

Plant Parasitic Nematodes In The Potato Growing Areas Of Maine

Nematodes are major pests of a number of temperate crops and can cause significant economic losses to farmers. This book provides a comprehensive account of such parasites, with chapters focusing on nematode pests of the main crops of importance in agriculture, horticulture and forestry. Written by leading authorities from the USA, UK, Canada, France, Netherlands, Australia, Bolivia and New Zealand, this book is a definitive reference work for plant pathologists in general, and nematologists in particular. Nematology being an established discipline covers a wide range of area ranging from basic aspect to the advanced and applied aspects involving recent advances in molecular techniques. This book discusses the following topics: the role of nematodes in our life (in agriculture, ecosystem functioning, experimental biology, ecological studies, pest management programs, or biocontrol), identification of GRSPs in nematode genomes, novel way for the diagnosis of pathogenic nematodes involving various recent molecular techniques, other methodologies for successful control of termites, evolution of plant-parasitic nematodes, viability of adult filarial nematode parasites,

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the impact of plant-parasitic nematodes on crops, and harnessing useful rhizosphere microorganisms for nematode control. The book also encompasses on classical study, molecular study, bioinformatics in nematology, biodiversity analysis, and culturing of nematodes in laboratory condition.

Plant-parasitic nematodes are recognized as one of the greatest threats to crop production throughout the world. Estimated annual crop losses of \$8 billion in the United States and \$78 billion worldwide are attributed to plant parasitic nematodes. Plant parasitic nematodes not only cause damage individually but form disease-complexes with other microorganisms thereby increasing crop loss. Nematode diseases of crops are difficult to control because of their insidious nature and lack of specific diagnostic symptoms which closely resemble those caused by other plant pathogens and abiotic diseases. Future developments of sustainable management systems for preventing major economical agricultural losses due to nematodes is focused on strategies that limit production costs, enhance crop yields, and protect the environment. This book presents a first compendium and overview for nematode problems and their management across North America. Each chapter provides essential information on the occurrence and distribution of plant parasitic nematodes, their major crop hosts, impact on crop production and sustainable

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management strategies for each region of the continent including, Canada, Mexico and all states of the USA. For each region, a thematic overview of changes in crop production affected by plant parasitic nematodes and their management strategies over time will provide invaluable information on the important role of plant parasitic nematodes in sustainable agriculture.

Electron Microscopy of Plant Pathogens

Plant Parasitic Nematodes

Plant Parasitic Nematodes of India

Plant Nematology

A Guide to Introductory Nematology

Soil Ecosystem Management in Sustainable Agriculture

This book establishes a solid base in palaeonematology with descriptions of 66 new fossil species and accounts of all previous fossil and subfossil nematodes from sedimentary deposits, coprolites, amber and mummies.

Most plant feeding nematodes occur in soil and infect roots. For a crop like banana, it is not known where in the root system these nematodes feed and cause damage and if banana genotypic differences in root development affect nematode infection and damage. By suppressing root growth and activity, nematodes may affect the nutritional status of the plants, while soil nutritional status would also affect nematode infection and damage. So, manipulation of soil nutrients may be a tool for managing nematodes

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in bananas. This monograph shows that nematodes are randomly distributed along banana roots while nematode damage is higher close to the corm, independent of cultivar and production area. It is also shown that banana root number and root size is a critical factor in plant tolerance to nematodes. This implies that when assessing bred genotypes for nematode resistance, any section of a primary root can be used for nematode reproduction. And, promoting vigorous root growth and/or the eliminating factors that reduce root growth and development is key to avoiding a rapid yield decline of bananas due to nematode infection.

Nematode worms are among the most ubiquitous organisms on earth. They include free-living forms as well as parasites of plants, insects, humans and other animals. In recent years, there has been an explosion of interest in nematode biology, including the area of nematode behavior. The latter has, however, until now, not been synthesized into a single comprehensive volume. *Nematode Behaviour* seeks to redress this imbalance by providing the first comprehensive review of current knowledge of the behavior of nematodes. Key topics including locomotion and orientation, feeding and reproductive behavior, and biotic and abiotic interactions are reviewed by leading authorities from the USA, UK, India and New Zealand.

