



NO. 17

Wheat Spindle Streak Mosaic

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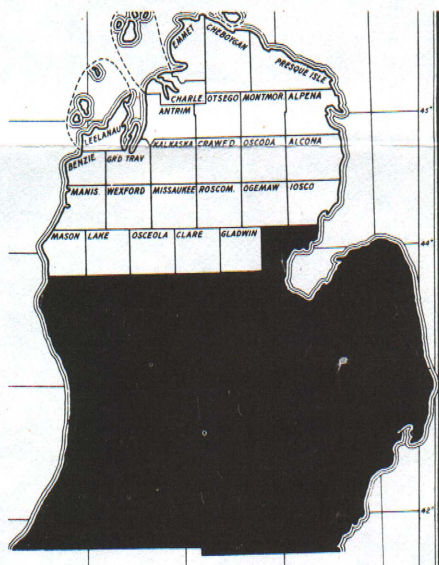
Wheat spindle streak mosaic (WSSM) was noticed about 1961, and now is found in all wheat growing areas of southern Michigan. Scientists have confirmed that WSSM is caused by a soil-borne virus moved from the soil into the roots of wheat plants probably by a primitive soil-inhabiting fungus. WSSM is found from New York to Virginia west to Ontario, Ohio and Michigan.

LOSSES

WSSM symptoms were particularly conspicuous during spring 1973. That year, in Michigan, average yield at harvest was 35 bu/acre compared to 40 bu/acre in 1972. In individual fields, losses ranged from 0 to 30%. Statewide losses due to WSSM are influenced by environmental conditions and are in the range of 2-6% or approximately 0.8-2.4 bu/acre each year.

SYMPTOMS

WSSM symptoms are typically produced on lower, older leaves of wheat during cool periods in the spring.



Michigan counties with considerable wheat spindle streak mosaic (black). No known cases in the Upper Peninsula.



Growth of wheat on infective soil from wheat field. Steamed soil (left) and untreated soil (right).

During late April and early May, symptoms may develop uniformly over an entire field or irregular yellowish-brown patches may appear in wheat fields. As the weather warms, (60°F and above) the symptom development ceases and new growth appears healthy. If cool wet weather continues, day temperatures infrequently exceeding 70°F, symptoms of the disease continue to develop until early June appearing even on the flag leaf. On new leaves, this virus disease appears as light-colored dashes or streaks in otherwise green leaves. The streaks have tapered ends which resemble spindles. As the leaves mature, brown areas replace the earlier faded green. Entire leaves die or just the leaf tip dies. Diseased plants remain slightly stunted and fewer tillers form. During good warm growing weather, the new symptomless leaves overshadow the diseased lower leaves.

LOOK ALIKES

WSSM probably escaped detection for a long time. The early spring yellowing was first thought to be due to wet ground, cold "backward" spring, nitrogen deficiency, acid soil, other nutrient deficiencies, and physiological yellowing. WSSM resembles other virus diseases of wheat. Wheat mosaic virus is also soil-borne



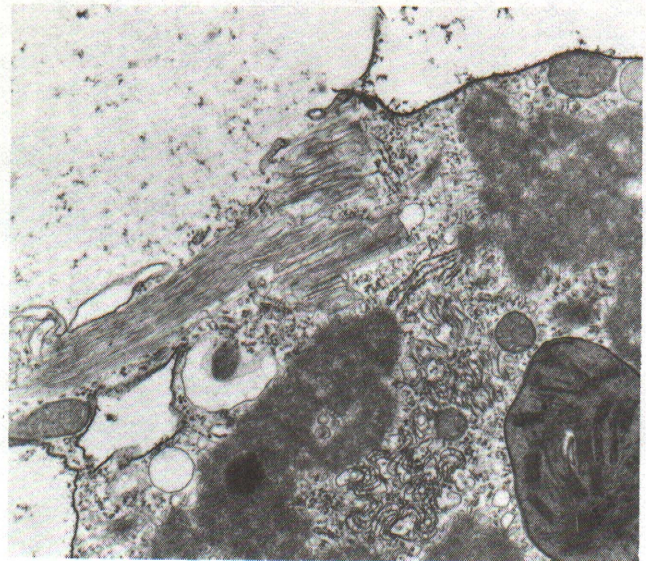
Wheat spindle streak mosaic leaf symptoms. Note spindle shape.

