European Society of Nematologists

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Nematology News

This was the 35th ESN Symposium Córdoba, Spain

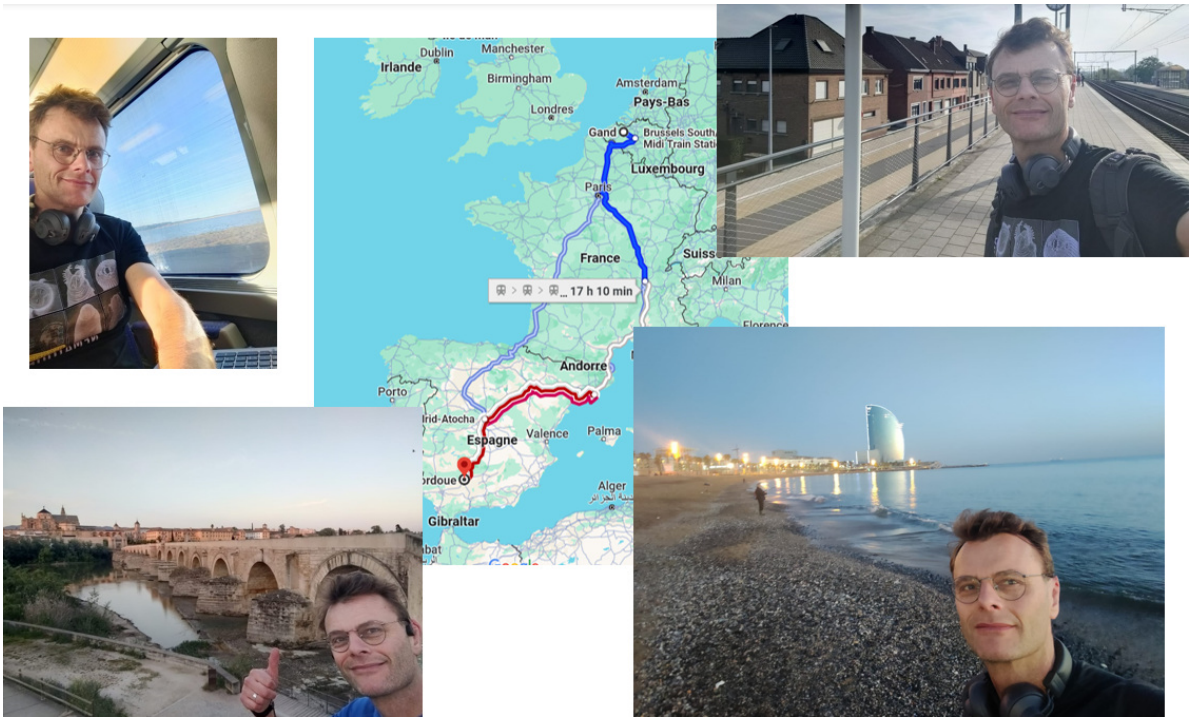
From 15 to 19th April 2024, the 35th Symposium of the European Society of Nematologists (ESN) was held in Cordoba, Spain. The event was organized by ESN, the Andalusian Institute for Agricultural and Fisheries Research and Training (IFAPA) and the Higher Council for Scientific Research (CSIC).

