ASPECTS OF VEGETATIVE PROPAGATION IN *VANILLA PLANIFOLIA* Andrews

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Abstract

Vanilla planifolia Andrews is part of the Fam. Orchidaceae and is the only orchid of significant economic importance because vanillin is extracted from its fruits and seeds, a very expensive spice valued in the food and pharmaceutical, perfumery and cosmetic industries. This paper presents aspects related to the vegetative propagation of vanilla under the conditions of the greenhouses of the Botanical Garden of the University of Craiova. The vanilla plants from which the cuttings used for rooting were harvested are vanilla specimens existing in the collection of tropical and subtropical plants of the botanical garden. Four types of linen substrates were used: Mt - tree bark; V1- pearlite; V2- fibrous peat; V3- mold leaf and the cuttings were fragments of a shoot with two nodes. Because of the stability, the most suitable substrates for the rooting of the cuttings and the development of the formed roots were found to be those composed of perlite (V1) and fibrous peat (V2). Rooted cuttings were potted in a substrate mixture of forest moss and fibrous peat. The plants thus had a good evolution, their survival rate being 100%.

Key words**: **vanilla planifolia, cutting, rooting substrate

INTRODUCTION

Vanilla planifolia Andrews is part of the Orchidaceae family and is the only orchid with significant economic importance because vanillin is extracted from its pods, a highly valued compound in the food and pharmaceutical industry, but also as an ingredient in perfumery and cosmetics. The genus Vanilla is a complex taxonomic group with approximately 120 species, characterized by a mode of vegetative reproduction, combined with intra- and interspecific hybridization and polyploidy phenomena (Felicien Favre et. al., 2022). Vanilla is an interesting plant for study, it forms two types of roots, namely branched terrestrial roots that form mycorrhizae and anchor it in the soil, and aerial roots that anchor it to tree trunks, being considered a hemiepiphytic plant. Sometimes it grows as an epiphyte attached to the bark of trees without rooting in the soil. This species comes from Mesoamerica and was already known and used in Central America when the Spaniards came, where it was used by the Aztec Indians to flavor the cocoa drink.

The fruits became known in Europe in the century. XVI, but only in the second half of the century. XX began large-scale cultivation outside the natural distribution area. Now it is cultivated in several tropical countries: Madagascar, Indonesia, Uganda, Comoros, Tahiti, India, Mexico. It is a liana with monopodial, glabrous stems that can reach 30m long and 5-10mm thick, internodes up to 12cm long, forming aerial roots at each node; the persistent, rigid, elliptic to ovate, fleshy and waxy leaves reach up to 20 cm long, but there are also leafless Vanilla species that photosynthesize only through aerial roots. The inflorescence develops laterally in the axil of the leaf, the flowers grouped in racemes are short pedunculated, they can be white, green and cream; it can have 20 flowers in the natural environment, they open in the morning and close in the evening. If pollination has not been achieved in this interval, there will be no chance to form fruits. The fruits are indehiscent pods, black when ripe up to 25 cm long and 8 mm thick containing thousands of tiny black seeds (WFO, 2024). Pollination in their natural environment is ensured by several species

of bees: Euglossa viridissima; Eulaema cingulata; Eulaema meriana; Melipona beecheii https://www.kew.org› plants›va...). Vanilla grows in the tropical forests of Mexico, Central and South America, it is extremely rare in the wild due to habitat reduction and overexploitation, as a result ex situ conservation actions are needed to protect this species; was assessed for the IUCN Red List of Threatened Species in 2017 and is listed as endangered according to criteria B2ab(iii,v) (https://www.kew.org›plants›va...).

MATERIALS AND METHODS

The study on the rooting and growth of stem cuttings from Vanilla planifolia was performed in the greenhouses of the Botanical Garden of the University of Craiova. The objective of this study was to establish the effect of different rooting substrates on the rhizogenesis process, in greenhouse conditions, in Vanilla planifolia cuttings and their evolution after planting in pots. The plants from which the cuttings were harvested are existing plants in the collection of the Botanical Garden, and the following types of substrate were used for rooting: M- tree bark; V1- pearlite; V2- red peat; V3- mold leaf. No rooting stimulants were used. The experiment was set up in March, the four variants of the rooting substrate were used and for each variant 10 cuttings with two nodes were made, one of the two nodes being placed in the rooting substrate. During a period of 90 days, as long as their rooting lasted, observations were made regarding their evolution, the formation of aerial roots and sprout, and at the end of the experiment, the rooting percentage of the cuttings, the length of the roots, the number of branches on the root, the length of the sprout, the number of leaves. Six months after the placement of the experiment, biometric observations were made on the obtained plants, which aimed at their evolution after planting in pots: the length of the terrestrial and aerial roots formed, the length of the sprout, the number of leaves and their size, percentage of rooting.

