

RESISTANCE OF BARLEY AND WHEAT CULTIVARS TO ROOT-KNOT NEMATODES, *MELOIDOGYNE* SPP.

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Abstract

The reaction of 5 barley and 8 wheat cultivars to *Meloidogyne incognita* Races 1 and 3, *M. arenaria* and *M. javanica* were studied. All barley cultivars were resistant to *M. arenaria* but susceptible or moderately susceptible to *M. javanica*. Barley cvs. Bonus and CC 163 were resistant to *M. incognita* Race 3 and *M. incognita* Race 1, respectively. All the wheat cultivars were resistant to root-knot nematode except Giza 155 and Giza 157 which were susceptible to *M. javanica*. The root and shoot dry weight of susceptible cultivars significantly reduced due to root-knot nematode infection.

In Egypt, barley (*Hordeum vulgare* L.) and wheat (*Triticum aestivum* L.) are important cereal crops used as human food and animal feed. Of the gramineous crops attacked by root-knot nematodes, *Meloidogyne* spp. (Ibrahim & Rezk, 1978; Ibrahim *et al.*, 1976), *M. javanica* was very common on wheat Cr. Giza 155 in newly reclaimed irrigated lands (Kheir *et al.*, 1979). Oteifa & El-Gindi (1982) showed that barley cvs. Bonus, Giza 119 and Giza 121 had different degrees of susceptibility to certain biotypes of *M. incognita* and *M. javanica*. Ibrahim *et al.*, (1983) found that 11 corn cultivars were susceptible to *M. arenaria*, *M. incognita* and *M. javanica* while 7 rice cultivars were moderately resistant.

The present study describes the reaction of 5 barley and 8 wheat cultivars to four populations of root-knot nematodes.

Materials and Methods

The populations of *M. incognita* (Kofoid & White) Chitw. (Races 1 and 3), *M. javanica* (Treub) Chitw., and *M. arenaria* (Neal) Chitw., isolated from infected roots of gramineous plants collected from Behera governorate were identified using perineal patterns of adult females and Sasser's differential hosts (Taylor & Sasser, 1978). The nematodes were reared on tomato (*Lycopersicon esculentum* Mill. cv. Prichard) for 60-75 days in the greenhouse. Nematode eggs extracted from galled tomato roots by method as described by Hussey & Barker (1973) were used for inoculation of hosts.

Table 1. Reactions of barley and wheat cultivars to the root-knot nematodes *Meloidogyne incognita* race 1 (MI-1) and race 3 (MI-3), *M. arenaria* (MA) and *M. javanica* (MJ).

Plant Cultivars	Root-knot nematodes			
	MI-1	MI-3	MA	MJ
Barley (<i>Hordeum vulgare</i> L.)				
Bonus	S	R	R	MS
CC 89	MS	MS	R	S
CC 163	R	MS	R	S
Giza 121	MS	S	R	S
Sahrawy	MS	MS	R	MS
Wheat (<i>Triticum aestivum</i> L.)				
Giza 155	R	R	R	S
Giza 157	R	R	R	S
Line 2188 x 1131	R	R	R	R
Sakha 8	R	R	R	R
Sakha 61	R	R	R	R
Sakha 69	R	R	R	R
Sakha 80	R	R	R	R
Stork	R	R	R	R

R = Resistant. MS = Moderately susceptible. S = Susceptible.

Seeds of barley and wheat cultivar were sown in 20 cm diameter clay pots containing steam sterilized sandy loam soil. A week after emergence, the seedlings were thinned to 6/pot and inoculated with 10,000 eggs in 10 ml of water by each nematode isolate. The treatments were replicated 5 times.

