Susceptibility of Impatiens Cultivars to Root-Knot Nematode, *Meloidogyne arenaria*

J. T. WALKER, Professor, Department of Plant Pathology, University of Georgia College of Agriculture, Georgia Station, Experiment, GA 30212

ABSTRACT

WALKER, J. T. 1980. Susceptibility of Impatiens cultivars to root-knot nematode, *Meloidogyne arenaria*. Plant Disease 64:184-185.

Impatiens cultivars consisting of 10 commercial hybrids, three plant introductions, and eight New Guinea hybrids were all susceptible to the root-knot nematode *Meloidogyne arenaria* in the greenhouse. Cultivars Futura White and Futura Red may have had some tolerance, based on growth and root-knot index. All infected cultivars, with the exception of Futura Red, weighed less (dry weight) than noninfected control plants. Infected commercial hybrids generally were taller than control plants, whereas New Guinea hybrids were shorter.

Impatiens holstii Engl. and Warb (= I sultana Hook.), commonly known as sultana, garden balsam, or cultivated touch-me-not, is a popular annual for shady or semishady gardens. A wide choice of foliage and flower colors is now available (3). Although the newest hybrids are cultivated from seed, cuttings root easily in moist sand or water and therefore are propagated readily for use as houseplants or transplants.

Impatiens is susceptible to several diseases caused by fungi, such as *Fusarium* wilt, white mold caused by *Sclerotium rolfsii,* and damping-off caused by *Rhizoctonia solani* (4). The plants are also susceptible to viruses (2) and various nematode species (1), including the root-knot nematode. The effect these nematodes have on the growth of the newer hybrids is not documented.

The purpose of this study was to determine the relative susceptibility of Impatiens hybrids and species to one root-knot nematode species, *Meloidogyne arenaria* (Neal) Chitwood, under greenhouse conditions. This nematode, commonly referred to as the peanut root-knot nematode, was chosen because of its widespread natural distribution in the South.

MATERIALS AND METHODS

Hybrid Impatiens seed (10 cultivars), obtained from Park Seed Co., Greenwood, South Carolina, were planted in a commercial medium (Metro-mix) composed of sand, peat, and ground pine bark. Patented New Guinea hybrids (eight cultivars) were provided by California-Florida Plant Corp., Fremont, California. Three plant introductions (PIs) were available through the Horticulture Department, Georgia Station.

Four plants were transplanted into one 12.5-cm diameter plastic pot containing approximately 1 L of pasteurized soil mix consisting of three parts soil (clay-loam), one part vermiculite, and one part peat. A minimum of three replicate pots for each cultivar or species was maintained for both the infected and the control series, but as many as 15–20 replicates were used in some trials when sufficient plants were available. Plants were fertilized with Peter's water-soluble fertilizer (20-20-20) or Osmocote (12-12-12).

Accepted for publication 4 October 1979.

00191-2917/80/000037$03.00/0

Table 1. Root-knot index and average percentage change in height and shoot weight of Impatiens infected with *Meloidogyne arenaria* compared with noninfected plants under greenhouse conditions

Cultivar	Percentage increase (+) or decrease (−)		Root-knot index[a]
	Height	Fresh weight	
Twinkles	+ 0.3	−21.1	1.4
Garden Blue	+ 6.3	−17.1	1.6
Fuchsia	− 2.7	−41.4	1.9
Imp series F_1 (pink)	+ 0.9	−42.2	3.1
Imp series F_1 (rose)	+10.6	− 9.7	1.5
Imp series F_1 (salmon)	+20.3	− 9.8	2.3
Scarlet	+20.3	−20.3	2.3
Scarlet Baby	− 2.5	−18.9	2.1
Futura Red	+12.3	+ 2.1	1.8
Futura White	+ 5.9	−12.4	1.2
PI 354261	+19.0	−40.3	4.0
PI 354264	−40.6	−47.1	2.5
PI 354265	− 2.8	−12.6	2.4
Aztec	−27.4	−40.0	2.0
Chickasaw	−26.1	−52.6	1.7
Chippewa	− 8.4	−40.7	2.7
Creek	−26.3	−39.2	2.0
Hopi	−19.2	−44.8	1.3
Maya	−15.0	−48.6	1.7
Navajo	−15.9	−35.3	2.0
Shawnee	−18.3	−57.7	1.3

[a] 0 = no observable knots on roots and 1 = 1–25%, 2 = 26–50%, 3 = 51–75%, and 4 = 76–100% of the root system knotted.

When plants attained a height of 6–8 cm, they were carefully removed along with the upper half of soil in each pot. Then, 5 g of galled Bonny Best tomato roots infected with *M. arenaria* was distributed evenly over the bottom half of soil in each pot. The Impatiens plants were reset immediately in the same pot from which they had been removed. A disturbed and replanted noninfected series of each cultivar served as controls.

The height and fresh weight of the top growth in each replicate were determined 3–5 mo after infection. The root system of each replicate was examined for root-knot development and rated on a scale of 0 to 4, with 0 = no observable knots on roots and 1 = 1–25%, 2 = 26–50%, 3 = 51–75%, and 4 = 76–100% of the root system knotted.

RESULTS AND DISCUSSION

All Impatiens cultivars were susceptible to *M. arenaria* (Table 1). Cultivars Futura White and Futura Red may have had slight tolerance, based on the combined fresh weight changes and root-knot index from several trials. Hopi and Shawnee had the lowest root-knot index rating among the New Guinea hybrids, followed by Chickasaw and Maya. The susceptibility of the New Guinea hybrids, however, was not very different from that of the Imp series F_1 hybrids or the three PIs.

The height of infected hybrids was not consistently diminished; in fact, some plants were slightly taller (7%) than the average of the control plants. Infected New Guinea hybrids, however, were consistently shorter than their noninfected counterparts by approximately 20%.

Fresh weight of infected plants averaged 23% less than that of noninfected plants. The weight of most hybrid plants ranged from 12 to 29% less than that of the control plants, whereas the New Guinea hybrids had a weight differential of 40% or greater. The three PI cultivars also produced less growth (33%) when infected with root-knot nematodes. Apparently, fresh weight was affected more than plant height by the nematode, even at relatively low populations. Futura Red was the only cultivar infected with nematodes that had a fresh weight greater than that of the control plants.

The genetic constitutions of the available and popular Impatiens appear to be nearly identical with regard to susceptibility to *M. arenaria*. New cultivars should be sought and evaluated for susceptibility to various root-knot species in order to provide breeders with resistance information. Commercially acceptable cultivars with resistance to root-knot nematodes are desirable for nematode control in home gardens.

LITERATURE CITED

1. GOODEY, J. B., M. T. FRANKLIN, and D. J. HOOPER. 1965. The Nematode Parasites of Plants Catalogued Under Their Hosts. Commonwealth Agricultural Bureaux. Farnham Royal, England. 214 pp.
2. LOCKHART, B. E., and F. L. PFLEGER. 1979. Identification of a strain of tobacco ringspot virus causing a disease of Impatiens in commercial greenhouses. Plant Dis. Rep. 63:258-261.
3. TAYLOR, P. V. 1979. Making the marriage of the flowers. Ornamentals South 1:12-13.
4. U.S. DEPARTMENT OF AGRICULTURE. 1960. Index of Plant Diseases in the United States. U.S. Dep. Agric. Handb. No. 165. 531 pp.