Soil Ecology and Nematology Training Course

August 21-31, 2012 – Texcoco, Mexico

Lectures, Laboratory exercises and Practical training

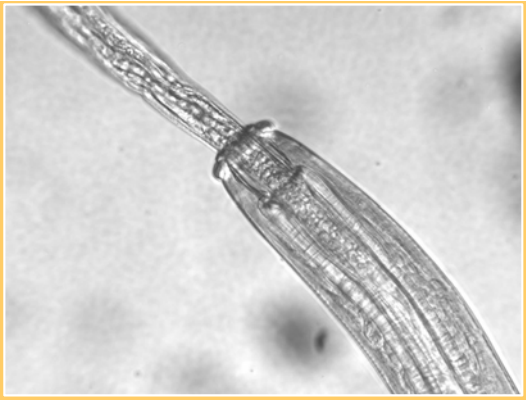
The soil ecosystem and nematodes

The organisms of the soil food web derive carbon and energy through plant- bacterial- or fungal-feeding and through successive levels of parasitism or predation. The functional roles of nematodes and other soil organisms, determined by their metabolic and behavioral activities, may be categorized as ecosystem services or disservices. Important services attributable to nematodes include mineralization of nutrients and the regulation or suppression of pest organisms, including plant-feeding species. Among the disservices plant-damage, which reduces carbon fixation and its availability to the food web, and overgrazing of prey, which diminishes abundance and beneficial functions of prey organisms.

Management to ameliorate potential disservices of certain nematodes may result in unintended but long-lasting diminution of the services of others. Beneficial roles of nematodes may be enhanced by environmental stewardship that fosters greater biodiversity and, consequently, complementarity and continuity of their services. Sustainable management to minimize the disservices and maximize the services of soil organisms requires understanding of their functional roles, their response to resource amendment or depletion, and their tolerance of disturbance.

The Latin American and Caribbean (LAC) region is a food production source for future generations worldwide. Conservation and remediation of soil health are priorities for sustainable and resilient agriculture; capacity building in eco-efficient stewardship of our natural resources is a key step component of that goal.

This course will address the recognition, biology and management of plant-parasitic and other soil nematodes within the context of stewardship of the entire soil ecosystem, including its biotic and abiotic components.



Instructors

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Lecture material to include:

1. The soil ecosystem: spatial patterns, linkages, connectance, top-down and bottom-up forces, management and disturbance effects.
2. Overview of the Nematoda, diversity, habitats, trophic roles, functional guilds – patch, landscape, regional and global levels.
3. Biology and life history of plant-feeding nematodes: root associates, ectoparasites, migratory and sedentary endoparasites.
4. Host-parasite interactions at the molecular, cellular and whole plant levels.
5. Important nematodes of subtropical and tropical crops – annuals and perennials.
6. Important nematodes of temperate crops – annuals and perennials.
7. Plant-parasitic nematodes important in landscape, recreational and natural systems.
8. Bacterial- and fungal-feeding nematodes, their indicator value, functional roles and their importance in nutrient cycling and soil ecology.
9. Generalist and specialist predator nematodes, their indicator value, functional roles and their importance in regulation of the soil food web.
10. Sustainable approaches to management of the soil ecosystem to achieve desired goals: reduced plant damage, soil fertility, conservation, host status, productivity, profitability.
11. Measurement and assessment of nematode assemblages: sampling, faunal analysis, molecular diagnostics, economic threshold concepts, cropping sequence optimization..
12. Concepts of sustainable management: population regulation, competition, antagonism, other biological, physical, chemical, cultural approaches, impacts on the system and the environment – integration and disintegration.

Laboratory exercises and practical training:

1. Observation and identification of specimens in relation to the above areas.
2. Use of keys, on-line, morphometric, anatomical and molecular approaches.
3. Signs and symptoms associated with parasitism in various hosts and cropping systems.
4. Biological antagonists.
5. Physical disturbance effects: heat, tillage, organic input, flooding, etc.
6. Cropping sequence simulations based on biological attributes and host status.
7. Interactions with other organisms: beneficial, apparent competition, disease complexes.
8. Soil sampling and assessment, faunal analyses of diverse production and natural systems.

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