STOKES: VIOLA NEMATODES

MELOIDOGYNE JAVANICA PARASITISM TO VIOLA LANCEOLATA

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ABSTRACT

A root-knot nematode, Meloidogyne javanica (Treub, 1885) Chitwood, 1949, is newly reported to parasitize roots of Viola lanceolata L. Root galls typical of root-knot nematode injury were produced by M. javanica on this violet. Multinucleate giant cells, usually 4 or 6 in number, were adjacent to each adult female nematode embedded in root tissue. Cortical and vascular tissues were commonly invaded by the nematode. Males were readily produced and were usually found in egg masses.

INTRODUCTION

In the fall of 1966 a Viola lanceolata L. plant with root galls from Picolata, Florida, was collected by Division of Plant Industry Plant Specialist A. E. Graham. Laboratory examinations revealed root-knot nematodes, later identified as Meloidogyne javanica (Treub, 1885) Chitwood, 1949, associated with the violet root galls. A check of Division of Plant Industry host-parasite files and Goody, et al (4) revealed this nematode-host association was previously unreported. A study of the relationship between M. javanica and this violet was initiated.

LITERATURE REVIEW

Meloidogyne javanica parasitizes many higher plants, including ornamental flowering plants (4). Treub (16) first worked with the parasitism of this nematode to higher plants in his work with sugar cane. M. javanica is reported to attack Viola odorata L. (7), Viola tricolor (8), and Viola sp. (5). Chitwood (2) reports moderately large galls to be formed by M. javanica hosts. Bird (1) established that continuous stimulation from M. javanica was required for giant cell development and maintenance. Several authors (3, 9, 11, 12, 13, 15) have established M. javanica involved in plant diseases.

EXPERIMENT METHODS

Viola lanceolata seeds surface sterilized for two minutes in a 1:1000 mercuric chloride solution were germinated in a petri dish on filter paper soaked with distilled water. All the composite had been previously autoclaved. These germinated seedlings were planted in heat-treated soil mixed especially for greenhouse use. At the time of planting each violet was inoculated with approximately 200 M. javanica eggs produced by a single female. Inoculum was obtained from naturally infected V. lanceolata, which had been maintained in a greenhouse. Inoculated plants were maintained in a plastic greenhouse where temperatures ranged 20-32° C.

Roots of some inoculated plants were examined at seven-day intervals to assess gall development. A pair of inoculated violets were left undisturbed for six weeks to compare with others which had been disturbed. The foliage of all plants was inspected daily. Normal greenhouse care was afforded test plants except that no pesticides were applied.

Galls from infected roots were harvested from inoculated plants and naturally infected plants for histological study. Roots were selected in early and advanced gall developmental stages for this work. Severely infected roots of naturally infected material were selected for comparative studies.

Results and Discussion

Slight root galling was observed on inoculated violet roots seven days after inoculation. The differentiation and maturation regions of roots were the areas where galling was first
observed. Increases in root diameter at infection sites occurred between inspection intervals throughout the trial. Disturbance of root systems had no apparent effect on the increase of root diameter. Root gall size was directly proportional to numbers of root-knot females present. Egg masses were first observed attached to *M. javanica* females in galled areas thirty-four days after inoculation (Fig. 1). Specimens of *M. javanica* males were commonly associated with egg masses. Intersexed males, characteristic of the species (14), were also observed.

Examination of stained serial sections revealed *M. javanica* associated with each swollen root studied. The normal number of giant cells associated with one nematode was 4-6. Usually more than one giant cell was present adjacent to another with the nematode head always against or between giant cells (Fig. 2). Severely infected roots were largely composed of the nematode or its effects. Giant cell nuclei were dispersed inside the cell (Fig. 3). Cytoplasm within the giant cells was more dense than that inside normal cells.

The nematodes most commonly parasitized vascular cells or inner cortical cells. The heads of the developing nematodes were oriented in their feeding sites towards the root tips. In some instances the vascular system was largely comprised of developing giant cells. Some cells appeared compressed by pressure of developing nematodes, giant cells and egg masses (Fig. 4).
Giant cell maintenance in infected *V. lanceolata* roots required continuous stimulation by *M. javanica* as reported by Bird (1).

**LITERATURE CITED**


**COMPARISON OF YELLOW STRAPLEAF SYNDROMES PRODUCED BY ANCPA AND ISOMERS OF ISOLEUCINE**

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**ABSTRACT**

The physiological disorder of chrysanthemum known as yellow strapleaf was closely reproduced by root zone applications of 1-amino, 2-nitrocyclopentane 1-carboxylic acid (ANCPA) and by similar applications of DL-alloisoleucine or a mixture composed of 50% DL-alloisoleucine and 50% DL-isoleucine. The syndromes produced by ANCPA and isomers of isoleucine differed in two ways under the test procedure involving application of the chemicals at the time Iceberg chrysanthemum plants were pinched, namely, (1) the upper leaves present on the plants at the time of treatment were subsequently much yellower in color as a result of ANCPA treatment than of isoleucine treatment; (2) and the ANCPA-treated plants recovered from a given degree of growth retardation more rapidly than the isoleucine-treated plants.

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Florida Agricultural Experiment Stations Journal Series No. 2615.