

## Transmission of Tobacco Ringspot Virus from Native Hosts to *Cucumis sativus* by *Xiphinema americanum*

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### ABSTRACT

Tobacco ringspot virus was transmitted to cucumber seedlings from naturally infected or inoculated *Eupatorium capillifolium*, *Plantago lanceolata*, *Rumex obtusifolius*, and *Xanthium strumarium* plants by hand-picked dagger nematodes (*Xiphinema americanum*). *Phytopathology* 60:917-918.

*Additional key words:* serology, flotation-sieving.

Tobacco ringspot virus (TRSV) has many hosts among native plant species common in areas where susceptible crop plants are grown (4, 9, 12). Seventeen indigenous plant species were demonstrated as natural hosts of TRSV in North Carolina (8). It has been assumed that weed hosts may serve as reservoirs of the virus and as acquisition sources for vectors. Thomas (11) reported inefficient mite (*Tetranychus* sp.) transmission of TRSV from naturally infected silver nightshade (*Solanum elaeagnifolium*) (2.53%) and wild sunflower (*Helianthus annuus*) (3.19%) plants which had been transplanted from the field to a greenhouse.

The dagger nematode, *Xiphinema americanum*, was a highly efficient vector of TRSV in greenhouse experiments (6, 10). Bergeson et al. (1) reported that 50% of the cucumber seedlings transplanted into field soil containing viruliferous *X. americanum* (46/100 g soil) developed tobacco ringspot symptoms. Evidence that dagger nematodes can acquire TRSV from a weed plant (*Eupatorium capillifolium*) in the field and transmit the virus to cucumber plants in greenhouse tests was reported by Rush (8).

Since *X. americanum* Cobb appears to be the most efficient vector of TRSV known to this time, an experiment was conducted to determine whether this nematode could acquire the virus from four native hosts and transmit it to cucumber (*Cucumis sativus* L.) and tobacco (*Nicotiana tabacum* L.).

A buckhorn plantain (*Plantago lanceolata* L.) seedling inoculated with the common strain of TRSV, a dogfennel (*E. capillifolium* L.) cutting from a naturally infected plant, a dock (*Rumex obtusifolius* L.) sprout from a naturally infected plant, and a cocklebur (*Xanthium strumarium* L.) seedling inoculated with the common strain of TRSV were used as acquisition hosts. The plants were grown in methyl bromide-sterilized sandy loam in 10 or 20-cm clay pots. National Pickling cucumber and Burley 21 tobacco seedlings growing in sterilized soil in 500-ml plastic pots were used as indicator plants.

Dagger nematodes were screened from soil collected from the root area of a Japanese holly plant (*Ilex crenata* Thunb. var. *helleri* Bailey) by the flotation-sieving technique of Byrd et al. (2), using Separan without sucrose (suggested by K. R. Barker). One to three thousand nematodes were added to the soil of each acquisition host. The same number were added to cucumber plants in 10-cm clay pots to insure that the nematodes were initially virus-free. These plants were observed for tobacco ringspot symptoms and serologically assayed when the experiment was terminated. After a 10- to 15-day acquisition period, the nematodes were extracted from soil around the roots of acquisition plants by the modified flotation-sieving method. Roots of the acquisition plants were assayed for virus, and hand-picked nematodes were placed in soil around the roots of indicator plants. Controls consisted of cucumber and tobacco plants which received 10 ml of the solution from which nematodes had been screened. The indicator and control plants were observed for 6-8 weeks for tobacco ringspot symptoms, and were then assayed serologically using Ouchterlony gel-diffusion tests and antiserum to the American Type Culture Collection isolate (ATCC-98) of TRSV. The plants were also assayed by mechanical inoculation of root and leaf material to cucumber seedlings.

TRSV was transmitted from all four of the weed species to at least one cucumber plant by hand-picked dagger nematodes (Table 1). The virus was not recovered from roots or leaves of the tobacco test plants. TRSV was recovered from the roots of all acquisition plants when they were assayed on cucumber at the time the nematodes were removed.

Tobacco ringspot is the most prevalent virus disease on cucurbits in the Rio Grande Valley of Texas (7), and has been observed on cucurbits in North Carolina (Plant Disease Clinic records, North Carolina State Univ., Raleigh) and Georgia (3). In North Carolina, tobacco is often planted in uncultivated fields which

TABLE 1. Transmission of tobacco ringspot virus from weed species by *Xiphinema americanum*

Acquisition host	No. nematodes/plant			No. infected plants		
	Tobacco	Cucumber	Control	Tobacco	Cucumber	Control
<i>Eupatorium capillifolium</i> <sup>a</sup>	50	50	50	0/3	1/3	0/3
<i>Plantago lanceolata</i> <sup>a</sup>	50	50	50	0/3	1/3	0/3
<i>Rumex obtusifolius</i> <sup>a</sup>	50	25	50	0/3	2/3	0/3
<i>Xanthium strumarium</i> <sup>b</sup>	50	25	50	0/3	2/3	0/3

<sup>a</sup> Perennial.

<sup>b</sup> Summer annual.

have been overgrown with weeds for 1 or more years. Although the virus was not transmitted from weeds to tobacco in greenhouse tests, this may only reflect the limited nature of the tests. Transmission of TRSV to tobacco by hand-picked dagger nematodes was reported by Flores & Chapman (5). It is concluded that nematode transmission of TRSV from native to cultivated hosts is an important aspect of the epidemiology of tobacco ringspot.

## LITERATURE CITED

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