Incidence of soybean mosaic virus and tobacco ringspot virus in southwestern Ontario

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A survey was conducted in eight southwestern Ontario counties (i.e. Essex, Kent, Elgin, Lambton, Oxford, Middlesex, Perth and Huron) in the summer of 1979 to 1981 to determine the incidence of soybean mosaic diseases. The overall incidence (3-year average) of mosaic diseases for the eight counties was 1.3%. Essex and Kent counties had total mosaic disease incidence of 1.65% compared to the total disease incidence for the other six counties of 0.83%. The average incidence of TRSV-disease was 0.67% and that of SMV-disease was 0.50%. Of the 265 mosaic samples collected, 135 and 102 were TRSV and SMV, respectively. The remaining 28 were other viruses.

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Huit comtés du sud-ouest de l'Ontario, soit Essex, Kent, Elgin, Lambton, Oxford, Middlesex. Perth et Huron, ont fait l'objet d'enquêtes durant l'été de 1979 a 1981, pour determiner l'incidence de la mosaïque du soja. L'incidence totale (moyenne sur 3 ans) de la mosaïque pour les huit comtés a été de 1.3 % et de 1.65 % pour les comtés d'Essex et de Kent comparativement à 0.83 % pour les six autres comtés. L'incidence moyenne du virus de la tache annulaire du tabac a ete de 0.67 % et celle du virus de la mosaïque du tabac de 0.50 %. Des 265 échantillons de mosaïque prélevés, 135 contiennent le virus de la tache annulaire du tabac et 102 le virus de la mosaïque du tabac. Les 28 echantillons restant contiennent d'autres virus.

Introduction

Ontario is the only province where a large acreage of soybeans is grown. In 1984, the acreage was over 1 million acres of which 85% was in southern Ontario (1). In 1984, Ontario soybeans had a total farm value of 257 million dollars. The soybeans produced in Ontario were insufficient for domestic consumption. Thus, some soybeans were imported to cover the shortfall. In addition, emphasis has been placed on the export market that requires blemish-free seed coats for tofu and other food products. Thus diseases which are detrimental to yield and quality should be controlled. One of these is soybean mosaic.

Soybean mosaic can be caused by several viruses, of those, only soybean mosaic virus (SMV) and tobacco ringspot virus (TRSV) are important in this region (6). At present, none of the registered Ontario cultivars are resistant to SMV and TRSV. The diseased plants produce very few seeds and are often mottled and mostly immature. If a very conservative 1% loss is assumed by these diseases, a yearly loss of 2.5 million dollars can be estimated. Seed coat mottling can reduce the grade and restrict the uses of the crop.

In addition, soybean virus diseases are very prevalent at the research station. Virus infection interferes considerably with soybean experiments and seed production. Considerable labour and funds are expended each year in efforts to control these diseases.

This paper reports the incidence of SMV and TRSV in the eight southwestern Ontario counties.

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Materials and methods

The incidence of soybean mosiac was surveyed in the summers of 1979, 1980 and 1981 in the eight southwestern Ontario counties (Essex, Kent, Elgin, Lambton, Oxford, Middlesex, Perth and Huron). Each county was subdivided arbitrarily into 10 areas, and 2 fields/area were surveyed. For each field, 20 rows were randomly selected and plants in a 6-meter length of a row were examined for signs of bud blight and mosaic. The percentage of plants with the mosaic diseases was calculated from the actual plant counts in the 20, 6-meter rows.

As for collection of mosaic samples, one sample/area was made from all counties except Kent, where 2 samples/area were collected because the disease incidence was approximately doubled that of the other 7 counties. All samples were individually placed in a plastic bag, tagged and transported in an ice chest. A total of 100 samples were collected each year for a period of 3 years. Of the 300 samples, 265 were successfully transferred to Amsoy 71 seedlings in a 21 ± 3°C greenhouse by mechanical inoculation as detailed previously (5).

Identification of TRSV isolates was based on their ability to infect at least 4 out of 5 of the diagnostic hosts: *Chenopodium amaranticolor, Cucumis sativus, Phaseolus vulgaris* cv. Bountiful, *Vigna sinensis* cv. Blackeye Ramshorn and *Nicotiana tabacum* cv. Samsun NN (Gibbs et *al.* 1970); while some isolates of SMV can infect only P. *vulgaris* cv. Bountiful (2).

Results and discussion

The incidence of SMV and 'TRSV disease in the eight southwestern Ontario counties are summarized in Table 1. There were significantly higher incidences of these virus diseases in Essex and Kent. Essex and Kent had a disease incidence of 1.6 and 1.7, respectively, for the overall 3-year average, while the other six counties had a disease incidence of 0.83%. The average incidence of mosaic diseases in Essex and Kent counties

Table 1. Average incidences (1979-81) of soybean mosaic virus- and tobacco ringspot virus-disease in the eight southwestern Ontario counties.

County	Disease Incidence (%) TRSV	SMV	Total
Elgin	0.6 ± 0.1 a	0.3 ± 0.2 a	0.9
Essex	1.0 ± 0.2 b	0.6 ± 0.1 b	1.6
Kent	1.2 ± 0.1 c	0.5 ± 0.1 ab	1.7
Huron	0.5 ± 0.1 a	0.4 ± 0.2 ab	0.9
Lambton	0.4 ± 0.1 a	0.3 ± 0.1 a	0.7
Middlesex	0.5 ± 0.1 a	0.4 ± 0.1 ab	0.9
Oxford	0.5 ± 0.1 a	0.3 ± 0.1 a	0.8
Perth	0.5 ± 0.1 a	0.3 ± 0.1 a	0.8

a-c Means in each column with the same letter are not significantly different ($P > 0.05$).

was twice as high as the average of the six other counties. This difference is attributed to the fact that Essex and Kent counties have a longer and warmer growing season and a greater diversity of vegetable crops. The combination of climatic and vegetative factors may flavor the population dynamics of the vectors.

The average incidence of TRSV-disease (0.67%) is higher than that of SMV-disease (0.50%). Both TRSV and SMV are seed transmittible in soybeans. Seeds from SMV diseased plants are generally mottled (4) but those from TRSV diseased plants are not. Thus, SMV diseased seeds can be easily separated from seed lots and consequently reduce its incidence in the field. Of 265 mosaic samples collected, 135 and 102 were categorized as TRSV and SMV, respectively. The remaining 28 had other viruses.

The incidence of TRSV reported here is higher than the 0.15-0.52% reported by Hildebrand and Koch (3) for Ontario. This could be that the incidence of TRSV has increased over time or that Hildebrand and Koch may have underestimated the disease incidence since their detection was based solely on the bud blight whereas strains of TRSV that did not cause bud blight were not accounted for (6).

Literature cited

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