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MICRUTALIS TREEHOPPERS AND PSEUDO-CURLY TOP IN FLORIDA

(HOMOPTERA:MEMBRACIDAE)[1]

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INTRODUCTION: The treehopper, ***Micrutalis malleifera*** Fowler, is the only known vector of pseudo-curly top virus, a minor disease of tomatoes in southern Florida. This circular condenses some of the literature on this vector and disease and presents new information on identification and distribution of ***Micrutalis*** spp. in Florida.

IDENTIFICATION: Metcalf and Wade (World catalogue 1965) listed 31 species of ***Micrutalis*** plus several named varieties, all from the Americas: 6 species from the U.S.A., 3 western and 3 eastern America, of which 2 are in Florida. ***Micrutalis*** treehoppers are the smallest representatives of the family in Florida. ***Micrutalis*** often has been confused with ***Acutalis***, represented by 1 species, ***A. tartarea*** (Say), common in the eastern U.S. The forewing (tegmen) of ***Acutalis*** has 5 apical cells, and the veins are prominent and usually dark; ***Micrutalis*** has only 4 apical cells, and the veins are very indistinct and pale. Also, Florida species of ***Micrutalis*** are smaller (up to 3.4 mm long, ***M. dorsalis*** (Fitch) is 4-5 mm) than ***Acutalis tartarea*** (3.5-5.Ø mm). ***A. tartarea*** has a brown or black "skull-cap" patch on the anterior pronotum that usually is different from the variable markings on ***Micrutalis***. Taxonomic comparisons of genitalia of ***A. tartarea*** and ***M. calva*** (Say) were made by Dennis (1952).

Fig. 1. ***Micrutalis calva*** (Say). Specimens from Torreya St. Pk., Florida, 7-XII-57, F.W. Mead. (DPI photo #86ØØ38; photo credit, J. Lotz).

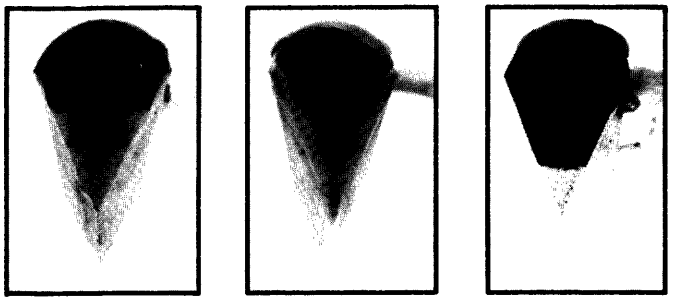

Fig. 2. ***Micrutalis malleifera*** Fowler. Specimens from lab colony, Belle Glade, Florida, VI-1957, J.N. Simons. (DPI photo #86ØØ38; photo credit, J. Lotz).

Key to Eastern U.S. Species of ***Micrutalis***

1. Length 4-5 mm; male subgenital plate (ventral view) widest near middle area, lateral margins subparallel much of distance, and median cleft slightly more than half total length of plate (fig. 6B); range: Canada, U.S.(but not south of North Carolina)..... .....***M. dorsalis*** (Fitch)

1'. Length not over 3.5 mm; male subgenital plate widest in basal third (fig. 6D,F) with sinuate lateral margins (fig. 6F), or if subparallel, then median cleft distinctly less than half length of plate (fig. 6D); ranges

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include peninsular Florida (fig. 3,4).....2

2(1') Male aedeagus (lateral view) with a squarish gap between anterior and posterior arms, the ratio of depth of gap to distance between tips of arms approximately 1:1, functional orifice more basal (fig. 6E); subgenital plate in ventral aspect with sinuate margins, somewhat bulbous basally, and with median cleft 4.8-5.2 of total length (fig. 6F) adults slightly shorter, males 2.6-2.7 mm, females 3.Ø-3.2 mm; pronotum usually black except for white apex (fig. 1), but highly variable, some patterns similar to species below.....***M. calva*** (Say)

2' Male aedeagus (lateral view) with a deeper "V to U" shaped gap between anterior and posterior arms; ratio depth of gap to distance between tips of arms approximately 3:2, functional orifice more apical (fig. 6C); subgenital plate in ventral aspect with nearly straight lateral margins, not sinuate, and with median cleft 3.6-4.1 of total length (fig. 6D); adults slightly longer, males 2.8-3.1 mm, females 3.3-3.4 mm; pronotum coloration variable, most distinctive pattern being a black tongue-like extension posteriorly invaded by white laterally (fig.2).....***M. malleifera*** Fowler

