described by Arnon (1). Leaf nitrogen was determined by the micro-Kjehdahl method. For stomatal counting, leaf impressions were taken in September according to the technique described by Horanic and Gardner (5). Stomatal counts were made with a microscope at 7 different positions from each leaf impression. Specific leaf weight (mg/cm^2) was determined by using dry weight for leaf blades used for making photosynthesis measurement. Root (storage roots) yield consisted of all roots 2.5 cm in diameter and over.

Storage root yield ranged from 10.5 to 30.9 MT/ha after 129 days of plant growth (Table 1). Significant genotypic differences in Pn were observed in both greenhouse and field experiments except for July. The range in Pn was 16.9 to 25.2 mgCO_2dm^{-2}hr^{-1} in the greenhouse (November–December) and 21.6 to 38.1 mgCO_2dm^{-2}hr^{-1} in the field (July–September). In most genotypes Pn was similar for each month but 'Travis', L7-3, 'Unit I Porto Rico', L4-131, and 'NC-172' were variable from month to month.

Average Pn of sweet potato genotypes investigated in this study were 1.5 to 2.0 times higher than those reported in literature (4, 6, 7) about 15 years ago. Similar time-related trends and increases in Pn of other crops have been reported (3). These Pn changes probably can be attributed to methods and techniques of measurement.

The range in percent leaf nitrogen was from 3.2 for 'Heartogold' to 4.5 for 'Julian'. Significant differences were observed in chlorophyll "a" content but not in chlorophyll "b." The range in stomatal density for adaxial and abaxial surfaces was 54 to 110 and 178 to 311 per mm^{-2}, respectively. 'Unit I Porto Rico' had the lowest stomatal density on both leaf surfaces. Stomatal density on abaxial surface was 2 to 3 times more than adaxial surface. Specific leaf weight (SLW) of sweet potato genotypes showed significant differences in both the experiments. Specific leaf weight values were higher for the field experiment than the greenhouse experiment. Similar environment-related variations in SLW for soybeans have also been observed (2). In both the experiments, cultivar 'Acadian' had higher SLW than all other genotypes.

With the exception of a significant positive correlation between percent leaf nitrogen and chlorophyll (r = +0.82), no significant correlation was found between various variables. Although Pn showed no correlation with root yield 'Travis' and 'Carver' had high Pn as well as higher yield than all other genotypes.

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Fruit Firmness of Firm Tomato Cultivars Ripened in Storage at 20°C for Extended Periods[1]

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***Abstract.* Fruits of the firm cultivars 'Florida MH-1' and 'Flora-Dade' and the less firm cultivar 'Walter' tomato (*Lycopersicon esculentum* Mill.) were harvested at the mature green stage of maturity and held at 20°C. After ripening at 20°C for 7, 14, and 21 days, 'Florida MH-1' and 'Flora-Dade' fruits were firmer than 'Walter' fruits. 'Flora-Dade' fruit were as firm at 21 days as fruit of 'Walter' at 7 days. 'Florida MH-1' fruit were as firm at 14 days as those of 'Walter' at 7 days. There was no relation between fruit color and firmness. A seasonal effect on firmness at 7 days was found for 'Walter' and 'Florida MH-1' but not for 'Flora-Dade'.**

The 'Florida MH-1' and 'Flora-Dade' tomato cultivars are extremely firm at the ripe stage (1, 9). The firmness of the ripe fruit offers the possibility of harvesting at an advanced stage of ripeness with a consequent expectation of more uniform quality for consumers (6). The acceptability of vine-ripened 'Florida MH-1' by consumers has been demonstrated along with the possibility of increased sales (5, 7). The retention of firmness following harvest is an important criterion for fruit harvested in the ripe stage. Evaluations were made of the firmness of firm and nonfirm cultivars up to 21 days after incipient color.

Firm cultivars 'Florida MH-1' and 'Flora-Dade' and a normal firmness cultivar 'Walter' were grown at the Agricultural Research and Education Center at Bradenton, Florida. The full bed plastic mulch system on raised beds with seepage irrigation was used (2). Plants were staked and tied. Standard fumigation, fertilization and pest control methods were used.

Mature green fruits were transported to Gainesville the day of harvest and placed at 20°C. Fruits showing the first appearance of color on the stylar end during a 1-day period were considered to be of equal maturity (8). Such fruits of each cultivar were separated into lots and stored at 20°C and 85% relative humidity for the designated ripening periods. Harvest dates were November 30 and December 7, 1978, May 25, and June 11, 1979 and May 30 and June 10, 1980. The fruits were ripened off the plants (first 7 days) so that all fruits would be subject to the same conditions prior to the extended storage.

Firmness was measured with a Cornell Pressure Tester (4) using a 3/4-inch (1.9 mm) plunger and a 2000-g weight for 5 sec. The range of the instrument is 0–7; the higher the value the softer the fruit. Care was taken to align each fruit so that the plunger was applied over an inner wall as judged by external appearance. Firmness was determined on separate lots of fruits 7 and 14 days after incipient color in 1978 and 7, 14 and 21 days after in 1979 and 1980. The fruits were red ripe at 7 days. There were 4 replications of each storage period with 6 to 10 fruits per replication.

