

level of nitrogen in the fertilizer, tends to increase the potassium level in the leaf without materially affecting the nitrogen content of the leaf in these four avocado varieties. Increasing the phosphorus levels, at the lowest nitrogen level in the fertilizer, tends to result in a slight increase of phosphorus in the leaf. However, at the two higher levels of nitrogen in the fertilizer, increased phosphorus level does not have this effect.

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OLEOCELLOSIS OR RIND-OIL SPOT ON PERSIAN LIMES

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The spotting of citrus fruits by oil liberated from the skin has been referred to as rind-oil spot or oleocellosis (1). This skin injury is characterized, in the case of Persian limes, by the appearance of irregularly shaped areas in which the oil glands are prominent due to the depression of the tissues surrounding the individual glands (Fig. 1). Shortly after the injury occurs these areas develop a brownish-green color which materially decreases the marketability of the fruit.

It has been found in the case of other citrus fruits (1) that the breakdown is most prevalent during the rainy season. It has also been noted that fruits picked when wet with dew or rain are more susceptible to rind-oil spot than when picked dry. Differences have likewise been noted in the susceptibility of fruit from different groves to this breakdown.

The present study was undertaken to determine the effect of picking limes while wet with dew, and the effect of season upon the susceptibility of this fruit to oleocellosis.

MATERIAL AND METHODS

The limes used in this investigation were field run fruit obtained from a grove planted on the Rockdale series soil of south Dade

County. On each of four different harvesting dates, two sets of samples, each consisting of 225 fruit, were picked. One set of samples was picked early in the morning when the fruit were still wet with dew and the other later in the day after the fruit had dried. In order to duplicate, in so far as possible, the procedure followed in handling limes commercially, the fruit was taken from the grove to the packing house where it was run through the waxer and polisher and removed from the line at the grading table. The fruit was packed 45 fruit to a lug and stored at room temperature. The fruit were then checked for rind-oil spots after 1 to 3 days, after 7 days, and after 14 days. No attempt was made to record the size of the rind-oil spots on the individual fruit. The data were analyzed statistically by the analysis of variance method as described by Paterson (2) for serial experiments. By this procedure it is possible to determine the significance of interacting factors, which in this case are moisture on the skin when picked and season, on the development of rind-oil spot.

OBSERVATIONS

As can be seen from the data in the accompanying table, Persian limes were found to be most susceptible to oleocellosis during the rainy season. A significant difference was found after each storage period between the total number of fruit for the four seasons which developed rind-oil spot when picked wet as compared to those picked when dry. Based on the totals for the four seasons, therefore,

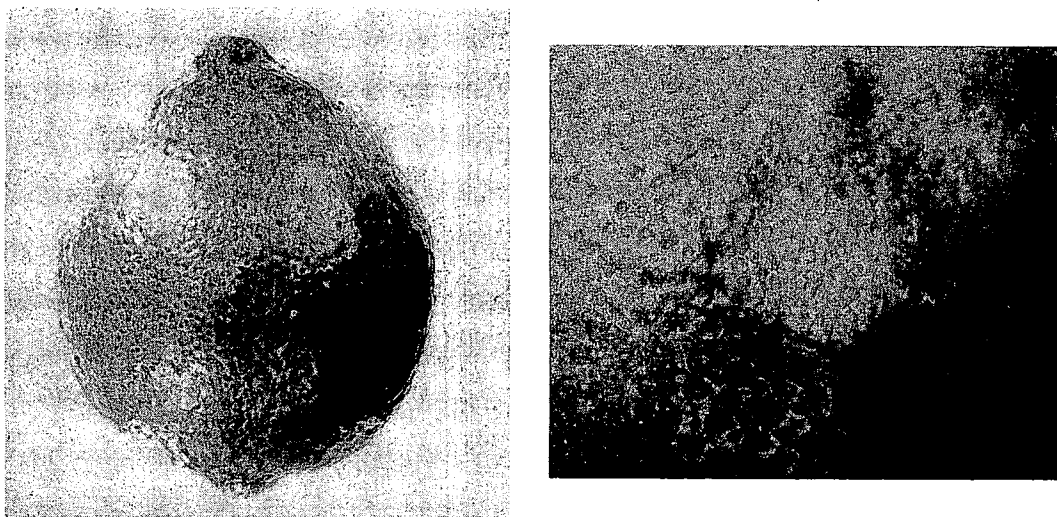


Figure 1. Oleocellosis or rind-oil spot on Persian limes. Left: whole fruit showing injury; right: enlargement of an affected area.

it was found that picking limes while wet with dew resulted in more rind-oil spotting of the fruit than when the fruit was allowed to dry prior to picking. It is evident from the data in Table 1 that the significant differences between the totals for the four seasons

was due to the pronounced differences found during the first two seasons. During the first dry season, significantly more limes developed rind-oil spot after storage for 7 and 14 days when picked while wet with dew than when allowed to dry prior to picking. During the

Table 1.