DISTRIBUTION: Florida distribution maps of ***Micrutalis calva*** (fig. 3) and ***M. malleifera*** (fig. 4) are based on dissected males in the Florida State Collection of Arthropods (FSCA). There is no doubt that the ranges are more extensive than shown, but there is sufficient evidence to show that the range of the "northern" species ***calva*** overlaps that of the "southern" species ***malleifera*** over most of peninsular Florida. ***Funkhouser (1951) listed M. calva*** from Canada and U.S., and ***M. malleifera*** from Mexico, but Metcalf and Wade (1965) showed a more extensive Neotropical range for each species. The ***M. malleifera*** oldest specimens in the FSCA are 2 females and 1 male collected on eggplant at Gainesville, Florida, November 6, 1947 by H. V. Weems, Jr. The concept of ***M. malleifera*** in this circular is based mostly on specimens from the pure colony used by Dr. Simons in his research at Belle Glade, Florida, circa 1957. His use of the name ***M. malleifera*** is based on the definitive identification by L. M. Russell, USDA Systematic Entomology Lab, Beltsville Maryland.

LIFE HISTORY: Simons (1962b) reported that ***M. malleifera*** was reared from egg to adult on eggplant, ***Solanum melongena*** L., in a greenhouse at Belle Glade, Palm Beach County, Florida. The average incubation period for eggs was 15 days; instars required 23 days, thus the average life cycle was 38 days. He added that ***M. malleifera*** reproduction was highest during warmer months, both in the greenhouse and in the field. Adults overwinter, but population levels were very low from October through April. Winter weather adversely affected reproduction.

HOST PLANTS: Simons (1962b) reported nightshade, ***Solanum nigrum*** L., a ground cherry, ***Physalis angulata*** L., and eggplant as hosts. Host labels on dissected males in FSCA determined by the author are as follows: at ***Dichromena latifolia*** Baldw., at ***Physalis viscosa*** L., at ***Physalis elliottii*** Kunze, at ***Solanum nigrum*** L., feeding on eggplant, and caught in Malaise trap. These ***M. malleifera*** were collected during February, May-July, and September-December.

PSEUDO-CURLY TOP DISEASE: This disease resembles curly top, and is caused by what appears to be a geminivirus (Christie et al. 1984). Its transmission to tomato plants and other hosts in southern Florida by a treehopper, ***Micrutalis*** sp., was first reported by Simons and Coe (1958), and by Simons (1958). This was the first and still the only record in the world of a treehopper being a vector of a plant disease etiologic agent. The known distribution of pseudo-curly top in southern Florida, as shown in fig. 5, is based on observations by J. N. Simons. Tomato, ***Lycopersicum esculentum*** Mill., seems to be the only commercial plant affected, and the problem has remained a minor one. This is probably because the major tomato season in Florida is during the cooler part of the year when the treehopper vector populations are at low levels. The princi-

pal treephopper build-up on nightshade is essentially restricted to late summer when weather is too hot for most commercial tomato growing. Simons (1962a) reported that tomatoes planted after October 1 rarely were infected. Also, the treehopper tends to cling to its weed host plants and not move to tomatoes, especially if the cropland is over 200 feet away.

Symptoms of pseudo-curly top (PCTD) in tomato plants, as stated by Simons (1959, 1962a), included vein clearing in young leaves within 10 days of inoculation, followed by rolled leaves, chlorosis with enlarged veins, plants becoming brittle, much stunting, axillary shoot development, little or no fruit set, and considerable purpling on stems, petioles and underside of leaves. Simons (1962a) also described symptoms on the following other hosts: ragweed, ***Ambrosia*** sp., jimsonweed, ***Datura stramonium*** L., tobacco, ***Nicotiana glutinosa*** L., nightshade, ***Solanum nigrum*** L. (=***gracile*** (Link)), and chickweed, ***Stellaria medea*** (L.) Cyr. Simons added that pole and snap beans, ***Phaseolus vulgaris*** L., in the Homestead area, often showed symptoms of virus infection similar to those caused by PCTD hosts. The symptoms in these hosts also were similar to those caused by other curly top viruses.

