

## INCIDENCE OF BLIGHT IN SEVERAL GROVES ON THE CENTRAL FLORIDA RIDGE

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and as much as 86% over a 4-year period (21.5% average) in a 1959 planting near Ft. Pierce. In selected groves and blocks of trees surveyed, DuCharme (3) reported losses in any 1 year to range from less than 1%, in groves in early stages of decline, to 22% in groves affected for at least 5 years.

The purpose of this paper is to record additional observations of the annual incidence of blight and especially to record the occurrence of blight in second generation (re-plant) trees.

Additional index words. Citrus, decline.

**Abstract.** The incidence of blight was measured in 15 citrus groves on rough lemon rootstock along the central Florida ridge. Average annual rates for each grove ranged from 1 to 11%. Detailed study of one grove with intensive blight showed that 78.8% of the original trees planted in 1955 contracted blight and 7.2% of the replants manifested blight at 5 to 12 years of age.

The term "blight" here refers to the decline of citrus trees with the same symptomology as young tree decline, sand hill decline and rough lemon decline. Blight is considered to be a specific disease that meets the criteria outlined by Cohen and Wutscher (2). Typical trees in this survey were tested and found to have higher zinc and phenolic contents in the wood and much lower waterflow rates than healthy trees.

Blight has plagued citrus groves since the 1870's. It apparently has been ever-present in Florida and a review of the history of blight has suggested that the disease may have intensified during various cycles (5).

W. T. Swingle and H. J. Webber (6) reported in 1896 that "... in some localities from 1 to 10 percent of the trees blight annually." O. F. Burger (1) in 1922 stated that growers were accustomed to losing 1 to 2% of their trees annually from blight. In 1970, Norris (4) reported annual rates of tree resets of 7 and 10%, due to young tree decline,

### Results and Discussion

Data are presented in Table 1 for 14 groves located in Lake, Orange, Polk and Highlands counties from ratings made in 1970 through 1976 on a scheduled yearly basis. The average annual incidence of blight for individual groves ranged from 1 to 11%. This is in general agreement with previous reports (1, 2, 3, 4, 5, 6). The percentage of trees in each grove showing initial blight symptoms from year to year is highly variable and does not suggest a pattern that might indicate a common causal factor.

Data are presented in Table 2 from the Swann grove near Avon Park. This *Citrus sinensis* (L.) Osb. cv. Valencia/rough lemon grove was planted in 1955 with trees propagated from budwood collected from trees registered free from psorosis and tristeza viruses. A high incidence of blight appeared in the grove in 1964 and early 1965 and prompted an intensive survey of the grove for clues that would lead to the cause of the disease. Detailed records of blight were taken each December thereafter. To date, 78.8% of the original trees have manifested blight symptoms. Blighted trees that were removed before 1967 were replaced with more 'Valencia'/rough lemon trees. A total of 290 of these replants (second generation trees) was observed through 1976. So far, 21 replants (7.2%) show blight symptoms.

Symptoms appeared in trees of all ages from 5 to 12 years. Blight in the second generation trees has occurred randomly without regard to location in the grove or the sequence of blight in the original trees.

Table 1. Annual percentage of blight in ridge groves on rough lemon rootstock (1970-1977).

County Location* No. trees <sup>†</sup> Approx. age	Lake			Orange	Polk				Highlands					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	551	1583	775	1462	428	558	262	178	1054	862	900	460	316	500
	30	10	13	19	29	29	29	30	24	24	24	16	16	16
1970	—	(1.7) <sup>x</sup>	(4.4)	(5.0)	(6.0)	(9.0)	—	—	—	(0.5)	(0.5)	—	—	—
1971	—	2.6 <sup>w</sup>	4.8	—	5.0	7.0	—	—	—	0.0	0.0	—	—	—
1972	(21.0)	2.0	3.5	3.0	4.0	11.0	(22.0)	(11.0)	(20.0)	1.0	2.0	(28.0)	(20.0)	(1.4)
1973	5.0	2.2	2.3	3.0	13.0	9.0	2.0	7.0	7.0	2.0	2.0	3.0	5.0	0.7
1974	6.0	2.1	1.9	0.0	7.0	9.0	3.0	0.0	21.0	6.0	6.0	6.0	2.0	1.4
1975	3.0	1.3	2.1	3.0	6.0	9.0	8.0	1.0	8.0	4.0	5.0	10.0	5.0	0.9
1976	2.0	0.6	2.8	5.0	6.0	11.0	7.0	9.0	8.0	5.0	6.0	5.0	9.0	0.0
1977	1.0	—	—	—	—	—	4.0	4.0	—	—	—	10.0	0.0	2.0
Avg.	3.4	1.8	2.9	2.8	6.8	9.3	4.8	4.2	11.0	3.0	3.5	6.8	4.2	1.0

