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THE TRANSMISSION OF RATTLE VIRUS BY *TRICHODORUS PACHYDERMUS*[1]

Met een samenvatting:
De overdracht van ratelvirus door Trichodorus pachydermus

BY

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HEWITT, RASKI and GOHEEN (1958) were the first to demonstrate the transmission of a soil-borne virus by nematodes. They were able to infect healthy grape vines with the fanleaf virus by placing in the soil near their roots the nematode *Xiphinema index* Thorne & Allen, taken from soil around the roots of diseased grape vines. *Xiphinema diversicaudatum* (Micoletzky) was later found to transmit *Arabis* mosaic virus (JHA & POSNETTE, 1959, 1961; HARRISON & CADMAN, 1959). The viruses transmitted by these *Xiphinema* species are isometric in shape.

Rod-shaped soil-borne viruses may also be transmitted by nematodes. SOL, VAN HEUVEN & SEINHORST (1960) were able to transmit rattle virus and *Atropa belladonna* mosaic virus to tobacco by growing it in soil to which had been added nematodes from soils infected with these viruses. *Hoplolaimus uniformis* Thorne and *Hemicycliophora* spec., isolated from infective bulk suspensions of nematodes, did not transmit the virus. Further experiments revealed that of four dorylaimoid species investigated, one, *Trichodorus pachydermus* Seinhorst, readily transmitted rattle virus.

MATERIALS AND METHODS

The nematodes used in the transmission experiments were extracted from sandy soil collected at Lisse (four dorylaimoid species including *Trichodorus pachydermus* of experiments A to D, listed in table 1) and at Gieterveen (experiment E in table 1). The Lisse field was known to be infected with rattle virus from observations by VAN SLOGTEREN (1958), which were corroborated in 1960 by the spinach test. For this test spinach is grown in the soil to be investigated. About five weeks after sowing, sap from the roots is pressed out and rubbed on leaves of healthy White Burley tobacco plants. The presence of rattle virus in the spinach roots, and therefore in the soil to be investigated, is revealed by the appearance of the necrotic ring and line patterns characteristic of rattle. In the field at Gieterveen potatoes suffered from stem-mottle and the presence of rattle virus could again be demonstrated by the spinach test.

Nematodes were extracted from soil by elutriation and sieving (SEINHORST, 1956). Not more than three to four hours after the elutriation specimens of the eelworm species to be investigated were picked from the extracted nema-

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TABLE 1. The transmission of rattle virus by *Trichodorus pachydermus*.
De overdracht van ratelvirus door Trichodorus pachydermus.

Experiment *Proef*	Number of nematodes per bag *Aantal aaltjes per zakje*	Amount of soil per bag in g *Hoeveelheid grond per zakje in g*	Number of plants *Aantal planten*	Number of infected plants *Aantal geïnfecteerde planten*
A	50	125	5	2
	0	125	4	0
B	100	250	5	5
	0	250	5	0
C	10	50	7	4
	0	50	2	0
D	16	50	5	5
	8	50	10	10
	4	50	10	7
	2	50	10	7
	1	50	10	4
	0	50	5	0
E	8	50	7	7
	0	50	5	0
Total *Totaal*	inoculated soil *geïnoculeerde grond*		69	51
	controls *controles*		21	0

tode mixture and, before being transferred to the soil to be inoculated, placed in drops of distilled water on a watch glass. The soil used in the experiments was autoclaved and, in order to remove water-soluble substances which might inactivate the nematodes, hot water was sucked through the soil on a Buchner funnel. From 50 to 250 g of this soil was placed in a plastic bag of suitable size. The nematodes were transferred to it with a little water and not more than a day afterwards one seedling of *Nicotiana tabacum* var. White Burley was planted in each bag. In the tests to investigate which nematode species transmits rattle, at least thirty specimens of one species were placed in a bag.

Transmission of virus was sometimes revealed by symptoms in the leaves of the test plants but more often had to be determined by testing for the presence of virus in their roots. Presence or absence of virus in the roots of control plants and of plants which showed no leaf symptoms after having grown for two to three weeks in soil inoculated with nematodes was investigated as described for the spinach test.

RESULTS

Of the four dorylaimoid species tested, rattle virus was transmitted only by *Trichodorus pachydermus*. Experiment D of table 1 shows that even one specimen of this species can infect a tobacco plant. That not all specimens added singly to the bags transmitted virus may have been due to the fact that not all

of them carried virus, or possibly to inactivity or death of some of the specimens. Generally no more than about two out of every three specimens added to soil could be extracted from it a week later, indicating that approximately one in three of the nematodes became inactive after transfer.

Geographical distribution of rattle virus and of *Trichodorus pachydermus*

T. pachydermus occurs quite commonly on sandy soils in the Netherlands wether arable land, pasture, woodland, or soil which is not under cultivation. It seems to be rare in clay soils, as is the soil-borne rattle virus. The distribution of the virus may therefore very well be limited to areas, where *T. pachydermus* occurs. This must still be corroborated by further research.

Samenvatting

De nematode-soort *Trichodorus pachydermus* Seinhorst kan ratelvirus overbrengen naar gezonde White Burley tabaksplanten. Eén aaltje, geïsoleerd uit met ratelvirus besmette grond, is zelfs in staat een tabaksplant met het virus te infecteren.

Evenals ratelvirus komt deze nematode-soort vooral voor in lichtere grondsoorten. In kleigrond worden beide zelden aangetroffen. Het is mogelijk, dat de verspreiding van het virus beperkt is tot gebieden waar *T. pachydermus* voorkomt. Dit moet nog nader worden onderzocht.

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