

Nematodes Associated with Plants from Naturally Acidic Wetlands Soil¹

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Abstract: Four plants, *Cyperus ochraceus*, *Eriocaulon compressum*, *Lythrum alatum*, and *Xyris jupicai*, growing along the shoreline of an oligotrophic lake in north central Florida were sampled for nematodes. The nematodes recovered were placed in four trophic groups: bacterivores, herbivores, omnivores, and predators. When the nematodes on all plants were considered, 27% were bacterivores, 23% were herbivores, 7% were omnivores, and 43% were predators. *Tripyla* was the dominant predator and the dominant genus of all nematodes, and *Malenchus* was the dominant herbivore. Dominance was not clearly pronounced in the other trophic groups.

Key words: acidic soil, bacterivore, *Cyperus ochraceus*, *Eriocaulon compressum*, herbivore, *Lythrum alatum*, nematode, oligotrophic lake, omnivore, predator, *Xyris jupicai*.

During a survey for herbivorous nematodes that may have potential as biological control agents of aquatic weeds, we sampled plants on the shoreline of an acidic lake in Florida. The plants were collected at Lake McCloud, a small (5 hectares, 5 m depth) soft-water oligotrophic lake located on the University of Florida's Katherine Ordway Ecological Reserve in Putnam County in north central Florida. The soil around the lake has a pH of 4.6-4.8, is brown in color, and consists of fine marine sands, kaolinitic sands, and sandy clays of Recent and Pleistocene origin. Floral diversity around the lake is impoverished due to the soil's low nutrient levels (1,3,10).

MATERIALS AND METHODS

Because destructive sampling in the Ordway Reserve is greatly restricted, we removed only one plant of each of four species, selected on the basis of their numerical dominance around the lake. Samples were taken in October 1984 on the southeastern shore of the lake from a 5 m² area situated 3 m from the water line. A plant, including its root mass and a core of adhering soil about 10 cm in diameter and

20 cm deep, was removed and placed in a plastic bag. The bags were stored in an ice chest for transport to the laboratory.

Plant species were identified by staff of the Herbarium, Institute of Food and Agricultural Sciences, University of Florida as sedge, *Cyperus ochraceus* Vahl. (Cyperaceae); pipewort, *Eriocaulon compressum* Lamarck (Eriocaulaceae); purple loosestrife, *Lythrum alatum* var. *conceolatum* (Elliot) Torrey and Gray (Lythraceae); and common yellow-eyed grass, *Xyris jupicai* Richard (Xyridaceae). All four plant species are wetlands species and are considered to be acidophilic (5-8). *Xyris jupicai* is not native to Florida; the other are.

The soil was shaken from each root mass, screened to remove any objects larger than 1 mm², mixed thoroughly, and a 100-cm³ subsample taken. Nematodes were extracted from the soil with a centrifugation-sugar flotation technique (4), concentrated on a sieve with 38-µm pore opening, and resuspended in water. The specimens were fixed in hot formaldehyde (final concentration = 2.5%), processed to glycerine (11), mounted in glycerine on microscope slides, identified to genus, and placed in the trophic groups bacterivores, herbivores, omnivores, or predators (9, 12).

RESULTS AND DISCUSSION

Densities of bacterivores were low on all plants, but 19 genera were present (Table 1). *Chronogaster*, *Euteratocephalus*, *Prismato-*

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laimus, and *Zeldia* were most common. Only *Prismatolaimus* and *Zeldia* were present around all four plants. Four of the genera, *Eumonhystera*, *Euteratocephalus*, *Paraphanolaimus*, and *Prismatolaimus*, have

been reported to be "acidophilic" forms characteristic of low pH environments (2). Bacterivores composed 27% of all nematodes recovered.

Four genera of herbivores were present:

TABLE 1. Genera and numbers of nematodes from soil around the roots of *Cyperus ochraceus*, *Eriocaulon compressum*, *Xyris jupicai*, and *Lythrum alatum* var. *conceolatus* on the shoreline of Lake McCloud, an acidic lake in north central Florida.

