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Patio Peach Trees

From Cuttings

J.P. Overcash • Kevin Hancock • Medardo Galindo

MAFES

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PATIO PEACH TREES---From Cuttings

SUMMARY

Our experiments show how leafy stem cuttings from peach trees in an orchard can be rooted and grown into fruiting trees by procedures as follow:

1. Prepare a mist bed with controls for duration and frequency of misting. A pasteurized, suitable sand-perlite mixture should be 5 to 6 inches deep.
2. Actively growing cuttings (shoots 6 to 8 inches long) should be collected from the orchard. Six-inch long terminal and sub-terminal cuttings are suitable. Mid-summer was found to be the proper time. Cuttings must be kept moist at all times or they will wilt and/or die. If they cannot be prepared and inserted in the bed the day they are collected, store them at 40°F and high relative humidity.
3. Cuttings should be dip treated in a fungicide-water mixture, such as Captan®, just before the hormone treatment and insertion in the bed 1 or 2 inches apart in rows 6 inches apart.
4. Hormone treatment for base of cuttings can be IBA in talc at 0.3%. Other effective treatments are IBA or IAA in an ethyl-alcohol-water mixture at 1000 to 2000 ppm, but these were more difficult to apply.
5. Misting is recommended from one hour after sunrise to one hour before sunset. Recommended frequency is from once per minute for new cuttings to once per 5 minutes for cuttings that have been well rooted. Recommended duration of misting is 2.5 seconds.
6. Rooted cuttings should be potted into a loose, well-drained potting mixture in 1-gal containers. A mixture that has been effective in these experiments is four parts shredded pine bark (less than 1-inch diameter), three parts masonry sand and one part pasteurized silty loam soil. Necessary mineral additions are dolomitic limestone to adjust the pH to 6 to 6.5, slow release NPK fertilizers and small quantities of other minerals (boron, copper, iron, manganese, molybdenum and zinc).
7. Plants may be grown outdoors in the first summer. They should be transferred from 1- to 3- and then to 5-gal containers with a good potting mixture that gives adequate drainage.
8. Water can be applied daily by trickle irrigation, overhead sprinkler or hand watering. Frequency is dictated by need to prevent serious drought stress. Watering should allow for 10% drain to leach the bottom of containers to eliminate soluble salt build-up.
9. During winter periods, the plants must be protected from damage from low temperatures by banking sawdust or pine bark around the containers.
10. Adequate insect and disease controls must be applied to prevent damage to fruits and trees.
11. Yields, life expectancy and plant vigor will relate to management by the owner. Cultivar selection will determine season of ripening as well as dictate potential yields and fruit qualities. However, this study shows that use of McNeely, Redhaven, Sunqueen and Loring will result in fresh fruit being intermittently available over five weeks.

Peach trees in commercial orchards in the United States, and worldwide, are propagated with seedling rootstocks and scion tops of chosen cultivars. More than 100 cultivars are being tested for their fresh market fruit potential in the research orchards at the Pontotoc Ridge-Flatwoods Branch of the Mississippi Agricultural and Forestry Experiment Station (MAFES).

Peach trees purchased from nurserymen in the southeastern Uni-

ted States often have either Lovell or Halford seedling rootstocks. These stocks have been used in this climatic region because they have been graft-compatible and produce vigorous trees of most peach cultivars. Sometimes these rootstocks may be susceptible to diseases and/or nematodes, and specialized rootstocks such as Nemaguard may be used.

Recent changes in the economics of peach growing have led growers

to attempt to improve yields per acre. This sometimes has led to high density plantings (14). Such plantings may range from 200 to 3000 or more trees per acre. Grafted nursery propagation is expensive, and growers of high density orchards have considered means of producing trees from cuttings (3, 4, 5, 6, 7, 8, 12, 14, 15).

Techniques for rooting leafy stem cuttings from peach trees (including hormone treatments to promote

rooting) have been studied since 1955 (3, 5, 6, 7, 8, 11, 12). However, this technique is not used widely in the southeastern United States for the production of peach trees for general orchard use. The use of cuttings for high density orchards is increasing, especially in the "meadow orchard". These trees may be

spaced 1 ft apart in rows 8 to 14 ft apart and pruned severely immediately following harvest to maintain a low hedge. The number of research trials with meadow orchards is increasing in the United States.

Trees of standard cultivars in nursery containers for dooryard use

by homeowners have been labeled "Patio Peach Trees". This process is described, beginning with research on methods of rooting leafy peach cuttings from standard orchard trees in the Fresh Market Peach Variety Test (14) at the MAF Pontotoc Ridge-Flatwoods Branch.

MATERIALS AND METHODS

Making Leafy Stem Cuttings

Cuttings of healthy new shoots (6 to 18 inches long) were collected in mid- to late summer in the orchard, wrapped in paper toweling, soaked in water, placed in a plastic bag in the shade, transported to Mississippi State University and refrigerated overnight at 40°F.

The propagation bed was well drained because a gravel layer was overlaid with 6 inches of a mixture of masonry sand and perlite, 1:1 (v/v), Figure 1. Before inserting cuttings in the bed, the potting mixture was steam pasteurized at 180°F for 2 hours to control disease organisms.

A misting system as described by Hartmann and Kester (9) and Heiser (10) was used for rooting the cuttings. Fog-Mist® nozzles manufactured by Sprayers and Nozzles Company of St. Petersburg, Florida were spaced so that the mist overlapped all cuttings in the bed.

