CANADA

Timber Talks

Department of Fisheries and Forestry

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Feeding Habits of Nematodes No. 69

Damaging agents or conditions within a forest nursery that inhibit the production of an abundant supply of healthy and vigorous seedlings are matters of grave concern for programs of reforestation. Seedlings in nurseries in coastal British Columbia are subject to attack from a dagger-type nematode (Xiphinema bakeri). These pests feed as parasites on Douglas fir, Sitka spruce, white spruce and grand fir seedlings, and cause a serious root disease (corky root rot) of Douglas-fir seedlings. To gain a better understanding of the causes of the damage, the nematodes' feeding habits were investigated in the laboratory.

Seeds of coastal and interior Douglas fir, Sitka spruce, white spruce, grand fir and western hemlock were surface sterilized, germinated asceptially and the root radicals pushed into 2% water agar. When the roots were 1-2 cm long, 10-15 nematodes, picked from nursery soil, were added to each root. Observations were made with transmitted and incident lighting at magnifications up to 500X.

Feeding occurred on all species except western hemlock, and usually ceased on white spruce and grand fir when light was applied. On Douglas fir and Sitka spruce 25% of the nematodes were feeding on the roots within 12 hr; the others wandered off and died. The worm selected a feeding site by moving along the root and nudging the epidermal cells with its head; this was accompanied by a thrusting back and forth movement, and twisting of a small stylet, or spear in its mouth. Plant cells selected for feeding were punctured by the stylet, which was then pushed into the cell by a steady motion, and usually within 5 seconds pulsating movements in the nematodes esophagus (stomach) started; periods of pulsation alternated with periods of inactivity. After feeding on a cell, the nematode punctured the next deeper cell, progressing inward from the root epidermis. The nematode's body was usually arched during feeding, and the time it remained at a feeding site varied from 20 seconds to 81 minutes. Depth of stylet penetration depended on the worm's age and penetration was always intracellular; after feeding, the stylet was retracted by a backward movement of the insect.

Initially the worms fed at random along the roots, but after one week feeding was concentrated on the root tips. All life stages except first stage larvae were observed feeding. Visible symptoms of the attack were darkening and swelling of root tips and cessation of growth.

Feeding habits of this nematode are similar to many others except for twisting of the stylet. Preference for feeding on root tips explain the root symptoms of galling, darkening and lack of lateral root development associated with attacks from this nematode. Root tip feeding appears to cause the initiation of symptoms typical of corky root disease, but deep penetration and feeding in the meristematic tissues of the roots is needed for disease development.

REPORT: Feeding of Xiphinema bakeri. Jack R. Sutherland. Forest Research Laboratory, Victoria, B.C.