

Rose, greatest improvement in rooting can be achieved by careful selection and management of mother stock plants.

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### LITERATURE CITED

- 1 Armstrong, J 1978 Vegetative propagation of Australian Native Rutaceae (Tribe Boronieae) Abstract 1862 XXth International Horticultural Congress, Sydney, Australia, August, 1978
- 2 Child, R D and R F Hughes 1978 Factors influencing rooting in hardwood cuttings of apple cultivars *Acta Horticulturae* 79 43-48
- 3 Dykeman, B 1976 Temperature relationships in root initiation and development of cuttings *Proc Inter Plant Prop Soc* 26 201-207
- 4 Good, J E G, J A Bellis and R C Munro 1978 Clonal variation in rooting of softwood cuttings of woody perennials occurring naturally on derelict land *Proc Inter Plant Prop Soc* 28 192-201
- 5 Hess, C E 1969 Internal and external factors regulating root initiation. In 'Root Growth' (Ed W J Whittington) Proc Fifth Easter School in Agricultural Science University of Nottingham 1968 Butterworths, London
- 6 Heuser, C W 1976 Juvenility and rooting cofactors. From Symposium on Juvenility in Woody Perennials *Acta Horticulturae* 56 251-261
- 7 Howard, B H and H R Shepherd 1978 Opportunities for the selection of vegetatively propagated clones within ornamental tree species normally propagated by seed *Acta Horticulturae* 79 139-144
- 8 Leopold, A C and P G Kriedemann 1975 Plant Growth and Development McGraw-Hill Publishing Co Ltd, N Y
- 9 Turner, M 1977 Propagation of Boronia Society for Growing Australian Plants Seminar, Perth

### AUTOMATING AERATED-STEAM TREATMENTS

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Since we introduced aerated-steaming of soil in our nursery in early 1962 we have gained a lot of experience and have greatly upgraded the equipment. We know the areas for cold spots, the time it takes to bring the various mixes up to temperature, etc, and with this knowledge we set out to automate these operations.

Initially we used electronic equipment for temperature control of the steam-air mix, the sensing of the soil temperature and the timing of the sequences. Unfortunately this

equipment proved to be unreliable. When it functioned properly it was very good and, possibly with better equipment and more reliable technicians, this could have been the best way to go. However, after many frustrations over a long period we discarded this equipment and switched to more mechanical type units. The equipment used is available off the shelf from various suppliers. I mention the equipment I have used but do not imply that this is the only or the best equipment available. At least what I have assembled is working, has more than paid for itself, and is expected to last a good few years yet.

For bulk soil we have mobile bins of  $\frac{1}{2}$  cubic yard capacity which are wheeled to a fixed aerated-steaming unit and coupled up with a flexible hose. The temperature of the steam-air mix is controlled by a Honeywell Modutrol Motor (M 945A) coupled to a  $\frac{1}{2}$ " steam valve (V 5011) and linkage (Q 455), in conjunction with a Fast Response Temperature Controller (T 991). The timing sequence is by two time clocks, TESCH 60 min., set up in a control box with the necessary relays, push-button start-stop switch, and sequence indicator lamps. A steam solenoid valve is incorporated in the steam line to give a positive shut-off of steam. When we are ready to steam it is only necessary to push the start button. The steam solenoid opens, the blower runs and the Modutrol motor moves to the open position until the temperature reaches  $62.5^{\circ}\text{C}$ , then it modulates to maintain this temperature. After 45 minutes the steam solenoid shuts and the Modutrol motor closes the steam valve, the blower remains running. At the end of the cooling cycle the blower stops, the unit then resets the clocks ready for the next batch. If the button is pushed during a treatment everything stops and the clocks reset; depending upon the stage reached, it is necessary to set the clocks manually to finish the treatment or the treatment will recommence when the button is pushed again. The blower we use on this unit is a high pressure type 11" diameter impeller with a 4" discharge opening driven by a  $\frac{3}{4}$  H.P. 3 phase 2910 r.p.m. motor.

The steaming of bedding plant flats is done in vaults that hold two racks of 168 flats (2688 punnets and  $1\frac{1}{2}$  cubic yards of soil). The doors of these vaults are opened and closed by a pneumatic ram, manually or automatically controlled. The steam-air temperature is controlled by a Danfos Temperature Regulator (IVT Type), a steam solenoid is incorporated in the line. The timing is by a Paragon 6 Hour Interval Reset Timer set up in a control box with the relays, start and stop buttons, and indicator lamps. The blowers are of the high pressure type, 21" diameter, 6" discharge opening driven by a 2 h.p. 2800 r.p.m. 3 phase motor. For a treatment the time clock is

set for the desired time for pre-heat and treatment, then the start button is pushed. The steam solenoid opens, the blower runs and the door closes. At the end of the preset time the solenoid closes, the blower stops and the door opens.

The pneumatic rams are 6' long  $\times$  1" diameter and operate on approximately 70 p.s.i.; restrictors are incorporated to give a slow opening and closing of the doors. The doors are counter weighted so that if the air pressure is lost they will slowly close on their own weight, yet can be easily opened by hand if necessary.

This equipment has been in operation for the last five years and has been virtually trouble free for that period. The only troubles we have had are a couple of solenoids requiring new discs and vault doors requiring occasional lubricating. The seed treatment unit that we have had in operation since 4 July 1962, and still going strong is manually operated, but can easily maintain temperatures within 0.2°C.

In 1974 I had almost completed an automatic unit when a couple of electronic technicians figured they could do the job better and more accurately, electronically. Alas this was not the case and now I am virtually back to where I left off. Hopefully I will be able to report on this unit some time in the near future.

## **PLANTS ON WHEELS**

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Why do we call this system "Plants of Wheels"? We looked at many different ways of moving plants. We looked at using as much productive space as possible and still be able to make the growing area work efficiently. We looked at a pallet system, a moving bench top, conveyor system and the uneconomical fixed bench. None of these were what we wanted in making plants totally mobile all around the nursery. Taking some of the ideas from each of these systems, we made our own design, which is a totally mobile bench.