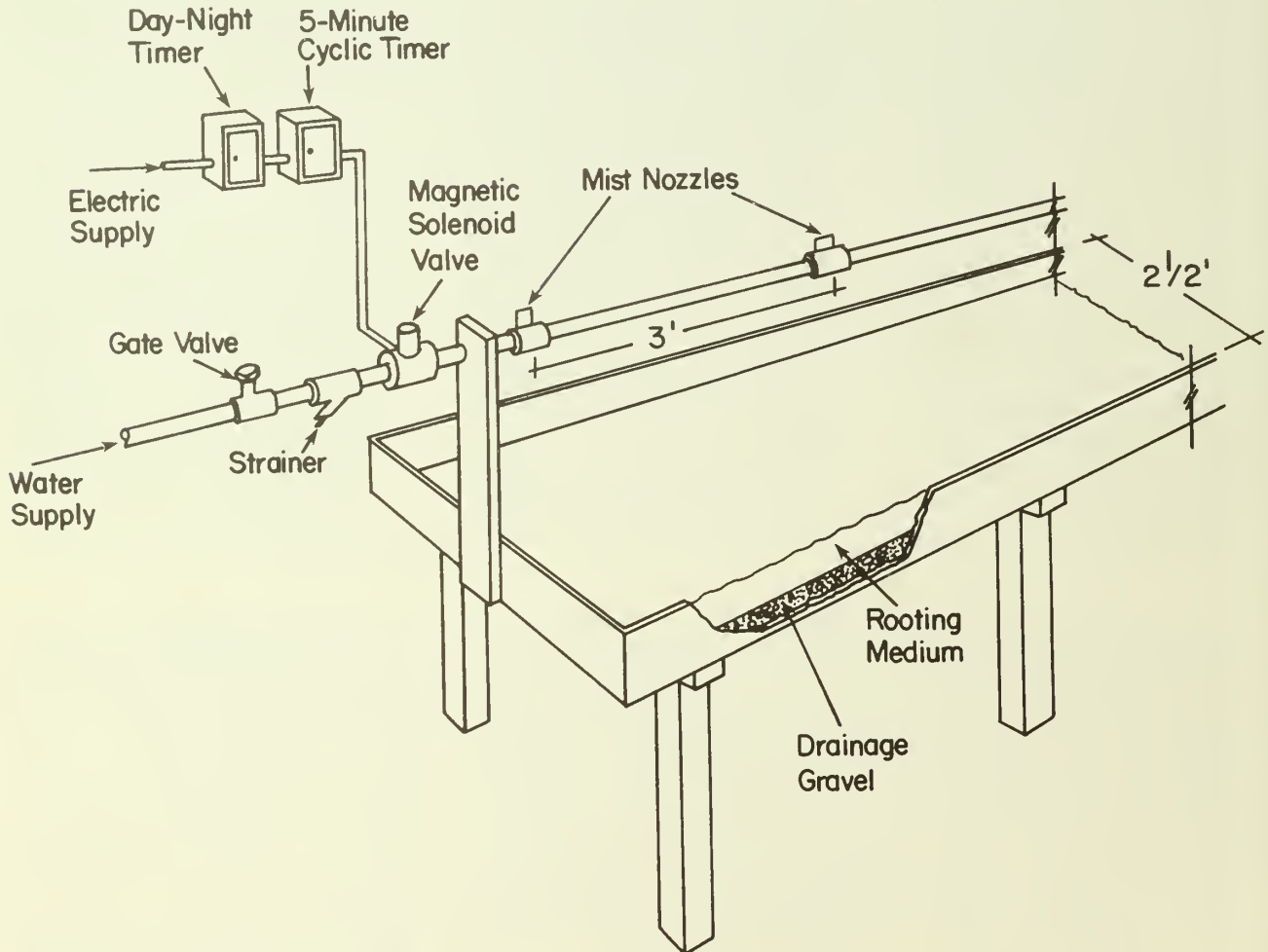


Figure 1. Intermittent mist propagating bed with on-off day-night timer and cyclic timer to regulate intervals between misting periods.

Misting time was controlled by a 2-hour time switch, and the daily duration was from an hour after sunrise to an hour before sunset. An intermittent, repeat-cycle timer was used to control frequency of misting. Newly set cuttings were misted once per minute. This frequency was gradually extended to once per 5 minutes, for hardening cuttings a few days before potting. Misting duration was 2.5 seconds per cycle.

Cuttings were made 6 inches long, and leaves were removed from 3 inches of the basal portion of the cutting to provide a leaf-free zone for insertion in the medium. Two opposite vertical cuts (1/2-inch long) were made through the bark at the base of the cuttings. Cuttings were immersed in a 1:400 (w/w) captan® (fungicide) water mixture to control diseases. They were then given a hormonal treatment before insertion in the medium.

The base of the treated cutting when inserted in a punched hole (3/8 inch-diameter) at 2 inches

deep. The medium was then firmed against the stem of the cutting and was hand watered to settle the medium around the base. Spacing was 1 x 6 inches between cuttings. After one week in the mist bed, applications of a water soluble 20-20-20 (N-P₂O₅-K₂O) solution of fertilizer (1/4 oz/3 gal of water) were made weekly. The rate of application was 1 gal per 30 sq ft of bed space.

After five to nine weeks in the propagation bed, the cuttings were removed and scored as to amount of roots formed, Figure 2. Cuttings with a score of 2 or higher had a 90% or better survival rate when transplanted (one plant per container).

The potting mixture consisted of four parts shredded pine bark (under 1-inch diameter), three parts coarse masonry sand and one part silty loam soil (v/v/v), which was steam pasteurized at 180°F for 2 hours before incorporation into the mixture. This mixture was designed and used by Bostian and Overcash

(1) for growing pecan seedlings in containers, with good growth response.

Chemicals added to a mixture of 32 qts of pine bark, 24 qts of sand and 8 qts of soil were 7.4 oz dolomitic limestone, 2.5 oz of 20% superphosphate, 1.3 oz calcium sulfate, 4.9 oz Osmocote® 18-6-12 (N-P₂O₅-K₂O of 8-9 mo release rate) and 0.2 oz of Peters Fritted Trace Elements® (7.5% Mn, 18% Fe, 3% Cu, 7% Zn, 3% Bo and 0.2% Mo). The potting mixture with all chemicals added was then mixed in an electric soil blender to obtain uniformity. This mixture has been quite effective for production of woody plants in containers. It has good drainage and reasonable nutrient holding capacity--the slow-release (N-P-K) fertilizer provides measured amounts of these elements over several months (13). The pH of the medium mixture after one growing season usually has ranged from 6.0 to 7.0.