Incidence of Rind-Oil Spot on Persian Limes.

Season and Date of Harvest	Condition of Fruit When Harvested	Total Number of Fruit Showing Rind-Oil Spot After Storage for: **			Moisture for 30 Day Period Prior to Harvest (Inches)		
		1-3 Days	7 Days	14 Days	Rainfall	Irrigation	Total
Dry Season May 11, 1953	Wet	14	19*	23*	3.68	0.75	4.43
	Dry	5	5	7			
Wet Season Sept. 4, 1953	Wet	82*	88*	94*	7.61	0.00	7.61
	Dry	58	65	80			
Wet Season Oct. 2, 1953	Wet	84	93	94	7.95	0.00	7.95
	Dry	78	93	97			
Dry Season Mar. 4, 1954	Wet	35	42	47	3.26	0.75	4.01
	Dry	40	48	52			
Total for Four Seasons	Wet	215*	242*	258*			
	Dry	181	211	236			

** Each figure for the individual seasons represents the total number of fruit showing rind-oil spot in 5 boxes of 45 limes each.

* Significant difference at 5% level.

first rainy season, significantly more rind-oil injury developed during the first 3 days storage on limes picked while wet with dew than on those picked after the fruit had dried. Significant differences were likewise observed between these samples after 7 and 14 days' storage. No significant differences in the development of rind-oil spot was observed between fruit picked while wet with dew or those picked when dry during either the second dry or second rainy season. Apparently differences in cumulative rainfall and irrigation prior to picking is not responsible for these inconsistencies since the total rainfall and irrigation for thirty days prior to picking for the two dry periods is 4.43 and 4.01 inches respectively and for the rainy seasons 7.61 and 7.95 inches.

Greater care in picking and handling Persian limes will decrease the amount of oil liberated from the skins and thus decrease the incidence of rind-oil spot.

A cursory check was made of other types of breakdown which developed on the fruit during storage. It was found that the limes

picked during the rainy season showed a higher incidence of blossom-end rot and other types of breakdown than did those picked during the dry season.

SUMMARY

Persian limes were found to be most susceptible to rind-oil spot during rainy seasons. Although some inconsistencies were observed in the data for the four seasons, significantly more limes developed rind-oil spot when harvested while wet with dew than when allowed to dry prior to picking.

ACKNOWLEDGEMENTS

The author wishes to acknowledge indebtedness to the Florida Tropical Fruit Growers Association and to Sunland Groves for their co-operation in this investigation.

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SOME LYCHEE INSECTS OF FLORIDA

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The lychee (*Litchi chinensis*) is not immune from attack by insects. Over forty insects have been recorded on lychee in Florida since 1938 by the State Plant Board. The presence of any one of these insects in excessive numbers may cause considerable concern to the grower.

Over fifteen thousand trees are now established and growing in Florida. As acreages increase, growers may expect additional insect problems, particularly where trees are planted in groves. Most other fruits grown commercially have specific insect problems, and lychee is no exception.

The following insects on lychee have been compiled from the records of the State Plant Board and a survey of lychee insects now being conducted, unless otherwise indicated.

SCALE-INSECTS

Sixteen species of scale-insects have been collected on lychee. Two have been found

in damaging numbers; any one of the others may sometimes present an economic problem.

The most serious scale-insect, thus far found, is one of the so-called armored scales, namely, *Pseudaulacaspis major* (Ckll.). The female is generally oval in shape, convex, and a dusty white in color; irregular in shape when crowded on the bark. This scale is found on the bark and fruit. Eggs have been observed under the scale covering during May and October. Young crawlers have been observed migrating to green, unripened fruit during May.

The next most serious scale-insect is one of the so-called soft scales, namely, the green shield scale (*Pulvinaria psidii* (Mask.)). The mature female, before egg deposition, is green in color, oval, smooth and moderately convex. With egg deposition the female extrudes the eggs into a developing mass of cotton-like material. The female becomes shrivelled or misshapen, and is usually surrounded by the cottony egg-sac.

The scale-insects of lesser importance are as follows: