INCIDENCE AND CONTROL OF THE BROAD MITE ON LIMES IN FLORIDA

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The broad mite, *Hemitarsonemus latus* Banks, produces silvering, "sharkskinning" and russeting of lime fruit. Such injuries are similar to that produced also by the citrus rust mite. *Phyllocoptruta oleivora* (Ashmead). Russeting of the fruit reduces its grade from "fresh" to "juice" quality resulting in finanical losses to growers. Broad mite infestations also cause distortions, twisting and stunting of lime leaves and of other crop plants such as avocado, guava, mango, papaya and tomatoes. Results of studies on grove and seasonal incidences and control of the broad mite are presented.

Mite Distributions.—World wide distributions and wide host plant ranges of broad mite infestations are evident by the report of van Marle (1944). Most reports refer to the broad mite as a pest of ornamental plants, such as begonia and cyclamens, which are much grown in greenhouses. Guava seedlings growing under the greenhouse bench are more heavily infested than those on the greenhouse bench or out of doors. Twelve to 40 cm. high plants under the bench were invariably observed in which the lst, 2nd or other pair of opposite leaves were distorted and reduced in size as a result of dense infestations of broad mites. Factors affecting mite infestations must include light and moisture conditions. Mites are found on young more than on mature leaves. Some leaves on twigs are and some are not infested in the early growth stages indicating much remains to be learned of mite ecology.

METHODS AND MATERIALS

Incidence was determined by counting mites on fruits 1/4 to inch diameter by using 10X triplet hand lens. Five fruit were taken from different parts of each tree for examination. Ten trees located in different parts in each of 9 commercial groves and one experimental station grove were sampled periodically from June 13, 1966, through May 17, 1968, Tables 1 and 2. Groves were separated from each other by distances of 1/2 to 10 miles.

Two chemical control tests were conducted, one in a commercial grove the other a grove on grounds of the Agricultural Research and Education Center. Regular grove sprayers with and gun applicators were used to spray each material tested on four trees in randomized blocks. Trees were sprayed to wetness. Results of treatments were taken on three days using 10 fruit from each treated tree, Tables 3

and 4. Wettable sulfur was used in each test as were several of the newer miticides.

Results.—Some groves were heavily infested with many broad mites, others with few. Most groves that were heavily infested tended to remain heavily infested and when they were lightly infested they tended to remain so. No attempt was made to relate infestations and control measures. Control measures were used in only three of the ten groves and were not needed in more than about 6 of the groves. Broad mite populations were very greatly reduced where sulfur was used but reappeared in a few months. Populations were more abundant in June, July and August, Table 2; months of lowest populations were in March, April and May.

Wettable sulfur, 6 lbs. in the first, Table 3 and 8 lbs., Table 4, per 100 gallons of water in the second test, was the most effective material in broad mite control.

Sulfur is recommended for broad mite control because of its (1) effectiveness, (2) cost and (3) safety to man. Groves with a history of broad mite infestations need frequent attention, whereas groves with low infestations may not require such vigilance.

LITERATURE CITED

Marle G. S. van, 1944. Aantasting van begonia's door mijten behoorende tot het geslacht **Tarsonemus** can. et fanz. Tijdschr. Plziekt. 50:25-44.

Table 1. Broadmites, total, on 50 limes on 10 trees in different groves on different days.