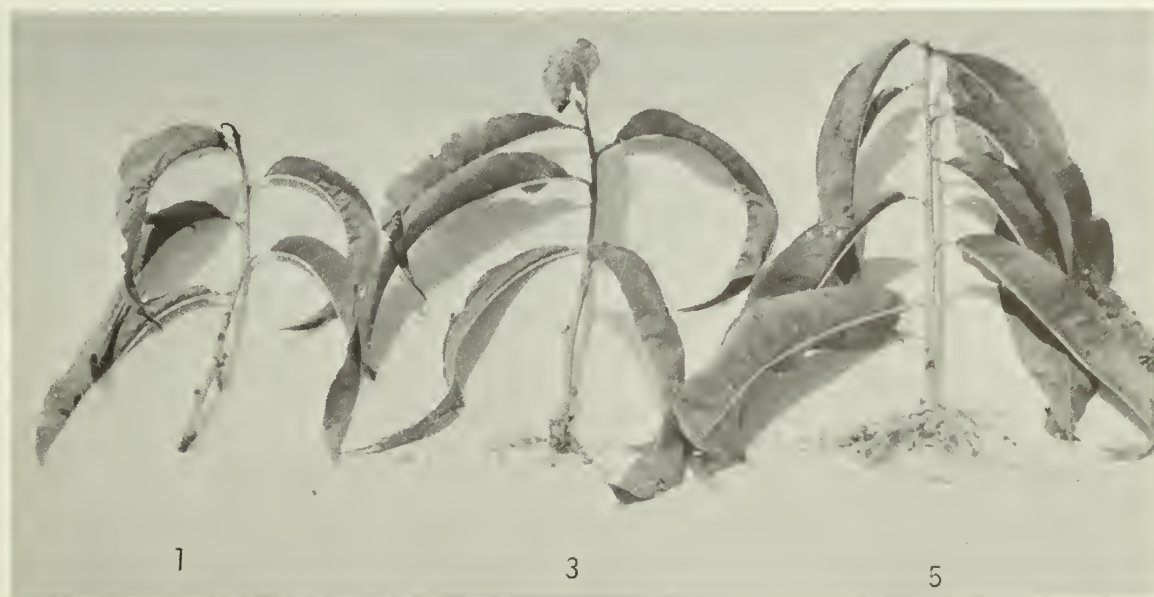


Figure 2. Degrees of rooting for peach cuttings on July 12, 1979 after five weeks in the mist propagation bed: 1 = no roots, 3 = moderate amount of roots with excellent survival after potting, and 5 = excellent roots and survival.

The Influence of Hormones on Rooting

A study of two growth-regulating hormones, indolebutyric acid (IBA) and indoleacetic acid (IAA) was started August 1, 1978 (8). The study was conducted with three cultivars --- Harvester, Norman and Washington. Ten cuttings of each cultivar were used as a control and

Producing Container Nursery Trees from Cuttings

Cuttings from Harvester, Norman and Washington were made in late summer of 1978 and were potted into 1 pt containers after rooting. They were kept in a greenhouse until December 16 and were then placed in a refrigerator at 40°F until March 6, 1979, to break the rest period. The plants were returned to the greenhouse and transplanted in the Bostian-Overcash potting

Rooting Effect as a Function of Position on the Shoot from which Cuttings were Made

New succulent shoots available for making cuttings from peach trees often range in length from 6 to 18 inches or more. An experiment was conducted to determine the rootability of cuttings from 18-inch

Production of Patio Peach Trees from Rooted Cuttings in Containers

Patio Peach Trees have been defined as those grown in containers with the intention of producing fruit on the home patio or in the dooryard. This involves vegetative propagation by leafy stem cuttings and tree growth capable of producing many fruit buds.

Leafy stem cuttings were made and rooted under intermittent mist in late summer 1979 and were transplanted after rooting into standard 1-gal containers. The Bostian-Overcash potting mixture was used and the plants were grown in the greenhouse until December.

ten were treated with Hormodin No. 2® (0.3% IBA in talc), Hormodin No. 3® (0.8% IBA in talc), a quick dip of IBA or a quick dip of IAA. Both quick-dip hormones were at concentrations of 500 or 1000, or 2000 parts per million (ppm). The trial was replicated four times.

The base of cuttings treated with the commercial talc hormone was

mixture in one gallon containers. The plants were kept in the greenhouse at 50°F or higher until May 11.

Plants were then transplanted into 3 gal nursery containers with the Bostian-Overcash mixture, plus the normal rate of Osmocote (X rate) or the Bostian-Overcash mixture plus twice the normal rate of Osmocote (2 X rate). Harvester, Norman and Washington were used in this test.

long shoots. Cuttings were made 6 inches long from the terminal, middle and basal portions of these shoots. Cultivars used were McNeely, Sunqueen and Washington, and the three hormonal treatments were IBA in talc at 0.1, 0.3 and 0.8%. Ten cuttings of each cultivar were used for each hormone

At that time, they were given a 30-day chilling period at 45°F to break their rest. They were then returned to a greenhouse at 50°F minimum temperature, at which time they began to grow. In March 1980, they were transferred to 3-gal containers with the same potting mixture. In July 1980, they were transplanted into 5 gal containers with the same potting mixture.

When the trees began to grow in the spring, they were trained weekly to one stem. When they were 19 inches above the containers, the growing tip was removed. Three side shoots were developed into primary scaffold limbs. When these shoots were 6 to 10 inches long,

dipped 0.5 inches deep, and surplus talc was removed by tapping base. The pure IBA and IAA were dissolved in small amounts ethanol and were diluted to specified concentrations with water and cuttings were inserted into mixture 1 inch deep for 1 min.