Plant Parasitic Nematodes in Temperate Agriculture

Fundamentals and Applications

Control of Plant-parasitic Nematodes

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Biological Control of Plant-parasitic Nematodes, 2nd Edition

Protecting Our Crops - Approaches for Plant Parasitic Nematode Control

Cellular and Molecular Aspects of Plant-Nematode Interactions

The Dorylaimida represent a large and very important group of soil and freshwater inhabiting nematodes of great agricultural importance. Both in appearance and mode of life they represent a wide diversity and as a consequence the number of species and higher taxa that have been described hitherto is the highest within Nematoda. The identification of species, genera, families, etc. of Dorylaimida is very difficult and at times causes problems for the specialist too. The large number of species on the one hand and often the meagre descriptions on the other make even well-known taxonomists to look at Dorylaimida with great hesitation and desperation. M. Shamim Jairajpuri and Wasim Ahmad have undertaken a great task in summarizing, evaluating and systematizing all the knowledge that has been published so far.

Plant Parasitic Nematodes Elsevier

Root-knot nematodes are the most economically important group of plant-parasitic nematodes worldwide, and their control presents a major global challenge. Advances are being made in understanding their biology, host-parasite interaction and management strategies. Covers the taxonomy,

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classification, morphology, life-cycle biology, genomes, resistance, sampling, detection, and management strategies of these pests.

Nematology

Cell Biology of Plant Nematode Parasitism

Vertical Distribution of plant parasitic nematodes in the soil of strawberry plantations

Parasitic Nematodes

Presence and Frequency of Occurrence of Plant Parasitic Nematodes on Coffee (Coffea Arabica L, Rubiaceae) in Ethiopia and the Importance of Endophytic Microorganisms [microorganisms] for Biocontrol

Plant Nematodes of Agricultural Importance

Plants, fungi, and viruses were among the first biological objects studied with an electron microscope. One of the two first instruments built by Siemens was used by Helmut Ruska, a brother of Ernst Ruska, the pioneer in constructing electron microscopes. H. Ruska published numerous papers on different biological objects in 1939. In one of these, the pictures by G. A. Kausche, E. Pfankuch, and H. Ruska of tobacco mosaic virus opened a new age in microscopy. The main problem was then as it still is today, to obtain an appropriate preparation of the specimen for observation in the electron microscope. Beam damage and specimen thickness were the first obstacles to be met. L. Marton in Brussels not only built his own instrument, but

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also made considerable progress in specimen preparation by introducing the impregnation of samples with heavy metals to obtain useful contrast. His pictures of the bird nest orchid root impregnated with osmium were revolutionary when published in 1934. It is not the place here to recall the different techniques which were developed in the subsequent years to attain the modern knowledge on the fine structure of plant cells and of different plant pathogens. The tremendous progress obtained with tobacco mosaic virus is reflected in the chapter by M. Wurtz on the fine structure of viruses in this Volume. New cytochemical and immunological techniques considerably surpass the morphological information obtained from the pathogens, especially at the host-parasite interface.

The book is written for under-graduate students of agriculture, horticulture and post graduates specializing in Nematology and Entomology dealing with plant parasitic nematodes. This book covers historical background including the developments in India and abroad, details of morphology, anatomy and taxonomy of plant parasitic nematodes, relevant nematological techniques and focus on nematode problems in important crop plants and their management. In 1992 a Concerted Action Programme (CAP) was initiated by Peter Sijmons with the purpose of intensifying collaborations between 16 European laboratories working on plant-parasitic nematodes. The four-year programme entitled Resistance Mechanisms Against Plant-Parasitic Nematodes focused on molecular aspects of the interaction between sedentary nematodes and plants on the model system *Arabidopsis* and on novel resistance strategies. Funding was provided mainly for exchange visits between collaborating laboratories and for the organization

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of annual meetings. During the last annual meeting which was held in May 1996 in Toledo, Spain, Carmen Fenoll initiated the production of this volume.

