WATERMELON MOSAIC*

June - 1965

A. INTRODUCTION

B. DESCRIPTION OF THE PROBLEM

1. History of the Disease
2. Geographical Distribution of Watermelon Mosaic
3. Description of Watermelon Mosaic Symptoms
4. Strains of Mosaic and Host Ranges

C. METHODS OF TRANSMISSION

1. Mechanical Transmission
2. Aphid Transmission
3. Seed Non-Transmission
4. Varietal Susceptibility

D. SUGGESTED METHODS FOR CURBING SPREAD OF WMV

1. Sanitation
2. Weed Control
3. Aphid Control
4. Trap Crops
5. Time of Planting
6. Summer Host - Free Period
7. Good Pest Control Program

E. RESEARCH NOW IN PROGRESS AND PLANNED FOR THE FUTURE

1. Breeding
2. Insects
3. Hosts
4. Controls
5. Fundamentals

A. INTRODUCTION

Development of watermelon mosaic again this year in south Florida indicates that this disease has become a serious problem of regular occurrence in watermelon production. The seriousness of the problem prompted a concerted effort on the part of Florida Agricultural Experiment Station and Extension workers to evaluate the situation to plan stop-gap control measures for use now and needed research for the future. This is a report of the evaluation made by this group. County Agents, growers, supplymen and all others interested in watermelon production should familiarize themselves with what is known about watermelon mosaic and what can be done to lessen mosaic damage.

B. DESCRIPTION OF THE PROBLEM

1. History of the Disease. Watermelon mosaic was first observed at Fort Meade, Florida, in 1932. Eighteen years later in 1950, it was found again at Felda, Immokalee, and Webster. From then on it has been observed each year in varying degrees. In 1958 it caused economic losses in scattered fields at Immokalee but it developed to very serious proportion there and elsewhere again in 1962. Thereafter, watermelon mosaic has developed regularly each year in varying amounts in some areas of the State. The 1965 season started with heavy outbreaks in Immokalee with indications of a repeat of the serious losses caused during the 1962 season.

2. Geographical Distribution of Watermelon Mosaic. Watermelon mosaic has been found in almost all of the major watermelon producing counties one or more times during the past four seasons. The tri-county area of Lee, Collier and Hendry was hit the hardest in 1962. The 1965 season appears to be a repeat of the 1962 season. There is every reason to believe that watermelons in other areas of the State may be seriously affected again in 1965.

3. Description of Watermelon Mosaic Symptoms. Diseased plants first show symptoms toward the tip ends of the vines. Leaves infected with mosaic are mottled with areas showing lighter green color than the normal color of leaves. Often, the leaves exhibit a "strap-leaf" appearance where size is much smaller than normal. Tips of the vines protrude above the vine giving a "petunia-like" appearance. Melons set after the vine is heavily infected are warted, distorted in shape, mottled in color, smaller in size and generally poor in quality. Heavily infected watermelons are not marketable.

4. Strains of Mosaic and Host Ranges. Two mosaic strains have been identified from watermelon producing areas of Florida. They are identified as WMV-1 and WMV-2. These two strains have been found singly in different seasons at Immokalee, but both in the same season in central Florida. According to our information at the present time, symptoms of these two virus strains are quite similar.

WMV-1 is restricted to the cucurbit family in its host range. These include cukes, squash, cantaloupes, watermelons and all wild cucurbits. WMV-2 attacks all of these plants plus members of at least two or three other families of plants. The latter includes both cultivated and wild legumes. WMV-2, therefore, may become quite widespread in any area in Florida.

C. METHODS OF TRANSMISSION

It is important that methods of transmission of watermelon mosaic are understood in order to avoid use of ineffective control practices. The following are known facts about how WMV is and is not spread in a watermelon planting.

1. Mechanical Transmission. WMV can be transmitted by mechanical means in the laboratory. Machinery moving thru the field and workers handling vines and melons during the growing stages may possibly transmit WMV from plant to plant.

2. Aphid Transmission. WMV is transmitted by winged aphids. No other insects are presently suspected. However, thirteen species of aphids have been identified which are capable of transmitting WMV.

