most varieties was delayed in 1962 because of a 58 day drought preceding the first harvests.

Table 3 indicates the average yield in pounds per tree, average weight per peach in pounds, percent red overcolor and flesh characteristics. When comparing yields it is necessary to consider the age of the tree.

The varieties could be grouped as to their commercial usefulness in North Florida as follows:

1. Suitable for commercial consideration—Maygold, Junegold, and Earligold.
2. Fruit quality lower than Maygold—Robin.
3. Maturity too late for the early market—Goldrush, Fortyniner, Valigold, Suwannee, Flordaqueen and Meadowlark.
4. Chilling requirement too high—Hiland and Sunhigh.
5. Chiefly of ornamental value—*Flordahome* and Saturn.

SUMMARY

The results of 1960, 1961 and 1962 trials with named peach varieties are summarized and evaluated for the Quincy area. The peach varieties Maygold, Junegold and Earligold can be recommended for commercial use in North Florida.

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EFFECT OF TEMPERATURE ON GERMINATION OF OKINAWA PEACH SEEDS

R. H. BIGGS AND MARY C. LANGAN[1]

Although several investigations have been made on the low-temperature stratification of peach seeds to overcome dormancy (2, 4, 5, 8 and others), there is little information on the influence of temperature on germination and the subsequent development of the seedlings. Pollock (6) has shown that a warm temperature of short duration prevalent during the germination period of some varieties of peach seed has a pronounced effect on the morphological development of the seedlings.

This study was undertaken to examine the influence of temperature on the initial stages of growth of fully mature peach embryos in a non-dormant state.

MATERIALS AND METHODS

The Okinawa (*Prunus persica*) was chosen for this investigation for four main reasons. Seed of this variety appear to be homozygous in their requirement for a low-temperature stratification period to overcome seed dormancy. Secondly, Okinawa seed require relatively short periods of stratification to overcome seed dormancy (1). Thirdly, when the seed coat and the associated endosperm tissue are removed from the embryo, its growth and development are similar to seeds which have had the block to growth removed by low temperature stratification (1). Lastly, this peach variety shows promising resistance to root-knot nematodes (7), a finding which has created a demand for this peach as a rootstock. In an attempt to supply this demand, considerable difficulty has been experienced by Florida nurserymen in obtaining good germination of Okinawa seeds under Florida conditions.

Seeds were harvested in 1961 from trees located at the Horticultural Unit of the Agricultural Experiment Station, Gainesville. To obtain seeds capable of good germination, care was exercised in harvesting the fruits, removing the flesh from the pits, washing and drying the pits, and removing the seeds from the pits. The seeds were stored dry at room temperatures until used.

Prior to subjecting aliquots of seed to different temperature treatments, they were placed in an enamel tray and barely covered with distilled water. During the imbibition period, the seeds were placed in a dark chamber with the temperature regulated at 78° F. After 24 hours the seeds were removed from the distilled water, washed and blotted before the seed coat and associated endosperm tissue were removed from the embryo. Immediately upon excising the embryo, it was placed in moist vermiculite in a cell on the temperature gradient bar. Nine embryos in individual chambers were

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used per treatment, and all tests were replicated at least three times. Data were taken on percent germination, percent of seeds which underwent lysis and radicle length.

Germination was considered to be complete when the radicle exceeded 2 mm in length. Measurements taken to reflect growth capacity included length of radicle on germinating seeds when they were removed from the temperature gradient apparatus, and visual observations of the development of seeds and seedlings kept for 4 weeks in a controlled climate chamber after removal from the gradient apparatus. The growth chamber had a temperature of 68° ± 2° F. and a 12-hour day of 900-1000 ft-c light intensity supplied by fluorescent lamps of the "cool white" type.

The temperature gradient apparatus has been described in detail elsewhere (1). Briefly, a temperature gradient was accurately maintained on a metal bar (6 ft. x 8 in. x 1½ in.) by applying a constant amount of heat to one end of the bar and removing heat from the opposite end. A Precision Scientific Co. No. 66600 constant-temperature water bath was used to furnish a controlled amount of heat, and a crushed ice bath, equipped with a water circulation system, was used to remove heat. The metal bar was tapped with holes (1 inch in diameter x 1 inch in depth) at regular intervals along the surface. These were designed to hold the seeds during the temperature treatment. Thermocouples, placed at regular intervals along the metal bar and connected to a 20-point Minneapolis-Honeywell potentiometric recorder, were used to moniter the temperature gradient. To maintain the temperature gradient with a minimum degree of fluctuation, the metal conductor was well insulated with styrofoam. The fluctuation in temperature around any one point was less than ± 1° F.

Results and Discussion

When Okinawa peach seeds, preconditioned so that temperature was the factor limiting germination, were subjected to various temperatures, it was found that germination would occur over a rather broad range. As can be seen in Figure 1, seeds germinated in a range of temperatures from approximately 50° to 95° F. Growth of embryonic axes occurred first in the warmer temperature, as illustrated by curve C. As they were left for longer periods of time on the gradient apparatus (curves A and B), germination took place at lower temperatures. Notice that the breaking point for germination in the warmer temperatures was not measurably changed by the additional periods of time on the gradient bar.

