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MAIZE DWARF MOSAIC



1. Early disease symptom. Base of upper leaves are yellow and mottled.
2. More advanced stage of disease development. More of the upper leaves are yellow and mottled, and the symptoms are farther out toward the leaf tips. Shortening of internodes results in dwarfing.
3. Severe symptoms. Many or all leaves of the plant show symptoms of yellowing and mottling.
4. A variation of the disease symptom with distinct yellow striping of leaves.





MAIZE DWARF MOSAIC

Herbert G. Johnson, extension plant pathologist and professor, Plant Pathology

Richard J. Zeyen, associate professor, Plant Pathology.

Erik L. Stromberg, plant pathologist, USDA, APHIS, PPO.

A virus disease problem occurred on corn in the Ohio River Valley in the early 1960's. The virus was found to be different from those previously known in corn and was named Maize Dwarf Mosaic Virus (MDMV) while the disease it caused was named Maize Dwarf Mosaic (MDM). It was potentially very serious and some severe corn yield losses occurred. The disease spread through the Ohio River Valley, south into Georgia and Alabama, west into Arkansas, Missouri, and Texas, and as far north as southern Iowa. Some degree of disease resistance was found in dent (field) corn and the situation stabilized due to the use of resistant hybrids, but the problem still exists. By the mid-1970's the disease was found in trace amounts in New York and these north central states: Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.

The pictures on this folder show fairly typical symptoms of MDM: stunting, chlorosis (yellowing), and mottling being the most common. Stunting occurs uniformly if all of the corn plants are infected with the virus uniformly at early stages of plant growth; in instances where some plants are infected and others are not, there is variation in plant height. Plants infected in the seedling stage may be only one-third to one-half the height of normal plants at maturity. Chlorosis and mottling symptoms appear about one week after infection during warm summer weather. The first symptoms are chlorosis and mottling at the base of new leaves emerging from the whorl. Symptoms are more severe and cover more area of each later-emerging leaf. Yield reduction is believed

to be due to smaller plants, reduction of green leaf color, and abnormal development of ear primordia. Plants with mild symptoms on upper leaves only, show little yield reduction. Many plants severely stunted, with most of their leaves yellow and mottled, produce no harvestable ears. The severity of the disease is related to the time of infection in relation to the stage of growth of the plant. Plants that have grown to half or more of their normal height before infection may produce quite well; plants infected in the seedling stage will likely be barren or produce a small, deformed ear.

Johnsongrass, a common weed in southern and central areas of the Corn Belt, proved a very successful overwintering host for the virus; several other perennial grasses can also be an overwintering host. More than 20 species of aphids are vectors (agents that transmit disease-causing entities) of this virus. These aphids transmit the virus in the spring from overwintering hosts to corn and from corn plant to corn plant during the growing season. The rate of spread of the disease is primarily dependent on: number of infected overwintering perennial host plants, rate of increase of aphid population, the movement of winged aphids on air currents, and length of the growing season; however, other factors may influence the disease.

Maize dwarf mosaic virus is described as being non-persistent in the aphid vector. It is believed carried on the mouth parts of the aphids and does not circulate or reproduce within the body of the aphid. The virus has a relatively short period of retention in the aphid. This retention time period has been determined by several experiments and a range of time from 20 minutes to 4 hours has been measured. Infection occurs immediately when the aphid punctures the surface of the leaf to feed. For that reason, chemical control of winged aphids has been ineffective in controlling MDM.

Most aphids are in a wingless form as they feed on plants. If unfavorable conditions such as overpopulation, maturing of plants, or severe drought take place, winged forms are produced that are weak flyers but low-level air currents often carry them in great numbers. Viruses such as MDMV may be carried great distances this way as long as the viability of the virus in the aphids is maintained. Long distance transport of the virus by winged aphids borne on winds is still hypothetical and unproven; however, aphid flights covering hundreds of miles have been demonstrated. Aphids can be removed from low level air currents by rain. It is possible that the recent northern occurrence of the virus may have resulted, in part, due to long distance aphid flights that were rained out over corn fields.

Research has identified six strains of the virus. Of these, five infect johnsongrass and one does not. The five strains may have other grass hosts in addition to johnsongrass.

Sweet corn is generally more susceptible to this virus disease than is dent (field) corn. Variety differences in sweet corn susceptibility have been found, but there haven't been breeding attempts to incorporate genetic resistance into sweet corn. Genetic resistance to this disease is generally believed, however, to be the most effective control. Cultural practices such as crop rotation, fertilization, or tillage appear to have little or no effect on disease development. Chemical control of the disease does not appear feasible. The virus has been found to be seed-borne at a very low level; however, seed transmission of the virus does not appear to be an important mechanism in the spread of the virus in the United States in recent years.