

GROWTH REGULATION OF SOME TROPICAL SPECIES¹

by David Hensley and Julie Yogi

Abstract. One-gram a.i. flurprimidol tablets (Cutless[®] Tree Implant) were inserted into the trunks of golden shower trees (*Cassia fistula*) on August 8, 1993. Plants were topped in June 1994 and again in December 1994. Regrowth after each topping was measured. There was no consistent influence of flurprimidol on growth of *C. fistula*. Paclobutrazol (Profile[®]) applied as a basal drench reduced growth of Queen palm (*Syagras romanzoffiana*) and Manila palm (*Veitchia merrillii*) 11 months after application.

Numerous chemicals have been used to regulate growth of trees (2). Flurprimidol and paclobutrazol have effectively reduced growth of many woody species when injected into their trunks. Both materials are labeled for tree injection and are typically pressure injected in an alcohol carrier (5,6). This technique and the alcohol have sometimes resulted in bark necrosis and bark splits, as well as weeping from and discoloration of injection sites (3). Power injection has often been slow and complicated to use (4), and success has varied with species.

DowElanco[™] recently labeled flurprimidol for application as Cutless[®] Tree Implant for application as a trunk implant and paclobutrazol as Profile[®] as a basal soil application. Growth of trees has been significantly reduced by flurprimidol applied as a trunk implant or soil drench (4), or paclobutrazol applied as a soil drench (1). The purpose of this study was to evaluate the influence of Cutless Tree Implant and Profile on growth of some tropical species.

Materials and Methods

Flurprimidol in *Cassia fistula*. One-gram a.i. flurprimidol tablets (Cutless Tree Implant) were inserted into 1 inch deep holes drilled into base of the trunks of golden shower trees (*C. fistula*) at the University of Hawaii Waimanalo Research

Farm on August 8, 1993. The trees ranged from approximately 8 to 20 cm (3 to 8 inches) in diameter. The tablets were inserted at rates of 0.1, 0.2, 0.4, or 0.8 g/cm (diameter at 30 cm [12 inches]). Controls were not treated or drilled. Applications were made according to label directions. Treatments were randomly assigned to test trees. The number of replicates in the complete random design varied with treatment, with the minimum number of replicates being 7 and the maximum 10.

The trees were topped (upper trunk and all side branches removed) at 2.5 m (8 ft) with a chainsaw on June 28, 1994. The trees received only natural rainfall and were fertilized in June 1994.

On December 27 and 28, 1994, all growth subsequent to topping in June was removed to the original 8 ft height. The shoot lengths and fresh weight of the growth occurring after topping were measured. Growth (shoot length and fresh weight) occurring after December 1994 was again removed and measured in June 1995. All data were statistically analyzed using analysis of variance and F-tests (.05).

Paclobutrazol on palm. Paclobutrazol (Profile) was applied to Queen palm (*Syagras romanzoffiana*) and Manila palm (*Veitchia merrillii*) as a basal drench of 1.25, 2.0, or 4.0 g a.i./inch trunk diameter (2.20, 3.50, or 7.00 mL RTU/cm trunk diameter) on August 3, 1993. The drench (RTU) contained 300 mL of Profile 2SC per gal. Controls were not treated. Mixing and application were done according to label directions. All applications were made at the trunk-soil interface. Each treatment and the control for Queen palm were replicated 5 times. Each growth regulator treatment with Manila palms was replicated 10 times and nontreated controls 6 times in a complete random design.

The height of plants was measured from the soil line to the highest growing point of the most recently matured frond at application and again on June 28, 1994. The base of existing fronds was marked with paint in October 1993 so that new growth could be identified and evaluated for phytotoxicity. The palms were harvested shortly after the June 1994 measurement, making further data collection impossible. All data were statistically analyzed.

Results

Flurprimidol in *C. fistula*. Treatment wounds had closed by June 1994. Application of flurprimidol as trunk implants did not dramatically or consistently have an effect on growth (average cm shoot length) (Figure 1) or biomass (average fresh weight of growth per tree) (Figure 2) regardless of the rate applied. There were no statistical differences (F-test, 0.5) in growth (Figure 3) or biomass (Figure 4) of December 1994 to June 1995 growth when measured in June 1995.

