

Vegetative propagation of *Passiflora actinia* by semihardwood cuttings

Propagação vegetativa de *Passiflora actinia* por meio de estacas semilenhosas

Regina Canestraro Koch¹; Luiz Antonio Biasi²; Flávio Zanette³; João Carlos Possamai⁴

Abstract: Two experiments were carried out to verify the effect of different concentrations of IBA (indolbutyric acid) and ethanol on vegetative propagation of *Passiflora actinia*. Semihardwood cuttings were used presenting four nodes and two leaves. In the experiment with IBA the following concentrations were tested: 0, 250, 500 and 1000 mg.L⁻¹. In the experiment with ethanol the treatments were the following ones: control, water, ethanol 10%, ethanol 30%, ethanol 50% and ethanol 70%. All treatments were applied by immersion of the base of the cuttings (2cm) for 1 minute. In both experiments a randomized blocks design with five replications was used, and each plot had twenty cuttings. The cuttings were maintained in a mist chamber, in plastic pots, with the commercial medium Plantmax[®]. The evaluation was made seven weeks after the trial installation. Significant differences were not observed among treatments, in both experiments, for all the analyzed variables, except for the number of roots emitted by the cuttings for the concentrations of IBA, which presented a significant linear regression. The rooting percentage was high, an average of 90% in the experiment with IBA and 70% in the experiment with ethanol. It can be concluded that *P. actinia* can be propagated by semihardwood cuttings without using growth regulator or ethanol.

Key words: *Passiflora actinia*, rooting, cuttings, ethanol, indolbutyric acid.

Resumo: Foram conduzidos dois experimentos para verificar o efeito de diferentes concentrações de AIB (ácido indolbutírico) e de etanol na propagação vegetativa de *Passiflora actinia*. Foram usadas estacas semilenhosas possuindo 4 nós e 2 folhas. No experimento com AIB foram testadas as seguintes concentrações: 0, 250, 500 e 1000 mg.L⁻¹. No experimento com etanol os tratamentos foram os seguintes: testemunha, água, etanol 10%, etanol 30%, etanol 50% e etanol 70%. Todos os tratamentos foram aplicados por imersão da base das estacas (2cm) durante 1 minuto. Em ambos experimentos o delineamento foi em blocos ao acaso com 5 repetições e 20 estacas por parcela. A estaquia foi realizada em câmara de nebulização, em tubetes de polietileno, contendo o substrato comercial Plantmax[®]. A avaliação foi feita 7 semanas após a instalação do experimento. Não foram observadas diferenças significativas entre os tratamentos, em ambos os experimentos, para todas as variáveis analisadas, com exceção do número de raízes emitidas por estaca para as concentrações de AIB, que apresentou uma regressão linear significativa. A porcentagem de enraizamento foi elevada, sendo em média 90% no experimento com AIB e 70% no experimento com etanol. Conclui-se que *P. actinia* pode ser propagada por meio de estacas semilenhosas sem a necessidade de utilização de regulador de crescimento e etanol.

Palavras-chave: *Passiflora actinia*, enraizamento, estaquia, etanol, ácido indolbutírico.

1 Introduction

Passiflora actinia is a passion fruit native to south of Brazil and this specie is tolerant to low temperatures (VANDERPLANK, 1996). The *P. actinia* flowering occurs in spring and its fruits are harvested in summer (CERVI, 1997). In commercial scale the propagation by seed is the most common method in Brazil (MELETTI; NAGAI, 1992). The plants can also be obtained by vegetative propagation through grafting and cuttings (SÃO JOSÉ; NAKAGAWA, 1988).

The propagation by cuttings represents a great development of the passion fruit industry, for obtainment of uniform orchard with superior clones (RUGGIERO; MARTINS, 1987; MATSUMOTO; SÃO JOSÉ, 1989).

In the cutting process, the use of an intermediary part of the branch with three to four buds is recommended (TORRES *et al.*, 1975). The best cutting time is the beginning of the shooting spring (RUGGIERO; MARTINS, 1987).

Matsumoto and São José (1989) accomplished an experiment to verify the rooting of the cuttings of *P. edulis* f. *flavicarpa* in different media. The cuttings were used with two nodes of the portion included among the 4° and 7° node starting from the first visible open leaf of the apex of the branch. The three tested media were: sand, sifted tanned manure and coal. There were not significant differences between the different treatments. The rooting of the cuttings was also high, above 80%.

Meletti and Nagai (1992) studied the cutting propagation

¹ Bióloga. M. Sc.

² Eng. Agr., Dr., Professor Adjunto, Departamento de Fitotecnia e Fitossanitarismo (DFF). Setor de Ciências Agrárias. Universidade Federal do Paraná (UFPR), Caixa Postal 19061, CEP 81.531-990, Curitiba-PR, Brasil

³ Eng. Agr., Dr., Professor Titular, DFF, UFPR.

⁴ Eng. Agr., M. Sc., Professor Adjunto, DFF, UFPR.

of seven passion fruit species (*P. alata*, *P. edulis* f. *flavicarpa*, *P. edulis*, *P. caerulea*, *P. maliformis*, *P. incarnata*, *P. serrato-digitata*). The authors concluded that the commercial species (*P. edulis* f. *flavicarpa* and *P. alata*) presented the best rooted index, independent of the medium, soil or sand. The wild species showed difficult to root in the conditions of the experiment and the cuttings with leaves rooted better than those without leaves.

This research aimed to study the potential of propagation of *Passiflora actinia* by semihardwood cuttings and the effect of IBA (indolbutyric acid) and ethanol in this process.

