To achieve good rooting with this system, misting the tops as well as the bases of cuttings is necessary.

Cuttings, rooted with this system, were held in a cooler (7°C) during winter and were planted in a meadow orchard in early March. Survival was 90% and trees were 1.2 to 2.0 m tall after one growing season.

Some of the cuttings in this experiment were left in the chamber several weeks after rooting and *Fusarium* killed the roots. Rooted cuttings should be removed after 3 to 4 weeks and held in a cooler or, if soils are warm, transplanted to the orchard site. Subsequent tests with air-rooted peach cuttings suggest that 50% to 75% will survive winter if planted by October 1 in South Carolina.

Air rooting provides a method for propagating semihardwood cuttings of peach scion cultivars without a solid medium. Observation of rooting progress is possible without disturbing the cuttings. Another potential advantage is the possibility of applying supplemental hormones or nutrients to the developing roots through the bottom mist line. Optimum rooting can be expected by taking cuttings in early August, assuring good coverage of the bases of the cuttings with mist, and using overhead mist also.

Preliminary tests with several other plants (rabbiteye blueberry, hybrid rhododendron, wild deciduous azalea, crepe myrtle, and *Juniper*) indicate satisfactory rooting of cuttings taken in mid-September and processed similarly as the peach cuttings described here.

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Factors Affecting Survival of "In Field", Rooted Hardwood Peach Cuttings

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Abstract. **Unrooted hardwood cuttings of 'Harvester', 'Redhaven', and 'Bicentennial' peach [*Prunus persica* (L.) Batsch] were planted directly in the field. Survival decreased with planting dates from November to January. Basal wounding increased survival of all cultivars. Survival of cultivars varied significantly.**

High-density peach plantings require inexpensive plant material for orchard establishment. This is especially true for annual or biennial (2, 4) peach production systems that would allow for the rotation of peaches with other crops. Although inexpensive peach trees can be produced from semihardwood cuttings (1, 3), propagation by hardwood cuttings would be most simple and least costly of all propagation methods. Although hardwood peach cuttings have been rooted (5, 6, 7, 8, 9, 11), in most cases the cuttings were precalloused or rooted in some type of propagation structure before planting in the field. An appealing method would be to root peach hardwood cuttings "in place" in the orchard where they are to be grown before the onset of low winter temperatures. This has been done with limited success (22% to 42% rooting) in the coastal plain of Israel (5), where soil temperatures are moderately high (12°C or greater) throughout most of the winter. Moderate soil temperatures are required for successful rooting of peach hardwood cuttings (5, 8, 9). Erez and Yablowitz (5) recommend that hardwood cuttings not be inserted outdoors where the soil temperatures are below 12° in winter; but in most of the peach area of the southeastern United States, soil temperatures, to the 15-cm soil depth, drop below this temperature during December, January, and February. This study was initiated to determine if "in place" planting of unrooted peach hardwood cuttings is feasible in the southeastern U.S.

Hardwood cuttings from 'Bicentennial', 'Harvester', and 'Redhaven' peach trees were taken on October 20, November 20, and December 20, 1981, and on January 20, 1982. Cuttings were of wood produced in 1981 that was about 0.6 cm in diameter and 30 cm in length. Leaves were stripped from the Oc-

Table 1. The influence of wounding, cultivar, and planting date on the survival of peach hardwood cuttings.

Date of planting	Survival (%)	
	Not Wounded	Wounded
	Harvester	
Oct. 20	28 b[z]	64 a
Nov. 20	40 b	31 b
Dec. 20	29 b	9 d
Jan. 20	3 d	15 d
	Redhaven	
Oct. 20	16 c	46 b
Nov. 20	3 d	19 c
Dec. 20	2 d	13 d
Jan. 20	1 d	1 d
	Bicentennial	
Oct. 20	9 d	24 b
Nov. 20	1 d	3 d
Dec. 20	2 d	5 d
Jan. 20	1 d	6 d

[z]Mean separation in rows or columns by Duncan's multiple range test, 5% level.

