

## THE ORNAMENTAL FOLIAGE PLANT CAST IRON, *ASPIDISTRA ELATIOR*, RESISTANT TO *MELOIDOGYNE INCOGNITA* AND *M. HAPLA*

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**Summary.** The reaction of cast iron plants (*Aspidistra elatior*) to Italian populations of the root-knot nematodes, *Meloidogyne incognita* race 1 and *M. hapla*, was evaluated under controlled conditions. Two groups, each of seven, of cast iron plants were transplanted into clay pots containing 1,000 cm<sup>3</sup> of steam sterilized sandy soil and artificially infested with 20,000 eggs and juveniles per pot of one or other of the nematode populations. Controls were pots into which plants of the susceptible tomato cv. Roma VF were transplanted. Forty days after nematode inoculation, root galls, eggs and second stage juveniles on the roots and different developmental stages within the roots of both species of nematode were virtually absent from the roots of cast iron plants but numerous in those of tomato. Therefore, cast iron can be considered highly resistant to both nematode species and shows promise for inclusion in rotations of flower crops to control these species of root-knot nematodes.

**Key words:** Host status, flower crop, root-knot nematodes, resistance.

In Italy about 2,618 ha are devoted to the propagation of ornamental foliage plants. Among these cast iron, *Aspidistra elatior* Blume, is becoming increasingly important. It is cultivated mostly in Campania (65 ha), Liguria and Tuscany and the area grown has increased by 10% per year over the last decade (Borrelli, 1997; D'Aponte and Longo, 2001). During a nematode survey of greenhouses in the Campania region several species of ornamental plants were found severely damaged by root-knot nematodes (Russo *et al.*, 2007). However, in the same infested green-houses, cast iron was never found infested. Further, the examination in 2005 and 2006 of a greenhouse previously found infested by root-knot nematodes and in which cast iron plants were subsequently grown showed negligible nematode soil population densities. Therefore, cast iron was suspected to be resistant to root-knot nematodes. Examination of perineal patterns of nematode females extracted from roots of infested flower plants showed them to be *Meloidogyne hapla* Chitw.

Therefore, a test was undertaken to confirm under controlled conditions the resistance of this plant. However, as *M. incognita* (Kofoid *et* White) Chitw. is the most common nematode in Italian greenhouses, this species was also considered along with *M. hapla*.

Twenty eight clay pots of 1 dm<sup>3</sup> were filled with sterilized sandy soil. Fourteen of the pots were each transplanted with one rhizome of cast iron having one sprout with two leaves and 10 cm in height on 5 March, 2007,

and the remaining fourteen were transplanted with one-month-old tomato (*Lycopersicon esculentum* L.) cv. Roma VF seedlings that served as controls. Four days later, each pot was inoculated with 20,000 eggs and juveniles of either *M. hapla* or *M. incognita* race 1. There were seven pots of each plant species inoculated with each nematode species. The pots were randomly arranged in a growth chamber maintained at 27 ± 2°C with 14 hours of light at an intensity of 3,000 lux and 10 hours of darkness.

The inocula of the two nematode species were obtained by rearing nematode populations from the collection of the second author's laboratory separately on tomato cv. Rutgers, in a glasshouse at 26 ± 2°C. Eggs and second stage juveniles were extracted from the roots using the NaOCl method (Hussey and Barker, 1973).

Forty days after inoculation, the plants were uprooted, the roots gently washed free of the adhering soil and weighed, and the gall index assessed according to a 0-5 scale (Taylor and Sasser, 1978). Eggs and second stage juveniles on each root were extracted by the NaOCl method (Hussey and Barker, 1973) and counted, and nematodes within the roots by Coolen's method (Coolen, 1979) and counted.

All data were subjected to analysis of variance and means were compared using the least significant difference (LSD).

The root gall index was zero for cast iron plants inoculated with *M. incognita* and *M. hapla* and severe (4.9 and 5) for tomato (Table I). Eggs and juveniles/g root of *M. incognita* and *M. hapla* were negligible (0.01 and 0.31, respectively) on cast iron and as large as 2514.8 and 1762.4, respectively, on tomato. The number of nematode specimens within the roots of plants inoculated with *M. incognita* and *M. hapla* was 0.18 and 0.13 for cast iron and

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**Table I.** Root weight, root gall indices, eggs and juveniles on the roots and all life stages of *Meloidogyne incognita* (Mi) host race 1 and *M. hapla* (Mh) in the roots of cast iron grown in a growth chamber at  $27 \pm 2$  °C.

Plant and nematode species	Root weight (g)	Gall index (0 – 5)*	Eggs and juveniles/g root	Specimens/g root
<i>Aspidistra</i> + Mi	17.8	0	0.02	0.18
<i>Aspidistra</i> + Mh	11.5	0.1	0.31	0.13
Tomato cv Rutgers + Mi	4.5	4.9	2514.8	110.3
Tomato cv Rutgers + Mh	5.2	5	1762.4	67.4
LSD (P ≤ 0.05)		0.04	0.229	0.205

\*0 = no gall, 1 = 1-2 galls, 2 = 3-10, 3 = 11-30, 4 = 31-100 and 5 = more than 100 galls.

110.3 and 67.4/g for tomato, respectively. In the roots of cast iron the greatest proportion of the nematode specimens were juveniles of the second and third developmental stages; females were few and no difference was observed between the two nematode species.

The results clearly demonstrated that *A. elatior* is resistant to the Italian populations of *M. incognita* race 1 and *M. hapla*. However, Misra and Mishra (1998) reported *A. elatior* to be susceptible to an Indian population of *M. incognita*. These discrepancies in host response to *M. incognita* are probably due to differences in the origin and virulence of the nematode populations used and/or response to the nematode of the different *A. elatior* cultivars, which were, however, unknown in both studies.

As most flower plants are very susceptible to root-knot nematodes, cast iron could play a key role in the control of these nematodes if rotated with susceptible plants within an integrated management system for both *M. hapla* and *M. incognita* as it would reduce nematode soil populations to non-damaging levels. However, whether *A. elatior* is also resistant to other root-knot nematode species and races needs to be investigated.

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