SURVEY AND DETECTION: Look for very small, wedge-shaped, smooth-backed treehoppers. The adults (1/7-1/8") usually have a smooth black pronotum, tapering to a white apex. For ***M. malleifera***, the vector of PCTD inspect favorite host plants such as nightshade, ground cherries, and eggplant. Ordinarily these hoppers do not run, jump or fly readily, so they may be hand picked or caught in a sweep net. They have been taken in sticky board traps, but light traps are unproductive for ***Micrutalis*** spp. Feeding is usually confined to the stems and petioles, with the insects assuming a position with the head pointed down. Nymphs tend to be gregarious and often form colonies near the apex of the plant (Simons, 1962b). Nymphs have a double row of spines down the back, and taper to a slender tail, typical of many treehopper species.

Kopp and Yonke (1970) listed ***Micrutalis calva*** as being caught in Malaise traps in Missouri, but for treehoppers in general they reported Malaise traps the least productive collecting method; hand picking was the best way to collect treehoppers. To collect ***M. calva***, special attention should be given to its host and food plants: ragweed, ***Ambrosia*** spp.; sunflower, ***Helianthus*** sp.; black locust, ***Robinia pseudo-acacia*** L.; swamp vegetation; goldenrod, ***Solidago*** spp.; ironweed, ***Veronia*** spp., etc. Specimens should be submitted dry in pillboxes or in vials of alcohol.

CONTROL: Simons (1959) recommended that nightshade and ground cherry should be eradicated for several hundred feet around a tomato field before planting. This prevents ***M. malleifera*** from building up close to the crop and possibly moving to the tomatoes.

LITERATURE CITED:

Christie, R. G., B. W. Falk, N.-J. Ko, and F. W. Zettler. 1984. Geminivirus-like nuclear inclusions associated with pseudo-curly top disease in Florida. Phytopath. 74(7):800 (an abstract).

Dennis, C. J. 1952. Genitalia of the Membracidae of Wisconsin. Canadian Ent. 84(6):157-173, fig. 1-45.

Fowler, W. W. 1894. Biologia Centrali Americana. Rhynchota. Hemiptera-Homoptera 2:1-184, illus.

Funkhouser, W. D. 1951. Homoptera: Family Membracidae. Genera Insectorum, Fasc. 208, 383 p.

Kopp, D. D., and T. R. Yonke. 1970. Annotated list of treehopper species (Homoptera:Membracidae) of Missouri and evaluation of collection methods. Trans. Missouri Acad. Sci. 4:76-83, 2 fig.

_____. 1973. The treehoppers of Missouri: Part 2. Subfamily Smiliinae; Tribes Acutalini, Ceresini, and Polyglyptini (Homoptera: Membracidae). J. Kansas Ent. Soc. 46(2): 233-276, fig. 34-127.

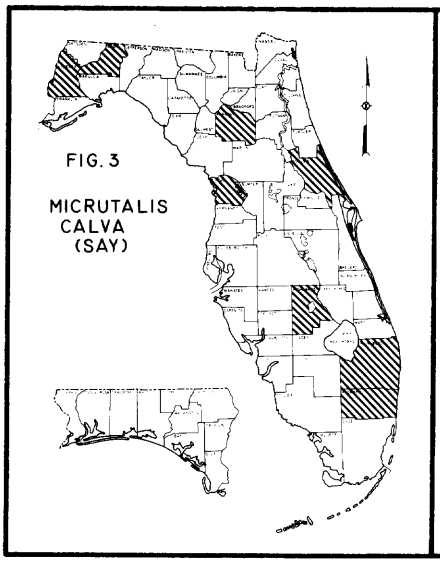
Metcalf, Z. P., and V. Wade. 1965. General Catalogue of the Homoptera. A Supplement to Fasc. I - Membracidae of the General Catalogue of the Hemiptera. Membracoidea. In two sections. North Carolina State University, Raleigh, 1552 p.

