Histopathology of Thuja orientalis and Juniperus horizontalis plumosa Infected with Meloidogyne incognita[1]

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In an unsuitable host *Meloidogyne* spp. produced few or no mature females (2, 5, 6, 10). The most common reaction of this relationship is reduced plant growth (9). Although typical root galls are the most noticeable evidence of *Meloidogyne* infection, variable root symptoms have been reported on some resistant plants.

Fassuliotis (8) observed that resistant *Cucumis ficifolius* and *C. metuliferus* infected with *M. incognita acrita*, showed only slight swelling whereas the susceptible *C. melo* developed extensive galls. Barriga-Olivares (1) reported that five *Meloidogyne* species attained only a low level of reproduction in two camellia species and that symptoms included typical galls, swelling and root tip necrosis. Nemec and Struble (10) found that coniferous woody ornamental plants were more resistant to *M. incognita* (Kofoid & White, 1919) Chitwood, 1949, than woody ornamental angiosperms. Typical symptoms on the coniferous species consisted of roots thickened two to three times their normal diameter, and slight galling.

In this study the host-parasite relations of *M. incognita* were examined in roots of two conifers which supported a low level of nematode development and responded with atypical root symptoms (10).

Plant species studied were *Juniperus horizontalis plumosa* Rehd. and *Thuja orientalis* L. 'Dwarf Greenspike'. Preparation of inoculum and procedures used to grow and inoculate these plants have been reported (10). Rooted cuttings of both species were grown for 75 days in infested and noninoculated soil. Infected and check root pieces were killed in FAA, dehydrated in tertiary butyl alcohol, infiltrated with a paraffin-beeswax-Tissuemat mixture, rotary microtomed at 15 μ and stained with safranin and fast green.

Larvae feeding in *J. horizontalis plumosa* roots stimulated formation of one to several thin-walled, elongated giant cells with enlarged nuclei. Few larvae developed beyond the spike stage, none laid eggs, and no necrosis was associated with their feeding. Median bulbs of feeding larvae were larger than those in larvae found in the soil, an indication that they were activity feeding (7). Moderate hypertrophy occurred in cortical and vascular tissues occupied by larvae (Fig 1A). Symptoms of *M. incognita* infection in *T. orientalis* 'Dwarf Greenspike' roots were similar with these exceptions. Giant cells usually were larger with thicker walls; cells surrounding maturing larvae became necrotic; limited numbers of larvae reached the egg laying stage; and hypertrophy seemed most prevalent in the stele.

Thickened roots and only slight galling caused in these plants by *M. incognita* contrasts with typical galling reported in other woody plants infected with *Meloidogyne* spp. (3, 12, 13). Reduced stelar and cortical hypertrophy, limited giant cell size and elongate shape probably account for roots of these conifers not being characteristically galled. Osborne and Jenkins (11) suggested that mild cortical hypertrophy in *Forsythia intermedia* galls initiated by *M. hapla* caused the galls to be small.

Resistance was expressed similarly in both plant species, except that hypersensitivity was absent in *J. horizontalis plumosa*. However, Dropkin (4) found that hypersensitivity was not entirely necessary for expression of plant resistance. Resistance characteristics shared by both plants were (i) delayed maturation of fewer larvae to the adult stage, (ii) reduced giant cell number and development, and (iii) moderate cortical hypertrophy. Fassuliotis (8) observed some of these relationships in *C.*