	Grove designation										
Date	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*Total*
June 13, 1966	0	0	5	0	2	0	98	0	0	1	106
July 5	28	0	0	6	137	0	141	1	0	0	313
August 2	34	2	1	0	96	0	3	43	0	7	186
August 9	9	0	5	0	55	0	0	12	7	8	96
August 22	0	0	5	5	3	0	36	195	67	5	316
September 6	0	1	0	0	0	0	0	0	8	11	20
September 20	13	0	0	0	0	0	0	14	6	5	38
October 5	0	0	0	0	0	0	0	0	0	0	0
October 19	0	0	0	0	0	0	35	0	0	4	39
October 31	0	0	0	0	0	0	0	0	0	0	0
November 18	0	0	0	0	25	0	0	0	0	6	31
November 29	0	0	0	0	0	0	0	0	0	0	0
December 15	0	0	0	0	26	0	0	0	0	0	26
December 29	0	0	0	0	8	0	9	0	1	6	24
January 9, 1967	0	0	0	0	24	0	22	0	0	14	60
January 24	0	0	0	0	0	51	0	0	0	28	79
February 8	0	0	0	0	0	0	32	0	0	53	85
February 22	0	0	0	0	0	0	0	0	0	0	0
March 8	0	0	0	0	0	0	2	0	0	0	2
March 21	0	0	0	0	0	0	0	0	0	0	0
April 4	0	0	0	0	0	0	0	0	0	0	0
April 19	0	0	0	0	0	0	0	0	0	0	0
May 2	4	0	0	0	11	8	3	5	0	0	31
May 15	0	0	0	0	0	0	0	0	0	3	3
May 29	0	0	0	0	0	0	0	0	0	0	0
June 14	0	0	0	0	0	0	1	7	0	3	11
June 28	14	0	0	0	15	2	88	0	0	0	119
July 11	0	0	0	0	9	11	0	50	0	0	61
July 23	0	0	0	0	10	0	0	0	0	0	10
August 7	0	0	0	0	0	0	0	0	0	4	4
August 23	0	0	0	0	0	0	0	0	0	4	4
September 6	0	0	0	0	1	0	0	0	0	55	56
September 18	0	0	0	0	0	0	0	0	0	10	10
October 3	0	0	0	0	9	0	4	0	0	0	13
October 16	0	0	0	0	0	7	0	0	3	0	10
October 31	0	0	0	0	0	9	0	0	0	7	16
November 14	3	0	0	0	0	0	8	0	0	1	12
November 29	0	0	0	*0	4	0	6	11	0	68	89
December 11	4	0	0	0	0	0	0	0	0	6	10
December 28	1	0	0	0	0	0	0	0	0	0	1
January 26, 1968	0	0	0	0	0	0	0	0	0	0	0
February 9	0	0	0	0	0	0	0	0	0	0	0
February 19	0	0	0	0	0	0	0	0	0	1	1
March 4	0	0	0	0	0	0	0	0	0	0	0
March 21	0	0	0	0	0	0	0	0	0	0	0
April 3	0	1	0	0	0	0	0	0	0	0	1
April 15	0	0	0	0	0	0	0	0	0	0	0
May 1	0	0	1	0	0	0	0	0	0	5	6
May 17	0	0	0	0	0	0	0	1	0	0	1
Totals	110	4	17	11	426	88	488	339	92	315	1890

* *No fruit was available in this grove on this day.*

Table 2. Monthly incidence of broad mite infestations, means of observations.

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Mean no./50 fruit per 10 trees	46.3	21.5	0.5	0.3	8.2	78.7	128.0	121.2	31.0	13.0	33.0

Table 3. Results of tests to control broad mites, —Dunagan's Grove. Treated September 11, 1965.

Material	Amt./100 gals.	Broad mites/10 fruit Combined, Sept. 14. 18 & 22 counts
Sulfur, wettable	6 lbs.	0 a*
Morestan, 25W$_1$/	1 lb.	0.5 a
Carbophenathion, 4E	3/4 pt.	0.8 a
Dicofol, 2E	2 quts.	1.3 a
Chloroprophylate, 2E$_2$/	1 pt.	3.5 a
Ethion, 4E	3/4 pt.	2.0 a
Tetradifon, 1E	1 pt.	3.5 a
Genite, N° 923, 50W	1 lb.	3.8 a
Chlorobenzilate, 50W	½ lb.	3.8 a
Binapacryl, 50W	1 lb.	4.8 a
Tin hydroxide, 20W	1 lb.	6.5 a
Zineb, 75W	1 lb.	7.0 a
Azinphosemethyl, 2E	1 pt.	14.5 ab
Aramite, 15W$_3$	1 lb.	25.5 b
Check	——	13.0 ab

* Means followed by the same letter are not significantly different.

1/ 6menthyl-2, 3-quinoxalinedithol cyclic carbonate
2/ isopropyl 4, 4-dichlorobenzilate
3/ 2-(p-tert-butyl phenoxy)-1-methylethyl 2-chloroethyl sulfite

Table 4. Results of tests to control broad mites. —Research Center Grove. Treated November 17, 1965.

Treatment Material	Amt./100 gals.	Broad mites/20 fruit, combined day, Nov. 19, Dec. 3 Dec. 15, 1965
Sulfur, wettable	8 lbs.	0 a*
Dioxathion, 4E	1 pt.	16.3 ab
Animert, 2E	1½ pts.	17.0 ab
Tetradifon, 1E	1 qt.	24.3 ab
Dicofol, 2MF	10 oz.	25.3 ab
Chloropropylate 2E	1 pt.	26.5 ab
Morestan 25W	1 lb.	31.5 ab
Banol[1]/ 75W	1 lb.	37.3 ab
Chlorobenzilate, 4E	½ pt.	42.3 ab
Imidan[2]/ 3E	1 pt.	44.0 ab
Aramite 15W	1 lb.	49.0 ab
Azodrin,[3]/ 3.2E	½ pt.	82.5 b
GC-6506,[4]/ 4E	½ pt.	86.8 bc
Check		141.0 c

* Means with the same letter are insignificant

[1]/ 6 chloro-3, 4 xylylmethly
[2]/ 0,0-dimethyl S-phthalimidomethyl phosphorodithioate
[3]/ dimethyl phosphate, ester with *cis* 3-hyroxy-N-methyl crotonamide
[4]/ dimethyl p-(methylthio) = phenyl phosphate*