

Effect of Time of Inoculation with Potato Virus Y on Yield and Quality of Burley Tobacco

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ABSTRACT

Significant reductions occurred in yield, grade and crop indices, value per hundredweight, and acre value of Burley 49 tobacco when plants became infected with potato virus Y early in the season. Infection in the middle of the season also significantly reduced the grade and crop indices and the value per hundredweight. Late infection had no significant effect on the factors studied. *Phytopathology* 61: 588-589.

Veinbanding caused by potato virus Y (PVY) is a worldwide disease of tobacco and is especially important in several European countries (3). PVY has prompted quarantines and destruction of tobacco, tomato, and pepper crops in Costa Rica (1) and is regarded as a potential threat to the flue-cured and shade-grown tobacco industries in the United States (3).

Precise information on losses in tobacco due to the virus is limited to estimates (3, 5, 6). Estimates are accompanied by uncertainty, as they usually are made during the growing season when it may be difficult to recognize the disease in the field (3). Furthermore, estimates are usually based on the number of diseased plants and the appearance of the plant rather than on wt or value of the cured leaf.

The objective of this investigation was to evaluate the effect of infection of burley tobacco with PVY at different times during the growing season on yield, quality, and value.

Inoculum was prepared from greenhouse-grown plants

systemically infected with PVY. Leaves were ground in a blender with the addition of approx four parts (v/w) of 0.1% Na₂SO₃ and filtered through cheesecloth. Carborundum (320 mesh) was added, and two leaves of each plant were inoculated by rubbing with cheesecloth pads dipped in the inoculum before each rubbing.

Plants in each of three blocks of *Nicotiana tabacum* L. 'Burley 49' were mechanically inoculated at approx 2-week intervals, beginning ca. 1 month after transplanting; a comparable block of plants served as a noninoculated check. Experiments consisted of three replications.

The study was conducted in 1968 and repeated but modified in 1969. In 1968, inoculations were made on 19 and 28 June and 12 July, with 80 inoculated plants/block; in 1969, on 26 June and 10 and 25 July, with 100 plants/block.

Normal cultural practices were followed for cultivation, harvest, and curing of the tobacco. Yield, grade index, crop index, value per cwt, and acre value were determined from the cured tobacco for each date of inoculation. The grade index is a measure of quality and is based on average market values during periods when tobacco was plentiful (4). The crop index is obtained by multiplying the yield by the grade index. The results were analyzed statistically.

All inoculated plants developed symptoms. The few noninoculated plants which developed symptoms were removed. Except for the last inoculation in 1969, all treatments produced tobacco of lower quality and value than the controls (Table 1).

Yield was reduced significantly when plants were inoculated in June, but later inoculations had no significant effect. Value per cwt, acre value, and grade and crop indices were significantly reduced by both June and early July inoculations. Infection at the end of July did not appreciably affect either index, the value per cwt, or the acre value.

The effect of PVY on the yield and quality of tobacco was related to the length of time that the virus was in the plant (Table 2). Early infection by PVY had the greatest effect on yield, quality, and value. Infection during the middle portion of the growing season

TABLE 1. Effect of date of inoculation with potato virus Y on the performance of burley tobacco in 1968 and 1969

Date of inoculation	Yield	Grade index	Crop index	Value/cwt	Acre value
	lb./acre			\$	\$
1968					
19 June	1,590	.228	363	68.89	1,095
28 June	1,497	.230	344	68.83	1,030
12 July	1,993	.291	580	70.09	1,398
None (check)	2,155	.413	890	72.24	1,557
LSD (.05)	202	.107	270	1.69	163
1969					
26 June	1,707	.441	753	69.45	1,184
10 July	2,022	.488	987	70.54	1,427
25 July	2,274	.626	1424	72.03	1,639
None (check)	2,224	.638	1419	72.45	1,613
LSD (.05)	340	.099	402	1.47	261

TABLE 2. Per cent change in characteristics of the crop resulting from infection of Burley 49 tobacco with potato virus Y at different times during the growing season

Time of infection	% Change ^a				
	Yield	Grade index	Crop index	\$/cwt	Acre value
Early ^b	-27	-39	-55	-5.0	-30
Middle ^c	-7	-25	-29	-2.8	-10
Late ^d	+3	-2	+2	-0.6	+2
LSD (.05)	9	21	25	1.8	8

^a As compared with the check treatment.

^b Each figure is the average of two inoculations in 1968 and one in 1969 made before 30 June.

^c Each figure is the average of one inoculation in 1968 and one in 1969 made during the period of 1-15 July.

^d Each figure is based on an inoculation made 25 July 1969.

had a lesser effect, and infection late in the season had no significant effect on the factors assessed. Symptoms of PVY appear in the new growth 7-10 days after infection. By mid-July, the older leaves were past the stage where virus multiplication could occur, and only a portion of the crop was affected by the virus. By the end of July, most of the tobacco to be harvested was past the stage where the virus could affect it. Most of the growth occurring after inoculation was removed when the plants were topped. In addition, when the plants were topped, the growth of axillary buds was inhibited by application of a sucker control chemical. Consequently, the effects of late infection were minimal. Early infection of tomato with tobacco mosaic virus also reduced yield more than later infection (2).

Thus, insect control, especially of aphids, during the first 6-8 weeks after transplanting is important, since in-

fection by PVY during this period will have the greatest effect on crop losses.

LITERATURE CITED

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