Plant Parasitic Nematodes in Sustainable Agriculture of North America

Molecular Biology, Biochemistry and Immunology

Techniques for Work with Plant and Soil Nematodes

, 2nd Edition

Identification Guides for the Most Common Genera of Plant-Parasitic Nematodes (and a Few Free-Living Genera)

The Physiology and Biochemistry of Free-living and Plant-parasitic Nematodes

Covering a wide range of rapidly-developing fields of research into parasitic nematodes, this comprehensive volume discusses the genetics, biochemistry and immunology of nematode parasites of humans as well as domestic animals and plants. This fully-updated edition also covers new advances including horizontal gene transfer, immune expulsion mechanisms, genetics of susceptibility in humans, nematode protein structures, role of bacterial symbionts, intrinsic immune response, host immune system modulation, modulation of allergic and autoimmune diseases and the use

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of parasitic nematodes or their products as therapeutics. The offered volume intends to review the biological control theme of phytonematodes from several prospects: ecological; applicative as well as commercial state of the art; understanding the mode-of-action of various biocontrol systems; interaction between the plant host, nematodes' surface and microorganism's; candidates for biocontrol; extrapolation of the wide knowledge existed in another systems for understanding biocontrol processes: *C. elegans* as a model and lessons from other natural systems; and exploiting advanced genomic tools to promote understanding biocontrol processes and thereafter improve specific biological control agents.

Covering all aspects of practical plant nematology in subtropical and tropical agriculture, the third edition of this definitive global reference work is fully revised and in full colour throughout. It covers the presence, distribution, symptomology and management of all economically important plant parasitic nematodes damaging

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the world's major food and cash crops. This includes: rice, cereals, solanum and sweet potatoes (and other root and tuber crops), food legumes, vegetables, peanut, citrus, fruit tree crops, coconut and other palms, coffee, cocoa, tea, bananas, sugarcane, tobacco, pineapple, cotton, other tropical fibres, spices and medicinal plants. New content for this edition includes: A chapter on nematode soil biodiversity and soil health; Reflections on the future impact of nematodes and nematology on food security; The importance of climate change, emerging threats, and new management technologies for large and small subsistence growers; Significant revisions to the IPM chapter and chapters on vegetables, citrus, legumes, tuber crops, cotton, peanut and banana where major advances in nematode management have occurred. This book is highly illustrated, with up-to-date practical guidance on methods of extraction, processing and diagnosing of different plant and soil nematodes and on integrated pest management. It remains an invaluable resource for those studying and

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working in the area of crop protection.

The Evolutionary History of Nematodes

**Plant Parasitic Nematodes in Subtropical and Tropical
Agriculture, 3rd Edition**

**Novel Ingredients for Use in Pet, Aquaculture and Livestock
Diets**

A Pictorial Key to Genera

Plant-parasitic Nematodes

**Building Coherence between Microbial Ecology and Molecular
Mechanisms**

Plant-parasitic nematodes are one of multiple causes of soil-related sub-optimal crop performance. This book integrates soil health and sustainable agriculture with nematode ecology and suppressive services provided by the soil food web to provide holistic solutions. Biological control is an important component of all nematode management programmes, and with a particular focus on integrated soil biology management, this book describes tools available to farmers to enhance the activity of

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natural enemies, and utilize soil biological processes to reduce losses from nematodes.

The genus "Meloidogyne" Goldi, 1892, or root-knot nematodes, represent a relatively small but economically important group of obligate plant pathogens. They are distributed worldwide and parasitize on almost every higher plant species. While reproducing and feeding within roots, they induce galls or root-knots and disorder the physiology of the infected plant, reducing crop yield and product quality. More than eighty nominal species have been described worldwide, while twenty species have been detected in Europe so far. This book includes a historical review on the genus, followed by a revision of the European species, and completed with a study on one of the most characteristic morphological structures within the genus: the perineal pattern.

