NOTES

HORTSCIENCE 22(3):506–507. 1987.

Tree-row-volume Spraying Rate Calculator for Apples

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Most pesticide recommendations for apple orchards have been based on a specified rate per hectare. These recommendations are based on dilute applications of materials in 3740 liters·ha^{-1} (400 gallons/acre) to trees in a ''standard'' orchard, which are about 6.1 m (20 ft) high, 7.0 m (23 ft) wide, and 10.7 m (35 ft) between rows (3, 6). Most orchards today do not conform to this standard, and many pesticides are applied at concentrations other than dilute.

In 1972, Byers et al. (3) proposed tree-row-volume (TRV) calibration for determining the dilute water rate for trees that differed from the ''standard''. TRV rates were based on the assumption that each row is a rectangular box and the volume of space occupied by foliage per acre could be calculated on the basis of the volume of a simple rectangular box. For a ''standard orchard'', the TRV was calculated to be 39,907 m^3 of foliage per hectare (580,331 ft^3/acre); 0.094 liters·ha^{-3} (0.00069 gallons/ft^3). We proposed that smaller than standard trees be sprayed at rates proportional to their TRV space compared to the standard tree size as defined above (3).

In a subsequent study, we found spray chemical deposits inversely related to tree size and canopy density (canopy density was measured as a function of light penetration through the canopy) (2). Reduced variability in thinning spur-type 'Delicious' with (2-chloroethyl)phosphonic acid (ethephon) was obtained by calibrating commercial airblast sprayers on a TRV basis. (5). Using TRV calibration it was found that higher canopy densities reduced pesticide deposits and that adjustments for canopy density would be important when using TRV spray calibration guidelines (9).

Grower acceptance of the TRV methods for estimating chemical rates/acre has been slow since its introduction in Virginia in 1972. One reason is that most sprayer nozzles are not engineered for rapid adjustment when a change in tree size warrants a change in chemical rate/acre. Several spray guides (1, 7, 8) now include the TRV concept for estimating the rate of chemical for differing tree sizes. Some growers are adjusting the chemical rate in the tank and mixing different chemical rates rather than changing water rates/ha.

Previous studies have shown that chemical deposits and distribution depend on factors other than tree size or canopy density; such as drift, tree shape, droplet size, water rate, tree volume, rate of sprayer travel, wind, type of equipment used, matching of sprayer nozzling to tree, sprayer air volume output, air velocity, and distance of sprayer to the target (3, 4).

The ''Apple Tree Row Volume Spraying Rate Calculator'' (Fig. 1) was developed to provide a rapid method for estimating the chemical rate per acre needed, based on changes in tree size. The calculator also provides a rapid method for determining the TRV chemical rate per acre from label rates/acre and will determine the amount of chemical required for different sprayer tank sizes at different water volumes per acre. If adjustments are desired for canopy density, pest pressure, drift, or any other reason, additional adjustments may be made by altering the percent TRV calculated (i.e., ± 20%) before using the second slide of the calculator for estimating the chemical rate per ha (acre).

The instructions are as simple as possible and are to be used only as a guide to estimate the needed chemical rate per acre. The instructions read:

Side #1
1) Set tree width at distance between rows.
2) Read % tree-row-volume^z at tree height.
3) Set chemical labeled rate/acre at % tree-row-volume^z (from spray guide or label).
4) Read TRV chemical rate/acre at arrow.
5) Set water rate/acre at TRV of chemical rate/acre.
6) Read TRV chemical required/tank at sprayer tank size.

^{z}% tree-row-volume may be altered ±20% if pest pressure, canopy density, or drift warrant.

The cautions read:

Do not use chemical rates over or under those indicated on the pesticide label. This slide rule should be used only as a guide for estimating chemical rates when a grower wishes to apply a chemical on a TRV basis rather than on a specified rate/acre. If canopy density, pest pressure, or past experience dictate, % TRV may be adjusted up or down by as much as 20%. TRV calibration will not compensate for poor chemical distribution, timing, chemical choice, weather, etc.

The TRV calibration slide rule is based on data that are believed to be reliable; but no warranty is expressed or implied by Virginia Polytechnic Institute and State Univ. regarding accuracy or usage of this slide rule.

A small window is provided on the front and a larger one on the back for a second party to place a sticker with a logo or advertisement.

The purpose for developing this slide rule was an attempt to standardize the many possible designs that might be built into a hand-held calculator.

Information on availability of this slide rule may be obtained from me.

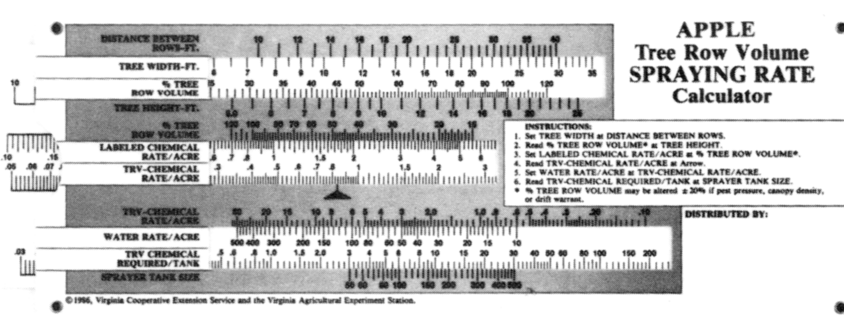

Fig. 1. Apple Tree Row Volume Calculator designed to estimate rate of chemical required per acre based on tree height, tree width, and row width. The calculator also will determine amount of chemical required for different spray tank sizes at different water volumes/acre.

