A SURVEY OF GREEN PETAL VIRUS IN NEW BRUNSWICK AND SOME EFFECTS OF BARRIERS ON SPREAD[1]

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Abstract

A 3-year survey of green petal disease in 22 strawberry fields in central New Brunswick showed only light infections in scattered areas. Barrier crops around small plots did not prevent spread of aster yellows virus into China asters and carrots, but 30-foot barriers of grain and timothy or interplantings of China asters and carrots showed promise of reducing spread of green petal into strawberries.

Introduction

Green petal disease of strawberry (6) has been increasingly troublesome in experimental plots at the Canada Department of Agriculture Horticultural Substation, McDonald's Corner, New Brunswick, since 1953 (3). In 1960, a plot containing more than 20 varieties was ploughed under because a large percentage of the plants was infected. Growers in the area appeared to experience little trouble during this time, although the extent and economic importance of the disease in commercial fields were not known. Aster yellows disease, meanwhile, was commonly present in almost all of the home gardens in the area. The relationship of this virus to that which causes green petal is not well understood, although strawberry green petal and clover phyllody diseases have been shown to be caused by the same virus (2, 4). Frazier and Posnette (4) suggest that green petal may be a strain of aster yellows virus but differences in symptoms on several hosts imply a distinction between it and both the eastern and western aster yellows viruses. Chiykowski (2), meanwhile, has transmitted green petal virus from strawberry to China aster with Macrosteles facifrons (Stal) producing symptoms typical of clover phyllody virus infection.

In 1961 we began a 3-year survey to determine the extent of green petal disease in some of the more important commercial strawberry-growing areas of the province. At the same time, we started a trial at the Substation to learn whether or not border crops or fallow had any effect on spread of both green petal and aster yellows viruses. Our results follow.

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Figure 1. Healthy strawberry plant on left and one infected with green petal virus on right.

Materials and Methods

The areas surveyed included fields in Carleton, York, Sunbury, Queens, and Kings Counties in central New Brunswick. The survey began each year in June, when most varieties were in full bloom; at which time symptoms of green petal virus are easily recognizable. During the 3 years, 1961-1963, only first- or second-year fruiting fields were examined. Incidence was rated by recording all clones of each variety that showed symptoms (Fig. 1), and by counting the infected plants in each clone.

The field trial on spread of green petal and aster yellows viruses into plots surrounded by different barriers began in early spring 1961 at McDonald's Corner Substation and continued until after harvest 1963. The trial consisted of 8 plots, each 10 rows wide. Four plots were planted with 3 rows each of the varieties Sparkle and Senator Dunlap and 4 half-rows each of China asters and carrots. The other 4 plots were each planted with alternate rows of the 2 strawberry varieties. Distance between rows was 5 feet and plants in a row were set one and one-half feet apart, except carrots, which were sown continuously. Ten strawberry plants or 5 China asters and continuous carrots made a row. Incidence of green petal infections was rated in the same manner used in the survey. Incidence of aster yellows was recorded by percentage of infected China asters and carrots. Each plot was completely surrounded by one of the barriers shown in Table 2. The strawberry mother plants, obtained from Norfolk Farms Limited, Vittoria, Ontario, were certified virus-free. The carrot seed was sown directly in the rows each year, but the China asters were started in a greenhouse and placed

the trial when the transplants were about 4 inches high. Good growth was ained each year in the test plants as well as in the barrier crops. The rye reached about 5 feet in height and the timothy 3 feet or more. Continuous cultivation of the fallow prevented any weeds from growing. No insecticides were applied to the trial nor were any leafhopper counts made.

Results and Discussion

The 3-year survey showed that green petal virus was not a serious economic problem in any of the fields examined (Table 1). Although only light infections were found in scattered areas, more diseased plants were found in 1961 than in either 1962 or 1963. Most infections were found in Sparkle and none in the varieties Paymaster, Redcoat and Senator Dunlap in any of the years.

Table 1. Numbers of strawberry clones found infected with green petal virus in New Brunswick fields from 1961 to 1963, inclusive.

Varieties	Number of fields surveyed	Approximate acreage surveyed	Number of infected clones[1]		
			1961	1962	1963
Catskill	3	3	0	2	1
Cavalier	4	5	1	0	0
Grenadier	2	4	1	1	1
Paymaster	1	1	0	0	0
Redcoat	5	8	0	0	0
Sparkle	5	8	7	2	0
Senator Dunlap	1	1	0	0	0
Mixed	1	1	1	0	0

[1]Each infected clone contained 1-7 diseased plants.

The effects of barriers on spread of both green petal and aster yellows viruses into small plots are shown in Table 2. None of the surrounding crops nor fallow prevented spread of aster yellows into China asters and carrots, but 30 feet of either grain or timothy appeared to almost completely stop spread of green petal into strawberries. The relatively high rate of spread of aster yellows virus is further evidence that this virus differs from that which causes green petal disease. Green petal infections were found only in 1962, and except for 1 clone in plot 3, all were in plots 2 and 6. The spread of this virus generally was not extensive but we were surprised to find none in plots 1 and 5. These latter plots contained China asters and carrots and plots 2 and 6 did not, which may have resulted in leafhoppers preferring to feed on these hosts rather than on the strawberries.

Barrier crops have been used to advantage in preventing spread of some aphid-borne viruses. For example, Broadbent (1) reduced incidence of cauliflower mosaic in cauliflower seedlings with barriers of barley and wheat. Similarly, Jenkinson (5) decreased spread of the same virus into broccoli seed beds with barrier crops of kale or barley when diseased plants were only 5 yards away. And, Simons (7) obtained significant decreases of spread of vein-banding virus into peppers by the use of sunflower barrier plants. Our results with one of two leafhopper-borne viruses show further promise of a similar means of control.

Table 2. Percentage spread of green petal and aster yellows viruses into small plots

Plot No.	Crop or Fallow Surrounding Plot	% Clones[1] with green petal virus						% Plants with aster yellows virus[2]			
		Sparkle			S. Dunlap			China asters		Carrots	
		1961	1962	1963	1961	1962	1963	1961	1962	1961	1962
1	15 ft. fallow and 15 ft. oats or rye[3]	0	0	0	0	0	0	55	50	5	10
2	Same as plot 1	0	8	0	0	4	0	-	-	-	-
3	30 ft. oats or rye	0	0	0	0	1.7	0	40	10	12	9
4	Same as plot 3	0	0	0	0	0	0	-	-	-	-
5	30 ft. fallow	0	0	0	0	0	0	90	10	7	14
6	Same as plot 5	0	8	0	0	4	0	-	-	-	-
7	30 ft. timothy and clover	0	0	0	0	0	0	40	35	5	8
8	Same as plot 7	0	0	0	0	0	0	-	-	-	-

[1] Plots 2, 4, 6, and 8 were each planted with 50 mother plants of Sparkle and 50 of S. Dunlap in 1961. The remaining plots contained 30 mother plants of each variety. One of 5 diseased plants in each infected clone..

[2] Plots 1, 3, 5, and 7 were planted each year with 20 China asters and 4 half-rows of carrots.

[3] Oats surrounded plot in 1961 and fall rye in 1962 and 1963.

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