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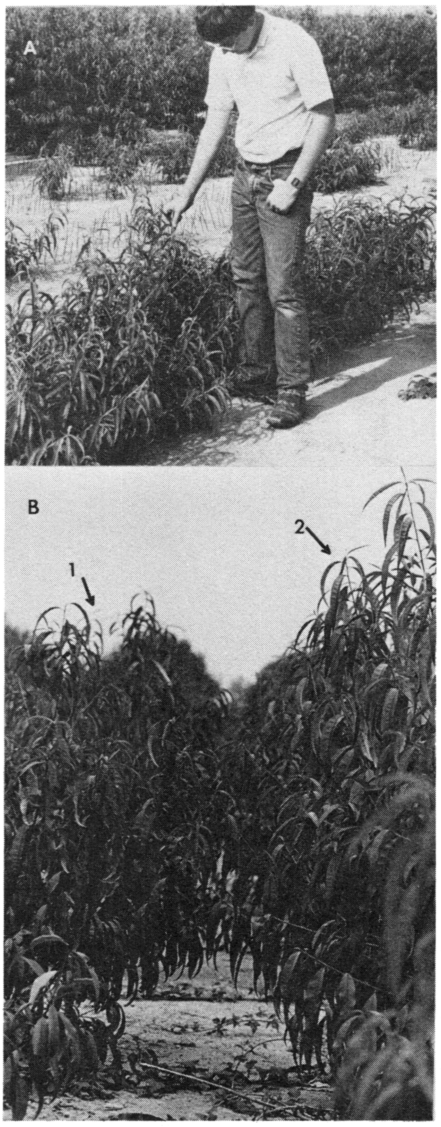

Fig. 1. Growth of hardwood-peach cuttings planted in place. **A** Survival of October-planted (1981) hardwood cuttings on June 6, 1982. **B** Growth of trees from October-planted (#1) and November-planted (#2) cuttings on October 12, 1982.

tober cuttings, but leaf fall had occurred by November 20. On some cuttings the base was wounded by making a 1-cm-long incision into the bark on each side of the cutting base; the bark was not removed as previously described (1, 3). The base of each cutting was dipped for 5 sec in 1000 ppm indolebutyric acid (IBA) in 50% ethanol solution (10). Following treatment, cuttings were inserted to a depth of 15 cm directly into a well-cultivated Cecil sandy loam soil. The experimental design used was a randomized complete block with 4 replications. Each replication consisted of 50 cuttings spaced 15 × 15 cm in such a manner that a 135 × 60 cm rectangle was formed. Cuttings were evaluated on June 6, 1982. Survival ratings were based on trees achieving at least 20 cm shoot growth (Fig. 1A); cuttings with less growth were considered too poorly rooted to produce a profitable tree.

There was a striking effect of wounding on survival (Table 1). The percentaged survival was nearly twice for wounded as compared to unwounded cuttings. It is well established that wounding promotes rooting of semihardwood peach cuttings (1, 3, 10).

Cultivars significantly influence survival (Table 1) as previously reported (5). 'Harvester' cuttings had a higher survival rate than did 'Redhaven' or 'Bicentennial' (Table 1). Issell (8) reported rooting percentages that ranged from 40% to 95% for 9 peach cultivars he rooted from hardwood cuttings.

Survival averaged highest in the earliest planting date and decreased with each planting date (Table 1). This agrees with results reported by other workers (5, 7, 8, 9). Cuttings propagated in October grew better and produced larger trees than did cuttings propagated on the other dates (Fig. 1B). Trees from October-planted cuttings grew to a height of 90 cm at the end of the growing season in spite of the very high densities.

These data suggest that direct field insertion of hardwood peach cuttings would be feasible with certain cultivars. This, in turn, suggests an economical method to establish high-density annual peach plantings in the southeast provided that several cuttings were placed in "nests" (5) with subsequent thinning where necessary.

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