Paclobutrazol on palm. Basal drenches of paclobutrazol dramatically reduced the growth of Queen and Manila palms. Growth of Manila palm was reduced by paclobutrazol (Figure 5). Queen palm growth (Figure 6) was also reduced by all rates. Fronds arising after application of the chemical were not malformed or shortened on either species, regardless of growth regulator rate.

Discussion

While flurprimidol has shown to be an effective growth regulator for a number of landscape species, it did not have any significant or consistent impact on the growth or biomass of golden shower trees during the first or second year after treatment. Arborists in Hawaii report that the chemical has effectively reduced the growth of shower trees when injected, although there have been no published research trials with this species. The lack of effect on growth by the chemical may be due to a failure of the material to effectively enter the transpiration stream of the tree. Many of the talc plants appeared intact when observed 30 days after application. According to a manufacturer's representative, the tablets should have softened and lost their form shortly after implanting. The research trial was located in Waimanalo on the island of Oahu, a relatively dry area (approx-

mately 36 inches of seasonal rain per year). August and September are dry months. It is possible that even though the holes were filled with water before and after insertion of the implants, the material may not have been readily available.

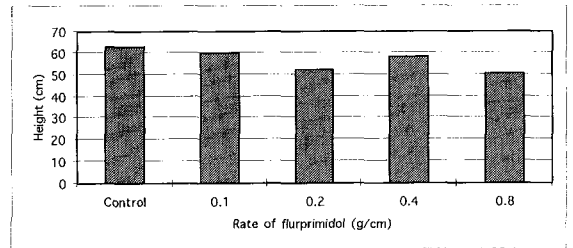


Figure 1. Average shoot growth (cm per tree) of golden shower trees treated with Cutless Tree Implant after topping in June 1994. Data were taken December 1994. There were no statistical differences among the means determined by F-test (.05).

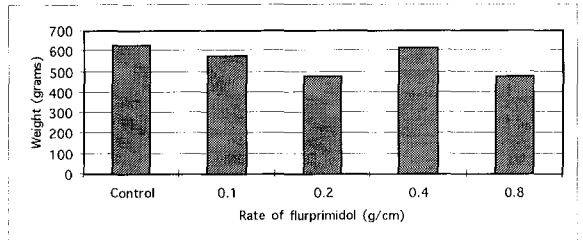


Figure 2. Average biomass (g fresh weight per tree) of golden shower trees treated with several rates of Cutless Tree Implant after topping in June 1994. Data were taken in December 1994. There were no statistical differences among the means determined by F-test (.05).

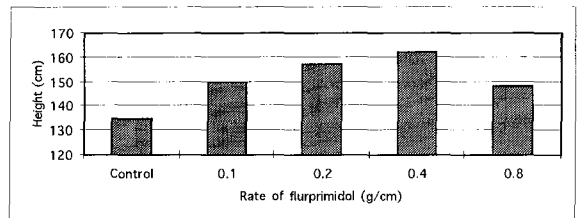


Figure 3. Average growth (cm per tree) of golden shower trees treated with several rates of Cutless Tree Implant after topping in December 1994. Data were taken in June 1995. There were no statistical differences among the means determined by F-test (.05).

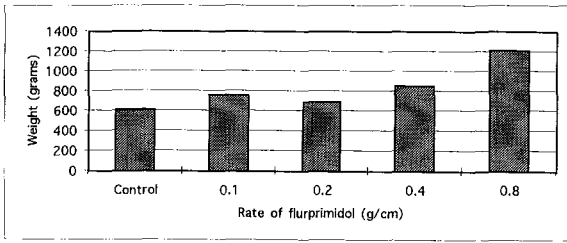


Figure 4. Average biomass (g fresh weight per tree) of golden shower trees treated with several rates of Cutless Tree Implant after topping in December 1994. Data were taken in June 1995.

