

## Host suitability of a number of plants for the nematode *Tylenchorynchus dubius*

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### Abstract

The host suitability of 41 plant species or varieties for a *Tylenchorynchus dubius* population from The Netherlands was determined in pots of 150 g of soil, each inoculated with 10 nematodes, 5 males and 5 females. The results, shown in Table 1, indicate the polyphagy of this nematode and the fact that several tropical crops are efficient hosts. Suitable hosts include several Gramineae (rice, sorghum, perennial rye grass, oats, millet, summer rye, corn and barley), Cruciferae (cauliflower, turnip, radish) and Leguminosae (gram, pea). Poor hosts include spinach, beet, carrot, flax, tobacco and cotton.

### Introduction

*Tylenchorhynchus dubius* is probably the most generally occurring phytophagous nematode in lighter soils in Western Europe. It has also been recorded from other widely separated places in temperate and subtropical regions. It is, however, possible that these records do not all concern the same species.

The nematode has been recorded as causing moderate stunting of growth produced experimentally under both greenhouse and field conditions on *Gossypium hirsutum* var. *punctatum* and *Phaseolus acutifolius* var. *latifolius* (Reynolds and Evans, 1953). *Lolium perenne*, red clover, oats, rye, swede, barley and corn were recorded as efficient hosts for this nematode in The Netherlands (Oostenbrink, 1959, 1961). The same nematode was found associated with *Rosa* spp. in India (Prasad and Das Gupta, 1964). Feeding habits were studied under laboratory conditions on apical meristem of root tips of *Trifolium pratense*, *Trifolium repens*, *Poa annua* and *Lolium perenne* (Klinkenberg, 1963).

Repeated cultivation of corn and *Vicia faba* on soil infested with *T. dubius*, led to population increases of 2-5 times (Skarbilovich, 1967).

In the present study of host suitability of plant species from different parts of the world, the rate of reproduction of the nematode on the plants was determined in pot experiments. The *T. dubius* used in these experiments was derived from a Dutch population not differing morphologically from the population from which Allen (1955) took his neotype.

Table 1. Reproduction of *Tylenchorhynchus dubius* on different plants in pot experiments under glasshouse conditions from 25th February to 3rd June, 1967. Number of nematodes per pot of 150 g of soil: average of four replicates, and range between brackets. Inoculum: 10 nematodes, 5 males and 5 females per pot.

Plant	Nematodes	Plant	Nematodes
1. Rice ( <i>Oryza sativa</i> 'Caloro')	501 (203-931)	21. Barley ( <i>Hordeum vulgare</i> )	28 (16-59)
2. Cauliflower ( <i>Brassica oleracea</i> var. <i>botrytis</i> )	348 (134-764)	22. Pearl millet ( <i>Pennisetum typhoides</i> 'Bultul')	28 (6-52)
3. Turnip ( <i>Brassica campestris</i> var. <i>rapa</i> )	348 (68-751)	23. Peas ( <i>Pisum sativum</i> 'Rovar')	21 (4-40)
4. Black gram ( <i>Phaseolus mungo</i> )	339 (10-624)	24. Radish ( <i>Raphanus sativus</i> 'non plus ultra')	18 (6-42)
5. Sorghum ( <i>Sorghum vulgare</i> 'Dochma')	194 (90-326)	25. Cotton ( <i>Gossypium barbadense</i> )	16 (3-31)
6. Perennial rye grass ( <i>Lolium perenne</i> )	180 (74-316)	26. Bitter gourd ( <i>Momordica charantia</i> )	11 (2-25)
7. Rape ( <i>Brassica campestris</i> var. <i>rapa</i> )	164 (34-376)	27. Chick pea ( <i>Cicer arietinum</i> 'Brown')	10 (0-16)
8. Green gram ( <i>Phaseolus radiatus</i> )	153 (42-275)	28. Spinach ( <i>Spinacia oleracea</i> )	10 (0-10)
9. Oats ( <i>Avena sativa</i> 'Marne')	136 (121-173)	29. Roselle ( <i>Hibiscus sabdariffa</i> )	6 (1-8)
10. Pearl millet ( <i>Pennisetum typhoides</i> 'Millet zango')	134 (42-291)	30. Carrot ( <i>Daucus carota</i> )	5 (3-10)
11. Summer rye ( <i>Secale cereale</i> )	115 (71-213)	31. Cotton ( <i>Gossypium hirsutum</i> )	5 (1-9)
12. Pearl millet ( <i>Pennisetum typhoides</i> 'Zaria local')	115 (16-236)	32. Globe Amaranth ( <i>Gomphrena globosa</i> )	5 (2-9)
13. Sorghum ( <i>Sorghum vulgare</i> 'Selor kuning')	54 (2-106)	33. Chenopodium ( <i>Chenopodium amaranticolor</i> )	4 (3-6)
14. Pearl millet ( <i>Pennisetum typhoides</i> 'Cumbu')	54 (5-104)	34. White gram ( <i>Cicer arietinum</i> 'White')	3 (1-4)
15. Sorghum ( <i>Sorghum vulgare</i> 'Feterita')	46 (10-67)	35. Sugar beet ( <i>Beta vulgaris</i> )	3 (1-4)
16. Rice ( <i>Oryza sativa</i> 'Ketan Gadjik')	46 (15-52)	36. Cucumber ( <i>Cucumis sativus</i> 'Long yellow cross')	3 (0-6)
17. Italian millet ( <i>Setaria italica</i> )	43 (32-59)	37. Petunia ( <i>Petunia alba</i> )	2 (0-3)
18. Swede ( <i>Brassica campestris</i> var. <i>napobrassica</i> )	43 (29-55)	38. Chillies ( <i>Capsicum annuum</i> 'Friesdorp')	1 (0-3)
19. Corn ( <i>Zea mays</i> 'Goudstein')	38 (25-56)	39. Flax ( <i>Linum usitatissimum</i> )	1 (0-2)
20. Tomato ( <i>Lycopersicon esculentum</i> 'Money-maker')	34 (15-43)	40. Datura ( <i>Datura stramonium</i> )	1 (0-2)
		41. Tobacco ( <i>Nicotiana tabacum</i> 'White Burley')	0 (0-1)

