

Effects of Cytokinin on Shoot and Rhizome Initiation in Leaf Cuttings of *Eucodonia* and *Achimenes*

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Summary

The impact the cytokinin, benzyladenine (BA) on rhizome production in leaf cuttings of *Eucodonia* and *Achimenes* was determined. In *Eucodonia* ‘Adele’, untreated petiole cuttings were not statistically different from the untreated leaf lamina cuttings. Lamina leaf cuttings hereby defined as leaf segments without a petiole. Untreated lamina cuttings were found to have the highest adventitious shoot formation. BA had a negative effect in *Eucodonia* on rhizome formation in petiole leaf cuttings and reduced the number of shoots initiated in leaf cuttings with a cut lamina. Leaf cuttings in

Achimenes only initiated rhizomes and roots. *Achimenes* ‘Desiree’ leaf cuttings produce a higher percentage and greater number of rhizomes compared to *Achimenes* ‘Tarantella’. The effect of BA on *Achimenes* leaf cuttings was similar to *Eucodonia*. There was no statistical difference between the untreated and BA treated leaf cuttings in *Achimenes* ‘Tarantella’. *Achimenes* ‘Desiree’ cuttings were observed to have negative effects from the BA treatment. Overall, a pretreatment with BA had no impact or a negative impact on rhizome initiation in *Eucodonia* and *Achimenes*.

INTRODUCTION

Eucodonia and *Achimenes* in the Gesneriaceae are native to Mexico and Central America. The diverse family consists of mostly tropical or subtropical herbaceous terrestrial or epiphytic plants. They are summer to fall flowering plants used as seasonal pot plants or for bedding. Both *Eucodonia* and *Achimenes* form scaly rhizomes (Zimmer et al. 2002). *Eucodonia* and *Achimenes* can be propagated using rhizomes or taking leaf cuttings (Dole and Wilkins 2005). New plants can form from the rhizome or pieces of the rhizome, or emerging shoots can be used as stock plants for future leaf cuttings (Geneve et al. 2022). Seasonal crop production requires an adequate supply of rhizomes as a starting material. Both species have the potential to become commercial seasonal potted plants but need a constant supply of rhizomes for stock plants. The objective of this research

is to investigate the impact of cytokinin (BA) on rhizome initiation in leaf cuttings in *Eucodonia* and *Achimenes*.

METHODS AND MATERIALS

Plant Material, Growing Conditions, and Experimental Design: *Eucodonia* ‘Adele’, *Achimenes* ‘Tarantella’, and *Achimenes* ‘Desiree’ plants (**Fig.1**) were grown in the greenhouse from March through November during 2021 and 2022. The plants were allowed to dry seasonally and go dormant during the fall. Flats were placed into the greenhouse during mid-March of 2021 and then moved into the growth chambers under plastic domes during 2022. There were four replicate 6 packs per treatment for this study. The leaves were evaluated 60 days after the cuttings were taken.



Figure 1. A. *Eucodonia* ‘Adele’; B. *Achimenes* ‘Tarantella’; C. *Achimenes* ‘Desiree’.

Shoot and Rhizome Initiation in Leaf Cuttings: *Eucodonia* leaf samples were harvested from dormant, stock plants and then cut with a razor 2mm from the petiole or across the lower portion of the lamina above the petiole. Leaves were either

untreated or soaked in BA at 50 mg·L⁻¹. *Achimenes* leaf samples were either untreated or soaked in a BA (50 or 100 mg·L⁻¹). Treated leaves were placed in their solution upright with about 1 mm of the lamina in the treatment. Leaves were left in their

treatments for 24 hours. Leaves were then placed into a 6-pack with vermiculite and placed into the growth chamber with light ($\sim 120 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) and constant 24°C.

RESULTS

Eucodonia leaf cuttings were able to produce roots, shoots, and rhizomes (Fig. 2A).