RESULTS AND DISCUSSIONS

Regarding the rooting percentage of *Vanilla planifolia*, the best results were obtained with the V1 variant (perlite) where the rooting percentage was 90%, followed by the V2 variant (fibrous peat) with a rooting percentage of 80%, with the other two variants, weaker results were obtained, 50% at Mt (tree bark) and 30% rooting percentage at V3 (leaf soil) (Figure 1). The length of the roots formed in the rooting substrate recorded the best results in the V2 variant where the average length of the roots was 11.87cm followed by the V1 variant with 9.4cm; in the Mt variant the formed roots reached 8.3 cm and in the V3 variant the smallest roots were only 2.06 cm (Figure 2). Regarding the number of roots, during this period of 90 days, the rooted cuttings developed a single root with an exception in the V2 variant where the second root also started to form. Regarding the ramification of the roots, they formed lateral ramifications in the V1 variant (perlite) where between 1 and 3 lateral ramifications were formed on each root with dimensions between 0.5-1.2cm, in the rest of the variants the root did not develop ramifications sides (Figure 3). In the rooted cuttings, during the 90 days, the formation of sprout began as follows: in the V2 version, 60% of the cuttings formed sprout, sprout that reached sizes between 1.4 - 6.7 cm long with 2 - 4 leaves per shoot, followed by the V1 variant where the cuttings developed sprout in a proportion of 40% that were 4-6cm long and a number of 3-4 leaves per shoot. In the Mt variant, a single cutting of 4.2 cm length with 3 formed leaves developed sprout and in the V3 variant no shoot was formed. The rooted cuttings were planted in pots in a mixture of forest moss and fibrous peat, they had a good evolution, their survival rate was 100%. The roots in the soil developed very well and spread the ball of earth, the main root reaching the maximum value of 35cm long with numerous secondary roots. White-green aerial roots formed at each node reached up to 17 cm in length. All plants obtained in this way formed sprout whose length reached 60

cm with a maximum of 12 leaves up to 9.5 cm long and 3 cm wide (Figure 4).

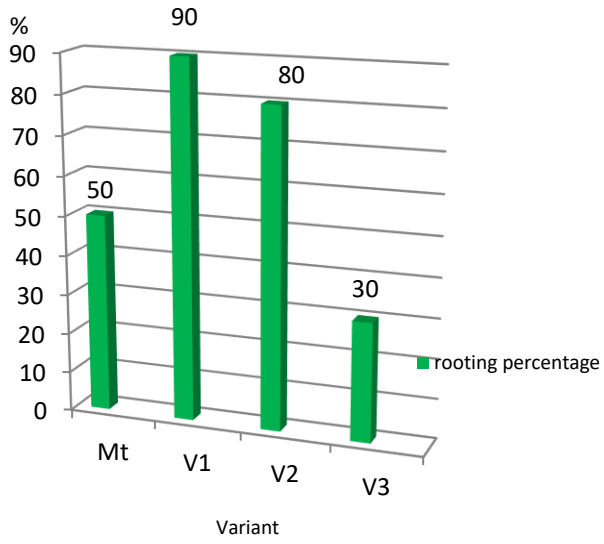

Figure 1 Rooting percentage of the cuttings

Figure 3

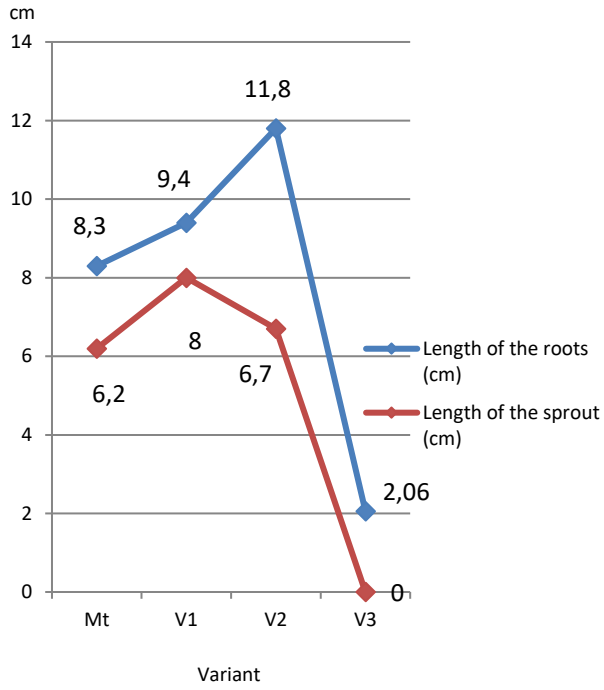

Figure 2 Length of roots and sprout

Figure4

CONCLUSIONS

- Regarding the effect of different rooting substrates on the rhizogenesis process of *Vanilla planifolia* Andrews cuttings, the best results regarding the rooting percentage of the cuttings and the development of the roots formed, were obtained with the perlite and fibrous peat variants.
- The rooting period of the cuttings in greenhouse conditions was 90 days.
- The rooted cuttings obtained were planted in pots in a culture substrate mixture consisting of forest moss and fibrous peat, their survival rate after planting being 100%.

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