

A Study of How Time and Greenhouse Thrips (*Heliothrips haemorrhoidalis* Bouché) Populations Affect Quality of 'Hass' Avocado

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Abstract. Eighty thrips-infested 'Hass' avocados were observed at 12 to 15 day intervals for 119 days (from May 2 until August 28). After harvest each fruit was graded at a commercial packinghouse as to whether they were first or second grade fruit based solely on degree of thrips damage. Damage due to thrips feeding increased proportionally to increases in time of exposure and number of thrips per fruit. Borderline first-grade fruit (that with very light to light damage) were infested with one or more thrips (mean 6.5 per fruit) for an average of 71.4 days. Borderline second-grade fruit (that also with very light to light damage) was infested for 98.1 days with an average of 6.6 thrips per fruit. Second-grade fruit with medium light to heavy damage were infested for 113.1 days with an average of 22.5 thrips per fruit.

Greenhouse thrips (*Heliothrips haemorrhoidalis* Bouché) are small, sluggish, slow-feeding insects that cause relatively little damage in small numbers, but if allowed to build up to sufficiently high levels, they can scar from 50-90% of an orchard's fruit (Ebeling, 1951). Greenhouse thrips feed on the avocado fruit skin, which dries out, turns light brown, cracks, and gives the fruit an unattractive appearance. Thrips also may feed on avocado leaves, but do not significantly reduce the photosynthetic capacity of the tree (Ortega and Ewart, 1971-72). Dark brown to black excrement may also be present on leaves and fruit (Essig and Hoskins, 1944). The purpose of this study was to determine how time and greenhouse thrips populations affect the quality (by industry standards) of fruit of the Hass avocado cultivar.

Materials and Methods

Four 5-year-old 'Hass' trees were chosen at random from a small block of trees on the Santa Barbara/Ventura county, California border near the Pacific coast. All avocados located at or below six feet in height were inspected and the ones with thrips or evidence of their presence were tagged and numbered. The fruit were observed and rated at 12 to 15 day intervals starting on 2 May and ending on 28 August, 1989. Damage was rated as follows (adapted from Goodall, 1989).

None (0): thrips or their fecal matter present, but no damage.
Very light (1): presence of excrement to detectable feeding damage.
Light (2): detectable feeding damage to 1/5 surface damage.
Medium-Light (3): 1/5 to 1/3 of fruit surface damaged.
Medium (4): 1/3 to 1/2 fruit surface damaged.
Medium-Heavy (5): 1/2 to 2/3 fruit surface damaged.
Heavy (6): 2/3 to 100% fruit surface damaged.

After the final damage rating by the authors, the fruit were taken to a commercial packinghouse and graded exclusively for thrips damage by the quality control manager. The authors then recorded which fruit were second grade or first grade.

Results and Discussion

Damage due to thrips feeding increased proportionally to increases in time of exposure and number of thrips per fruit. However, for the borderline fruit, time and thrips populations had different degrees of influence on how much damage the fruit received. Looking at time alone, there is a significant difference between the two groups; borderline first grade fruit (1-2 rating) were infested with one or more thrips (6.5 average) 60% of the experimental time (71.4 days), while borderline second grade fruit (1-2 rating) with one or more thrips (6.6 average) was infested 82.4% of the time (98.1 days) (Table 1). Second grade fruit with medium light to heavy damage (3-6 rating) were infested 95.3% of the time (113.1 days) with an average of 22.5 thrips per fruit. While there was a whole range of damage to the fruit from none to 100%, the fruit of most interest in this study are those that received the same damage rating (1-2) at the end of the experiment, but were graded differently according to packinghouse standards. These fruit were borderline between first and second grades. The borderline second grade fruit were infested more frequently in all the thrips population ranges (except "no thrips"), but the ratio of time spent gets progressively smaller as the thrips population ranges increase. Damage was more closely related to thrips population density in more severely damaged second grade fruit (3-6 rating), but in the case of borderline fruit (1-2 rating), there was virtually no difference in the average number of thrips per observation between first and second grade fruit (first grade averaged 6.5 thrips per observation, while similar second grade fruit averaged 6.6 thrips per observation).

It was concluded that 'Hass' avocados can withstand approximately 71.4 days of exposure to an average of 6.5 thrips per fruit without being downgraded, however, any additional duration (days) with this number of thrips (or more) present could result in downgrading of fruit in California packinghouses.

Literature Cited

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Table 1. Comparison of first and second grade 'Hass' avocados as to greenhouse thrips numbers and number of days with thrips present.

	<i>First Grade Fruit</i>		<i>Second Grade Fruit</i>	
	Damage Rating	Damage Rating	Damage Rating	Damage Rating
	0	1-2	1-2	3-6
Total number of fruit per damage category (percentage of total)	4 (5%)	13 (16.3%)	22 (27.5%)	41 (51.3%)
Mean number of thrips per fruit per observation of fruit with one or more thrips	1.0	6.5	6.6	22.5
Percent of observations with one or more thrips per fruit	3.3%	60.0%	82.4%	95.3%
Projected days w/thrips present on fruit ^z	3.9	71.4	98.1	113.4

^z Calculated as follows: percentage of observations with one or more thrips per fruit multiplied by total duration of thrips counts (119 days).