In another test, Norman and Harvester were used to determine the influence of supplemental water soluble 20-20-20 (N-P₂O₅-K₂O). One pint of a mixture of 0.17 oz 20-20-20/3-gal container was applied each week from May 21 to July 23. The growth criterion recorded was the increase in trunk height between the two dates. Growth after bud break was limited to the terminals by removing lateral shoots each week.

treatment of each shoot position and the trial was replicated four times. The experiment was initiated on July 29, 1980, the cuttings were removed from the mist bed five weeks later, and numbers of rooted cuttings were recorded.

they were tipped to promote further branching to develop a miniature tree with the shape typical of an open-center orchard tree. The tree in each container was tied to a 3/8 inch steel rod to permit development of the desired shape. Weekly training kept the trees in the desired shape, with a minimum amount of growth removed.

In May and June 1980, many plants were growing at the rate of 1/2 inch per shoot per day. They were healthy and dark green in color until July when unusual high temperatures occurred and growth rate was reduced. The trees were growing in black plastic containers on a concrete floor in full

un and were hand watered daily. On June 1, five supplementary fertilizer programs were initiated, using four replicates of a random design of one-tree plots of each cultivar x fertilizer combination. Rates and dates of application are shown in Table 1. Cultivars were Harbrite, McNeely, Princess Anne and Sunqueen. The basic rate (F1) was 0.28 g (.8 gm) of actual N per container per week. The fertilizers were (1) Sta-Green* Super Nursery® 20-5-10 (N-P₂O₅-K₂O) including supplements of 0.02% boron, 0.05% copper, 0.10% iron, 0.05% manganese, 0.0005% molybdenum and 0.05% zinc; (2) 20-20-20 (N-P₂O₅-K₂O) water soluble fertilizer at two rates and (3) Calcium nitrate** (15.5% N) at two rates.

Total length of growth for all scaffolds, plus secondary and tertiary branches, was recorded at the end of the growing season. Canopy volume was calculated, using width

Fruit Production on Patio Peach Trees

In the spring of 1981, seven cultivars--- Harbrite, Loring, McNeely, Princess Anne, Redhaven, Sunqueen and Washington---were selected for fruiting. Four one-tree replicates were selected for uniformity and were randomized on an outdoor concrete floor with spacing between trees of 4 x 5 feet. The trees were protected from insects and diseases by standard insecticide

The Influence of Hormones on Rooting

The dramatic increase in rooting of leafy stem cuttings following the use of hormones is shown in Table 2 and Figure 3. Rooting percentage (average of three cultivars) was

Table 1. Fertilizer treatments for container-grown "Patio Peach" nursery trees from cuttings of Harbrite, McNeely, Princess Anne and Sunqueen.

No.	Treatment Fertilizer	Weekly rate of N/container			
		June 1-15	June 22 - July 6	July 13-27	August 3-17
F1	Sta-green (20-5-10)*	0.8	0.8	0.8	0.8
F2	Low 20-20-20**	0.8	0.8	0.8	0.8
F3	High 20-20-20	0.8	1.6	2.4	3.2
F4	Low Ca (NO ₃) ₂	0.8	0.8	0.8	0.8
F5	High Ca (NO ₃) ₂	0.8	1.6	2.4	3.2

* (N-P₂O₅-K₂O) plus minor elements: B, Cu, Fe, Mn, Mo and Zn.

**Water soluble (N-P₂O₅-K₂O).

x height to top of tree from the lowest limb in the crotch.

Cultivar Studies

One-tree plots of Candor, Compact Redhaven, Harbrite, Harken, Harvester, Jefferson, Loring, McNeely, Norman, Princess Anne,

and fungicide applications, and were watered daily as needed.

The residual mineral content of the mixture was low because the trees had been potted in the Bostian-Overcash potting mixture for 2 1/2 years---first in a 1-gal container, then a 3-gal container and finally a 5-gal container. The need for substantial supplemental fertilizer elements was met by applying (1) Osmocote® 16-8-12 (8 to 9 mo release rate) at .33 oz/container on

Redhaven, Rosy Dawn and Sunqueen in 5-gal containers were studied. The supplemental fertilizer program was the same as F3 in Table 1. All growing methods were the same as in the fertilizer test. The experiment was a random design with four replications.

the surface of the potting mixture in mid March and at monthly intervals thereafter until mid September and (2) a fertilizer solution containing water-soluble 20-20-20 (N-P₂O₅-K₂O) at 0.5 oz/gal of water at 1 pt/container weekly. The pH was maintained above 6.0. Results recorded were dates of ripening, yields of fruit/tree in lbs and average fruit diameter.

RESULTS AND DISCUSSION

only 5% for the check (no hormones), and the ones that rooted had very weak roots. Differences in percentages of rooted cuttings among cultivars were not significant, suggesting that reported differences in rooting between cultivars (6) may

not have been genetic but may have been differences in stage of growth, and/or vigor of the shoot and/or trees from which cuttings were collected.

The best treatments were 0.3 and 0.8% IBA in talc and IAA quick-dip

*Supplied by Sta-Green Plant Food Company, Sylacauga, Alabama 35150.

**Supplied by Viking Ship Branch Agricultural and Industrial Chemicals of San Francisco, California.

liquid at 1000 and 2000 ppm, which averaged 75% rooting. These rooting percentages are entirely acceptable for efficient propagation of peach trees from cuttings.

Hormones applied as quick dip (liquid) were more effective at 2000 ppm than at 500 ppm for both hormones, and 1000 ppm IAA was better than 500 ppm IAA in promoting rooting.

There was a direct positive correlation between larger percentages of cuttings rooted from the hormone treatments and the extensiveness of root development (Table 2). The largest root systems (per cutting) were from 0.3 and 0.8% IBA in talc and IAA quick dip at 1000 and 2000 ppm.

IBA in talc is readily available in many garden stores; therefore, it can be a convenient source of a root-promoting hormone. IAA as a quick dip requires ethyl alcohol as a solvent, along with accuracy in dilution. Thus, it is more complicated for a propagator to use.

Producing Container Nursery Trees from Cuttings

Peach trees produced in containers have many fibrous roots (Figure 4), which is in contrast with the large and branched root system of the typical nursery tree that has been grafted on a seedling rootstock. These fibrous roots often literally fill the container of potting mixture of pine bark, sand and soil.

The rooted cuttings of Norman and Washington made outstanding growth in 3-gal containers from May 21 to July 23, 1979 and until the end of the growing season (Figure 5). Some trees trained to a single trunk were more than 6 ft tall.

The greatest increase in trunk height from May 21 to July 23 (10 weeks) was by Norman trees fertilized with the 2X Osmocote rate plus weekly applications of a water soluble 20-20-20 (N-P₂O₅-K₂O) fertilizer (Table 3)--this was at the rate of 0.4-inch daily increase in

Table 2. The influence of hormone treatments on rooting of leafy cuttings of three peach cultivars under intermittent mist from August 24 to October 11, 1978.

Treatment	Rooting Percentage				Amount of roots/cutting--score
	Cultivar			Average	
	Harvester	Norman	Washington		
Check	0	10	5	5 h**	1.15 b**
0.3% IBA in talc**	70	65	95	77 ab	3.35 a
0.8% IBA in talc**	60	75	75	70 abcd	3.12 abc
IAA 500 PPM	30	75	40	48 e	2.48 cde
IAA 1,000 PPM	90	65	90	82 a	3.27 ab
IAA 2,000 PPM	70	85	70	75 abc	2.97 abc
IBA 500 PPM	30	10	20	20 fg	1.38 g
IBA 1,000 PPM	20	25	30	25 fg	1.43 fg
IBA 2,000 PPM	45	40	30	38 ef	2.10 ef
Average***	46 a	50 a	51 a		

*1.0 - no roots; 5 - dense roots 1 to 2 inches long.
 **0.3 IBA-talc - Hormodin 2®, .08 IBA-talc - Hormodin 3®.
 ***Means followed by the same letter do not differ significantly, using Duncan's Multiple Range Test at the 0.05 level.

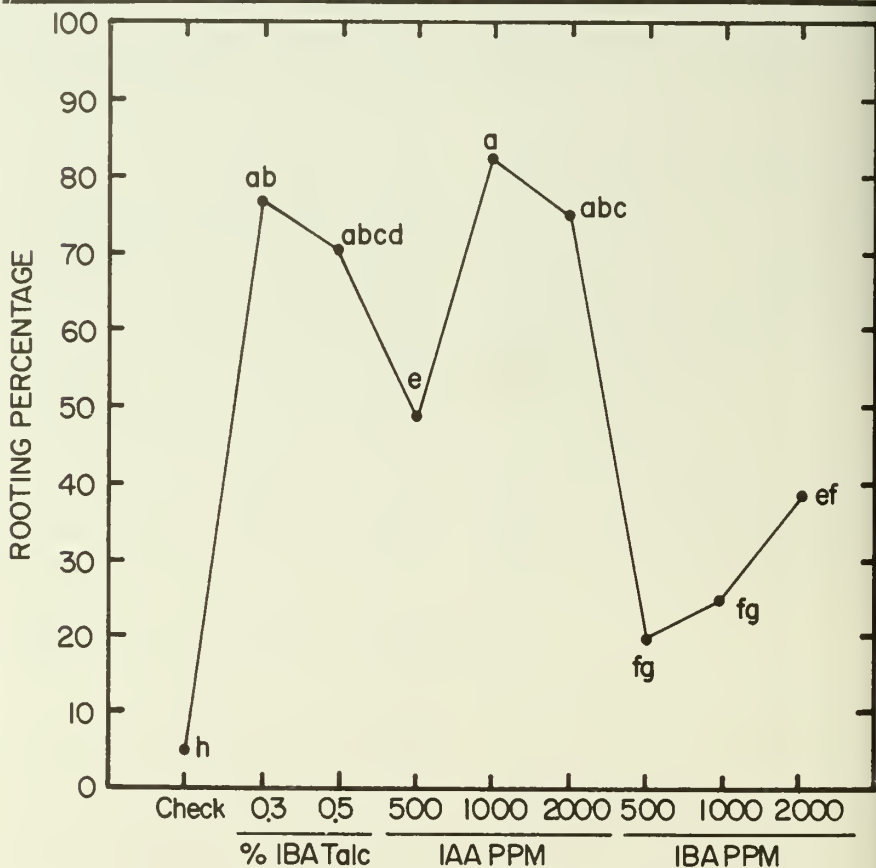


Figure 3. Average rooting percentages for leafy cuttings of three peach cultivars (Harvester, Norman and Washington) in response to dip treatment of base of cuttings with root-promoting hormones before insertion in medium of mist bed. Cuttings were made on August 21 and removed from the bed on October 11, 1978. (Treatment means not followed by a common letter differ (P < .05) as determined by Duncan.)



Figure 4. Fibrous root system of a peach tree rooted from a cutting and grown for three months in a 1-gal can.



Figure 5. Medardo Galindo with tall potted patio peach trees from cuttings after one summer's growth in 3-gal containers.

Table 3. The influence of fertilizer programs on the increase in trunk height by potted trees of two peach cultivars (grown from cuttings made in 1978) during the period May 21 to July 23, 1979.

Cultivar	Treatment	Increase in trunk height by Biweekly Intervals				
		2	4	6	8	10*
		-----inches-----				
Norman	X	3.3	9.0	17.7	15.1	25.7 d
Norman	X + NPK	3.5	8.4	17.5	25.9	28.7 cd
Norman	2X	5.7	11.5	21.1	28.1	33.6 b
Norman	2X + NPK	7.1	15.5	26.7	34.0	40.1 a
Washington	X	2.6	6.1	12.2	16.4	21.2 e
Washington	X + NPK	2.9	8.7	17.0	22.8	27.3 d
Washington	2X	4.7	9.3	16.7	24.4	27.9 cd
Washington	2X + NPK	5.2	10.1	18.5	27.0	31.6 bc

*Means not followed by the same letter differ significantly using Duncan's Multiple Range Test at the 0.05 level.

trunk height during the 10 weeks. The least growth was by Washington at the X Osmocote rate.