Received for publication 6 Oct. 1986. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

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HORTSCIENCE 22(3):507–508. 1987.

Growth Regulator Effect on Growth and Flowering of *Zantedeschia rehmannii* hyb.

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Additional index words. Calla lily, ancymidol, paclobutrazol, growth retardants

The recent availability of zantedeschia hybrids with large flowers of various colors has made zantedeschia a popular cut flower in New Zealand, Japan, and Europe. New Zealand zantedeschia breeders have developed hybrids that are free-suckering with multiple flowers, which makes them a potential potted plant. However, zantedeschia attain heights of 40 to 50 cm and are not aesthetically pleasing specimens grown in 15-cm containers without use of growth regulator chemicals.

The growth regulator α-cyclopropyl-α-(4-methoxyphenyl)-5-pyrimidinemethanol (ancymidol) provides height control on a wide variety of ornamental crops (1, 4) and the experimental growth regulator β-[(4-chlorophenyl)methyl]-α-(1,1-dimethylethyl]-1*H*-1,2,4-triazole-1-ethanol (paclobutrazol) also has been effective on a wide range of ornamental (1, 3) and bulbous crops (4). Ancymidol and paclobutrazol are effective as soil drenches (1–3), provided the media does not contain pine bark, in which case higher concentrations are needed (1).

The objective of this experiment was to determine the influence of drench applications of ancymidol and paclobutrazol on growth, height, and flowering of zantedeschia.

Preliminary experiments indicated foliar sprays were not effective because they do not reach the emerging leaves, which are folded and protected by an outer sheath. When the leaf fully unfolds, the petiole concomitantly has reached its maximum length and is no longer receptive to retardation by growth regulators.

Two-year (5 cm in diameter) zantedeschia tubers were obtained from a producer in Aug. 1984 and stored dry at 5°C at the Plant Growth Unit of Massey Univ., Palmerston North, New Zealand. Tubers were planted 29 Oct. in 17-cm plastic pots containing 3 peat : 2 pumice (v/v) with 2 kg 28N–2.6P–10K and 1 kg 14N–6.1P–11.6K Osmocote, 3 kg dolomite, and 600 g Micromax incorporated per cubic meter. The medium was drenched with Benlate following planting. Each treatment consisted of six plants with each plant serving as a replicate. The pots were placed in randomized blocks on a drained capillary mat bench in a glasshouse after the growth regulators were applied. Day and night temperatures of 20° to 24°C and 16° to 18°, respectively, were maintained.

Ancymidol and paclobutrazol were applied in 240 ml of solution when shoots emerged from the soil, at 0, 1, 2, 3, or 4 and 0.5, 1, 2, 4, or 8 mg a.i./pot, respectively. Plant height and flower scape length were measured from pot rim to the tallest leaf and base of flowers, respectively. Leaf width was measured at the widest point and length was measured from the base to the tip of the leaf blade. Measurements were taken at anthesis of the first flower on each plant.

Ancymidol drench at 1, 2, or 3 mg did not show significant differences with respect

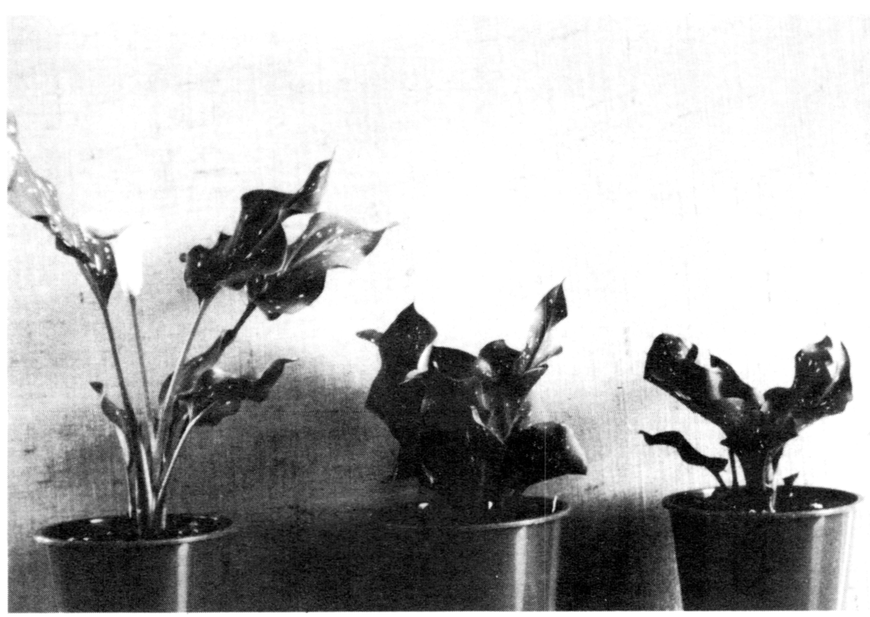

Fig. 1. *Zantedeschia rehmannii* treated with paclobutrazol at shoot emergence. From left to right: Control, 4 mg, and 8 mg a.i./pot. Note: Leaves appear to be more rounded on treated plants due to inhibition in length.

Received for publication 26 Sept. 1986. Florida Agricultural Experiment Stations. Journal series no. 7570. I acknowledge the support from Topline Nurseries, Auckland, New Zealand for supplying the Zantedeschia tubers for this study. The work was conducted while on sabbatical leave at Massey Univ., Palmerston North, New Zealand. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

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