Plant Nematode Biology and Parasitism; Migratory ectoparasites; Soybean: Glycine max; Peanut (groundnut): Arachis hypogaeae; Other beans and peas; Vegetables;

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Vegetable crops; Flowers; Flower crops; Cereals; Rice: Oryza sativa; Maize: Zea mays L.; Wheat: Triticum aestivum; Root and Tuber Crops; Potato: Solanum tuberosum; Sweet potato: Ipomoea batatas; Yams: Dioscorea spp.; Cassava: Manihot esculenta; Taro: Colocasia esculenta; Ginger: Zingiber officinale; Carrot: Daucus carota; Sugar beet: Beta vulgaris; Tree, Plantation, and Cash Crops; Banana and plantain: Musa spp.; Black pepper: Piper nigrum; Citrus crops; Coconut: Cocos nucifera; oil palm: Elaeis guineensis; Cotton: Gossypium spp.; Tobacco: Nicotiana tabacum; Coffee: Coffea spp.; Sugarcane: Saccharum officinarum; Pineapple: Ananas comosus; Deciduous fruit and nut crops; Collection, Extraction, and Preservation of Nematodes for Diagnosis; Collecting samples; Care of samples after collection; Extraction of nematodes from soil and plant samples; Staining nematodes in plant tissues; Nematode identification.

Special Report of the Joint Legislative Committee on Agricultural and Livestock Problems ... on Status of the

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Plant Parasitic Nematode Situation in California
Plant-Parasitic Nematodes and Banana Root Systems
Interactions
Concepts, Diagnosis and Control
Free-Living, Predaceous and Plant-Parasitic Nematodes
Biological Control of Plant-Parasitic Nematodes:
Dorylaimida

"Written by leading research workers from Europe, USA, Australia and New Zealand, this is the only up-to-date reference book which reviews and integrates all the current research findings on the physiology and biochemistry of these organisms, including the molecular information which has accumulated in recent years.

Plant Parasitic Nematodes, Volume III provides a comprehensive discussion of the different advances in plant nematology. This includes biochemical techniques to taxonomy and innovation in transmission and scanning electron microscopy technology. It explains a broadened basis for understanding nematode physiology and behavior and the sensory mechanisms that govern nematode actions and plant host-nematode interactions. The book discusses the development of modern approaches to the evaluation and reduction of crop losses. The emphasis of this volume is on plant parasites and insights gained through research on other nematodes. In particular, the book explains the anatomical, developmental,

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behavioral, and genetic studies on the free-living nematode *Caenorhabditis elegans*, which is a widely used laboratory model for examining various biological problems. The information provided by various researches on *C. elegans* increases our understanding about the relevance of nematodes to general biological processes in higher organisms, including man. The book is divided into 19 chapters which cover the following concepts of plant nematology: biochemistry, cytochemistry, and genetics; morphology and function; host-parasite relations; and evaluation and control of crop losses. The present volume is an excellent reference for students, lecturers, and research professionals in plant parasitology and related fields.

When I conceived this book, what I had in mind was what I did not know about coffee-parasitic nematodes (CPNs). Indeed, after reading many papers and several chapters in books, I felt far from having a comprehensive understanding of the subject. Not only would it be a daunting task to retrieve the numerous articles, reports, theses and dissertations on CPNs published since 1878, but it would also be impossible to learn, on my own, from all the enormous experience acquired by nematologists and coffee growers in so many countries. Therefore, this book is dedicated to those with restless minds, who want to know more about CPNs and their importance in coffee production worldwide. This book has been diligently written by top scientists in their areas of expertise or country, and it has been meticulously edited to guarantee precision without compromising an enjoyable read. I learned a lot from this book...I'm sure you will too. Finally, I'd like to thank

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Zuzana Bernhart from Springer, who believed in this project and decided to publish it; Susan Casement, who revised all chapters for grammatical correctness; and all the contributors, without whom this book would never have become a reality. Campos dos Goytacazes, RJ, Brazil Ricardo M. Souza vii Contents Part I The Crop 1 Coffee: The Plant and its Cultivation..... 3 Henrique D. Vieira 2 The Coffee Industry: History and Future Perspectives..... 19 Denis O. Seudieu Part II The Root-Lesion Nematode, *Pratylenchus* spp. The Biology of Nematodes Vol.2 - Northeastern, Midwestern and Southern USA Cytogenetics, Host-parasite interactions, and physiology