The best growth by trees of both cultivars was by those fertilized with the 2X Osmocote rate plus weekly supplemental applications of water soluble 20-20-20 (N-P₂ O₅ - K₂ O). The next best treatment was

X Osmocote with the weekly supplement, and the poorest growth was by trees receiving the X rate of Osmocote without the supplement.

These growth rates indicate that the X rate and 2X rate of Osmocote were not adequate for maximum growth from March to late July. This was true even though the

Osmocote was released over a eight-to nine-month period. Apparently, the rate of availability of NPK from Osmocote is accelerated during hot summer months and did not provide adequate season-long fertilization at the rate applied.

Rooting Effect as a Function of Position on the Shoot from which Cuttings were Made

Cuttings of McNeely, Sunqueen and Norman given basal treatments of IBA in talc at three concentrations showed large differences in rooting percentages. The 0.1% concentration was too weak and was not very effective in promoting roots (Table 4). However, cuttings treated with either 0.3 or 0.8% IBA were equally effective in promoting roots. There were no differences in the amount of rooting by cuttings made from the tip, middle or basal portion of the 18-inch portion of vigorous peach shoots in mid-summer.

The 0.3% IBA in talc as a basal treatment of leafy stem cuttings propagated under intermittent mist is less expensive and just as effective as the 0.8% IBA formulation. If a propagator is making peach cuttings from an orchard tree, he may effectively make both terminal and subterminal cuttings, knowing that, while they are still actively growing, they have good rooting capability.

Production of Patio Peach Trees from Rooted Cuttings in Containers

Growth of rooted cuttings of Harbrite, McNeely, Princess Anne and Sunqueen own-rooted peach trees planted in 5-gal containers for the study of supplemental fertilizer treatment (Table 1) is reported in Table 5. There were no apparent differences in cultivar response to fertilizer supplements.

All trees in the treatment with high level supplement of 20-20-20

Table 4. The effect of position and hormone treatment on rooting percentage of three peach cultivars (McNeely, Sunqueen, Washington) in 1980.

% IBA-talc	Cuttings with Roots			Average*
	Position			
	Tip	Middle	Base	
0.1	10.3	5.3	10.7	9.9 a
0.5	43.3	43.3	39.7	42.1 b
0.8	39.0	55.3	37.3	44.4 b
Average**	31.4	41.5	29.2	

*Means not sharing a common letter differ significantly at Duncan's .05 level.

**Means not sharing a common letter differ significantly at Duncan's .05 level.

Table 5. The influence of five fertilizer treatments on trunk and circumference of "Patio Peach" trees from cuttings and total limb growth of four peach cultivars in nursery containers on October 18, 1980.

Cultivar	Treatment ^Y	Trunk	Limb
		circum.	growth
		-----inches-----	
Harbrite	F1	4.3 a ^Z	127 a ^Z
	F2	4.6 a	110 a
	F3	3.6 b	67 c
	F4	4.8 a	159 b
	F5	3.8 b	113 a
McNeely	F1	4.4 a	117 a
	F2	4.4 a	132 a
	F3	3.5 b	97 b
	F4	4.6 a	113 a
	F5	3.9 a	112 a
Princess Anne	F1	4.6 a	95 a
	F2	4.8 a	113 b
	F3	3.8 b	70 c
	F4	4.7 a	104 a
	F5	4.2 a	93 b
Sunqueen	F1	4.8 a	109 a
	F2	4.8 a	128 b
	F3	4.3 b	128 b
	F4	4.6 a	106 a
	F5	4.2 b	128 b

^YF1 - Sta-green, F2 - low 20-20-20, (N-P₂O₅-K₂O),

F3 - high 20-20-20, F4 - low CA (NO₃)₂ and

F5 - high CA (NO₃)₂.

^ZMeans of each cultivar not sharing a common letter differ significantly by Duncan's Multiple Range Test at the 0.5 level.

($0-P_2O_5-K_2O$), regardless of cultivar, were in the lowest or a low growth category. Under ordinary circumstances, when large, actively growing plants are supplied additional fertilizer, there is an increase in growth. An unusual "heat wave" in July of 1980 (Figure 6) produced detrimental effects on plants—including those in containers as well as those growing in soil. Heat accumulation in the container-growing area (on or just above the floor) was excessive.

The duration and intensity of the high temperatures in July and August, 1980, caused acute reduction in growth rate of all trees in containers. The poor growth by trees with the high 20-20-20 ($N-P_2O_5-K_2O$) fertilizer supplement may have resulted from toxicity of the fertilizer concentrations and ambient heat above optimum growing conditions. The somewhat unthrifty condition of one tree is shown in Figure 7.

Wong and others (15) have discussed the influence of high soil temperatures on woody plants. In our study, roots against the containers were killed when the black plastic was exposed to the sun. The reduced rate of vegetative growth, because of excessive ambient tem-

