HOST REACTION OF *COFFEA* SPP. TO *PRATYLENCHUS BRACHYURUS*

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RESUMEN

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Se ha estudiado, en invernadero, la reacción de seis germoplasmas de café (*Coffea canephora* cv. Apoatã y cv. Laurentii, *C. congensis* cv. Bangelan, *C. salvatrix* y los híbridos interespecíficos Icatu H 4782-7-514 y Sarchimor C 1669-33) en relación a *Pratylenchus brachyurus*. Bajo el diseño experimental completamente randomizado con 10 repeticiones, las plantas jóvenes del café se han inoculado con 0 ó 1 000 juveniles + adultos de *P. brachyurus*. Tras 90 días se evaluó, la altura de las plantas, el peso de la materia fresca del sistema radicular, el peso de la materia seca de la parte aérea y las proporciones de reproducción. Los híbridos interespecíficos Icatu H 4782-7514 y Sarchimor C 1669-33 se han comportado resistentes a *P. brachyurus*.

Palabras claves: café, nematodos, resistencia.

The lesion-nematode *Pratylenchus brachyurus* (Godfrey) Filipjev and Schuurmans Stekhoven was identified as a parasite of coffee (*Coffea* spp.) for the first time in the region of Tingo Maria, in Peru (Krusberg and Hirschmann, 1958). The nematode also occurs on coffee in Brazil, Costa Rica, U.S.A. (Hawaii), India and Ivory Coast (Luc and Guiran, 1960; Kumar and Samuel, 1990). Under field conditions, the most characteristic symptoms of *P. brachyurus* infection of coffee are plant and root growth reduction, leaf shedding and nutrient deficiency symptoms (Lordello, 1988). A greenhouse trial showed that *Coffea arabica* cv. Mundo Novo and cv. Catuaí are intolerant hosts of *P. brachyurus*, since seedling growth of both coffee cultivars was reduced by *P. brachyurus*, although reproduction by the nematode was very low on both coffee cultivars (Inomoto *et al.*, 1998).

Host-parasite relationship and management of *Meloidogyne incognita* (Kofoid and White) Chitwood, *M. exigua* Goeldi and *P. coffeae* (Zimmermann) Filipjev and Schuurmans Stekhoven, the most widespread and damaging nematodes on coffee, have been well studied. Coffee breeding programs have been developed in many countries, in order to achieve genetic resistance to these nematodes. However, information on *P. brachyurus* damage to coffee plants is scarce, and data about control of *P. brachyurus* on coffee are absent.

The experiment reported herein was conducted in the greenhouse, in Piracicaba, SP, Brazil, in order to evaluate host-parasite relationships between several coffee cultivars and *P. brachyurus* (Pb). Six sources of *Coffea* sp. germplasm (*C. canephora* cv. Apoatã and cv. Laurentii, *C. congensis* cv. Bangelan, *C. salvatrix* and the interspecific hybrids Icatu H 4782-7-514 [artificial hybrid between *C. arabica* and *C. canephora* with several backcrosses with *C. arabica*] and Sarchimor C 1669-33 [natural hybrid between *C. arabica* cv. Vila Sarchi and hybrid of Timor]) were evaluated with regard to the reproduction rate of Pb and its effect on the growth of seedlings.

Coffee seedlings at the "little soldier" stage (soon after emergence—Wellman, 1961), obtained from seeds germinated in sand, were transplanted into plastic pots containing 500 cm^3 of sterilized soil. The seedlings were maintained in a screenhouse until the "butterfly" stage (when the two cotyledons are expanded), when they were transferred to a greenhouse with temperature ranging from 17 to 32°C, and inoculated with Pb. The nematode isolate was obtained from a maize (*Zea mays* L.) field in Piracicaba, SP, Brazil, and maintained in the laboratory on alfalfa callus culture (Riedel *et al.*, 1973). Motile stages of the nematode were extracted from the cultures using a modified version of the Baermann method (Southey, 1970). Inoculation was done with a suspension of Pb poured into two holes in the soil near the base of seedlings. Ten seedlings of each of the six cultivars were inoculated with initial population (Pi) of 0 or 1 000 motile stages and arranged in a completely randomized design. Maize seedlings were also inoculated to confirm the effectiveness of the nematode population used. The seedlings were maintained in the greenhouse during the experimental period (90 days).