It should be stated that each curve of Figure 1 represents a separate experiment and that the data were obtained when the embryos were removed from the temperature gradient apparatus.

A possible explanation for the sharp decrease in the germinative capacity of the seeds around 90° F. may be partially found in the data presented in Table 1. Average length of the radicle showed that root growth became progressively poorer as the temperature was increased from 77° to 90° F., and finally nil at 93° F. Furthermore, there was an increase in the lysis of the seeds as the temperature became warmer than 85° F. These observations would seem to indicate that warm, but not biologically high, temperatures are unfavorable for peach seed germination.

Observations were continued on the seeds and seedlings after removal from the temperature gradient apparatus and placed in a controlled climate chamber. In general, it was observed that the inhibitive influence of cool temperatures of short duration on seed germination and subsequent seedling development was only temporary, whereas the inhibitive influence of warm temperatures of short duration was of a more lasting nature. This was surmised from a decrease in the height of the seedlings and the induction of anomalous leaf development by temperature higher than 85° F. These findings were in agreement with previous reports (3, 6) that rather warm temperatures during peach seed germination have an adverse effect on seedling growth and development.

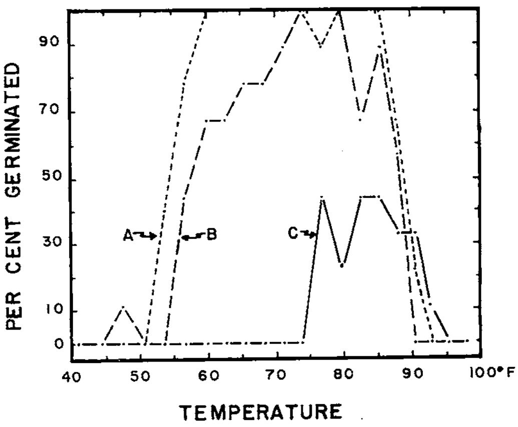

FIGURE 1. GERMINATION OF OKINAWA PEACH SEED AFTER 72 HOURS (C), 120 HOURS (B), AND 168 HOURS (A) EXPOSURE TO THE DESIGNATED TEMPERATURE.

Table I

Seed germination, radicle growth, and lysis of the seeds as influenced by an exposure to the indicated temperature for 168 hours.*

Temperature (°F)	Percent Germination	Average Radicle Length (mm)	Percent of Seeds Rooted
41.0	0	-	-
44.5	0	-	-
47.5	0	-	-
50.75	0	-	-
53.75	40	1.0	-
56.75	78	4.5	-
60.0	100	7.0	-
62.75	100	13.5	-
65.75	100	15.0	-
68.50	100	15.5	-
71.25	100	20.0	-
74.0	100	19.7	-
77.0	89	22.0	11
79.75	100	15.0	-
82.75	100	17.0	-
85.25	100	8.8	-
88.0	67	9.2	22
90.5	22	7.0	56
93.0	0	-	44
95.5	0	-	78
98.0	0	-	78

*The data were taken from the same experiment as Part A of Figure 1.

SUMMARY

Using a temperature gradient apparatus, a critical study was undertaken of the influence of temperature on the germination of Okinawa peach seeds. When seeds, *preconditioned* so that temperature was the limiting factor for germination, were subjected to various temperatures, it was found that Okinawa peach seeds would germinate over a rather broad temperature range from approximately 50° to 95° F. However, the resulting seedlings from the seeds germinated in this broad spectrum of temperatures were found to differ widely in their capacity for growth. In general, the growth capacity of the seedlings was decreased markedly by a temperature greater than 78° F. during the period of germination. Accompanying the decrease in the growth capacity of the seeds exposed to warm temperatures was an increased vulnerability to invasion by organisms which caused seed-rot.

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PAPAYA FRUIT FLY CONTROL

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The papaya fruit fly, *Toxotrypana curvicauda* Gerstaecker, is a serious pest of the papaya in Florida, making control measures a frequent necessity. The species apparently exists throughout the Caribbean countries wherever papayas are grown. Control measures, however, are generally not practiced, although it is often a serious pest. Although the fly is prevalent at all seasons and breeds continuously, it is much more abundant in some seasons than in others, and in some areas more than in others. In Cuba it is usually more prevalent in the dry than in the rainy season, according to Acuña and de Zayas (1946). Papaya fruit is the obligate host of the papaya fruit fly; although larvae are occasionally found in mango fruit, they seldom or never develop to maturity therein.

Thick fleshed varieties are infested less frequently than fruit with thin flesh. Selection and production of varieties having thick flesh were recommended by Knab and Yothers (1914) for reducing fly infestations. All fruit in the younger stages, however, is thin fleshed and is easier for the fly to penetrate for oviposition. Removal and destruction of all infested fruit before the larvae mature and emerge to pupate in the soil surface have been recommended as a control measure.

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