

Rooting of blueberry minicuttings

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This research aims to assess the effect of leaf area on rooting of semi-hardwood minicuttings of cultivar Powderblue, collected on January. Four-node segments with 3.2 cm length and 2.17 mm diameter, approximately, were taken from lateral branches of irrigated plants. The treatments were divided according to number of attached leaves: T1 – two entire leaves; T2 – one entire leaf; T3 – two leaves cut in half; T4 – one leaf cut in half. After preparation of the cuttings, their bases were immersed into a growth regulator solution (IBA) at 2,000 mg L⁻¹ for 15 seconds. Subsequently they were put in expanded polystyrene trays (Isopor[®]) filled with a mix of commercial substrate (Plantmax[®]) and washed thick sand at 3:1 ratio. The experimental design utilized was a complete randomized block with one cultivar (Powderblue) and four types of minicuttings, with five replications, each replicate consisting of ten minicuttings. On the 90th day the cuttings were assessed for the percentage of the rooted, dead minicuttings with root, number of minicuttings showing only callus (without root), minicuttings without both callus and roots, number of the better-developed roots, length of the better-developed root and buds number. Treatment 3 and 2 showed the highest percent rooting (98% and 96%, respectively) and treatment 1 showed the lowest (72%). Therefore, the use of blueberry minicuttings for propagation allowed higher use of propagative material. Furthermore, minicuttings of Powderblue with two cut leaves permitted in 90 days the formation of up to 98% of rooted minicuttings.

Key words: propagation, cutting, growth regulator, Vaccinium, Powderblue.

Lobato de Oliveira Fischer, Doralice; José Carlos Fachinello; Luís Eduardo Corrêa Antunes; Claudiomar Fischer; Clevison Luiz Giacobbo (2013) Enraizamiento de miniestacas de mirtilero. Rev. Fac. Agron. Vol 112 (1): 1-5.

Objetivou-se com este trabalho avaliar o efeito da área foliar no enraizamento de miniestacas semilenhosas da cultivar Powderblue, coletadas no mês de janeiro. O material utilizado, oriundo de plantas irrigadas, foram segmentos de ramos laterais com quatro gemas, apresentando na extremidade superior as folhas conforme os tratamentos: T1-duas folhas inteiras; T2-uma folha inteira; T3-duas folhas cortadas pela metade; T4-uma folha cortada pela metade. Com o auxílio de um canivete, fez-se lesões laterais nas miniestacas a partir das gemas inferiores. Em seguida as bases foram imersas por 15 segundos, em soluções com fitoregulador ácido indol butírico (AIB), na concentração de 2000 mg.L⁻¹. E colocadas para enraizar em bandejas de poliestireno expandido (isopor[®]), contendo uma mistura de substrato comercial (plantimax[®]) com areia grossa lavada, na proporção 3:1. O delineamento experimental utilizado foi de blocos inteiramente casualizados, com uma cultivar (Powderblue), quatro tipos de miniestacas, com cinco repetições, sendo cada repetição constituída de dez miniestacas. Aos 90 dias, avaliou-se a porcentagem de miniestacas enraizadas; miniestacas mortas com raiz; o número de miniestacas que apresentavam somente calo (sem raiz); miniestacas sem calo e sem raízes; número de raízes mais desenvolvidas; comprimento da raiz mais desenvolvida; e número de gemas (ponta verde). Houve interação da área foliar com as variáveis analisadas. Para a variável porcentagem de enraizamento, verificou-se maior percentual nos tratamentos 3 e 2 (98% e 96%, respectivamente) e menor porcentagem no tratamento 1 (72%), com duas folhas inteiras. Concluindo-se que a propagação de mirtilero através de miniestaca possibilita um maior aproveitamento do material propagativo e que miniestacas com duas meia folha da cv. Powderblue possibilitam a formação de até 98% de estacas enraizadas no espaço de 90 dias.

Palavras chave: propagação, estaquia, regulador de crescimento, Vaccinium, Powderblue

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INTRODUCTION

The blueberry production is spreading in the world (Strik & Yarborough, 2005; Banãdos, 2006) and many issues about that crop are being answered by the local researches like adaptation of varieties (Antunes et al., 2008) and cultural practices (Williamson & Miller, 2009; Silveira et al., 2010; Bryla et al., 2011; Pannunzio et al., 2011).