At the end of the experiment, three growth parameters were measured: plant height, root fresh weight, and shoot dry weight, after drying at 60°C for 4 days. The nematodes from the total root system and total soil volume of each pot (500 cm^3) were extracted using the blender-centrifugal-flotation (Coolen and D'Herde, 1972) and the centrifugal flotation (Jenkins, 1964) techniques, respectively. The final population (Pf) was estimated by adding the root and soil nematode numbers found for each replicate. Data were analyzed without transformation using the ANOVA procedure (SAS Institute, Cary, NC), and treatment mean comparisons were conducted using Tukey's Multi Comparison test.

Reproduction rate (Pf/Pi) of Pb, after 90 days, was very low for all inoculated plants, ranging from 0.01 to 0.27 (Table 1). The Pf/Pi on maize was 11.045 (average of 8 replicates), confirming the viability of the inoculum used. These results, in accordance with others obtained previously (Inomoto *et al.*, 1998), show that coffee plants are poor hosts for Pb.

No root necrosis was observed on the germplasm inoculated with Pb. This was expected, because the experiment utilized sterilized soil, free of opportunistic microorganisms, which combine with Pb to cause the root necrosis observed in field conditions (Inomoto *et al.*, 1998). The nematode did not affect any growth variable in interspecific hybrids (Icatu H 47B2-7-514 and Sarchimor C 1669-33), which can be considered resistant to Pb, according to the concept of Dropkin and Nelson (1960). This is the most valuable result obtained in the present work, since these hybrids can be used in breeding programs as a source of resistance to Pb. Icatu H 4782-7-514 has the additional advantage of being resistant to coffee rust (*Hemileia vastatrix*) (Gonçalves, 1993). The role of Pb as a pathogen of coffee has not yet been defined, but the intolerance of the two most important cultivars of coffee (*C. arabica* cv. Mundo Novo and cv. Catuaí) is known (Inomoto *et al.*, 1998), and this nematode has potential importance if intolerant coffee plants are planted in fields heavily infested with Pb, e.g. areas previously cultivated with cereals or other good hosts for this species (Lordello, 1988).

In spite of the low Pf/Pi for all germplasm studied, Pb reduced the heights of *C. canephora* cv. Laurentii, *C. salvatrix* and *C. congensis* cv. Bangelan; shoot dry weight of *C. salvatrix*, and the root fresh weight of *C. canephora* cv. Apoatã (Table 1). The host reaction of these cultivars is not clear, since Pb negatively affected only one or two of the growth variables analyzed. However,

Table 1. Effect of *Pratylenchus brachyurus* on plant height, shoot dry weight and root fresh weight of six coffee germplasm lines, and nematode reproduction rates (Pf/Pi).

Germplasm line	Plant height[z] (cm)	Shoot dry weight[z] (g)	Root fresh weight[z] (g)	Pf/Pi[z]
Check	9.30 a	0.80 a	3.83 a	—
C. canephora cv. Apoatã	8.80 a	0.69 a	2.67 b	0.27
C.V. %	15.7	26.7	35.0	
Check	11.09 a	0.91 a	3.32 a	—
C. canephora cv. Laurentii	9.81 b	0.76 a	2.81 a	0.12
C.V. %	8.41	21.5	23.0	
Check	12.50 a	1.01 a	1.00 a	—
C. salvatrix	10.33 b	0.64 b	0.71 a	0.01
C.V. %	9.74	20.9	38.3	
Check	1.14 a	0.96 a	3.80 a	—
C. congensis cv. Bangelan	8.85 b	0.83 a	3.61 a	0.05
C.V. %	15.6	24.6	27.8	
Check	8.94 a	0.74 a	3.14 a	—
Sarchimor C 1669-33	8.27 a	0.70 a	2.97 a	0.08
C.V. %	12.5	16.4	24.1	
Check	11.77 a	0.72 a	3.45 a	—
Icatu H 4782-7-514	10.69 a	0.67 a	3.36 a	0.15
C.V. %	10.8	12.4	15.6	

[z]Each value is an average of 10 replicates. Different letters within the germplasm lines indicate statistical difference among treatments using the Tukey test, $P \leq 0.05$.

the potential importance of Pb to these coffee plants is evident, because these results show some similarity with the intolerant reaction of *C. arabica* to Pb. Moreover the effect of Pb on *C. canephora* cv. Apoatã, should receive further study because the cultivar is used widely as a rootstock of C. arabica in Brazil, due to its resistance to *M. exigua*, *M. incognita*, and *M. paranaensis* (Gonçalves, 1993). It is also noteworthy that Pb negatively affected two growth variables of *C. salvatrix* germplasm, although the Pf/Pi value (0.01) was extremely low.

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