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Host Suitability of Commercial Corn Hybrids to *Meloidogyne arenaria* and *M. incognita*[1]

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Abstract: The host suitability of 64 commercial corn hybrids for a *Meloidogyne arenaria* race 2 population and a *M. incognita* race 4 population was determined in greenhouse experiments. 'Northrup King 508' and 'Pioneer Brand 3147' maintained *M. arenaria* below and at the initial population level, respectively, indicating that these hybrids are relatively poor hosts for this species. RF values (final egg number/initial egg number) of the hybrids for *M. arenaria* ranged from 0.8 for Northrup King 508 to 42.3 for 'Pioneer Brand XC941'. All hybrids were excellent hosts for *M. incognita* with RF values ranging from 20.7 for 'Sunbelt 1860' to 49.5 for Pioneer Brand XC941.
Key words: corn, host suitability, *Meloidogyne arenaria*, peanut root-knot nematode, *M. incognita*, southern root-knot nematode, *Zea mays*.

Meloidogyne spp., root-knot nematodes, are commonly associated with corn, *Zea mays* L., in the southeastern United States (2,3,12). There are a number of conflicting reports on the susceptibility of corn to *M. incognita* (Kofoid and White) Chitwood. Corn was reported as a poor host for *Meloidogyne* spp. (3), whereas others report the increase of root-knot nematode populations on corn (1,2,5,7). Although limited information is available on resistance of corn to *M. incognita* (1,9,10) and *M. arenaria* (Neal) Chitwood (1,8), no mass screening of corn for resistance has been reported.

This investigation was initiated to determine the host suitability of commercial corn hybrids for *M. arenaria* and *M. incognita*.

MATERIALS AND METHODS

Populations of *Meloidogyne arenaria* race 2 and *M. incognita* race 4 were obtained from the Department of Plant Pathology, North Carolina State University, Raleigh. Inoculum was increased on tomato (*Lycopersicon esculentum* Mill. cv. Floradel) in the greenhouse. After 8–10 weeks, eggs were collected from tomato roots using NaOCl (4).

Sixty-four commercial corn hybrids evaluated in the 1986 corn variety trials at Mississippi State University were selected for this study. Seeds were planted in Todd Planter Flats (Model 300, Speedling, Inc., Sun City, FL) containing a potting mixture of methyl bromide-sterilized sandy loam soil and river sand (1:1). When 7–10 days old, seedlings were thinned to one per cell and inoculated by pipetting a water suspension containing 3,000 nematode eggs of the appropriate species into each cell. Plants evaluated for *M. arenaria* and *M. incognita* reproduction were grown in the greenhouse at an average temperature of 30 ± 5 C and 30 ± 4 C, respectively.

Hybrids were arranged in a randomized complete block design with eight replications for each nematode species. After 60 days, roots were carefully washed free of soil, weighed, and cut into 1-cm segments. Eggs were extracted from each root system using NaOCl (4) and counted. Oostenbrink's (11) R factor (RF) (final egg number/initial egg number) and the number of eggs per gram of fresh root were determined for each hybrid–nematode treatment. All data were subjected to analysis of variance. Hybrids were compared by least significant differences (LSD) ($P = 0.05$). The experiments were repeated at an average temperature of 29 ± 5 C and 30 ± 4 C for *M. arenaria* and *M. incognita*, respectively.

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TABLE 1. Reproduction of *Meloidogyne arenaria* and *M. incognita* on corn hybrids after 60 days.

