establishing a nutritional program for container production.

Literature Cited

1. Dickey, R.D., R.T. Poole and J.N. Joiner. 1967. Effects of nitrogen, phosphorus, and potassium levels on growth and chemical composition of *Rhododendron indicum* 'Formosa' and *Viburnum suspensum*. Proc. Amer. Soc. Hort. Sci. 91:762-770.

2. Flint, H.L. and J.J. McGuire. 1961. Effect of different soil levels of nitrogen and potassium on growth of *Forsythia intermedia,* Zabel and *Viburnum plicatum tomentosum* Miq. in containers. Proc. Amer. Soc. Hort. Sci. 78:553-559.

3. Graca, M.E.C. and D.F. Hamilton. 1981. Effects of nitrogen and phosphorus on root and shoot growth of *Cotoneaster divaricata* Rehd. and Wils. Scientia Hortic. 15:77-85.

4. Hoagland, D.K. and D.I. Arnon. 1950. The water culture method for growing plants without soil. Calif. Agri. Expt. Sta. Cir. 347.

5. Hogue, E., G.E. Wilcox and D.J. Cantliffe. 1970. Effect of soil phosphorus levels on phosphate fractions in tomato leaves. J. Amer. Soc. Hort. Sci. 95:174-176.

6. Niemiera, A.X. and R.D. Wright. Growth of *Ilex crenata* Thunb. 'Helleri' at different substrate nitrogen levels. HortScience 17:353-355.

7. Richards, F.J. and A.R. Rees. 1962. Effects of phosphate on growth of barley under conditions of potassium deficiency. Ind. J. Plant Physiol. 5:33.

8. Shanks, J.B. and C.B. Link. 1961. The ratio and intensity of nitrogen, phosphorus, and potassium fertilization of azaleas for greenhouse forcing. Proc. Amer. Soc. Hort. Sci. 78:496-506.

9. Sinha, N.C. and J.N. Singh. 1982. Studies in the mineral nutrition of Japanese mint. 1. Influence of potassium deficiency on the phosphorus, metabolism, respiration, foliage growth and essential oil content. Plant and Soil 66:283-290.

10. Williams, R.F. 1948. Effects of phosphorus supply on the rates of intake of phosphorus and nitrogen and upon certain aspects of phosphorus metabolism in gramineaous plants. Aust. J. Sci. Res. 1:333-361.

11. Yeager, T.H. and R.D. Wright. 1981. Influence of nitrogen and phosphorus on shoot:root ratio of *Ilex crenata* Thunb. 'Helleri.' HortScience 16:564-565.

12. Yeager, T.H. and R.D. Wright. 1981. Response of *Ilex crenata* Thunb. cv. Helleri to superphosphate-incorporated pine bark. HortScience 16:202-203.

13. Yeager, T.H. and R.D. Wright. 1982. Phosphorus requirements of *Ilex crenata* Thunb. cv. Helleri grown in a pine bark medium. J. Amer. Soc. Hort. Sci. 107:558-562.

Rooting of Semi-Hardwood Peach Cuttings as Affected by Basal Fungicide, Mist, and Anti-Transpirant Treatments[1]

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Abstract

Dipping semi-hardwood *Prunus persica* 'Harmony' and 'Cresthaven' cuttings in a Captan-Benomyl mixture following an IBA quick dip treatment increased rooting compared to cuttings not receiving the fungicide treatment. Fungicide treated cuttings rooted as well or better in moist sand with daily watering as they did under intermittent mist. An anti-transpirant dip did not improve rooting and was deleterious to rooting in some treatments.

Index words: *Prunus persica* L., Captan, benomyl, Vapor Gard

Introduction

Increasing interest has been shown in recent years by growers to propagate their own peach trees by rooting cuttings. Rooted cuttings are of particular interest to those growers planting high density systems such as the orchard meadow (2) or Tatura trellis (1). In these cases, grower propagated trees represent a significant savings in establishment cost of the orchard. For growers with more conventional plantings, the potential savings, though less, could still be significant.

The method of propagation most often used is rooting of semi-hardwood cuttings taken after terminal bud set. In Virginia this usually occurs in early August. Terminal cuttings of approximately 20 cm (8 in) are taken and all but the upper 3 to 4 leaves removed. Basal wounds are made on each side of the cuttings after which they are dipped for 5 seconds in 2500 ppm IBA, inserted into the rooting medium and placed under intermittent mist (2).

