

AGRICULTURAL EXPERIMENT STATION
OREGON STATE AGRICULTURAL COLLEGE

Wm. A. Schoenfeld, Director

Corvallis

Circular of Information No. 84

February, 1933.

SUGGESTIONS FOR THE CONTROL OF TOMATO MOSAIC AND STREAK

by

Frank P. McWhorter and A. G. H. Bouslog

What the Mosaic and Streak Diseases of Tomato Are, and What They Do

Mosaic is the common leaf-mottle trouble which affects both greenhouse and field tomato crops. It mottles leaves, accounts for the "fern leaf" appearance, weakens plants, and reduces yields 30% or more. Other names for the disease are "fern leaf" and "calico"; mosaic is the preferred designation.

Streak is the destructive "winter-blight" which causes premature death of greenhouse plants. Blighted foliage, brown or black streaked stems, and angular black spots on leaves are symptoms. Fruits of severely diseased plants become blotched, misshapen culls.

In outdoor southern Oregon plantings, streak produces the destructive blight which may be called "Tip Blight" since the terminal shoots die first. This is followed by gradual withering and yellowing of the entire plant. Ring-like spots develop on ripened fruits. In recent years Tip-Blight has become the most important disease in the southern Oregon canning section. Its appearance under field conditions is different from that in the greenhouse. It has been mistaken for "Wilt," "Bacterial Canker," Western Yellow Blight (Curly top) and other tomato diseases.

Tomato mosaic and tomato streak are both virus diseases and they are related. Mosaic of tomato and mosaic of tobacco are caused by the same virus. This virus is easily transferable from one host plant to the other and in both host plants produces similar mottle symptoms. Tomato Streak or Tip Blight is a mixture of this tomato (or tobacco) mosaic virus and a potato virus. Therefore, a plant which has "Streak" has two diseases at the same time. That is why mosaic weakens but streak kills.

Important Facts About Streak and Mosaic Which Must be Understood and Met in Order to Achieve Control

FACTS ABOUT BOTH

1. Both are incurable. Control can only be accomplished by prevention.
2. Both are extremely infectious. They can be carried from plant to plant by simply touching one plant, then another. Mechanical transfer during the processes of transplanting, pruning and pollinating is more important than occasional transfer by insects.

3. Both are occasionally seed born.
4. Control by varietal selection has not been achieved; no worthwhile resistant variety of tomato has been found.

FACTS ABOUT MOSAIC

1. Tomato and tobacco mosaic are the same.
2. The most common source of mosaic in tomato plantings is tobacco. Tobacco in any form, including "chewing," "smoking," and even tobacco which has been toasted, is a menace to tomato plants. The mosaic virus will live in dried tobacco leaves for years. The user gets the virus on his fingers--an invisible trace is enough--and thence to the plant. Spitting is also a hazard.
3. Tomato plants during all stages of active growth are susceptible to infection from tobacco or from diseased tomato plants and weeds related to tomato.
4. Experiments have shown that if one pint of mosaic diseased tomato plant juice were poured into and mixed with one hundred and twenty-five thousand gallons of clean water, and a small flat glass rod were dipped into this mixture and gently rubbed on one leaf each of 100 young tomato plants, eighty out of every hundred of these are likely to develop mosaic. That's how infectious it is.
5. Other sources of mosaic are
 - a. Old plants left about the greenhouses or farm.
 - b. Soil recently used for tomatoes and still containing tomato plant debris.
 - c. Ornamental pepper plants with mottled leaves (greenhouse).
 - d. Weeds related to tomato such as black nightshade, ground cherry, and jimson weed or thorn apple.

FACTS ABOUT STREAK

1. Tomato mosaic and a potato virus together produce streak.
2. A plant at first having mosaic virus, and later having the potato virus, will develop streak. Likewise a plant may receive the potato virus first and the mosaic later, then develop streak.
3. A young tomato plant having streak is a menace to its neighbors since the disease is easily transferred by touch (mechanically) from plant to plant. In this case both viruses are transmitted together.
4. Any commercial potato plant regardless of whether it appears healthy may contain and is likely to contain the virus which combines with mosaic and causes streak.
5. Juice from any part of the potato plant is dangerous to tomatoes.

SUGGESTED POINTS BY WHICH CONTROL CAN BE ACCOMPLISHED

Introductory statement:

From the above one might conclude that control of such infectious diseases is impossible. This is not the case. In greenhouses where these diseases are being studied, accidental infections are prevented by certain precautions which will be mentioned. The basis of control must be extreme cleanliness.

1. Seeds must be the best obtainable. Cheap seeds selected from general run plants may be the starting point of mosaic and streak.
2. The use of tobacco about or near seed beds or during potting, transplanting, or pruning operations should be absolutely prohibited. Moreover, smoking by employees and visitors should be prohibited in tomato greenhouses.
3. Tobacco users working with plants must wash their hands thoroughly in "strong-soapy" warm water before working with seeds or plants. Likewise, all employees should wash their hands before working with tomatoes even if they do not use tobacco. Careful washing will eliminate sources of infection. After washing, the hands should be dried on a clean or freshly boiled towel. This procedure will remove the virus from the hands.
4. Women who handle potatoes, cut them for cooking, etc., should use precautions as above before working with tomato plants.
5. All potato plants and potato debris should be kept away from greenhouses and fields where tomatoes are grown. Using potatoes in greenhouses for poison baits is a frequent source of trouble.
6. If certain plants in a seed bed are off-color, or mottled, or definitely mosaic diseased, be careful to avoid touching them. Leave them until after transplanting the clean plants. Destroy them later. Transplant or set only the disease-free plants. When hallocks or other plant containers are used, those containers in which yellowed or mottled plants are observed should be removed without touching the plants.
7. Under greenhouse conditions where some form of hand pollination (as with stick) is necessary, be careful not to carry the disease from plant to plant with a stick or cloth-wrapped stick. It is not practical to have a different stick for each plant but it is practical to have several sticks and proceed as follows.
 - a. Use certain sticks on the best plants.
 - b. Other sticks for second best.
 - c. Other sticks for suspicious or diseased plants. After pollination is finished, boil all the sticks and cloths. Since sticks can be boiled and thereby completely sterilized, we recommend the use of sticks in preference to shaking with hands or fingers.
8. It is possible to remove young diseased plants from greenhouse or field plantings if extreme care is used
 - a. Not to infect other plants while so doing.

b. To clean hands, etc., afterwards.

9. During pruning operations, pinching buds, etc., great care must be exercised. Prune the best plants first. In the case of doubtful plants, it is suggested that pruning be done with a knife instead of pinching with fingers and that the knife be sterilized after each plant. To sterilize knife, dip the knife into a glass containing 1 part formalin to 3 parts water.

Moreover, even in the case of supposedly clean plants, the hands should be washed frequently in strong soapy water during pruning operations.

None of the above suggestions imply additional expense; they do imply additional trouble. In considering whether these precautions are worthwhile, remember that under Oregon conditions mosaic--streak combinations may and all too often do account for complete losses of tomato crops both in the greenhouse and in the field.
