INCIDENCE AND EFFECTS OF WHEAT SPINDLE STREAK MOSAIC IN ESSEX AND KENT COUNTIES, ONTARIO, 1967-68

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Abstract

Symptoms of wheat spindle streak mosaic were present in an average of 49.6% of the plants in winter wheat fields surveyed in Essex and Kent counties, Ontario, in 1967 and 1968. It is estimated that the average loss in grain yield was 5% in both years,

A mosaic disease of winter wheat caused by a soil-borne virus has been recognized in southern Ontario since 1957 (1-4). This disease, characterized by a mosaic which includes light green to bright yellow lens-shaped spots or short streaks, and straw-colored to light brown necrotic blotches, is now designated wheat spindle streak mosaic (4). In recent years this mosaic has been widespread in southwestern Ontario, showing especially in the unusually cold springs of 1967 and 1968, when it imparted an overall brownish discoloration to many fields. Surveys of this disease were made in Essex and Kent counties, Ontario, in 1967 and 1968.

Surveys

Surveys were made during May, when the bright yellow spotting on the spring foliage showed most clearly. In randomly selected fields, counts were made on enough 1-yard or 1-foot lengths of row to arrive at a consistent estimate of the proportion of infected plants.

About one half the number of fields of wheat examined in 1967 and about one quarter of those examined in 1968 were completely infected (Table 1). In Essex Co. only a small proportion of fields was completely free from disease, Heavily infected fields were found in all areas visited in both counties. The overall infection for 119 fields examined in the two seasons was 49.6%.

Estimates of loss caused by the disease

Fields were selected in May near Harrow which showed areas where the leaves were discolored by the disease, interspersed with areas of green, **symptomless** plants. Six pairs of plots were staked in each of four fields in each season. One plot of each pair was in an area where essentially all plants were infected, and the other was in an area as close by as possible where the plants showed no symptoms. Each plot was 0.84 m^2, and care was taken to avoid poorly drained areas, thinly drilled rows, and any other obvious difference between the *two* areas except for the presence or absence of the disease symptoms. Ripe heads were collected from the plots, counted and threshed, and the grain was weighed.

These comparisons showed reductions in grain yield caused by the disease in all eight fields, significant at or close to $P = 0.05$ in five of them, resulting in an average loss of 13% in grain (Table 2). The disease reduced the number of heads per m^2 by an average of 6. 1%; this effect reached significance at $P = 0.05$ for only one of the individual fields, but it was consistent.

This estimate of losses from disease assumes that other adverse conditions are not consistently associated with the disease, and obvious effects of this type were avoided when staking the plots. However, in field F in 1968 the stand grew less vigorously on the diseased areas, and allowed the development of weeds which probably accentuated yield loss. If this field were excluded, the figures from the other seven fields indicate an average yield loss of 10.1% due to the disease.

This method of estimating **loss** also assumes that the symptomless plants were not infected, presumably because the vector or virus had not reached their part of the field. If they were infected and damaged, but for some reason did not show symptoms, the comparisons made would underestimate the effects of the disease.

If the figure of 10. 1% yield loss from complete infection is used, an average of 49.6% infected plants would result in a loss of 5.0% per year in yield in Essex and Kent counties in 1967-68. The combined wheat acreage of Essex and Kent is about 70,000 and at an average yield of 45 bushels per acre this loss would represent 2.2 bushels per acre over the two counties as a whole. In fields with all plants infected, loss due to the virus would be about 4.5 bushels per acre.

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Table 1. Incidence of wheat spindle streak mosaic in Essex and Kent counties in 1967 and '1968

Year	County	Number of fields examined	Number of fields with: No disease	Up to 50% diseased plants	51-95% diseased plants	All plants infected	Average infection for all fields (%)
1967	Essex	29	2	9	4	14	66.2
1968	Essex	35	3	15	7	10	52. 2
	Kent	55	20	14	6	15	39.1

Table 2. Comparison of areas of healthy plants with areas of plants infected with wheat spindle streak mosaic

Year and field	Number of heads/m^2: Healthy	Infected	Reduction (% of healthy)	Yield of grain (g/m^2): Healthy	Infected	L. S. D. (P = 0.05)	Reduction (% of healthy)
1967 A	402	395	1.8	360	323	14	10.4
B	421	402	4.6	368	322	90	12.8
C	431	393	8.7	420	335	68	20.1
D	492	464	5.5	445	414	60	7.1
1968 E	579	560	3.3	452	427	39	5.7
F	536	460	13.9	365	233	67	35.9
G	434	422	2. 8	396	356	44	9.9
H	475	441	6.9	421	396	27	5.9
Mean	471	442	6. 1	403	351	31	13.0

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