Plants were harvested 70 days after inoculation. The roots were washed free of soil and immersed in aqueous phloxine B (0.15 g/l water) to stain the egg masses in the roots. Galls and egg masses were rated according to the scale: 0 = 0, 1 = 1-2, 2 = 3-10, 3 = 11-30, 4 = 31-100 and 5 = more than 100 galls or egg masses (Hadiocganda & Sasser, 1982). Plants with ratings 0-2 were categorised as resistant (R) 2.1 — 3.9 as moderately susceptible (MS) and 4 or greater as susceptible (S) to the nematodes. The dry weight of the root and shoot system of harvested plants were determined and the data statistically analyzed (Snedecor & Cochran, 1967).

Table 2. Effect of *Meloidogyne incognita* race 1 (MI-1) and race 3 (MI-3), *M. arenaria* (MA) and *M. javanica* (MJ) on root and shoot dry weights of barley and wheat cultivars.

Cultivar	Root dry weight (g)					Shoot dry weight (g)				
	C	MI-1	MI-3	MA	MJ	C	MI-1	MI-3	MA	MJ
Barley:										
Bonus	0.31a	0.15**	0.24	0.33	0.29	1.32	0.68**	1.12	1.24	1.47
CC 89	0.27	0.29	0.31	0.25	0.16*	1.47	1.15	1.12	1.30	0.85**
CC 163	0.34	0.36	0.29	0.34	0.22*	1.37	1.08	1.26	1.08	1.00**
Giza 121	0.28	0.25	0.16*	0.30	0.13*	1.33	1.26	0.96*	1.19	0.82**
Sahrawy	0.26	0.22	0.18	0.26	0.37	1.05	1.08	0.81	1.15	1.05
Wheat:										
Giza 155	0.39	0.38	0.38	0.39	0.22**	0.97	0.98	0.96	0.98	0.60*
Giza 157	0.38	0.37	0.36	0.38	0.28**	0.98	0.94	0.93	0.92	0.62*
Line 2188 x 1131	0.41	0.41	0.43	0.42	0.41	1.14	1.15	1.15	1.12	1.13
Sakha 8	0.43	0.41	0.42	0.43	0.41	1.39	1.40	1.39	1.37	1.38
Sakha 61	0.44	0.43	0.42	0.43	0.43	1.54	1.53	1.55	1.53	1.55
Sakha 69	0.41	0.40	0.41	0.42	0.42	1.41	1.41	1.40	1.41	1.40
Sakha 80	0.59	0.58	0.57	0.57	0.55	1.31	1.30	1.32	1.32	1.29
Stork	0.49	0.49	0.48	0.47	0.48	1.61	1.60	1.59	1.60	1.58

C = Control.

a Data are average of 5 replicates of 6 plants each.

* Significant at $P = 0.05$ from comparable control.

** Significant at $P = 0.01$ from comparable control.

Results and Discussion

All barley cultivars tested against 4 populations of root-knot nematodes were resistant to *M. arenaria* but susceptible or moderately susceptible to other nematode populations, except cvs. Bonus and CC 163 which were resistant to *M. incognita* Race 3 and *M. incognita* Race 1, respectively (Table 1). Previous studies by Oteifa & El-Gindi (1982) indicated that cvs. Bonus and Giza 121 were resistant to *M. incognita* (biotypes 2 and 3) but moderately susceptible to *M. incognita* biotype 4 and to *M. javanica*. In contrast all the wheat cultivars tested were found resistant to all 4 nematode populations, except cvs. Giza 155 and Giza 157 which were susceptible to *M. javanica* (Table 1).

Date of the effect of root-knot nematodes on the root and shoot dry weights showed that where cultivars were susceptible their growth was also reduced (Table 2). *M. javanica* significantly reduced root and shoot dry weight of barley cvs. CC 89, CC 163 and Giza 121. A significant reduction in root dry weight of cv. Bonus was found with *M. incognita* Race 1 infection. Root and shoot dry weights of cv. Giza 121 were significantly reduced after infection of *M. incognita* Race 3. In contrast, the root and shoot dry weight of wheat cultivars were not significantly reduced except for cvs. Giza 155 and Giza 157 infected by *M. javanica*. It may be mentioned that Kheir *et al.*, (1979), also found that *M. javanica* suppressed the growth of wheat cv. Giza 155.

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