

## SYMPTOMS OF SUNFLOWER MOSAIC DISEASE

By

R. G. Orellana  
Research Plant Pathologist  
Crops Research Division, ARS  
United States Department of Agriculture  
Beltsville, Maryland (U.S.A.)

In 1967 a planting of sunflowers, Helianthus annuus L. 'CM-162', at Beltsville, Maryland, was affected by a mosaic that was previously unobserved on this crop in the area. Weber (11) in 1932 had observed mosaic symptoms on sunflowers in Florida. Except for a mechanically transmitted mosaic in Argentina (3,4,8,10), where it had been apparently introduced from the Soviet Union, and isolated cases of sunflower mosaic in India (1), Uruguay (6), and Africa (12), no viruses have been reported as occurring extensively on the cultivated sunflower. The wild perennial sunflower, H. decapetalus L. var. multiflorus Hart., is host of cucumber mosaic (CMV) (9). Gill (2) has experimentally obtained infection of sunflower by CMV. Schmelzer and Molnar (7) believe, however, that the Argentinian sunflower mosaic disease is nonviral.

The sunflower mosaic disease at Beltsville was characterized by mosaic symptoms and chlorotic rings which were more severe on young leaves of plants up to 2 months of age than on those of older plants. Diseased plants were stunted, sometimes had discrete narrow light-brown streaks on the petioles and stems, and produced malformed heads and shriveled seed.

Sunflower and other plant species used in transmission tests are listed in Table 1. Seedlings were dusted with 600-mesh Carborundum and inoculated by rubbing the leaves with a cotton swab dipped in crude sap extracted by grinding field-infected sunflower leaves in a mortar with 0.1 M phosphate buffer pH 7.0. Sap in other tests was likewise extracted from artificially infected sunflowers, 'Kentucky-35' tobacco, or 'Blackeye' cowpea. Plants were rinsed with water after inoculation and kept in a greenhouse at about 24 C during the day and 18 C at night. Incubation period and most prominent symptoms incited on sunflower and other hosts by CMV-SF are shown in Table 1. The sunflower virus was readily recovered from susceptible hosts except A. chinensis, B. vulgaris 'SL-742', Cassia occidentalis, G. max 'Kent', L. esculentum 'Rutgers', Z. mays, and Z. elegans 'Cut and Come Again', which all required shading of the plants before and after inoculation.

According to Orellana and Quacquarelli (5) the mosaic disease of sunflowers at Beltsville was incited by a strain of CMV which was serologically identical to CMV-Y.

Table 1. Reaction time and foliar symptoms incited on plant species mechanically inoculated in the greenhouse with crude sap from sunflowers naturally infected by mosaic virus at Beltsville, Maryland.

	Reaction time	Main symptoms
	days	
<u>Aster chinensis</u> Nees.	10-15	Leaf mottle
<u>Beta vulgaris</u> L. 'SL-742'	15-20	Small, transient local lesions
<u>Cassia occidentalis</u> L.	2-25	Leaf mottle
<u>Chenopodium amaranticolor</u> Coste et Reyn.	4-7	Necrotic local lesions
<u>Cucumis sativus</u> L. 'National Pickling'	4-7	Chlorotic local lesions, mosaic
<u>Cucurbita pepo</u> L. 'Zucchini squash'	4-7	Chlorotic local lesions, mosaic
<u>Cyamopsis tetragonoloba</u> (L.) Taub. 'Brooks'	4-7	None
<u>Datura stramonium</u> L.	7-10	Chlorotic local lesions
<u>Glycine max</u> (L.) Merr. 'Kent'	10-15	Vein clearing
<u>Gomphrena globosa</u> L. 'Rubra'	10-15	Red local lesions, mottle
<u>Helianthus annuus</u> L.	10-15	Mosaic, chlorotic rings
<u>Helianthus tuberosus</u> L. 'Jerusalem artichoke'	12-15	Mild mosaic
<u>Lycopersicon esculentum</u> Mill 'Rutgers'	10-15	Leaf crinkle, vein necrosis
<u>Nicotiana tabacum</u> L. 'Samsun'	7-10	Mosaic
<u>Nicotiana tabacum</u> L. '402'	7-10	Mosaic
<u>Nicotiana tabacum</u> 'Kentucky 35'	7-10	Mosaic
<u>Nicotiana glutinosa</u> L.	7-10	Mosaic
<u>Nicotiana rustica</u> L.	10-15	Vein yellowing
<u>Phaseolus lunatus</u> L. 'Jackson Wonder'		None
<u>Phaseolus vulgaris</u> L. 'Bountiful'		None
<u>Phaseolus vulgaris</u> L. 'Black Valentine'		None
<u>Sesamum indicum</u> L. 'Paloma'	6-10	Mosaic
<u>Vigna sinensis</u> Endl. 'Blackeye'	2-7	Red local lesions, mosaic
<u>Zea mays</u> L.	10-20	Mild chlorotic streaks
<u>Zinnia elegans</u> Jacq. 'Cut and Come Again'	10-20	Mild chlorosis

## LITERATURE CITED

1. BATTU, A. N., and H. C. PHATAK. 1965. Observations on a mosaic disease of sunflowers. *Indian Phytopathology* 18 (3): 317.
2. GILL, C. C. 1965. Increased multiplication of viruses in rusted bean and sunflower tissue. *Phytopathology* 55: 141-147.
3. MARENGO, L., and C. CARRERA. 1932. Parásitos vegetales hallados sobre plantas cultivadas en la Facultad de Agronomía y Veterinaria de Buenos Aires. *Agronomía* 25 (146): 39-58.
4. MUNTANOLA, MARIA. 1948. Descripción de una nueva enfermedad del girasol. *Rev. Invest. Agric. (Buenos Aires)* 2: 205-211.
5. ORELLANA, R. G., and ANTONIO QUACQUARELLI. 1968. Sunflower mosaic caused by a strain of cucumber mosaic virus. (In press).
6. SACKSTON, W. E. 1957. Diseases of sunflowers in Uruguay. *Plant Disease Reporter* 41 (10): 885-889.
7. SCHMELZER, K., and ANNAMARIA MOLNAR. 1964. Pseudomonas aptata (Brown et Jamieson) Stevens im Zusammenhang mit vermeintlichen pflanzlichen virusinfektionen. *Phytopathologische Z.* 50: 112-128.
8. SORIANO, S. 1932. Nota sobre algunas enfermedades de los vegetales producidas por virus en la Republica Argentina. *Physis* 11: 87-92.
9. THORNBERRY, H. H. 1966. Plant pests of importance to North American Agriculture. *Index of Plant Virus Diseases. Handbk. No. 307, U.S. Department of Agriculture*, pp. 446.
10. TRAVERSI, B. 1949. Estudio inicial sobre una enfermedad del girasol (Helianthus annuus L.) en Argentina. *Rev. Invest. Agric. (Buenos Aires)* 3: 345-351.
11. WEBER, G. F. 1932. Mosaic, a virus disease of many plants. *Florida Growers* 40 (12): 10-11.
12. WILTSHIRE, S. P. 1955. Plant diseases in the British colonial dependencies. *FAO Plant Prot. Bull.* 3: 140.