BRANCHING OF *TUPIDANTHUS* AIR LAYERS AFTER TOPPING AND DEFOLIATION

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Abstract. Defoliation of topped *Tupidanthus* layers initially stimulated higher numbers of lateral breaks than decapitation alone. The subsequent elongation of the laterals, however, was greatest in the non-defoliated treatment.

Tupidanthus calyptratus Hook. f. & T. Thoms. is a tropical ornamental that is increasing in popularity. Although similar in habit to *Brassaia actinophylla* Endl. (1), *Tupidanthus* possesses a higher value in the wholesale foliage market. In Hawaii, air layers are used to increase field stock plantings of *Tupidanthus*; however, these air-layered shoots exhibit strong apical dominance with little branching occurring after transplanting into the field. The potential for obtaining additional layers from these shoots would be improved if greater branching was achieved. In this paper, we report the effect of topping and leaf removal on lateral shoot growth of air-layered *Tupidanthus*.

MATERIALS AND METHODS

Tupidanthus plants growing in Keaau, Hawaii were air-layered in August, 1981 by, making 3 spirally arranged slits 76 cm from the shoot apex. Thirteen weeks later, the layers were removed, treated, and planted into holes filled with 20 liters of sugarcane ash. The parent soil in the area was a histosol composed primarily of crushed Aa cinder and organic matter. Treatments were: 1) intact control; 2) decapitation + complete defoliation; 3) decapitation + defoliation with the 5 uppermost leaves intact; 4) decapitation + defoliation with the 5 lowermost leaves intact; and 5) decapitation without defoliation. Each treatment consisted of 10 replicate plants. All decapitations were performed at the internode above the latest fully expanded leaf. Observations of lateral shoot number and length were made at 6 and 29 weeks.

RESULTS AND DISCUSSION

At 6 weeks after treatment the greatest number of breaks was evident in the decapitated, fully defoliated plants (Table 1). Removal of the upper leaves was more effective in stimu-

lating lateral breaks than removal of lower leaves. These results indicate that leaves contribute to the inhibition of bud outgrowth and are consistent with the conclusions obtained by previous workers (4). The greater inhibition experienced in plants with the upper leaves intact is not surprising since leaves are known auxin sources (2), and auxin transported from apical tissues is involved in the inhibition of lateral bud growth (3,4).

Table 1. Lateral breaks in *Tupidanthus* air layers at 6 and 29 weeks after decapitation and defoliation

Treatment	Mean number of lateral breaks	
	6 weeks	29 weeks
Intact control	0	0.4
Decapitation + no defoliation	0.7	4.0
Decapitation + lower leaves removed	1.1	4.0
Decapitation + upper leaves removed	3.2	5.6
Decapitation + complete defoliation	12.5	Dead
LSD, 5%	1.8	2.6

The data in Table 1 also show that decapitated, non-defoliated plants initially exhibited a low number of lateral breaks, but no significant differences were evident in the surviving decapitation treatments at 29 weeks. Length of the laterals in the non-defoliated plants, however, was superior to those in the remaining treatments (Table 2). By 29 weeks none of the fully defoliated plants had survived the treatment.

Table 2. Length of lateral shoots in *Tupidanthus* air layers 29 weeks after treatment

Treatment	Mean length of lateral shoots (cm)
Decapitation + no defoliation	36.4
Decapitation + lower leaves removed	24.7
Decapitation + upper leaves removed	16.7
LSD, 5%	10.5

Thus, although lateral breaks in decapitated plants was encouraged by defoliation, it probably resulted in sufficient deprivation of photosynthates to limit the subsequent growth of the laterals. Our study provides practical information regarding *Tupidanthus* propagation and indicates that decapatition without defoliation is the preferred method to obtain material for additional layers.

LITERATURE CITED

1. Graf, A.B. 1974. Exotica. Roehrs Company Inc., E. Rutherford, N.J.
2. Leopold, A.C. and P.E. Kriedemann. 1875. Plant Growth and Development. McGraw-Hill, Inc., N.Y.

3. Nagao, M.A. and B. Rubinstein. 1976. Early events associated with lateral bud growth of *Pisum sativum L. Bot. Gaz.* 137:39-44.
4. Rubinstein, B. and M.A. Nagao. 1976. Lateral bud growth and its control by the apex. *Bot. Rev.* 42:83-113.

SEED PROPAGATION OF PALMS

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Abstract. Interest in the production of palms in Hawaii has accelerated in recent years. This has resulted from greater use of palms in the landscape and the potential production of palms for the export market for interior landscape use on the mainland.

With this increased production has come a great awareness of some of the production problems with this crop. During the past year we have initiated a research project to study the culture and nutrition of palms. One of the objectives of the project is to determine the factors that influence the rate of palm seed germination and establishment. Two preliminary trials are reported here.

REVIEW OF LITERATURE

There are several different methods that have been used to improve the germination of palm seeds. *Copernicia* palm seeds were found to begin germination within 5 to 21 days after the pericarp was removed and the seeds were soaked in tap water which was changed daily. Mechanical scarification and soaking in 10% sulfuric acid for 15 minutes further hastened germination (10). Scarification by filing the hilum until the embryo was visible accelerated seed germination of *Gastrococos crispa* (Syn.: *Acrocomia crispa)* and *Arenga engleri* (8). Supplemental bottom heat (75 to 80°F) has been found to accelerate germination in many palm species (16,19,20) and soaking areca palm seeds briefly in sulfuric acid has also been recommended (2,15).

Most researchers agree that palm seeds germinate best when fresh, ripe seeds are used. Many palms lose their viability within a month as they have almost no ability to withstand desiccation (6). The fruit pulp or pericarp is usually removed and the seeds sown in a sterile, well drained medium such as vermiculite, which has good porosity and a high water holding capacity (19). However, Bunker (4) reported a germination rate of 83% after 30 days for *Chrysalidocarpus lutescens* seeds with the fruit pulp still attached when treated with 75° to 85°F bottom heat.