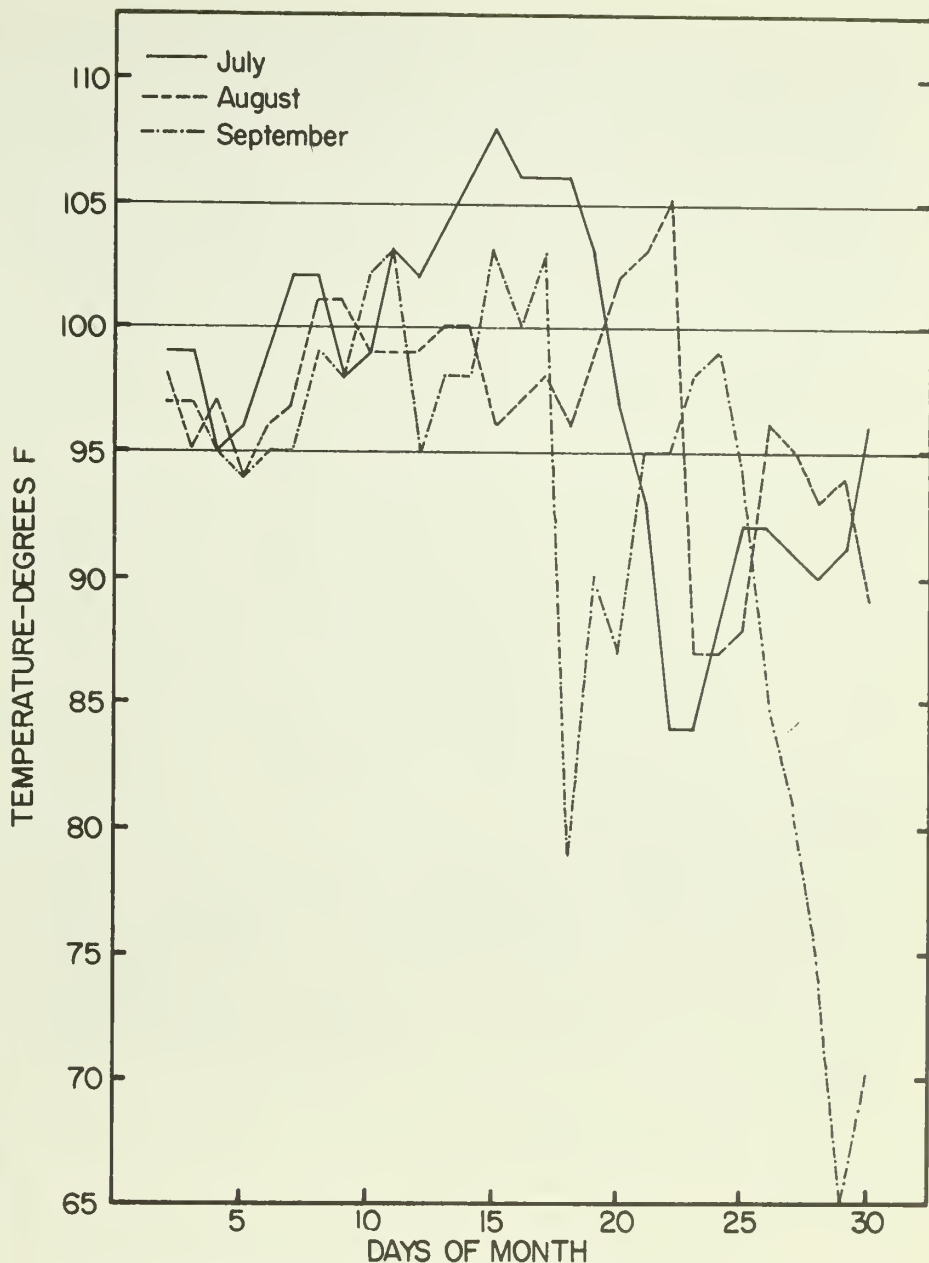


Figure 6. Daily maximum air temperature at Mississippi State University during the summer of 1980.



peratures, caused the trees to initiate and "set" a large crop of fruit buds during this period of time.

In a test of 13 cultivars with four replicates of each, there were tremendous differences in tree growth, either because of varietal characteristics or physiological conditions of the cuttings at the time they were rooted (Table 6). Sunqueen trees grew the most (total inches of shoot

growth beyond the trunk), and Candor, along with Compact Redhaven, Harbrite, Harken, Harvester and Jefferson, grew the least.

This test indicated that there are true genetic differences in vegetative growth between cultivars. Compact Redhaven is classed as a somewhat dwarf tree type, even when it is grafted on a vigorous rootstock.

Figure 7. Patio peach tree from cutting after one summer in a 5-gal container.

Fruit Production on Patio Peach Trees

Seven cultivars of own-rooted peach trees in 5-gal containers were selected from the 1980 tests for fruiting in 1981, were placed on an outdoor concrete floor area and were hand watered daily. Excess flowers and fruits beyond what the trees could mature dropped for physiological reasons (Figure 8). Cultivars and dates of the first ripe fruit were Harbrite, McNeely and Princess Anne on June 10; Redhaven on June 26; Sunqueen and Washington on July 3 and Loring on July 15 (Table 7). This represents more than one month of ripe fruit from patio trees of this limited number of cultivars. Yields/tree ranged from an average 0.9 lb for Washington to 4.6 lbs for McNeely. Average diameter of fruits ranged from 2 1/4 to 2 7/8 inches, which is about normal for these cultivars.

This test indicated that patio peach trees from rooted cuttings can be maintained in a healthy condition in 5-gal containers and will form flower buds during the first summer and produce fruit in the second, third and subsequent summers. A dormant tree at the end of the second summer (Figure 9) had many lateral fruit buds on limbs and shoots and produced fruit the next summer.

Trees of six cultivars were maintained in 5-gal containers during the third summer. They were fertilized regularly, were watered adequately and produced their second crop of fruit as a "Patio Peach"

Table 6. The influence of high 20-20-20 supplemental fertilizer applications at weekly intervals on growth of trees from cuttings of 13 peach cultivars in five-gallon containers at Mississippi State University in the summer of 1980.

Cultivar	Trunk circum.	Total canopy volume ^Y	Total limb growth
	inches	inches ³	inches
Sunqueen	4.3 a ^Z	20,551 a ^Z	135 a ^Z
Rosy Dawn	4.3 a	15,015 b	117 b
Redhaven	3.5 b	9,867 c	104 bc
Princess Anne	3.8 ab	7,453 cd	97 bc
Norman	3.5 ab	6,744 cd	95 bc
McNeely	3.4 b	6,400 cd	94 bc
Loring	3.5 b	6,331 cd	92 bcd
Jefferson	3.1 bc	6,074 cd	91 bcde
Harvester	3.1 bc	5,942 cd	84 bcde
Harken	3.4 b	5,886 cd	70 cde
Harbrite	3.6 ab	4,805 cd	69 cde
Compact Redhaven	3.0 bc	4,532 cd	67 de
Candor	4.0 a	3,242 d	60 e

^YCalculated from measurements of height above pot and width of canopy in two directions.