3. Seed Non-Transmission. WMV is not transmitted thru seed. After many tests, seed has never been shown to carry WMV.

4. Varietal Susceptibility. All varieties of watermelon are susceptible. Preliminary reports by growers indicate some slight differences in susceptibility. It is still too early to state whether or not the varieties differ sufficiently in resistance to WMV to suggest a change in varieties.

D. SUGGESTED METHODS FOR CURBING SPREAD OF WMV

There is no complete control of WMV presently. The best that can be expected is a delay in incidence or a reduction in severity of WMV injury to watermelon crops. The following are some possible means of delaying or reducing WMV.

1. Sanitation. Destroy all crop residue after harvest is completed. This is especially true of vine crops and any volunteers that may emerge subsequently. Since the aphid is attracted to yellow objects, it is suggested that sunflowers and other yellow-flowered crops be destroyed before they start producing flowers.

In addition, it may be wise not to cull melons. Any other operation, such as vine-turning, etc., should be eliminated, if possible. Use of machinery should be kept to a minimum and then used with care so as not to speed transmission from diseased to healthy plants.

2. Weed Control. Host plants in the surrounding area and on ditch banks of a field should be destroyed to prevent aphid build-up in those areas. Host plants were discussed under "Host range."

3. Aphid Control. It has been shown experimentally that spraying weeds and other host plants in the border areas around a field is very important in virus control. By this approach aphids are killed before they reach the crop. Spraying the watermelon crop itself is strongly recommended even though a winged aphid may infect a watermelon plant before it can be killed.

4. Trap Crops. Research work with other crops has indicated use of trap crops in areas bordering watermelon fields. These trap crops should not be host plants as described under "Mosaic Strains." Rather, trap crops, such as sweet corn, pepper, potatoes, tomatoes, eggplants, etc., which are attractive to aphids, should be planted.

Trap crops are supposed to trap the winged aphids where a thorough aphid-control program would tend to eliminate them. Trap crops offer the possibility of using approved systemic aphicides in the control program.

5. Time of Planting. Delay in time of planting, especially in south Florida, is strongly recommended. The shorter period of time a watermelon crop remains in the field, the less danger there is from infection by mosaic. Furthermore, this practice would tend to introduce a break in the cycle of mosaic spread, possibly, by having a vine-crop free period following late November or early December frosts or freezes which would kill out fall vine-crops.

6. Summer Host - Free Period. A period of one to three months where no vine-crops are permitted to grow in one area would cause a definite break in the cycle of the WMV-1 strain. This would appear to be worthwhile in the Immokalee area.

Growers, as a group, should destroy all vine-crop residues after harvest is completed and all volunteers that emerge thereafter until the fall planting of vine crops is started.

7. Good Pest Control Program. Growers are urged to carry out an effective pest control program. Mosaic may not be completely controlled, but the odds are that the severity of the disease can be lessened by such a program.

E. RESEARCH NOW IN PROGRESS AND PLANNED FOR THE FUTURE

The Florida Agricultural Experiment Stations recognize the seriousness of watermelon mosaic virus. Research work to solve the problem has been in progress for two years.

Plans are now being made to widen the scope of research. The following are problems related to WMV that are being studied by workers of the Experiment Stations at Immokalee, Bradenton, Leesburg and Gainesville.

1. Breeding. Selecting and breeding for a variety resistant to both WMV strains.

2. Insects. Determining species of aphids and other insects transmitting virus and studying the life history of each in hopes of finding methods for control.

3. Hosts. Identification of host range of each strain of the virus.

4. Controls. Testing various methods which offer some promise for control of the disease. These include trap crops, host plant control, chemicals, etc.

5. Fundamentals. Studying the basic aspects of all phases of the problem in hopes of developing new leads which may eventually result in solving the problem, economically.

This material was assembled by James Montelaro, Associate Vegetable Crops Specialis from information obtained in the literature from the staff of the Florida Agricultural Experiment Stations, Florida Agricultural Extension Service, and the United States Department of Agriculture. The list of contributors is too long to list here.