Color measurements were made on fruits from the 1980 harvests to determine if the firmer cultivars developed color at a slower rate than the less firm cultivar. The color was determined as previously described (3) except that a white standard was used with the Hunter color meter with values of: R_L = 94.9, a = −1.2 and b = 2.2.

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Table 1. Tomato fruit firmness as influenced by cultivar and stage of ripeness.

Harvest date	Days of ripening (20°C)	Fruit firmness		
		Walter	Fla. MH-1	Flora-Dade
Nov. 30, 1978	7	3.5b[y]	2.3a	---
	14	5.4c	3.6b	---
Dec. 7, 1978	7	3.7d	2.4b	2.1a
	14	5.1f	4.0e	3.3c
May 25, 1979	7	4.2c	3.1b	2.4a
	14	5.1f	4.4e	3.4c
	21	5.5g	4.8f	3.8d
June 11, 1979	7	4.0c	---	2.5a
	14	5.1d	---	3.1b
	21	5.5e	---	4.0c
May 30, 1980	7	4.5[x]	2.9a	2.6a
	14	---	4.0c	3.4b
	21	---	4.9d	4.0c
June 10, 1980	7	4.6e	3.0b	2.5a
	14	5.6g	4.7e	3.3c
	21	5.9h	5.2f	4.0d

[z]The lower the value the firmer the fruit.
[y]Mean separation at 5% level within harvests by Duncan's multiple range test.
[x]Value not included in statistical evaluation.

Table 2. Tomato fruit color as influenced by cultivar and stage of ripening.

Harvest date	Days of ripening	Tomato fruit color (Hunter a/b values)[z]		
		Walter	Fla. MH-1	Flora-Dade
May 30, 1980	7	2.50[y]	2.63cd[x]	2.22a
	14	-	2.71d	2.52c
	21	-	2.51c	2.36b
June 10, 1980	7	2.19ab	2.41de	2.25bc
	14	2.26b	2.49e	2.33cd
	21	2.11a	2.38d	2.24bc

[z]The higher the value the more intense the color.
[y]Value not included in statistical evaluation.
[x]Mean separation at 5% level within harvests by Duncan's multiple range test.

'Flora-Dade' and 'Florida MH-1' fruits were firmer at 7, 14 and 21 days after incipient color than 'Walter' fruits for all harvests (Table 1). 'Flora-Dade' fruits ripened for 14 or 21 days were as firm as, or firmer than, 'Walter' fruits ripened for 7 days. 'Florida MH-1' fruits ripened for 14 days were as firm as 'Walter' fruits ripened for 7 days except for the December 7, 1978 harvest. The difference in firmness values between 7 and 21 days was greater for 'Florida MH-1' than for 'Walter' or 'Flora-Dade' indicating a faster rate of softening for that cultivar. 'Walter' and 'Florida MH-1' fruits softened more between 7 and 14 days than they did between 14 and 21 days.

The 2 firmer cultivars developed as much red color as 'Walter' indicating that the increased firmness was not due to an overall slower ripening rate (Table 2).

No decay occurred in fruits held 7 to 14 days except at the June 10, 1980 harvest when 2.5% (1 of 40) of 'Flora-Dade' fruits had decayed in the 7-day sample. At 21 days, 9.5% of 'Walter' fruits had decayed with a similar amount for each harvest; 5% of the 'Florida MH-1' fruits had decayed at 21 days for each of the May 25, 1979 and June 10, 1980 harvests. 'Flora-Dade' fruits were without decay at 21 days except for the June 10, 1980 harvest when 5.0% occurred.

The average firmness values after 7 days of ripening for fall and spring harvests respectively were 3.6 and 4.3 for 'Walter' fruits, 2.4 and 3.0 for 'Florida MH-1' fruits and 2.2 and 2.5 for 'Flora-Dade' fruits. The differences between fall and spring values were significant except for 'Flora-Dade'.

The results indicate that ripened fruits of firm cultivars such as 'Flora-Dade' and 'Florida MH-1' could be handled for a 7 to 14 day period and have acceptable firmness.

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Effect of Low Temperature on Survival of Apple Buds Infected with the Powdery Mildew Fungus[1]

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Additional index words. Malus domestica, Podosphaera leucotricha, freezing injury

***Abstract.* The lowest survival temperatures were determined quantitatively for dormant terminal buds of 'Newtown', 'Golden Delicious' and 'Rome Beauty' apples (*Malus domestica* Borkh.) that were either healthy or infected with powdery mildew (*Podosphaera leucotricha* (Ell. & Ev) Salm.). Irrespective of cultivar, all mildew-infected buds were more susceptible to freezing injury than healthy buds. Survival of mildew-infected buds at about −22°C was similar to survival of healthy buds at −26°. Field data on 'Jonathan' showed that terminal mildew infection following winters warmer than −22° was 26.5%, but was only 4.0% following winters −24° or colder.**

The apple powdery mildew fungus overwinters as mycelium in vegetative and fruit buds (1, 2, 5, 10). *Podosphaera leucotricha*, an obligate parasite, survives only in association with living host tissue. Following severe winters, mildew severity is low (6, 9). Previous work has shown that low temperatures do not directly affect the fungus mycelium but that mildew-infected buds were more likely to be injured by exposure to low temperature than were healthy buds (4, 6). This study was conducted to determine quantitatively the lowest survival temperatures of healthy and mildew-infected buds of selected apple cultivars.

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