Vol.1 - Canada, Mexico and Western USA Root-knot Nematodes

The Biology of Nematodes synthesizes knowledge of the biology of free-living, plant-parasitic, and animal-parasitic nematodes. Contributed works by recognized researchers apply groundbreaking molecular techniques, many of which resulted from work on *Caenorhabditis elegans*, toward new approaches to the study of nematode worms. Topics covered include: ? Systematics and phylogeny ? Neuromuscular physiology ? Localization ? Sense organs ? Behavior ? Aging ? The nematode genome ? Survival strategies ? Immunology ? Epidemiology ? Structure and organization ? Gametes and fertilization

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Development ? Feeding, digestion, and metabolism

This book describes methods for evaluating the resistance and tolerance of plant cultivars to important parasitic nematode species, such as root-knot, cyst and root-eating nematodes, and discusses the concepts and consequences of resistance. This book provides an invaluable source of information to all plant pathologists, nematologists and plant breeders.

Plant-parasitic nematodes are among the most destructive plant pathogens, causing enormous losses to agronomic crops worldwide. This book provides an up-to-date review of research related to two of the most important nematode pests, root-knot and root-eating nematodes. Chapters cover early plant-nematode interactions, identification of nematode proteins important in the establishment of nematode feeding sites, and classification of biochemical and signaling pathways significant in the development of specialized feeding sites in the host. The cellular and subcellular structures essential for the parasitic interaction are examined by light and electron microscopy. Modern techniques of gene expression analyses and genomic sequencing are poised to provide an even greater wealth of information to researchers, enabling them to develop and examine natural and manmade mechanisms of resistance to this important plant pest.

A Color Handbook

Handbook of Invasive Plant-Parasitic Nematodes

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Nematode Behaviour

Plant Resistance to Parasitic Nematodes

Detection and Quantification of Plant Parasitic Nematodes from Field Soil by Conventional and Real Time PCR

Soil fumigation for the control of plant parasitic nematodes on boxwood

Plant-parasitic and free-living nematodes are increasingly important in relation to food security, quarantine measures, ecology (including pollution studies), and research on host-parasite interactions. Being mostly microscopic, nematodes are challenging organisms for research. *Techniques for Work with Plant and Soil Nematodes* introduces the basic techniques for laboratory and field work with plant-parasitic and free-living soil-dwelling nematodes. Written by an international team of experts, this book is extensively illustrated, and addresses both fundamental traditional techniques and new methodologies. The book covers areas that have become more widespread over recent years, such as techniques used in diagnostic laboratories, including computerized methods to count and identify nematodes. Information on physiological assays, electron microscopy techniques and basic information on current molecular methodologies and their various applications is also included.

Plant-parasitic nematodes devastate crops worldwide, in turn impacting international trade, social and economic development. Effective control of nematodes is essential for crop protection, and requires an understanding of nematode biology, taxonomy,

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population dynamics and sampling methods. Providing a broad introduction to nematodes as plant parasites, this book begins by describing nematodes by genera, and builds on this foundation to detail nematode biology and pest management, including biological and chemical control. Chapters are authored by international experts and enhanced by extensive illustrations and focus boxes. Fully updated throughout, this new edition is an essential resource for postgraduate students, extension officers, researchers and crop protection scientists.

This book contains 56 identification guides for the most common genera of plant-parasitic nematodes and a few other genera found in the soil and includes a comprehensive bibliography of keys to species in the genera.

