

Cutting size in the vegetative propagation of *Dendrobium nobile* Lindl

Ronan Carlos Colombo^{1,*}, Vanessa Favetta¹ and Ricardo Tadeu de Faria¹

¹Universidade Estadual de Londrina, Departamento de Agronomia, CP 6001, CEP 86051-970, Londrina, PR, Brazil. *Corresponding author, E-mail: ronancolombo@yahoo.com.br

ABSTRACT

The vegetative propagation of orchids allows for the collection of plants genetically identical to the mother plant and reduces their juvenile period. Among the most commercialized orchids in the world, the *Dendrobium nobile* and its hybrids stands out among. Therefore, the objective of this work was to study the propagation of this species through pseudobulb cuttings. Cuttings with two or three buds (knots) were collected from adult plants and stacked in sand, horizontally and vertically, constituting a 2 x 2 factorial scheme, number of buds x cuttings position; with four replications of 15 cuttings. Six months later, the percentage of sprouted cuttings, number and length of shoots per cutting and root length were assessed, but no interaction or differences between treatments were found. The use of cuttings with two buds is recommended to optimize the propagation material and further collection of greater number of plants.

Key words: Orchidaceae, cutting, asexual propagation.

INTRODUCTION

Orchids are among the most appreciated and the most commercially valued of all ornamental plants. Species of the *Dendrobium* genus call the attention for their color variety and number of flowers per pseudobulb, guaranteed by the hybridization between the species and their commercial hybrids. *D. nobile* and its hybrids are widely commercialized as potted plants or used in landscaping, being also cultivated in tree trunks (Figure 1).



Figure 1. *Dendrobium nobile* plants grown on a tree, at full bloom.

D. nobile, a native of Southwest Asia, is grown in all continents. The plant, formed by pseudobulbs, measures around 30 cm and demands little shadowing, 30% being enough for its cultivation. Flower stems are small (2 cm), and flowers, generally three per stem, flourish in the Spring and lasts up to 30 days (Watanabe et al., 2002). In addition, the dendrobium orchids show plasticity in relation to environmental adaptation, and, according to Watanabe et al. (2002), the species develops in temperatures between 5 and 35 °C. As for the hybrid plants, they may present vegetative characteristics similar to the *D. nobile* species; however, flower coloration can go from white to shades of yellow and pink (Faria et al., 2009, 2011, 2013).

The propagation of these plants can be done through seeds or vegetative structures. When done with seeds, the process is longer and, in the case of hybrids, there is high genetic variability, and the plants obtained take three or more years to flourish. Therefore, one way to reduce the time for getting seedlings and guarantee the maintenance of the mother plant characteristics is through vegetative propagation.

As dendrobium orchids show pseudobulbs of the “cane” type, it is possible to fragment them to obtain cuttings. Cuttings reduce expenses with laboratory techniques, becoming viable to small growers, increasing their financial returns (Vilela et al., 2010). Shoots originated from this material are known as keikis and can also emerge due to some environmental stress conditions or excessive nitrogen fertilization (Moraes et al., 2011).

The propagation of dendrobium orchids and other orchids by cutting has been reported by other authors (Meneguice et al., 2004; Mengarda et al., 2013; Vilela et al., 2010; Venturieri and Pickscius 2013; Vichiato et al., 2015); however, results are still not very expressive. Thus, the objective of this work was to assess the influence of cutting size and cutting position in the propagation of *D. nobile*.

MATERIAL AND METHODS

The work was developed between the months of August 2013 and February 2014, at Universidade Estadual de Londrina (UEL), Department of Agronomy. Plants of *Dendrobium nobile* species, with three years of age, were selected and used as mother plants for the collection of cuttings of pseudobulbs for the implementation of the experiment. The pseudobulbs had the leaves removed manually and, after, sectioned in the region of the internodes, to obtain cuttings with two and three vegetative buds.