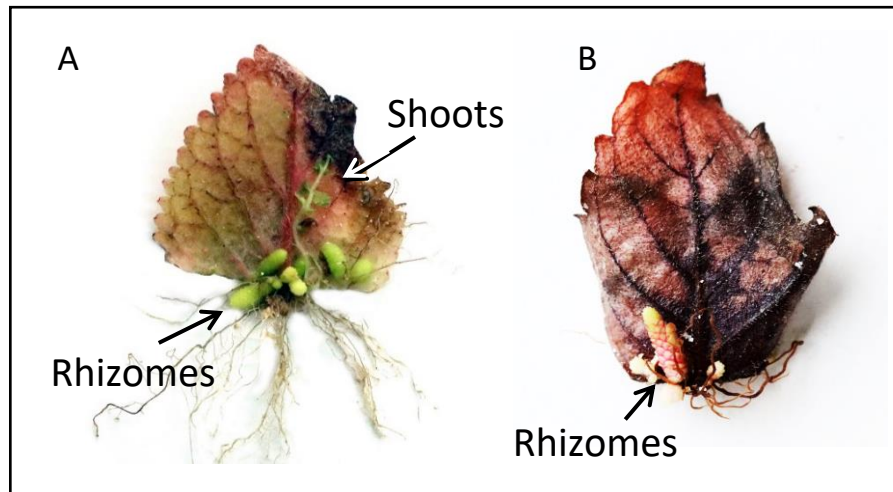


Figure 2. Rhizome initiation in A. *Eucodonia* 'Adele' and B. *Achimenes* 'Tarantella'.

There was no difference in the percentage of rhizomes initiated from untreated cut lamina and petiole leaf cuttings (Fig. 3).

Untreated cut lamina cuttings produced 3.5 rhizomes per cutting which was a slight increase compared to the 2.5 rhizomes per cutting in untreated cut petiole cuttings.

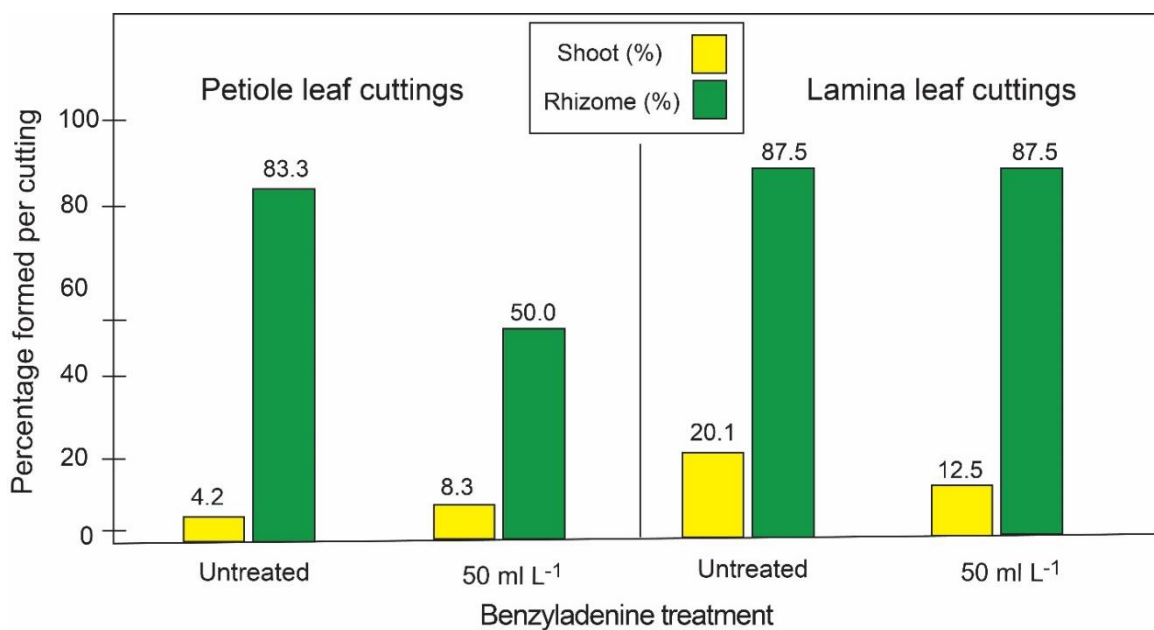


Figure 3. Percentage of shoot and rhizome production in *Eucodonia* 'Adele' petiole and lamina leaf cuttings treated with 0 or 50 mg L⁻¹ benzyladenine (BA).

In contrast, untreated cut lamina leaf cuttings formed a higher percentage of adventitious shoots compared to petiole leaf cuttings (Fig. 3). BA had no impact on leaf cuttings with a cut lamina, but there was a reduction in the number of leaf cuttings forming shoots after a BA treatment.

Both *Achimenes* species only initiated roots and rhizomes from leaf cuttings (Fig. 2B). On average, leaf cuttings of

Achimenes ‘Desiree’ produced a higher percentage and greater number of rhizomes compared to *Achimenes* ‘Tarantella’ (98% vs. 67% and 4.5 vs. 1.8 rhizomes per cutting, respectively). In *Achimenes* ‘Tarantella’, there was no difference between the untreated and BA treated leaf cuttings (Fig. 4). However, in *Achimenes* ‘Desiree’ there was a decrease in rhizome production for the cuttings treated with BA at 50 mg·L⁻¹.