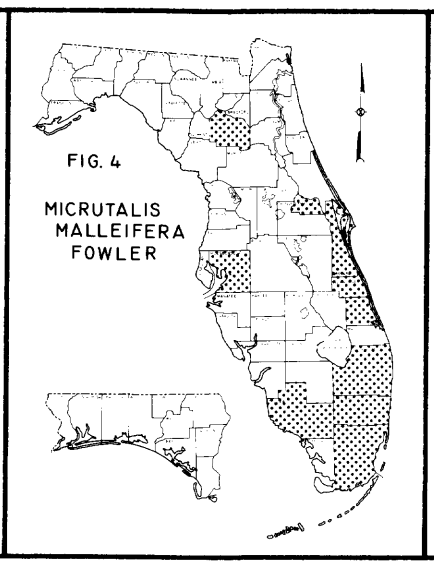
Simons, J. N. 1959. Virus diseases affecting vegetables in south Florida. Proc. Florida State Hort. Soc. 71:31-34.

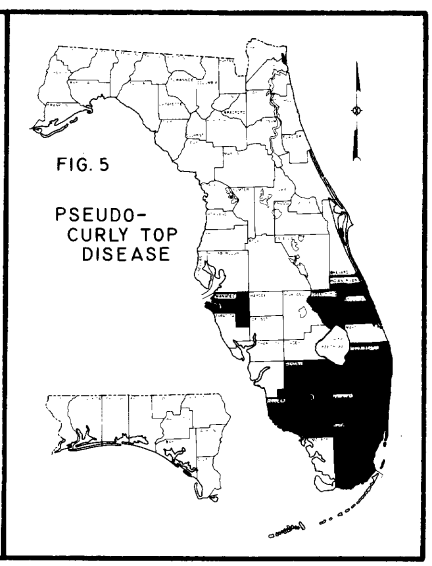
_____. 1962a. The pseudo-curly top disease in south Florida. J. Econ. Ent. 55(3):358-363, fig. 1-2.

_____. 1962b. Life-history and behavioral studies on ***Micrutalis malleifera***, a vector of pseudo-curly top virus. J. Econ. Ent. 55(3):363-365, fig. 1-3.

_____, and D. M. Coe. 1958. Transmission of pseudo-curly top virus in Florida by a treehopper. Virology 6(1):43-48, fig. 1.







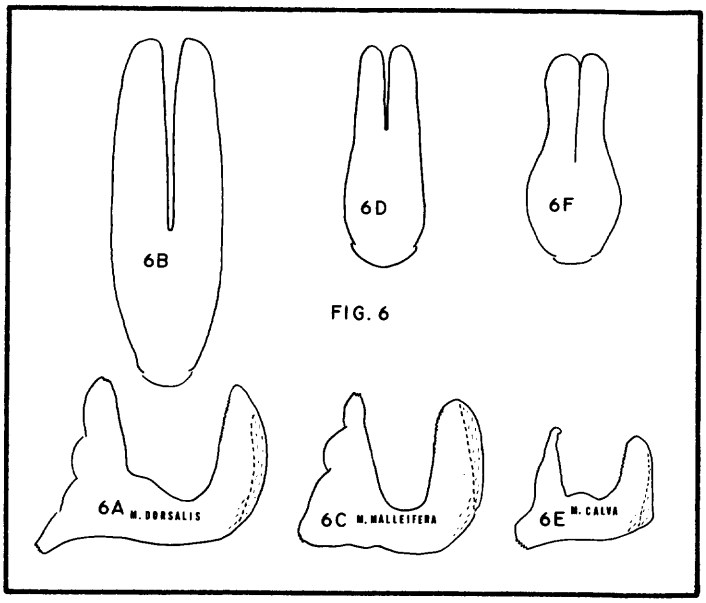


Fig. 6. B,D, & F = subgenital plates, ventrad (drawn to same scale); A,C, & E = aedeagus, left lateral (drawn same scale, but different from subgenital plates. ***Micrutalis dorsalis*** (Fitch): WEST VIRGINIA, Monongehela N.F., Cranberry Glades, 15-VIII-1972; H.V. Weems, Jr., elev. 3400 ft. ***Micrutalis malleifera*** Fowler: lab colony, Belle Glade, FLORIDA, VI-1957, J.N. Simons. ***Micrutalis calva*** (Say): Torreya State Park, FLORIDA, 7-XII-1957, F.W. Mead.

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