BARLEY STRIPE MOSAIC VIRUS IN MANITOBA IN 1971 [1]

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Abstract

In 1971, barley stripe mosaic virus was detected by infectivity and serological assays in 34.0% and 4.51, respectively, of the 2- and 6-row barley fields surveyed in southeastern Manitoba. The incidence of plants with barley stripe mosaic symptoms in these fields varied from a trace to about 20%. At present, the predominant source of this virus in Manitoba is probably infected seed of the 2-row barley variety 'Herta'.

Introduction

In 1970, barley stripe mosaic virus (BSMV) was detected in 22% and 41, respectively, of the fields of 2-row barley (*Hordeum distichum* L. emend. Lam.) and 6-row barley (*H. vulgare* L. emend. Lam.) surveyed in southern Manitoba *(3)*. A survey was conducted in Manitoba in 1971 with the objectives of intensifying the search for BSMV in 2-row barley, determining if the virus was again more prevalent in 2-row than in 6-row barley, and identifying the most commonly infected variety or varieties.

Materials and methods

The 1971 survey for BSMV, conducted from July 5 to 15, was confined to southeastern Manitoba, since about 65% of Manitoba's 1970 2-row barley crop was grown in this region (1). Fields of 2- and 6-row barley in the early tillering to milky ripe stage were inspected at intervals of about 5 and 15 miles, respectively, along eight preselected survey routes totalling about 1400 miles. Fields were sometimes inspected at shorter or longer intervals for reasons discussed previously (3).

A sample was collected in each field where plants with suspected symptoms of barley stripe mosaic (BSM) were detected. Each sample consisted of 2-4 apical leaves from one tiller of each of three plants with symptoms. The day after collection, each sample was ground in a sterile mortar with 1 ml of distilled water, and a group of 14-16 'Black Hulless' barley test plants in the 2-leaf stage was inoculated with the crude extract. Seven to 10 days after inoculation, the presence or absence of symptoms was recorded and the third leaf was detached from each of three diseased test plants in each group. The three leaves were combined and juice was extracted with a plier-type press. Each sample of juice was tested undiluted against undiluted BSMV antiserum using the Ouchterlony double diffusion method (4) and. the final results of this test were recorded 1 week later. The diffusion medium was prepared with 0.5% Ionagar No. 2 and 0.21 sodium azide in distilled water. Procedures for storing field-collected leaf samples and for growing and inoculating test plants were similar to those described previously (3). The BSMV antiserum was the same as that prepared and used by the author in 1970 *(3)*.

Results and discussion

The presence of BSMV in each field-collected leaf sample was demonstrated transmission of the virus to 'Black Hulless barley and by its subsequent reaction with BSMV antiserum. Extract from healthy 'Black Hulless' plants (control) did not react with this antiserum.

BSMV was detected in 49 of 144 (34.08) fields of 2-row barley and in 2 of 44 (4.5%) fields of G-row barley surveyed. The incidence of plants with BSM symptoms in both fields of 6-row barley was a trace, whereas in fields of 2-row barley the approximate incidence was a trace in 40 fields, I-2% in 6 fields, 5% in 2 fields, and 20% in 1 field. BSMV was also detected in a 2-row selection and in the 6-row variety 'Keystone' in barley breeding plots near Winnipeg. The incidence of diseased plants was about 1% and 2%, respectively.

Symptoms of BSM in 2-row barley were generally more pronounced in 1971 than in 1970. Brown stripes, sometimes present in the form of a V or W, were generally observed on lower leaves of diseased plants. Mosaic symptoms, which were rarely detected in 1970, were frequently observed on upper leaves. In a few fields, however, faint brown stripes on lower leaves were the only apparent symptoms of infection.

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Although the percentage of 2–row barley fields in which BSMV was detected was 12% higher in 1971 than in 1970 (3), this difference is not considered to be indicative of the rate of virus spread. It was probably due mainly to the detection of more trace infections in 1971, because of either more pronounced symptom development or a more intense and protracted search for BSEI in this type of barley, or uoth. Some trace infections, however, were detected only after extensive searching and, therefore, the 1971 estimate for the percentage of 2–row barley fields with BSMV-infected plants may still be conservative.

'Herta', a variety licensed for sale in Canada in 1956, comprised at least 94% of the 2–row barley acreage in Manitoba in 1970 (1) and about 73% in 1971 (2). It thus seems probable that in 1970 this was the variety most frequently infected with BSMV. In 1971, growers of 15 of 49 (30.6%) of the 2–row barley fields known to contain BSMV-infected plants were personally interviewed and each reported that the infected variety was 'Herta'. Although the possibility of other 2–row barley varieties being infected with BSMV cannot be discounted, there can be little, if any, doubt that at present the predominant source of the virus in Manitoba is infected seed of 'Herta' barley. No evidence has been obtained that 'Fergus', a variety licensed in 1960 and grown on about 22% of the 2–row barley acreage in Manitoba in 1971 (2), has become infected with BSMV under natural conditions.

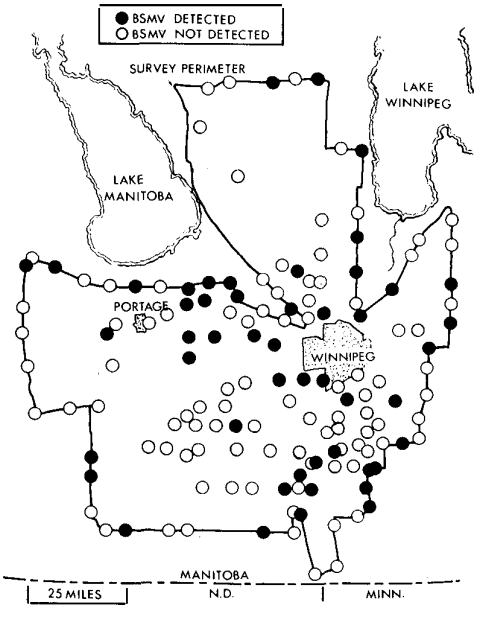

Figure 1. Distribution of barley stripe mosaic virus in fields of 2-row barley in southeastern Manitoba in 1971.

BSMV was present in 2–row barley fields throughout the region surveyed, but it appeared to be more common in some areas than in others (Fig. 1). This may indicate that some seed sources of 'Herta' are almost or completely free of the virus or, alternatively, that 'Fergus' was the predominant 2–row barley variety in areas where BSM was not detected.

In greenhouse (3) and field (Chiko, unpublished) tests, 'Herta' and 'Fergus' barley appeared to be equally susceptible to BSMV. Therefore, even if 'Fergus' or another susceptible 2–row variety eventually replaces 'Herta', the virus could become a serious problem in the production of 2–row barley in Manitoba.

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