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CHILLING INJURY IN POLLOCK AVOCADOS DURING COLD STORAGE

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The sensitivity of the avocado fruit to low temperatures necessitate careful handling during shipment and storage. West Indian varieties are more subject to low temperature injury, commonly called "chilling injury," than are Guatemalan and Mexican varieties.

Chilling injury in avocado fruits is characterized by abnormal ripening, darkening of the flesh, development of undesirable flavors and odors, and pitting and darkening of the skin. These symptoms do not necessarily occur simultaneously. More detailed descriptions of chilling injury in the avocado may be found in the work of Lynch and Stahl (1), Mustard (2), Mustard and Lynch (3), and Pennock (4).

The following observations on chilling injury were made during the course of experiments on storage of the Pollock avocado, a West Indian variety.

EXPERIMENTAL PROCEDURE

Fruits of the Pollock variety ranging in size from 20 to 40 ounces and free of decay and skin blemishes were picked from commercial groves in Dade County during late August of 1958 and 1959. At this time the fruits were mature, as indicated by the fact that all control fruits ripened normally and were excellent in palatability.

Samples of 10 to 15 fruits were stored at temperatures of 35, 40, 45 and 50°F. for various periods. The 1959 experiment did not include storage at 35°. Comparable samples were ripened at 60 and 70°. At the end of the storage periods, samples from the lower temperatures were transferred to 70° and allowed to ripen. Observations were made on decay, chilling injury, palatability and ripening time. All fruit was allowed to become fully ripe before final observations on chilling injury were made. Chilling injury was classified as slight, moderate, or severe.

Table 1.—Chilling injury to Pollock avocados after storage at 35, 40, 45 and 50° F. for indicated periods, Florida, 1958 and 1959.

Season and storage temperature	Chilling injury after indicated storage period			
	6 days	13 days	19 days	22 days
<u>1958:</u>				
35° F.	slight	-	-	moderate to severe
40° F.	none	-	-	slight to moderate
45°	none	-	-	slight to moderate
50°	none	-	-	slight
<u>1959:</u>				
40° F.	-	slight	moderate to severe	-
45°	-	slight	moderate to severe	-
50°	-	slight	moderate to severe	-

RESULTS

Results presented in table 1 show that fruit sustained chilling injury at temperatures of 35, 40, 45 and 50° F. if the period of storage was sufficiently long. In no case did symptoms resembling chilling injury occur in fruits held at temperatures of 60 and 70°. At these temperatures, fruits ripened normally and were excellent in palatability.

In 1958, after a storage period of 6 days, slight chilling injury developed in fruits stored at 35° F., but there was no injury at the higher temperatures. After 22 days, chilling injury was severe at 35°, slight to moderate at 40° and 45°, and slight at 50°. In the 1959 experiment, slight chilling injury was found in fruit stored at 40°, 45° and 50° for 13 days, and moderate to severe chilling injury resulted after 19 days at 40°, 45° and 50°. Internal symptoms, characterized by graying or blackening of the tissues and development of a bitter flavor, were found to be a more sensitive indicator of chilling injury than external symptoms. Pitting and darkening of the skin were found only in cases of severe internal injury. It is important that fruits be allowed to ripen fully before final observations on chilling injury are made, because slight injury is difficult to detect when the fruit is hard.

DISCUSSION

In 1939, Lynch and Stahl (1) reported that chilling injury occurred in Pollock avocados after storage at 38°F. for 14 days, but that no chilling injury resulted after storage at 42° for 21 days or 48° for 28 days. Our results differ from those of Lynch and Stahl in that chilling injury occurred at storage temperatures as high as 50° in a period of 13 days.

This difference, and the fact that our results varied appreciably between 1958 and 1959, lead to the conclusion that preharvest factors may be important in the reaction of Pollock avocados to low temperature.

Fruit maturity, cultural practices and climatic conditions during fruit development are variables which might affect the sensitivity of i avocados to low temperatures. Further research is needed on this problem, and wherever possible, these factors should be taken into account.

SUMMMARY

Mature West Indian avocados of the Pollock variety were stored at temperatures of 35, 40, 45 and 50°F. for various periods of time during two seasons. Chilling injury occurred in fruits stored at each of these temperatures for 19 to 22 days.

Differences in results between the two seasons indicate that factors other than storage environment may have important effects on susceptibility of avocados to chilling injury.

LITERATURE CITED

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