The culture of blueberry, despite the great commercial importance in South America, is still incipient in Brazil. The difficulty of propagation is among the factors that limit the expansion of this culture. This reduces the availability of plants (either micro-propagated or cutting-derived plants) for commercialization, creating a situation of high demand and low supply of plants (Damiani et al., 2009).

Propagation by cuttings is a very important and widely spreading method with large application in fruit culture (Fischer et al., 2008). The viability of the use of this technique depends upon a number of factors, such as the capacity of adventitious root formation of each specie and/or cultivar, quality of the formed root system (Ristow et al., 2011) and posterior plant development in the production area.

In the traditional system of plant propagation by cuttings the recommended length of the cuttings is around 10 to 15 cm, maintaining two or three superior leaves and removing the lower leaves. In general, for semi-hardwood cuttings the leaves must be cut in half to avoid water loss and facilitate management (Fischer et al., 2008; Ristow et al., 2009).

However, minicuttings is an alternative method of vegetative propagation used successfully in commercial scale for different cultures (Schuch et al., 2007; Wendling & Dutra, 2010), but little studied for this particular species.

HYPOTHESIS AND OBJECTIVE

The rooting of mirtilheiro is possible with the use of minicuttings.

The objective of the present study was improve the blueberries plant quality and obtain a better use of the material derived from the stock plants the experiment tested the rooting of smaller cuttings (minicuttings).

MATERIALS AND METHODS

The experiment was carried out in the greenhouse of the company Frutplan Mudas Ltda located at Colônia Ramos, 3° district of Pelotas, RS, Brazil, from January to April. It was used semi-hardwood minicuttings of the blueberry cv. Powderblue derived from lateral branches arising from mother plants irrigated with four years of age.

The shoots ("whips") were collected from the field early in the morning and soon segmented in minicuttings, in other words, four-node cuttings with 3.2 cm long and 2.17 mm diameter. After segmentation, the basal leaves were stripped off. The upper leaves remained according to treatments: T1 – two entire leaves; T2 – one entire

leaf; T3 – two leaves cut in half; T4 – one leaf cut in half.

Two lateral lesions on the base of each minicutting, just below the inferior buds, were made using a pocketknife. Then, the minicuttings bases were immersed into a growth regulator solution (IBA) at 2000 mg L⁻¹ diluted in ethilic alcohol 40%, for 15 seconds. In sequence, they were put to root in expanded polystyrene trays (Isopor®) filled with a mix of commercial substrate (Plantmax®) and washed thick sand at 3:1 ratio. The material was kept in a greenhouse equipped with intermittent micro-sprinkler irrigation. The pH of the water was reduced approximately to 5 by using Quimifol P 30® (Fischer et al., 2008). After planting, the cuttings were mist watered every 15 days with a fungicide solution (3 g of Captan 500 PM per liter of water).

The experimental design was a complete randomized block with one cultivar (Powderblue) and four types of minicuttings (T1 – two entire leaves; T2 – one entire leaf; T3 – two leaves cut in half; T4 – one leaf cut in half), with five replications of ten mini-cuttings.

After 90 days, the cuttings were assessed for: a) the percentage of the minicuttings rooted – it was considered cuttings with one or more roots; b) dead mini-cuttings with root – minicuttings that emitted root but did not survive until experiment ending; c) number of minicuttings showing only callus (surviving or not); d) minicuttings without both callus and roots (surviving or not); e) number of the better-developed roots; f) length of the better-developed root and g) buds number (green-tip) – buds in advanced stage of development.

The data were submitted to analysis of variance F-test and the comparison of means between treatments was applied when the comparative data were statistically significant. The means differences were separated with Duncan test at 5% level of significance. The data expressed in percentage (rooting) were transformed in sen arc ((x/100).1/2). The statistical analyses were performed by using WinStat 2.0 program (Machado & Conceição, 2002).

RESULTS AND DISCUSSION

The highest percentage of rooting cuttings occurred in the treatments 3 and 2 (98% and 96%, two cut leaves and one entire leaf, respectively) and the lowest percentage was observed in the treatment 1 (72%) with two entire leaves (Figure 1A).

This percentage of rooted minicuttings is higher than those reached by Schuch et al. (2007), who evaluated the rooting capacity of 'Climax' using medium and basal microcuttings (57% and 63.87%, respectively). Also by Wagner Jr. et al. (2004) in working with herbaceous Cuttings 12 cm keeping the two cut leaves obtained percentages of rooting medium for cultivating Bluegem of 66%, followed by Climax cultivars (56%); Woodard (54%) and Delite (45%).