		M. arenaria		*M. incognita*	
Hybrid no.	Brand name	RF†	Eggs/g fresh root	RF†	Eggs/g fresh root
508	Northrup King	0.8	339	28.8	6,869
3147	Pioneer	1.0	350	26.5	4,977
1860	Sunbelt	1.8	561	20.7	4,380
G4765	Funks	2.0	968	39.3	10,110
G4858	Funks	2.2	678	39.7	8,740
3187	Pioneer	2.5	801	38.4	6,882
8905	Coker	2.8	894	24.8	5,631
S8645	Stauffer	2.9	1,367	34.5	7,547
1876	Sunbelt	3.4	875	36.9	7,769
3055	Pioneer	3.9	1,227	32.4	9,578
519	Pioneer	3.9	1,503	44.9	11,529
G4868	Funks	4.1	862	34.7	7,838
3020	Coker	4.3	1,664	43.8	9,424
XC848	Pioneer	4.4	1,176	41.7	8,531
PX9581	Northrup King	4.8	1,817	30.2	7,226
G4734	Funks	4.9	1,991	37.4	9,893
RA1502	Funks	5.0	1,424	44.4	9,573
6066X	Funks	5.2	1,938	37.0	7,712
81-37	McCurdy	5.3	2,213	32.8	7,053
8172	McCurdy	5.9	2,231	30.0	6,726
G4733	Funks	6.1	2,351	42.0	11,013
DK789	DeKalb	7.2	1,958	33.7	6,319
DK689	DeKalb	8.0	2,066	45.6	9,143
GK850	AgraTech	8.3	3,309	48.1	10,796
9990	Paymaster	8.5	3,087	23.1	4,980
3165	Pioneer	9.9	3,613	38.1	9,025
1802	Sunbelt	10.0	3,426	42.1	9,574
77B	Coker	10.1	3,599	34.6	7,336
8696	Coker	12.1	5,806	32.7	10,378
3320	Pioneer	12.3	4,199	44.5	10,256
PX95	Northrup King	12.8	4,465	32.2	7,700
8951	Paymaster	13.1	4,238	34.7	8,684
FFR955	FFR	14.8	5,050	24.7	5,824
X322501	Paymaster	15.0	4,868	33.9	10,497
19A	Coker	18.1	6,157	39.7	9,912
SX352	PAG	18.2	6,867	39.8	9,244
PX79	Northrup King	18.4	7,746	31.8	9,008
GK925	AgraTech	18.7	7,381	42.9	11,012
DK656	DeKalb	18.8	6,422	39.9	9,350
8150	McCurdy	18.8	6,814	35.2	8,732
7800	McCurdy	19.1	6,475	36.5	8,597
8990	Paymaster	19.4	9,744	30.3	9,292
CX6801	Coker	19.7	6,125	37.4	8,609
8625	Coker	19.9	6,635	36.5	12,698
G4614	Funks	20.1	7,345	34.4	7,823
CX5067	Coker	20.6	6,747	47.3	8,913
X6674	Northrup King	21.0	7,906	36.9	7,583
FFR810	FFR	21.3	8,561	43.5	11,998
7990	Paymaster	21.7	10,317	36.8	8,427
FFR901	FFR	22.3	8,108	47.3	11,188
CX5071	Coker	22.5	7,748	36.3	8,993
1827	Sunbelt	22.5	7,814	39.6	8,552
8601	Coker	22.5	8,643	44.4	9,326
2570	Asgrow/O's Gold	22.9	7,481	38.1	8,832
RX798	Asgrow/O's Gold	22.9	8,980	33.7	10,449
21	Coker	23.7	6,973	43.0	8,238
X6685	Northrup King	23.8	7,998	46.8	8,347
3389	Pioneer	24.4	7,356	46.7	11,116

TABLE 1. Continued.

		M. arenaria		*M. incognita*	
Hybrid no.	Brand name	RF†	Eggs/g fresh root	RF†	Eggs/g fresh root
8400	Jacques	24.5	7,639	37.5	10,129
FFR747	FFR	24.6	8,635	42.8	10,484
8575	Coker	24.7	9,191	36.0	7,628
S7759	Stauffer	27.6	8,996	46.6	10,149
5509	Asgrow/O's Gold	32.6	10,904	37.2	7,999
XC941	Pioneer	42.3	12,545	49.5	10,280
	LSD ($P = 0.05$)	6.2	2,584	10.7	2,658

† RF (reproduction factor) = final egg number/initial egg number.

RESULTS AND DISCUSSION

Hybrids differed ($P = 0.05$) in ability to support the *M. arenaria* population (Table 1). 'Pioneer Brand 3147' and 'Northrup King 508' maintained the population at the initial level or below. RF values ranged from 0.8 for Northrup King 508 to 42.3 for 'Pioneer Brand XC941'. Northrup King 508 and Pioneer Brand XC941 had the lowest (339) and highest (12,545) number of eggs per gram of fresh root, respectively.

All hybrids tested were good hosts for *M. incognita.* Although hybrids differed ($P = 0.05$) in RF and number of eggs per gram of fresh root, reproduction was high on all hybrids. RF ranged from 20.7 ('Sunbelt 1860') to 49.5 (Pioneer Brand XC941). Eggs per gram of fresh root varied from 4,380 to 12,698 for Sunbelt 1860 and 'Coker 8625', respectively.

These data indicate that many commercial corn hybrids are hosts for both *M. arenaria* and *M. incognita.* A few hybrids, however, such as Northrup King 508 and Pioneer Brand 3147, appear to be poor hosts for *M. arenaria.* The control of *M. arenaria* by crop rotation might be enhanced by carefully selecting the corn hybrid used.

Corn has been used with varying success in crop rotations to control *M. incognita.* Soybean yields were sustained and nematode population densities remained at low levels in a corn–soybean rotation with the use of a nematicide (6). In a 3-year rotation with cotton, however, high population densities and severe root galling on cotton developed following corn (7). There have been a number of reports of root-knot nematode increase after cropping to corn (2,5,12). It appears that the usefulness of presently available corn hybrids in rotation schemes for the control of *M. incognita* may be limited.

Because of the variability in pathogenicity of *Meloidogyne* spp. on corn (1,9), the hybrids used in this study may react differently to other host races or geographical isolates. Also, monoculture of corn may result in selection of nematode biotypes which readily reproduce on corn hybrids that are initially poor hosts.

The development of resistant corn genotypes will be useful in the management of root-knot nematode populations under various crop rotation programs.

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