^ZMeans not sharing a common letter differ significantly by Duncan's Multiple Range Test at the 0.5 level.

(Figure 10). There was a very heavy flower bud set on the trees following the second crop. They were in a good, healthy and vigorous condition, with many fruit buds for their third crop. No pruning was needed

during the first and second crop years. Some support was given to weak limbs, by tying them to an iron rod to prevent bending to the ground or breaking from a heavy fruit load.

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Figure 8. This 2-year-old Princess Anne patio peach tree that produced a fruit crop in June 1981 was propagated from a cutting in August 1979.

Table 7. Yields and dates of harvest of peach trees grown from cuttings, during their second summer (1981) in containers, by cultivar.

Cultivar	Harvest date	Lb/ tree	No. Fr./ tree	Av. Fr. Dia.
Harbrite	June 10	2.1 B*	7.8 BC	2 2/8
Loring	July 15	1.6 B	4.5 BC	2 7/8
McNeely	June 10	4.6 A	16.2 A	2 4/8
Princess Anne	June 10	2.3 B	11.0 AB	2 2/8
Redhaven	June 26	2.2 B	4.2 BC	2 5/8
Sunqueen	July 3	1.3 B	5.2 BC	2 3/8
Washington	July 3	.9 B	2.0 BC	2 5/8

*Numbers not followed by the same letter are significantly different, using the Duncan's Multiple Range Test at .05 level.

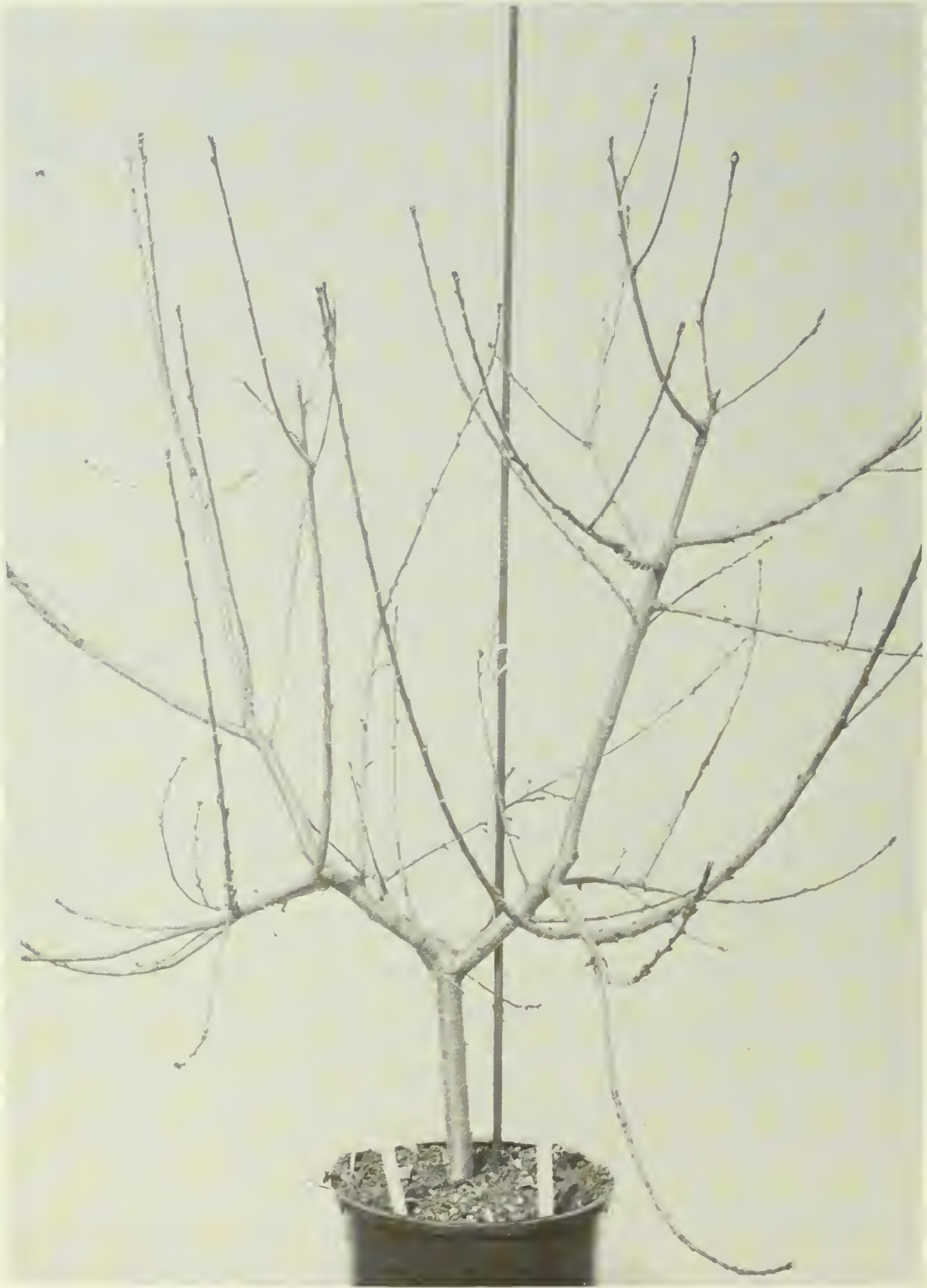


Figure 9. A Patio Peach Tree in February 1982 following two summers in a 5-gal container. This tree was propagated from a leafy cutting that was rooted in August 1979.



Figure 10. Fruit on a Princess Anne patio peach tree during the second crop year in a 5-gal container.

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