (N=28) of the one cactus individual, were deliberately pollinated with it's own pollen, immediately after anthesis, with assistance of the a little soft brush. The pollen was taken in anthers with brush and put abundantly on all surface of the stigma. Immediately after hand pollination, the flowers were isolated in paper bags and maintained for three weeks, to verify the fertilization rate.

The outcrossing tests (N=33) were done as described previously for self-pollination, however with other individual pollen.

The pollination was achieved three/four hours after collect pollen, which remained in close bottle, still in their anthers, up to their use.

For characterizing the flower morphology of *S. truncata*, they were observed under stereoscopic microscope. The manipulated flowers and flowers buds were observed three times in the day: 6 – 6:30 am or 9 – 11 am; 2 – 3 p.m. or 5 - 6:30 p.m.; and 10 – 11 p.m.

RESULTS

Fruit formation after self-pollination tests were not verified, most of the control flowers 96% didn't developed fruits either. The outcrossing test shows the formation of fruit in 92,3% of the pollinated flowers (Table 1).

Schlumbergera truncata flowers presents length of $68,8 \pm 3,5$ mm ($\bar{x} \pm DP$) of the ovary at stigma extremity. They own nine leaf on the corolla (tube petals), with 60 mm of length, partially joined in the proximal part (pseudo-simpetalia), forming a tube with 33 mm of length. This tube isn't complete, opening in the upper part. The other petals present diverse size, as follows: two petals with 10 mm (petal 1), three petals with 15 mm (petal 2) and three petals with 28 mm (petal 3) located at the flower base, near to ovary. Upper than that, near to the tube, there are two petals

Table 1. Flower number of *Schlumbergera truncata* tested and the number of developed fruits in Jundiaí, SP.

Tests	Number of flowers	Number of fruits
Self-pollination	28	00
Outcrossed pollination	33	24
Control	25	01

with 40 mm (petal 4). Many pistils, with length varying between 25 mm to 58 mm and the stigma were partially expose outside of the tube, since the petals of the tube doesn't open totally). The pistils number is very diverse in a single individual (82 ± 16) (Table 2, Figure 1). Was verifying many ovules in the ovary after fecundation.

Table 2. *Schlumbergera truncata* flower parts dimensions in Jundiaí, SP.

Floral parts	Number	Average dimension (in mm)	
		Length	Diameter
Ovary	01	Length	19
		Diameter	08
Tube	01	Length	33
		Diameter	07
Sepals	06	05	
Petals 1	02	10	
Petals 2	03	15	
Petals 3	03	28	
Petals 4	02	40	
Tube's Petals	09	60	
Stigma	01	62	
Pistils	(82 ± 16)	28 – 58	
Flowers	–	($68,8 \pm 3,5$)	
Distance stigma/anthers	–	04 – 37	

Schlumbergera truncata present anthesis at the end of the night, with flower completely opened at the down.

DISCUSSION

This study showed that the reproductive system in *S. truncata* is obligatorily xenogamous/allogamous. The absence of fruit in control flowers may indicate that in urban habitats the natural pollination this species is very uncommon. The morphological characteristics and the anthesis are typical of the ornitophily syndrome, indicating possible pollination by hummingbirds. Recently Boyle (1996) showed that *S. truncata* and *S. buckleyi*, individuals cultivated in the USA, we are self-incompatible, with inhibition of pollen tube growth in the style. Therefore, the reproductive

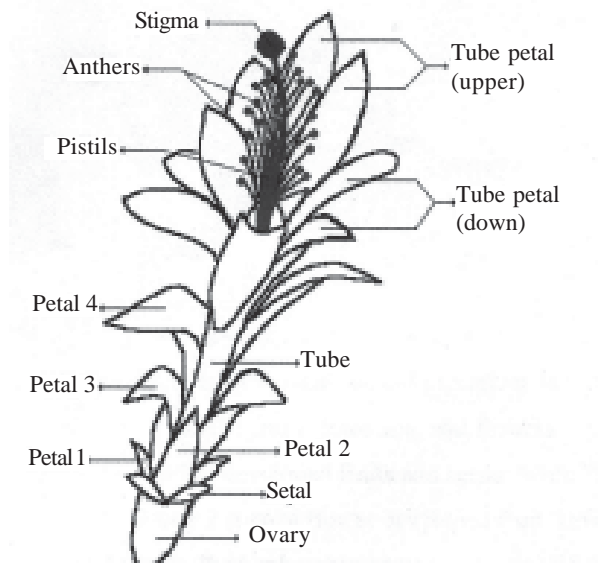


Figure 1. Floral parts of *Schlumbergera truncata* in Jundiaí, SP.

system in *S. truncata* doesn't suffer significant change, even after introduction in countries with different conditions from the original area in Brazil. Although a study with native population has not been achieved, they would probably show similar reproductive characteristics of those found here and by Boyle (1996).

Abendroth (1969) considered hummingbirds as the provable pollinator agent of the *S. truncata*. Although hummingbirds weren't observed visiting flowers in the present study, one fruit developed in cultivate condition. Figueiredo & Alvares (1993) observed hummingbirds visiting with regularity, exotic cactus flowers in semi-urban environment.

The presence of the *S. truncata* inside cities, besides its aesthetic and recreate useful for humans population, can be a factor of attractance and maintenance of hummingbirds in urban environment, enlarging the biodiversity in this antropic ecosystem.

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