In previous unpublished work, variable results were observed in our experiments with this method, due to fungal rot of the cuttings. Overcash *et al.* (3) used a fungicidal dip following the IBA treatment but Couvil-

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lon *et al.* (2) did not include fungicides in their procedure.

Materials and Methods

Experiments were conducted to determine whether fungicide treatment benefits rooting of peach cuttings under our conditions. A 4% Vapor-Gard anti-transpirant foliage dip was included as an alternative to misting as had been suggested for other plants (4).

Each treatment consisted of 50 terminal cuttings approximately 20 cm (8 in) long of 2 peach cultivars, 'Cresthaven' and 'Harmony' which were collected August 3 and 15, 1983, resp. All cuttings were wounded and treated with IBA as previously described. Rooting medium was a coarse sand in flats.

Treatments included 1) mist 5 sec per min during the daylight hours, 2) mist plus basal fungicide dip, 3) 4% Vapor-Gard foliage dip, plus basal fungicide dip without misting, 4) basal fungicide dip with no mist, and 5) check (no mist, no fungicide). The 3 non-mist treatments were watered daily to maintain the sand in a wet condition. A fungicide mixture of 50% captan plus 10% benomyl as wettable powders was used. Treated cuttings were dipped into the fungicide mix immediately after the IBA dip. Treatments were divided into 10 replicates of 5 cuttings each. Percent rooting for each replicate was recorded after 4 weeks. Prior experience had shown that further rooting was minimal after 4 weeks.

Results and Discussion

Fungicide treatments of both cultivars resulted in increased rooting percentage compared to corresponding control treatments without fungicides (Table 1). However, the responses to fungicide treatments were cultivar specific. The highest percent rooting on 'Harmony' occurred with the basal fungicide dip with no mist. Vapor-Gard in combination with the fungicide without misting significantly reduced percent rooting of 'Harmony' cuttings compared to receiving the fungicide without mist treatment. However, the Vapor-Gard treatment provided comparable results to that of the fungicide plus mist treatment. 'Cresthaven' cuttings responded almost identically when treated with fungicides or mist plus fungicide. The Vapor-Gard plus fungicide treatment significantly depressed rooting of 'Cresthaven' cuttings compared to cuttings receiving the fungicide with or without mist treatments.

Significance to the Nursery Industry

These findings indicate that the use of Captan-benomyl fungicide basal dip treatments on peach cuttings enhances rooting. It is also significant that some cuttings rooted as well in a moist sand medium as in sand under mist. 'Harmony' cuttings rooted better without misting. Anti-transpirants probably should not be used unless research on other types of anti-transpirants or cultivars show a benefit. Our studies lead us to believe satisfactory results can be obtained by simply keeping the rooting media wet by daily irrigation. Growers planning to propagate peaches by this method might do well to try other fungicides in addition to the two we tried for their effect on the cuttings.

Literature Cited

1. Chalmers, D., B. van dem Ende and L. van Heek. 1978. Productivity and mechanization of the Tatura trellis orchard. HortScience 13:517-521.

2. Couvillon, G.A. and A. Erez. 1980. Rooting, survival and development of several peach cultivars propagated from semi-hardwood cuttings. HortScience 15:41-43.

3. Overcash, J.P., K. Hancock and M. Galinko. 1983. Patio peach trees. Mississippi Agricultural and Forestry Experiment Station Bulletin 915. 13 pp.

4. Whitcomb, C.E. and L.T. Davis, Jr. 1970. Anti-transpirants—a better way to root cuttings? Amer. Nurseryman 132 9:100-101.

Table 1. Effects of basal fungicide treatment, Vapor-Gard and Mist on percent rooting of semi-hardwood peach cuttings.[z]

	Treatment				
Cultivar	Mist	Mist + fungicide	Vapor-Gard + fungicide	Fungicide	Check
'Cresthaven'	2 a[y]	40 b	6 a	36 b	0 a
'Harmony'	0 a	58 b	58 b	80 c	4 a

[z]All cuttings were basally wounded and received a 5 second dip in 2500 ppm IBA.

[y]Means within rows followed by the same letter or letters arse not significantly different at the 5% level using Duncan's Multiple Range Test.