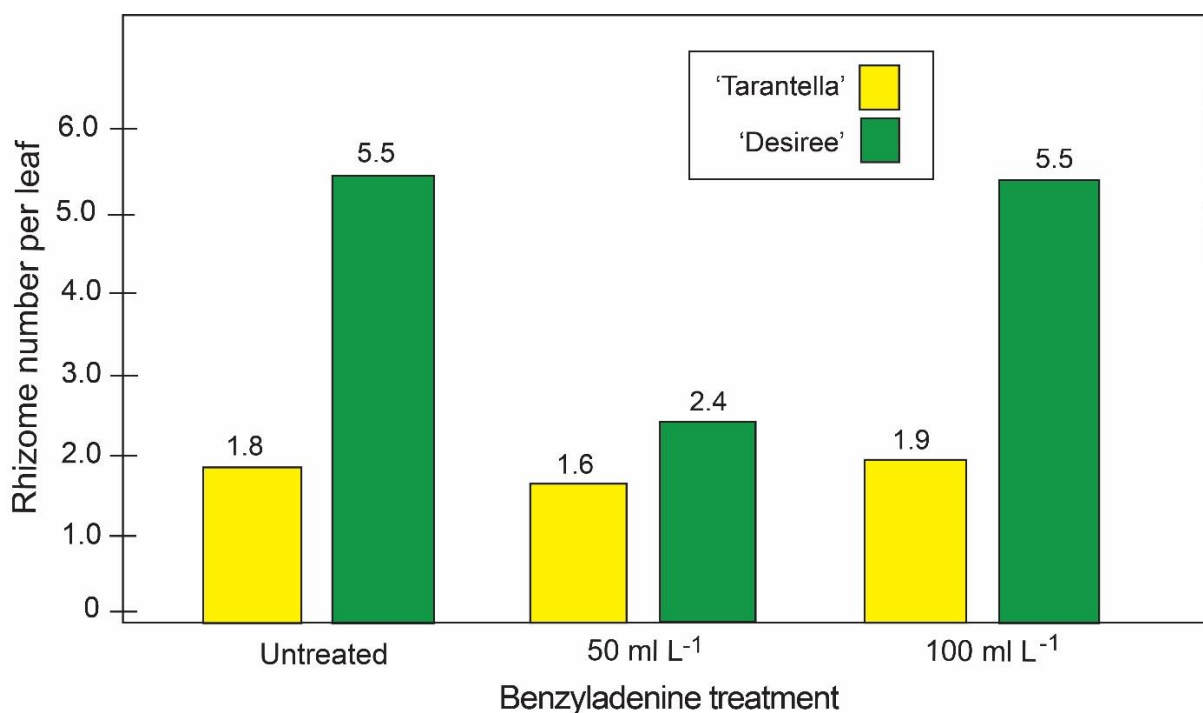


Figure 4. Rhizome production in *Achimenes* ‘Tarantella’ and ‘Desiree’ leaf cuttings treated with 0, 50, or 100 mg L⁻¹ benzyladenine (BA).

DISCUSSION

A viable propagation method utilizing leaf cuttings requires adventitious organ formation. Selected members in the Gesneriaceae can form adventitious shoots, roots, and rhizomes from leaf cuttings (Miller and Brigden 2005). Cytokinins, including BA, have been used to increase shoot initiation in leaf sections for many crops cultured in tissue culture and a few species from traditional leaf cuttings (Davies et al. 2018).

In *Eucodonia*, BA increased shoot initiation from rhizome segments (Geneve et al. 2023) but the impact of BA on rhizome initiation in leaf cuttings has not been evaluated. In the current study, treating leaf cuttings in *Eucodonia* with BA reduced the number of leaves forming rhizomes, but increased the number of rhizomes formed per petiole leaf cutting (Fig. 3). The addition of

BA to *Achimenes* leaf cuttings had no impact or reduced rhizome formation depending on the cultivar (**Fig. 4**). In this preliminary study, only a single concentration of cytokinin was used for a single exposure time. It is possible that a study varying concentration and exposure time could yield in-

creased rhizome formation. A novel approach could be treating stock plants with a cytokinin foliar spray prior to taking leaf cuttings rather than post-severance cytokinin treatment.

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