Cuttings were displayed horizontally and vertically, on Styrofoam trays containing washed sand of medium granulometry as substrate. Trays were kept in a greenhouse with shading of 60%; and irrigated daily to keep the sand humid and prevent cuttings dehydration

The experimental design consisted of a 2 x 2 factorial scheme, with five replications, each replication with 15 cuttings. Number of buds per cutting (two or three) and cuttings position (horizontally or vertically) were studied as factors. The following characteristics were evaluated: percentage of cuttings that generate shoots, shoot length, number of shoots per cutting and number of roots.

Data were analyzed by ANOVA to verify significance. The number of shoots per cutting and number of roots variables were transformed into $1/\sqrt{x+1}$, to meet ANOVA's assumptions.

RESULTS AND DISCUSSION

Means for the analyzed variables are presented in Table 1 and no significant differences among treatments were found. An average value of 47% was verified for the sprouted cuttings percentage, indicating that propagation by cutting is viable for the propagation of *Dendrobium nobile* compared to other conventional propagation methods. Therefore, plant cuttings with two buds can be used, to take more advantage of the propagation material, aiming at the production of a greater number of plants.

Table 1. Variables assessed in cuttings of *Dendrobium nobile*, with two or three buds, stacked horizontally and vertically, at six months of cultivation.

Factors	Sprouted cuttings (%)	Number of shoots	Shoot length (cm)	Number of roots
Number of buds				
Two	44.7	1.2	3.3	2.7
Three	49.3	1.2	2.3	2.4
Position				
Horizontal	43.3	1.1	2.6	2.3
Vertical	50.7	1.2	3.0	2.8
CV (%)	28.6	18.0	31.0	19.4

Vilela et al. (2010), studying types of pseudobulbs cuttings (basal, median and apical) in the propagation of this species, found values related to sprouted cuttings percentage between 26 and 49%. Similar results were obtained by Venturieri and Pickscius (2013), evaluating the effect of substrates and fertilizers on the budding of cuttings of *D. nobile*, with values between 27 and 40% of budded cuttings.

In regards to the number of shoots, an average value of 1.2 shoots per cutting. Corroborating with these results, Vilela et al. (2010) found a number of shoots between 0.8 and 1 in cuttings of this species, with one, two or three buds. Vichiato et al. (2015), studying IBA doses in the propagation of *D. nobile* by plant cuttings, did not observe the effect of this growth regulator on the number of shoots. On the other hand, Mengarda et al. (2013) verified that the application of IBA reduced the number of shoots in *D. nobile*, and a larger number of shoots per cutting was observed (2.5), in the zero dosage. These same authors found similar results for the orchid *Arundina bambusifolia*.

As for shoot length and number of roots, the effect of the treatments on these variables was no observed. Vichiato et al. (2015) also found no differences between shoot lengths for this species, when concentrations of IBA were applied to promote pseudobulbs cuttings rooting. However, Vilela et al. (2010), obtained greater shoot lengths in cuttings of *D. nobile*, with two and three buds, when compared with cuttings with a single bud. Probably, due to the greater size of the cuttings, more accumulated reserves were carried to the shoots.

In addition, the development of floral bulbs (Figure 2) was verified in some cuttings instead of the development of shoots. It is likely that there had already been a floral induction in these segments of pseudobulbs, since the harvesting period coincided with the species flowering period, and the temperatures tend to be milder. Ichihashi (1997) reports that to differentiate *D. nobile* floral buds, it is necessary temperatures below 15 °C and, the lack of cold causes aerial shoots or absence of flowers. Similar results are presented by Lin et al. (2011), working with the temperature of 10 °C to promote floral induction in this species.



Figure 2. Overview of the experiment with cuttings of *Dendrobium nobile* stacked in sand; detail in the back, cuttings with flowers and floral bulbs.

CONCLUSION

The pseudobulb cutting is viable for the vegetative propagation of *Dendrobium nobile*. The position and number of bud per cutting do not affect the development of shoots in this species.

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