and causes a disease but when viewed with an electron microscope, the virus particles are shorter and thicker. Wheat streak mosaic is another virus disease which is evident only at higher growing temperatures. Wheat streak mosaic is transmitted by the tiny wheat curl mite from other wheat or corn. In corn, the mite causes the discoloration known as kernel red streak.

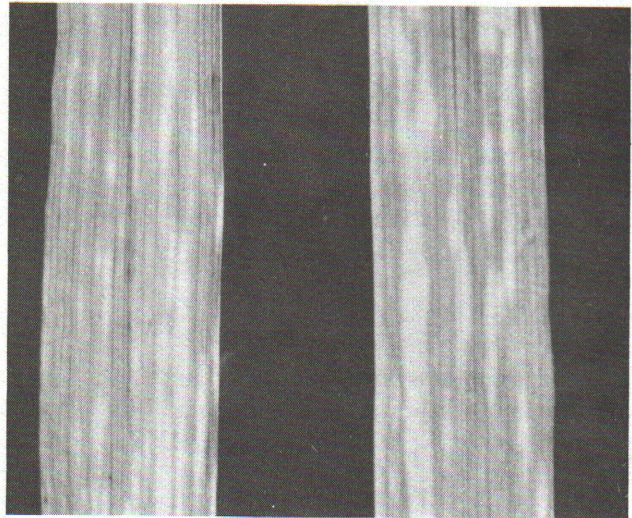
CONTROL

Use of normal amounts of commercial fertilizer does not affect disease incidence. WSSM appears under either low or high fertility. Some manures can cause an unexplainable decrease in disease. Delaying the average fall planting date by one week reduces disease incidence the following spring.

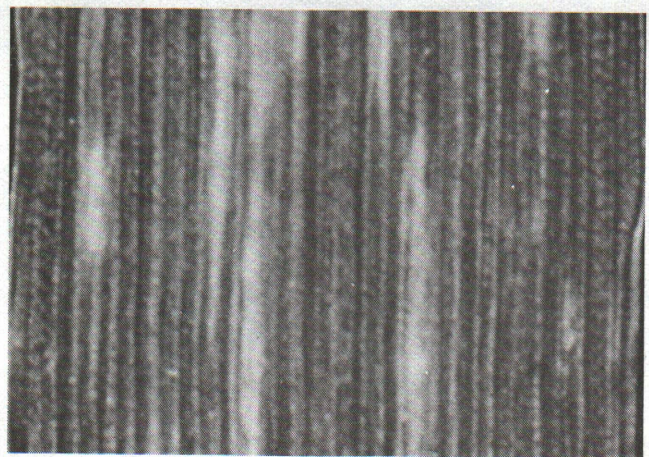
WSSM increases if wheat is grown repeatedly on the same ground. The virus apparently can persist for many years. Hence control by long intervals between wheat crops is not practical. Sterilization with heat or some chemicals is effective but not economically feasible. Breeding wheat varieties with resistance is the best way to control WSSM. All present commercially grown varieties, both red and white winter wheat, are susceptible. However, a few varieties from other areas offer some resistance which can be incorporated. Yorkstar and the new variety Tecumseh are less damaged by WSSM than are the less tolerant varieties, Genesee, Ionia and Arthur. Fortunately WSSM is not seed transmitted.



Electron microscope photo of rod-shaped particles at upper left and pin-wheel cell inclusion at lower right.



Leaf symptoms of wheat spindle streak mosaic.



Close-up of leaf symptoms of disease. Note spindle shape.