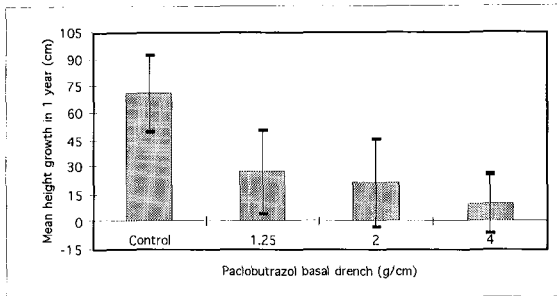


Figure 5. Average height (cm) of Manila palms 11 months after basal trenches of paclobutrazol (Profile 2SC). Bars represent standard deviations of means.

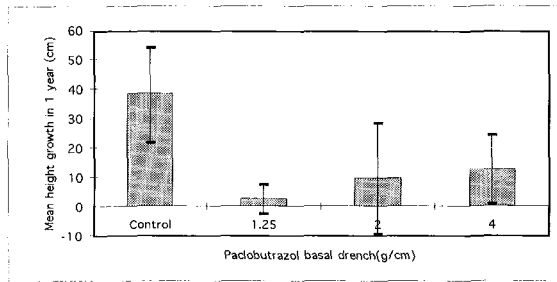


Figure 6. Average height growth (cm) of Queen palms 11 months after basal trenches of paclobutrazol (Profile 2SC). Bars represent standard deviations of means.

In a later and separate study in Kailua, Oahu, Cutless Tree Implants failed to reduce growth of rainbow shower trees (*C. fistula x javanica*) within 12 months after treatment (data not shown). The treatment area is located in the same dry region as the Waimanalo study.

While flurprimidol has shown to be effective in reducing growth of shower trees, trunk implants were ineffective even at elevated rates. Injection of the material appears to be a superior method of application for this species in drier tropical areas.

Paclobutrazol applied as a basal soil drench reduced the growth of both palm species within 11 months after treatment. There was no visible damage or abnormal growth of fronds arising after treatment. We could find no published work with palms with any chemical growth regulators. Unfortunately, the trees were harvested shortly after measuring so the duration of the regulation could not be evaluated. Paclobutrazol appears to have potential in controlling growth of these palm species and additional work is warranted on these and other palms.

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Literature Cited

1. Burch, P.L., R.H. Wells, and W.N. Kline. 1996. *Red maple and silver maple growth evaluated 10 years after application of paclobutrazol tree growth regulator.* J. Arboric. 22(2): 61-66.
2. Neely, D. 1990. *Tree Growth Regulation.* International Society of Arboriculture, Urbana, IL.
3. Perry, T.O., F.S. Santamour, Jr., R.J. Stipes, T. Shear, and A.L. Shigo. 1991 *Exploring alternatives to tree injection.* J. Arboric. 17(8): 217-226.
4. Redding, K.D., P.L. Burch, and K.C. Miller, K. 1994. *Growth, biomass and trim/chip time reduction following application of flurprimidol tree growth regulator.* J. Arboric. 20(1): 38-45.
5. Sterrett, J.P. 1985. *Paclobutrazol: A promising growth regulator for injection into woody plants.* J. Amer. Soc. Hort. Sci. 110(1): 4-8.
6. Watson, M.R. 1987. *Research on tree growth regulators has exciting implications for horticulture.* Amer. Nurseryman 166(4): 76-79.

*Department of Horticulture
College of Tropical Agriculture
and Human Resources
University of Hawaii
Honolulu, HI 96822-2279*

Résumé. Des comprimés renfermant 1 gramme de flurprimidol (implants Cutless® Tree) ont été insérés dans les troncs 1casses pleureuses dorés (*Cassia fistula*) le 8 août 1993. Les végétaux ont été écimés en juin 1994 et de nouveau en décembre 1994. La repousse a été mesurée après chaque écimage. Il n'y a pas eu d'effet réel de l'action du flurprimidol sur la croissance de *C. fistula*. Le paclobutrazol (Profile®) appliqué par mouillage de la base du tronc a donné une réduction significative de la croissance chez le palmier Romanzoff (*Syagras romanzoffiana*) et le palmier de Manille (*Veitchia merrillii*) 1 mois après l'application.