\*Grove, variety, location: 1) Katy, 'Valencia,' near Groveland; 2) Patrick, 'Valencia,' near Howey; 3) Gibbs, 'Valencia,' near Howey; 4) Fuller's Crossing, 'Valencia,' near Ocoee; 5) Hickory Lake, 'Valencia,' near Frostproof; 6) Hickory Lake, 'Hamlin,' near Frostproof; 7) Crooked Lake, Red grapefruit, near Lake Wales; 8) Crooked Lake, 'Duncan' grapefruit, near Lake Wales; 9) Tyree, 'Valencia,' near DeSoto City; 10) Rawles, 'Valencia,' near DeSoto City; 11) Rawles, 'Valencia,' near DeSoto City; 12) Alpine, 'Valencia,' near Avon Park; 13) Alpine, 'Valencia,' near Avon Park; 14) Alpine, 'Valencia,' near Avon Park.

<sup>†</sup>Number of trees in the original planting.

<sup>x</sup>Number in parentheses is percentage blight at first reading.

<sup>w</sup>Percentage of blight among remaining healthy trees.

Table 2. An example of continued intensive decline in the Swann grove near Avon Park of Valencia/rough lemon over an 11-year period.

Year	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
No. trees <sup>z</sup>	980	918	829	752	700	629	580	504	448	408	339	281
Blight <sup>r</sup>	26.2	6.3	9.7	9.3	6.9	10.1	7.8	13.1	11.1	8.9	16.9	17.1
Replants <sup>s</sup>							0.7	0.7	1.0	0.7	2.5	1.8

<sup>z</sup>Number of healthy trees remaining from 1328 original trees.

<sup>r</sup>Percentage of remaining healthy trees showing new blight symptoms. Eleven-year average was 10.7%.

<sup>s</sup>Percentage decline of replants in 290 spaces where original blighted trees were removed. Blight occurred in second generation trees 5 to 12 years old.

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## SIMILARITIES BETWEEN MARCHITAMIENTO REPENTINO DISEASE IN URUGUAY AND ARGENTINA AND BLIGHT OF CITRUS IN FLORIDA<sup>1</sup>

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**Abstract.** Marchitamiento repentino, a disease whose cause is still unknown, has slowly spread over much of the Uruguayan and Argentinian citrus-growing areas since 1960. The visual aspects of marchitamiento, zinc and manganese deficiency symptoms, small leaves, wilting of a sector of the tree, and eventual decline of the whole tree, are very similar to those of blight (young tree decline) in Florida. Blight-affected trees accumulate zinc and water-soluble phenolics in the wood. Analyses of 36 samples of 'Valencia' and navel orange (*Citrus sinensis* (L.) Osbeck), 'Marsh' grapefruit (*C. paradisi* Macf.), and mandarin (*C. reticulata* Blanco) wood from Uruguay and Argentina showed that 16 of 18 trees

visually diagnosed as being affected by marchitamiento also had higher Zn and water-soluble phenolics levels than 18 comparable, apparently healthy trees. Earlier work has shown that tristeza and 6 other causes of citrus tree decline do not increase the Zn content of the trunk wood, suggesting that marchitamiento repentino and blight could be similar disorders.

It is generally believed that blight (young tree decline) occurs only in Florida. In recent years, however, it has been reported that citrus trees in Central and South America are declining with visual symptoms similar to those of blight (2, 3). Considering the differences in climate, soil, rootstock, and cultural practices, it is rather difficult to make comparisons on the basis of visual symptoms; however, analysis of the wood offers an objective method for investigating similarities between tree declines in different places. The accumulation of Zn in the wood (4) has been shown to occur on trees with blight but not with 7 other causes of decline (5). The original test for blight, water injection into the trunk (1), in combination with Zn and phenolics analysis of the wood, permits almost certain diagnosis of the disease (5).

Salibe et al. (3) recently published observations on visual symptoms and susceptibility of citrus varieties to marchitamiento repentino. The appearance of symptoms—Zn and manganese deficiency, small, narrow leaves, wilting of a sector of the tree, and eventual decline of the whole tree—is similar to what is commonly observed on the Ridge in Florida. In addition, Salibe et al. (3) reported small and sometimes lopsided fruit, aborted seed, necrotic lines in the cambial area of large branches, and xyloporosislike pitting on the affected side of the trunk. Like blight, marchitamiento repentino has not been found in trees less than 5 years old and is most common in trees older than 10 years. In contrast to blight, graft transmission of marchitamiento to young 'Valencia' trees (11 of 44 index trees) was possible.

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