Tabel 1. Vermeeandering van *Tylenchorhynchus dubius* op verschillende planten in potten onder glas van 25 februari tot 3 juni 1967. Aantal aaltjes per pot met 150 g grond: gemiddelden van vier herhalingen en tussen haakjes de uiterste individuele getallen. Inoculatie van 10 aaltjes, 5 mannetjes en 5 wijfjes per pot.

## Materials and methods

A monospecific population of *T. dubius* originally obtained from a plot in the garden of the Plantenziektenkundige Dienst (Plant Protection Service), Wageningen, was multiplied on perennial rye grass, *Lolium perenne*, in steam-sterilised soil under greenhouse conditions and was extracted using the Oostenbrink elutriator. Sandy soil of pH 7 from a sea polder was used in this study. It was sieved and thoroughly mixed before sterilization. After 2 months, plastic pots 6 cm in top diameter and 10 cm deep were filled with 150 g of soil. Seeds of the various plants to be tested were sown in these pots. After germination, the plants were thinned to three per pot and maintained for 1 month before the nematode inoculum was added.

The initial inoculum consisted of ten full-grown nematodes per pot, viz. 5 males and 5 females. The females contained no visible eggs, but may or may not have been fertilised. They were hand picked into one ml of water in small watch glasses and then poured around the plant roots after loosening the soil. The inoculation site was then covered with surrounding soil and extra water was added. Four replicate pots were inoculated per plant species. The pots were randomly arranged on the glasshouse bench and maintained until the end of the experiment. From February to April the plants received extra light from high-pressure mercury vapour lamps for 12 h per day. All the plants grew well during the experiment. The experiment was evaluated after 100 days, on 3 June, 1967.

All the pots were washed for nematode extraction, using the elutriator, and the whole catch was counted.

## Results and discussion

The results of the study are given in Table 1, in which the test plants are listed in order of decreasing host suitability, according to average nematode reproduction. The nematode multiplied, in individual replicates as well as on an average, on plant species No. 1–26. It appeared that ten nematodes per 150 g soil was generally enough to start infection. Suitable hosts included several Gramineae (rice, sorghum, perennial rye grass, oats, millet, summer rye, corn and barley), Cruciferae (cauliflower, turnip, radish) and Leguminosae (gram, pea). Poor hosts include spinach, beet, carrot, flax, tobacco and cotton. It is interesting to note that *T. dubius* is very polyphagous and that several good hosts of this Dutch population were found among the tropical crops. Cotton was not found to be a suitable host and this raises the suspicion that Reynolds and Evans (1953) were dealing with another nematode.

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## Samenvatting

### *Waardplantgeschiktheid van een aantal planten voor het aaltje Tylenchorhynchus dubius*

De waardplantgeschiktheid van 41 plantesoorten of -variëteiten voor een Nederlandse *T. dubius*-populatie werd bepaald in potten met 150 g grond, waarvan in elk 10 nematoden, namelijk 5 mannetjes en 5 vrouwtjes, geïnoculeerd werden. De resultaten van Tabel 1 tonen aan dat het aaltje zeer polyfaag is en ook dat verscheidene tropische gewassen goede waardplanten zijn. Goede waardplanten zijn onder meer verscheidene Gramineae (rijst, sorghum, Engels raaigras, haver, gierst, zomerrogge, mais en gerst), Cruciferae (bloemkool, stoppelknol, raapzaad en radijs) en Leguminosae ("gram" en erwt). Slechte waardplanten zijn onder andere spinazie, biet, peen, vlas, tabak en katoen.

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