This difference of results could be related to diameter and length and leaves number of the cuttings. According to Trevisan et al. (2008) the presence of leaves in semi-hardwood and hardwood cuttings facilitates rooting. But in the other hand, the leaves represent a transpiratory surface, which means an increase in the rate of water loss under conditions of

high temperatures. For this reason, environment humidity should be kept at around 100%.

The highest number of dead rooted cuttings occurred in the treatment 4 (one leaf cut in half).It only significantly differed from treatment 2 (one entire leaf) (Figure 1B). This result may be correlated to the early leaf fall in this treatment and to the non-control in temperature at the rooting environment, once the greenhouse is not acclimatized.

For the variable average number of minicuttings with or without root it was verified that the treatment with two entire leaves (T1) was significantly superior whether compared to the others, and there was a gradual reduction in the treatments 4, 3 and 2 (Figure 2A). According to the results achieved in the variables rooting percentage and callus formation, the treatments that showed the lowest percentage of minicuttings callused (T3 and T2) also they had higher rooting.

Schuch et al. (2008) did not observe in blueberry roots growing from callus, even in some cases where there might be callus and root formation on the same cutting.

Measuring minicuttings without both callus and root, significant differences were observed, mainly in the treatments 4 and 1 (one leaf cut in half and two entire leaves) (Figure 2B).

Hartmann & Kester (1990) describe that the products from photosynthesis are important for the root initiation and development. However, high transpiration and respiration rates can affect the rooting process in cuttings with leaves attached, being that the equilibrium between foliar area and cuttings size appears imperative.

The treatments 2 and 1 (with one and two entire leaves, respectively) showed promising results regarding the average number of roots and the length of the better-developed roots. The treatment 4 (one leaf cut in half) had inferior results to average number of root, but it did not differ from treatment 3 (two leaf cut in half) in variable of length of the better-developed roots (Figure 3A and 3B). Nachtigall et al. (1998) worked with cuttings of different length (15 cm) and observed that cuttings with two leaves attached provided satisfactory results in root development for the cultivar Delite. So, it would appear that the foliar area of the cuttings must be proportional to their length.

The viability of cutting propagation depends not only on the facility of rooting but also on root system quality. The presence of leaves facilitates the root formation by the production of some compounds and the regulation of the hydric state on the cutting (Trevisan et al., 2008). The use of only one entire leaf per minicutting, besides facilitating management, saves time in cutting preparation.

At the moment of the evaluation, in the green-tip stage, the minicutting of the treatment 2 had a higher number of buds, rooting and root length (Figure 4).

The minicuttings with one entire leaf attached rooted possibly earlier, promoting a higher number and length of root, which allowed shooting. Also, the commercial substrate and the Quimifol P 30[®] used in pH adjustment have nutrients that contributed for the better minicutting development.

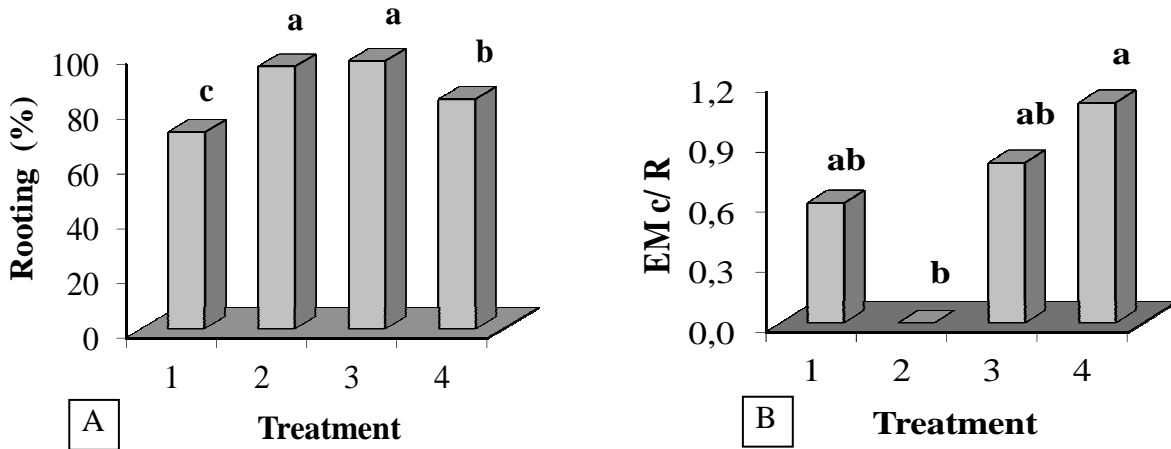


Figure 1 - A – Rooting percentage and B – average number of dead semi-hardwood minicuttings with root (EM c/ R) of blueberry cv. Powderblue. Pelotas-Brazil, 2012.

