

## Seed Transmission of Tobacco Streak Virus in Bean

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Tobacco streak virus (TSV) naturally infects many plant species, including bean (Phaseolus vulgaris) (1). Several strains of TSV have been identified (1). Bean red node is a strain commonly found infecting beans in the Western U.S. In 1951, Thomas and Graham (3) reported that the red node strain of TSV was seedborne in an average of 1.4% of 21,424 seeds of several Pinto cultivars from Colorado.

In eastern Washington, we have isolated two pathotypes of TSV from several naturally infected legumes at Central Ferry, WA (along the Snake River) (2). The pathotypes, designated I and II, belong to distinct serotypes. At Central Ferry, alfalfa (Medicago sativa) and white sweet clover (Melilotus alba) are the primary reservoirs and overwintering hosts of both pathotypes. The two pathotypes induce different symptoms in bean. Pathotype I isolates cause reddening of the nodes of the stem and the pulvini of the leaves and leaflets. Pathotype I isolates are similar to the red node strain of TSV in bean. Pathotype II isolates induce a green to yellow mosaic of the foliage, but do not cause reddening of the nodes or pulvini.

In 1986, young Black Turtle Soup (BTS) bean plants in 15-cm-diameter plastic pots were placed in the field at Central Ferry for 12-16 day intervals throughout the growing season. After exposure, plants were collected, sprayed with an insecticide, and incubated in a greenhouse. Subsequently, plants were indexed on Chenopodium quinoa or tested for infection by TSV and other viruses by indirect enzyme-linked immunosorbent assay (ELISA). Seeds from TSV-infected plants were tested for seed transmission of TSV.

TSV was isolated from BTS bean trap plants only during the period of 25 June to 4 August. Maximum infection of trap plants occurred on 9 July when 83% of the plants were infected with TSV. Isolates of pathotype I were transmitted in 3.8% of 236 seeds. No transmission of isolates of pathotype II was detected in 106 seeds.

In greenhouse studies, nine bean cultivars were inoculated with one isolate each of pathotype I and II. Seeds from TSV-infected plants were germinated and tested for infection by TSV two to four weeks after transplanting. The pathotype I isolate was seed transmitted in six of nine cultivars at rates of 0.9 to 15.1%, while the pathotype II isolate was seed transmitted in five of nine cultivars at rates of 0.5 to 2.4% (Table 1). These levels of seed transmission, though relatively low, may be very important in initiating TSV epidemics where thrip vectors are abundant. This emphasizes the importance of using virus-free seed.

## Literature Cited:

1. Fulton, R.W. 1985. Tobacco streak virus. No. 307 in: Descriptions of Plant Viruses. Assoc. Appl. Biol., National Vegetable Research Station, Wellesbourne, Warwick, England. 5 pp.
2. Kaiser, W.J., Wyatt, S.D., Pesho, G.R. 1982. Natural hosts and vectors of tobacco streak virus in eastern Washington. *Phytopathology* 72:1508-1512.
3. Thomas, W.D., Jr. and Graham, R.W. 1951. Seed Transmission of red node virus in pinto beans. *Phytopathology* 41:959-962.

Table 1. Transmission of two pathotypes of tobacco streak virus (TSV) in seed of nine bean cultivars<sup>a</sup>

Bean cultivar	Pathotype I			Pathotype II		
	No. seeds <sup>b</sup>	No. seed infected <sup>c</sup>	% Seed transmission	No. seeds infected	No. seed infected	% Seed transmission
Red Mexican UI 34	106	16	15.1	116	0	0
Black Turtle Soup	146	21	14.4	158	1	0.6
Pinto UI 111	213	18	8.5	214	1	0.5
Pinto UI 114	105	8	7.6	151	2	1.3
Monroe	77	1	1.3	130	0	0
Bountiful	235	2	0.9	210	1	0.5
Great Northern UI 123	136	0	0	130	3	2.4
Dubbele Witte	122	0	0	148	0	0
Stringless Green Refugee	84	0	0	120	0	0

<sup>a</sup> TSV pathotypes I (Me1 40 is similar to bean red node) and II (Me1 F).

<sup>b</sup> Seeds were harvested from plants that were mechanically inoculated with each isolate of TSV in the seedling stage.

<sup>c</sup> Bean seedlings were indexed on Chenopodium quinoa to detect infected seedlings.