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EFFICIENCY OF TRANSMISSION OF AN ISOLATE OF GRAPEVINE FANLEAF VIRUS (GFV) BY THREE POPULATION OF *XIPHINEMA INDEX* (NEMATODA: DORYLAIMIDA)

by
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Summary. The vector efficiency of three populations of *Xiphinema index* in the transmission of an Italian isolate of grapevine fanleaf virus (GFV) was tested using «Mission» grape seedlings as bait plants. The population from Italy transmitted the GFV isolate more efficiently than a USA (California) or an Israel population.

It is known that different populations of *Xiphinema diversicaudatum* vary in their efficiency of transmission of different strains of strawberry latent ringspot virus (SLRV) (Brown and Taylor, 1981; Brown and Trudgill, 1983; Brown, 1985) and of arabis mosaic virus (AMV) (Brown, 1986). Taylor and Brown (1980) hypothesized that the same phenomenon might occur among populations of *Xiphinema index* and strains of grapevine fanleaf virus (GFV).

Since differences in the reproductive capacity were noted among populations of the natural vector of GFV (Coiro and Brown, 1984; Brown and Coiro, 1985), this work was undertaken to ascertain whether populations of *X. index* Thorne *et* Allen from widely separated geographical areas also differed in their efficiency of transmission of an Italian strain of the virus.

Materials and methods

The three populations of *X. index* used in the experiment were from Davis, (California) USA, from Bet Dagan, Israel and from Bari, Italy. They were cultured on virus-free fig (*Ficus carica* L.) in pots of sterilized sandy soil maintained in a glasshouse.

The isolate of GFV was obtained from an infected clone AQ4, *Vitis vinifera* L., cv. Montepulciano d'Abruzzo, from the virus collection of the Dipartimento di Patologia vegetale, Bari.

Cuttings of infected «Montepulciano d'Abruzzo» and of healthy *V. rupestris* cv. St. George were rooted in plastic pots filled with a sterilized sandy soil. After 5-6 weeks, when rooted, they were removed, washed and replanted in clay pots (25 cm diam.) containing soil with nematodes from one of the three populations of *X. index*. The GFV infected «Montepulciano d'Abruzzo» cuttings were used as the virus source while healthy *V. rupestris* «St. George» provided virus-free nematodes as controls. After an acquisition access period of four months, the nematodes were wet-screened from the pots by Cobb's screening technique.

Lots of five or ten females were hand picked and added to 25 ml clay pots containing sterilized sandy-loam and bait plants; the pots were maintained in a temperature control cabinet at 14-15°C (Taylor and Brown, 1974). After seven weeks access to the bait plants, nematodes were extracted and counted. The roots of each plant were examined for evidence (galls) of nematode feeding.

Virus was assayed in the «Mission» bait plants in two ways: a) by extracting sap from roots in 0.1M phosphate buffer, pH 7.2, with a few drops of 2.5% aqueous nicotine solution, and rubbing the extract on the leaves of Celite-dusted *Chenopodium quinoa* Willd. and *Gomphrena globosa* L. test plants; b) ISEM (immunosorbent electron microscopy) test of the comminuted roots of the same bait plants in 0.06M Sorensen's phosphate buffer, pH 6.5, using a specific antiserum to GFV (N. 306, titre 1:512) (Milne and Luisoni, 1977; Russo *et al.*, 1980) obtained from the antiserum collection of the Dipartimento di Patologia vegetale di Bari.

To check virus location in the «Mission» bait plants ISEM tests were made at several levels in the root system:

at the galls, along the roots and in the vicinity of the collar.

Sap from *C. quinoa* and *G. globosa* test plants showing symptoms of virus infection was occasionally serologically checked against the homologous antiserum in a gel double diffusion test.

Leaves from all of the *C. quinoa* and *G. globosa* test plants, whether or not showing typical symptoms of GFV infection, were assayed for virus detection by ISEM.

Results and discussion

Galling on the roots of both bait and test plants provided evidence of nematode feeding and indicated that they had the opportunity to acquire and transmit virus. Further, the numbers of nematodes recovered from the bait plants after seven and 14 weeks acquisition indicated that they had been actively reproducing. Differences in reproduction were evident between the populations (Table II).

The use of grapevine as a bait plant to assess the efficiency of nematodes as virus-vectors presents difficulties because of the low concentration of the virus that is present (Martelli, 1975 and 1978). For this reason a very sensitive test, ISEM, was used to improve the virus detection from roots of bait and from tests plants. However, virus was detected only in the vicinity of the galls and not in other regions of the roots. Virus was not detected in the bait plants to which virus-free nematodes had been added as a control.

The results of transmission are summarized in Table I. Transmissions occurred with all tree populations but with the highest in the Italian population with ten females per pot. The results are not conclusive, but suggest that the Italian population of *X. index* was the most efficient in transmitting a local, Italian, isolate of GFV. Brown and Trudgill (1983) have provided evidence of specific transmission between some virus strains and populations of longidorid vector species.

TABLE I - *Transmission of GFV to «Mission» grape seedlings by females of three* Xiphinema index *populations.*

Population	No. nematodes per replication	ISEM test	
		Mission grape bait seedlings*	*C. quinoa* or *G. globosa* test plants
Italy	5	0/5	2/5
	10	5/5	5/5
Israel	5	0/5	0/5
	10	2/5	3/5
USA (California)	5	2/5	2/5
	10	0/5	0/5

* Access period seven weeks.

TABLE II - *Mean number of* X. index *(adults and juveniles) recovered per 5 replications after 7 and 14 weeks respectively.*

Population	After seven weeks			
	Numbers of nematodes per replicate			
	5		10	
	♀♀	jj	♀♀	jj
Italy	4	183	8	334
Israel	3	105	9	215
USA (California)	4	105	6	119
	After fourteen weeks			
Italy	30	153	16	120
Israel	58	145	20	171
USA (California)	68	231	12	170

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