| Nematode genus | Number of nematodes per 100 cm ³ soil | | | | |
|-----------------------------------|--|-------------------|--------------|----------------|---------------|
| | <i>Cyperus</i> | <i>Eriocaulon</i> | <i>Xyris</i> | <i>Lythrum</i> | On all plants |
| Bacterivores | | | | | |
| <i>Alaimus</i> de Man | 3 | 1 | — | — | 4 |
| <i>Aphanolaimus</i> de Man | — | — | 2 | — | 2 |
| <i>Araeolaimus</i> de Man | — | 1 | — | — | 1 |
| <i>Aulolaimus</i> de Man | — | 1 | — | — | 1 |
| <i>Bastiania</i> de Man | 3 | — | 1 | — | 4 |
| <i>Chromadora</i> Bastian | — | — | — | 2 | 2 |
| <i>Chronogaster</i> Cobb | 3 | 7 | — | 4 | 14 |
| <i>Cryptonchus</i> Cobb | 1 | 5 | 1 | — | 7 |
| <i>Cylindrolaimus</i> de Man | — | 1 | — | 1 | 2 |
| <i>Eumonhystera</i> Andr ssy | 1 | — | — | — | 1 |
| <i>Euteratocephalus</i> Andr ssy | 1 | 8 | — | 2 | 11 |
| <i>Leptolaimus</i> de Man | — | — | — | 2 | 2 |
| <i>Macrolaimus</i> Maupas | — | — | — | 1 | 1 |
| <i>Odontolaimus</i> de Man | — | 2 | — | — | 2 |
| <i>Paraphanolaimus</i> Micoletzky | 1 | — | — | — | 1 |
| <i>Prismatolaimus</i> de Man | 2 | 6 | 4 | 2 | 14 |
| <i>Rhabditis</i> Dujardin | — | — | 1 | — | 1 |
| <i>Tylocephalus</i> Crossman | 1 | — | — | — | 1 |
| <i>Zeldia</i> Thorne | 2 | 2 | 4 | 2 | 10 |
| Total bacterivores | 18 | 34 | 13 | 16 | 81 |
| Percentage bacterivores | 22 | 42 | 16 | 20 | 27 |
| Herbivores | | | | | |
| <i>Atylenchus</i> Cobb | — | 1 | 1 | 3 | 5 |
| <i>Basiria</i> Siddiqi | — | — | — | 4 | 4 |
| <i>Helicotylenchus</i> Steiner | 1 | 5 | — | 4 | 10 |
| <i>Malenchus</i> Andr ssy | — | 10 | 39 | 3 | 52 |
| Total herbivores | 1 | 16 | 40 | 14 | 71 |
| Percentage herbivores | 1 | 22 | 56 | 20 | 23 |
| Omnivores | | | | | |
| <i>Dorylaimus</i> Dujardin | — | — | 1 | — | 1 |
| <i>Laimydorus</i> Siddiqi | 12 | — | 1 | — | 13 |
| <i>Mesodorylaimus</i> Andr ssy | — | 3 | 4 | — | 7 |
| Total omnivores | 12 | 3 | 6 | 0 | 21 |
| Percentage omnivores | 57 | 14 | 29 | 0 | 7 |
| Predators | | | | | |
| <i>Actinolaimus</i> Cobb | 1 | — | 1 | — | 2 |
| <i>Aulolaimus</i> de Man | — | 1 | — | — | 1 |
| <i>Diplogaster</i> Schultz | 1 | — | — | — | 1 |
| <i>Labronema</i> Thorne | — | — | 1 | — | 1 |
| <i>Mononchulus</i> Cobb | 2 | — | — | 2 | 4 |
| <i>Nygolaimus</i> Cobb | — | — | 4 | — | 4 |
| <i>Onchulus</i> Cobb | — | 1 | 8 | — | 9 |
| <i>Tobrilus</i> Andr ssy | — | — | 5 | 2 | 7 |
| <i>Tripyla</i> Bastian | 20 | 44 | 12 | 26 | 102 |
| Total predators | 24 | 46 | 31 | 30 | 131 |
| Percentage predators | 18 | 35 | 24 | 23 | 43 |
| Total all nematodes | 55 | 99 | 90 | 60 | 304 |

Atylenchus, associated with *E. compressum*, *L. alatum* var. *conceolatus*, and *X. jupicai*; *Bassiria*, associated with *L. alatum* var. *conceolatus*; *Helicotylenchus*, associated with *C. ochraceus*, *E. compressum*, and *L. alatum* var. *conceolatus*. All are new host reports. Only in the case of *Malenchus* on *X. jupicai* was a herbivore the dominant taxon in a fauna. All four genera were associated with *L. alatum* var. *conceolatus*, the only dicotyledonous plant sampled. Herbivores composed 23% of all nematodes.

Omnivores were very low in numbers and were represented by only three genera, *Dorylaimus*, *Labronema*, and *Mesodorylaimus*. No omnivores were present on *Lythrum alatum* var. *conceolatus*. Omnivores composed 3.0% of all nematodes.

Predators were represented by eight genera. *Tripyla* was the most abundant genus of predators as well as of all trophic groups present, and was the only predator associated with all four plants. The greatest number of predator genera, five, was associated with *X. jupicai*, but the greatest number of individuals, 46, was associated with *E. compressum*. Predators composed 43% of all nematodes recovered.

The greatest numbers of individuals occurred on *E. compressum* and *X. jupicai*, primarily due to large numbers of *Malenchus* on *X. jupicai* and *Tripyla* on *E. compressum*. Total numbers of all nematodes associated with each plant were low, never exceeding 100 individuals per 100 cm³ of soil. The predator *Tripyla* was the most numerous genus associated with all plants except *X. jupicai*, where the herbivore, *Malenchus*, was more numerous. Considered by trophic groups, predators were most abundant around *C. ochraceus*, *E. compressum*, and *L. alatum* var. *conceolatus*, and were the

second most abundant trophic group associated with *X. jupicai*. Herbivores were the most numerous group around *X. jupicai*.

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