Plant Parasitic Nematodes Associated with Cabbage in Poland

Plant-Parasitic Nematodes of Coffee

The Plant Parasitic Nematode Genus *Meloidogyne* Göldi, 1892 (Tylenchida) in Europe As Revealed in Stone, Amber and Mummies

Systematic studies

Formerly titled Plant-Parasitic Nematodes: A Pictorial Key to Genera, this volume has been the standard work on plant disease around the globe. Now in its fifth edition, it remains the fundamental reference for students as well as for diagnosticians--a usable, comprehensive key to plant-parasitic nematodes and the only guide to feature both photographs and drawings. Accompanied by full-page plates, the book

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offers descriptions of 68 genera, including most that have one or more species known to be plant parasites. The bibliography of approximately 2,500 entries on the taxonomy and morphology of nematode genera is one of the fullest on this subject. For the present edition, the authors have made revisions throughout and have added references to more than two hundred genera not previously included. An updated taxonomy, glossary, and an index are also provided. William F. Mai is Liberty Hyde Bailey Emeritus professor, Peter G. Mullin is Coordinator of Laboratory Instruction, and Howard H. Lyon is Biological Photographer (retired) in the Department of Plant Pathology, Cornell University. Plant parasitic nematodes are major pests of agricultural crops and cause huge monetary losses. There is a very high risk of spread of plant-parasitic nematodes from one country to another, with the movement of plants and planting materials such as seeds, bulbs, corms, suckers, tubers, rhizomes, rooted plants, nursery stock and cut flowers. In view of the large quantities and the wide variety of materials being imported and exported, it is important to assess the status of invasive nematodes and their quarantine importance in relation to agricultural trade. This book contains information on around 100 invasive nematodes and their potential threat in different countries. Each nematode entry includes information on authentic identification, geographical distribution, risk of introduction, host

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ranges, symptoms, biology, ecology, planting material liable to carry the nematode(s), nematode vectors, chance of establishment, likely impact, and phytosanitary measures. There are detailed accounts of diagnosis procedures including sampling, isolation, detection and identification of nematodes based on morphological and molecular characters. The book offers a global perspective on invasive plant-parasitic nematodes and useful for practitioners, professionals, scientists, researchers, students, and government officials working in plant quarantine and biosecurity.

This book is designed for undergraduate agricultural science students, farmers and farm extension personnel to provide a comprehensive description of plant-parasitic nematodes. It is constructed with 16 different chapters comprising of: an introduction; a brief history of plant nematology; the economic importance of nematodes; general characteristics of a plant-parasitic nematode; general morphology of nematodes; the anatomy of nematodes; the general life cycle biology of plant-parasitic nematodes; taxonomy/systematics/classification of major plant-parasitic nematodes; classification of nematodes based on feeding habits; identification keys for major plant-parasitic nematodes; damage symptoms caused by the nematodes; interaction of nematodes with other microbial pathogens; different methods of nematode control; prominent nematode resistant crop cultivars; the

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concept of integrated nematode management; nematode parasites of important agricultural and horticultural crops with their management practices; and fundamental nematological techniques. The introduction covers the definition of nematodes, history of nematology, the yield loss caused by nematodes, some important animal parasitic nematodes, and beneficial nematodes including nematodes used in insect control, weed control, and biological monitoring systems. The morphology and anatomy of nematodes are simply explained with detailed diagrams. The taxonomy classification structure based on evolutionary concepts are provided with major differentiation characteristics between important groups. The life cycle of different feeding groups of plant-parasitic nematodes is illustrated with simple illustrations. Identification keys and symptoms of nematode damage are described with suitable images. Overall, nematode control techniques available in literature are summarised briefly with suitable photographs wherever needed. The nematode pests, their symptoms and specific control measures for major agro-horticultural crops like rice, wheat, cotton, pulses, groundnuts, vegetables, potatoes, bananas, citrus, grapevines, spices, medicinal plants and flower crops are discussed. The final chapter of this book presents some basic nematode techniques, including nematode extraction protocols, nematode fixing, and mounting techniques. Overall, this fundamental and easy-to-understand book will be particularly useful

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for students in the biological and agricultural sciences, agronomists, agricultural extension workers and farmers to enable them to gain more insight and equip them with knowledge to solve problems concerning nematodes.