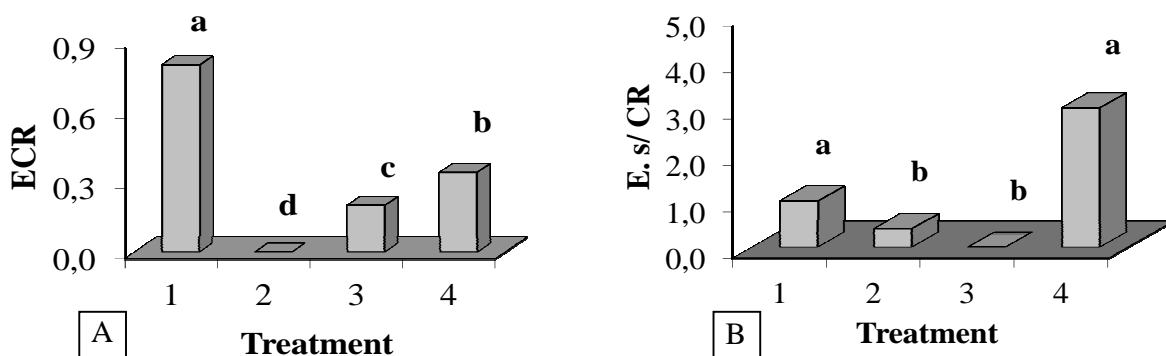


Figure 2 - A – Average number of semi-hardwood minicuttings of blueberry cv. Powderblue with callus and without root (ECR) and B – without callus and root (E.s/CR). Pelotas-Brazil, 2012.

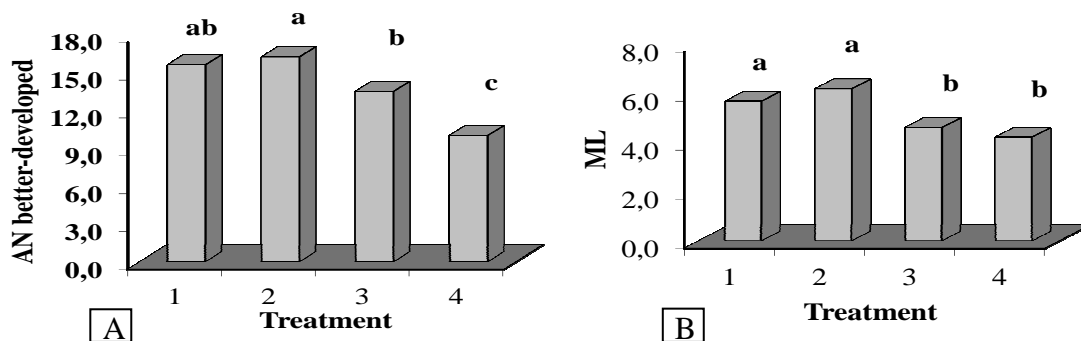


Figure 3 - A – Average number (AN) and B – medium length (ML) of the better-developed root of semi-hardwood minicuttings of blueberry cv. Powderblue. Pelotas-Brazil, 2012.

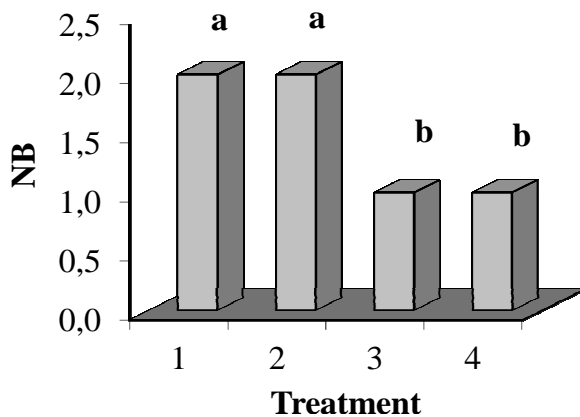


Figure 4 – Average number of buds in green-tip (NB) of semi-hardwood minicuttings of blueberry cv. Powderblue. Pelotas-Brazil, 2012.

CONCLUSION

Minicuttings of 'Powderblue' containing two cut leaves permitted in 90 days the formation of up to 98% of rooted minicuttings.

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