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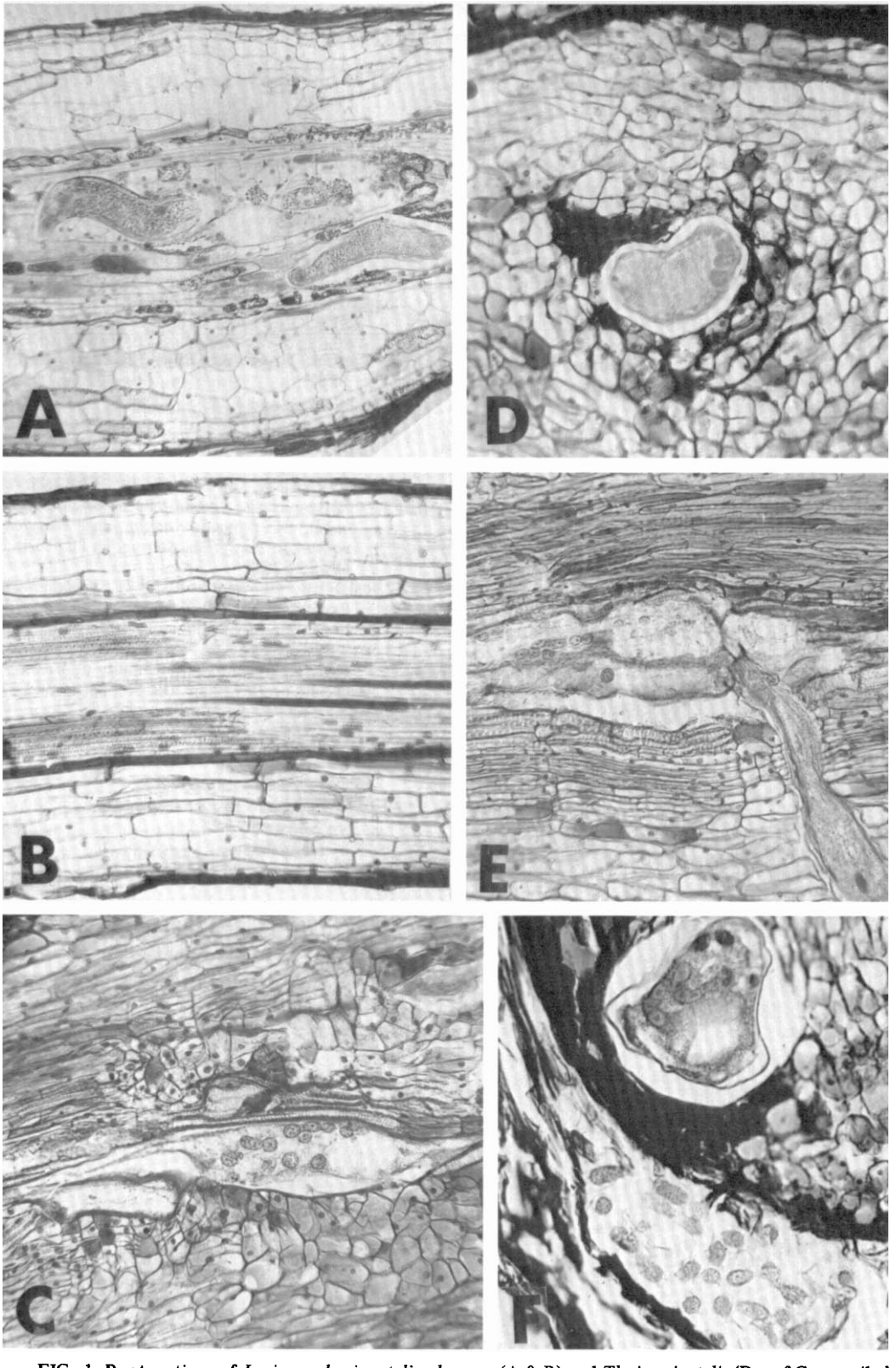

FIG. 1. Root sections of *Juniperus horizontalis plumosa* (A & B) and *Thuja orientalis* 'Dwarf Greenspike' (C, D, E, F). **A.** Disorganized vascular tissue containing *Meloidogyne incognita*. **B.** Noninfected root. **C.** Longitudinal section of giant cell. **D.** Necrotic phloem surrounding female. **E.** Larva feeding on giant cells. **F.** Adult with egg mass deposited in cortex.

metuliferus and *C. ficifolius* infected with *M. incognita acrita*.

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