NOTEWORTHY AND NEW RECORDS OF GRASS VIRUSES IN CANADA IN 1964

J. T. Slykhuis[1]

Re-isolation of wheat spot mosaic from wheat in Alberta

Wheat spot mosaic was first recognized in southern Alberta in 1952 when it was found to be caused by a virus transmitted by the mite Aceria tulipae (K.), the vector of wheat streak mosaic virus (WSMV) (3). In the field, plants infected with wheat spot mosaic virus (WSPMV) sometimes had a chlorotic speckling, and were usually more chlorotic than plants infected with WSMV alone. However, it was difficult to recognize its presence because the symptoms were often confused by various combinations of wheat streak mosaic, barley yellow dwarf, mildew, rust and other diseases, Since WSPMV has not been transmitted manually, transmission teats with individual mites were necessary: to determine its presence and separate it from WSMV. *However, it appeared to be frequently associated with WSMV and was isolated repeatedly with mites from diseased wheat between 1952 and 1955. Highly pathogenic isolates were difficult to maintain in culture and when experiments were temporarily discontinued in 1956-57, all cultures of WSPMV were lost, New isolates were readily obtained from field plants in 1958. These were cultured on wheat at Ottawa until 1960, but again the virus isolates were lost,

Although no virus similar to WSPMV has been reported by investigators in Kansas or any other areas in tho U. S.A. where WSMV commonly oocura, we assumed that we could re-isolate it any time we wished from mosaic-diseased wheat in Alberta. To our dismay, we failed in our attempts to isolate it from plants collected in Alberta in 1962. More deliberate efforts were made to isolate it from plants collected in June, and from extensive oollections in October 1963, but these also failed. Then, quite unexpectedly, we isolated it from mosaic-diseased wheat collected at Lethbridge by Dr. T.G. Atkinson in May, 1964. As though to taunt us, it eluded us in another attempt to isolate it from plants collected in July.

The isolates we now have from the May, 1964 collection, cause severe symptoms and require careful attention to maintain in culture on wheat. Less seriously affected hoots will be sought, and studies made on the characteristics of this elusive but destructive virus.

A. tulipae from wheat in Ontario were found to carry a factor similar to WSPMV causing a mild chlorotic mottle (5). This condition was found at Ottawa again in 1964.

High incidence of Agropyron Mosaic and low incidence of Soil-Borne Wheat Mosaic in Ontario.

In May, 1964, very few plants with symptoms of soil-borne wheat mosaic wore identified in winter wheat in the counties of York, Simcoe, Huron, Middlesex or Perth where this disease has been common in other years, Conversely, Agropyron mosaic was found at the edges of most fields examined in the same areas. In some fields, 75% to 100% of wheat plants near diseased Agropyron repens (L.) Beauv. at the borders were affected.

[1]Plant Research Institute, Research Branch, Canada Department of Agriculture, Ottawa, Ontario,

The temperature during the early stages of growth in the fall can strongly influence the incidence of these diseases in winter wheat. Infection by the soil-borne wheat mosaic virus is favored by cool soil temperatures (near 10°C) for long periods when the plants are young. Conversely, Agropyron mosaic virus (AMV) spreads most readily in summer and may continue to spread in the autumn if temperatures are very warm (6). The mean temperature in southern Ontario for October, 1963, was 6°F above normal (1). These high October temperatures apparently had a major influence on the low incidence of soil-borne wheat mosaic and the high incidence of Agropyron mosaic observed in the wheat crops in 1964.

Wheat Streak Mosaic on Winter Wheat in Ontario

Winter wheat plants with mosaic symptoms were collected in southwestern Ontario in May, and manual transmission tests were done to verify the presence of viruses. The symptoms on test plants inoculated with juice from several diseased wheat plants found in a field near Clandeboye in Middlesex County differed from the symptoms on plants inoculated from other collections infected with Agropyron mosaic virus (AMV). Like known isolates of wheat streak mosaic virus (WSMV), the causal virus infected oats but not A. repens, and was transmitted by A. tulipae.

More diseased plants were collected from the field and again a virus similar to common isolates of WSMV was isolated. Cross protection tests with known isolates of AMV and WSMV and serological tests with antisera specific for each of these viruses have verified that the virus is identical with WSMV.

This is the first known observations of WSMV in Ontario. The question is, how did it get there? Was it carried in during the summer or fall of 1963 by wind-borne mites from winter wheat areas 900 to 1000 miles west, or is it established on perennial hosts in the area? To test the latter possibility, it is planned to seed plots of winter wheat in the area next spring to determine if the virus spreads during the summer.

Ryegrass Mosaic in British Columbia

Mosaic symptoms were found on ryegrass growing on roadsides near Ladner, B.C., in August. Transmission tests at Ottawa showed that a virus from the diseased ryegrass infected Lolium multiflorum L., L. perenne L. and oats, but not wheat, barley or rye. The disease appears to be similar to ryegrass mosaic found in Washington, U.S.A. (2) and England (5).

Literature Cited

1. ANONYMOUS. 1963. Monthly Record Meteorological Observations in Canada. October 1963. Meteorological Branch, Can. Dept. Transport.
2. BRUEHL, G.W., H. TOKO and H.H. MCKINNEY. 1957. Mosaics of Italian ryegrass and orchard grass in western Washington. Phytopathology 47: 517.
3. SLYKHUIS, J.T. 1956. Wheat spot mosaic, caused by a mite-transmitted virus associated with wheat streak mosaic. Phytopathology 46: 682-687.
4. SLYKHUIS, J.T. 1958. A survey of virus diseases of grasses in northern Europe. FAO Plant Prot. Bull. 6: 129-134.
5. SLYKHUIS, J.T. 1961. Eriophyid mites in relation to the spread of grass viruses in Ontario. Can. J. Plant Sci. 41: 304-308.
6. SLYKHUIS, J.T. 1963. Agropyron mosaic as a disease of wheat in Canada. Can. J. Bot. 40: 1439-1447.

PLANT RESEARCH INSTITUTE
CANADA DEPARTMENT OF AGRICULTURE
OTTAWA, ONTARIO.