2 Material and Methods

To accomplish the cuttings of *Passiflora actinia*, some mature plants were selected in the field, in the Fazenda Experimental do Canguiri of the Universidade Federal do Paraná, located in the municipal district of Pinhais-PR.

Two experiments were installed, one with IBA on June 24th, 1997 and another one with ethanol on July 7th, 1997. The cuttings were prepared from the intermediary portion of the branches despising the apical portion, presenting four nodes and two complete leaves in the superior node with 20cm of length.

The experiment with IBA was installed with the following treatments: 0, 250, 500 and 1000 mg.L⁻¹ of IBA. The IBA was diluted in a solution of ethanol 50%, and control was also constituted by the same solution. A randomized blocks design with five replications was used, and each plot had twenty cuttings.

The experiment with ethanol was installed with the following treatments: control (without immersion), water, ethanol 10%, ethanol 30%, ethanol 50% and ethanol 70%. The experimental design was the same used on experiment with IBA.

In both experiments, the treatments were applied by immersion of the base of the cuttings (2cm) in the solutions for 1 minute. The cutting was maintained in a mist chamber in plastic pots, with watering display 2 minutes on and 30 minutes off. The medium used was the commercial mix Plantmax[®]. The experiments were evaluated seven weeks after its installation through the following variables: number of rooted cuttings, number of retained leaves, number of shooted cuttings, number of shoots per cutting and number of roots per cutting. The significance of treatment effects was determined using analysis of variance.

3 Results and Discussion

The tested concentrations of IBA didn't present significant differences to each other for the rooting percentage, retained leaves, shooting and number of shoots per cutting (Table 1).

The rooting observed for *P. actinia* was 90% on the average, in the same way as previously reported by

Matsumoto and São José (1989), São José (1991) and São José *et al.* (1994) for *P. edulis* f. *flavicarpa* and superior to the mentioned by Cereda and Papa (1989) for this species and for *P. alata*.

Table 1 – Effect of different IBA concentrations on rooting of semihardwood cuttings of *Passiflora actinia*^y

IBA concentration (mg.L ⁻¹)	Number of rooted cuttings	Number of retained leaves	Number of shooted cuttings	Number of shoots per cutting	Number of roots per cutting
0	18	1.5	12	1.2	1.5
250	19	1.8	13	1.3	1.6
500	18	1.6	12	1.2	1.5
1000	19	1.7	13	1.3	1.6

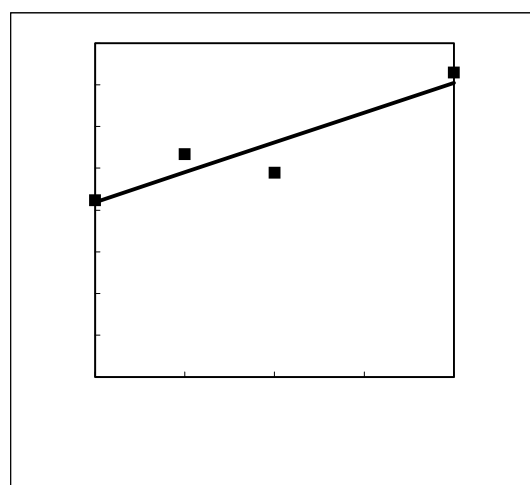
^y Data taken after 7 weeks.

^z Averages doesn't differ significantly by F test of ANOVA. Values are means of five replications consisting of 20 cuttings each.

The retained leaves were 74% on the average, what should have been contributed for obtaining high rooting rate. Meletti and Nagai (1992) concluded in their experiments, with seven passion fruit species (*P. alata*, *P. edulis*, *P. caerulea*, *P. maliformis*, *P. incarnata*, *P. serratodigitata*), that the leaves are decisive in the rooting. The leaves promoted great development and weight to the roots, larger number of shoots per cuttings and better phytosanitary condition to the clonal plants. The cuttings without leaves deteriorated easily before taking root. The results of Almeida *et al.* (1991) for the species *P. edulis* f. *flavicarpa*, whose presence of the leaf favored the rooting, were also observed in this work.

The use of IBA presented a significant effect in the increase of the number of roots for cuttings, and it was observed a significant linear regression between this variable and the concentration of IBA (Figure 1). In the highest dose of IBA (1000 mg.L⁻¹) it was observed 14.6 roots on the average by cutting.

Figure 1 – Effect of concentrations of indolbutyric acid in the number of roots emitted by semihardwood cuttings of *Passiflora actinia*.



In the experiment with ethanol the treatments didn't differ significantly for the rooting percentage, retained leaves, shooting, number of shoots per cuttings and

number of roots for cuttings (Table 2). Bhattacharya *et al.* (1985) reported that ethanol and other alcohols can be useful like source of carbon and also dissolved the endogenous auxin presented in the cuttings. In the hardwood cutting propagation of 'Garber' pear, the application of ethanol for a short time by dipping the base of cutting increased the percentage of rooting (ZANETTE, 1995). In this experiment the rooting cuttings was 70% on average. The retained leaves were also lower, happening 30% of retained leaves on the average.

Table 2 – Effect of different ethanol concentrations on rooting of semihardwood cuttings of *Passiflora actinia*^y.

^y Data taken after 7 weeks.

^z Averages doesn't differ significantly by F test of ANOVA. Values are means of five replications consisting of 20 cuttings each.

4 Conclusions

The vegetative propagation of *P. actinia* can be accomplished by semihardwood cuttings with two leaves without using of IBA or ethanol.

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