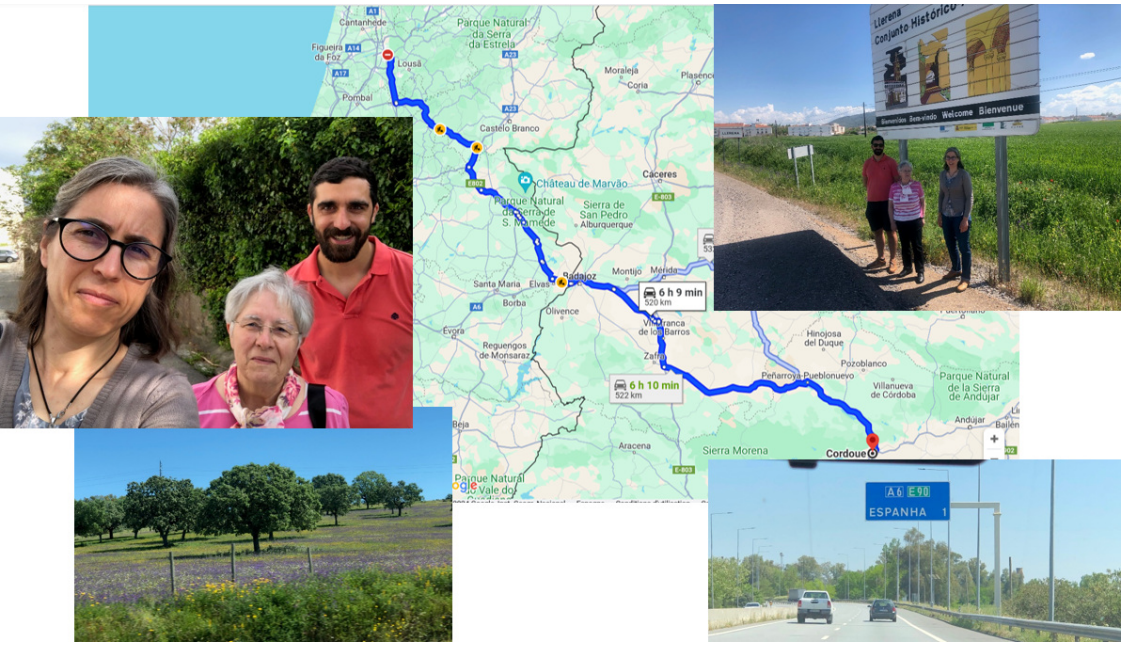
Nematologists from Europe and the rest of the world [Austria, Australia, Belgium, Bosnia and Herzegovina, Canada, Chile, China, Cyprus, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, India, Iran, Ireland, Israel, Italy, Japan, Kenya, Norway, Poland, Portugal, Slovenia, South Africa, Serbia, Spain, Sweden, Switzerland, Thailand, The Netherlands, Turkey, UK, and USA] participated in 8 plenary conferences, 177 oral communications and 123 posters. In total, 332 participants, shared and updated the current knowledge and the most recent advances in etiology, epidemiology and control of diseases caused by plant-parasitic nematodes, host-parasite relationships, systematics and taxonomy, the use of entomopathogenic nematodes in the biological control of pests, biodiversity and ecology of soil nematodes and their use as bioindicators.

ESN Award for “green” attendance to the ESN 2024 symposium

To demonstrate its commitment to sustainable development, ESN rewarded "greener" travel to the 35th International Nematology Symposium in Córdoba, Spain (April 15-19, 2024).

Wim Bert travelled by train; a return trip of approx. 4400 km between Gent and Córdoba.





Isabel Abrantes, Carla Maleita and Duarte Santos travelled together by car on a return trip from Coimbra to Córdoba (approx. 1100 km).

ESN fellow - Florian Grundler

Courtesy of Junior Lusa Kika.

Election of Fellow of the Society is accorded to General Members in recognition of outstanding contributions to the science of Nematology or distinguished service in promoting the Objectives of the Society. During the banquet of the 35th Symposium of the European Society of Nematologists (ESN) Florian Grundler was awarded.

Professor Florian M.W. Grundler, Department of Molecular Phytomedicine, Bonn University, was a pioneer in the investigation of the host factors involved in sex determination of the beet cyst nematode *Heterodera schachtii*. His microscopic and ultrastructural observations generated crucial data on nematode migration and establishment of feeding sites inside host plant roots. Together with others, Florian successfully established *Arabidopsis thaliana* as a model host for plant-nematode interaction studies. Using this model system, Florians research group provided crucial insights into the metabolism, water and nutrient flow from host plant roots into cyst nematode-induced feeding sites. Besides his more fundamental oriented work, Florian is also active in applied nematology such as characterization of resistance genes against cyst nematodes in sugar beet and wheat.
Florian is also much appreciated for his enthusiasm and his inspiring role as lecturer in nematology. His political skills were highly visible in managing numerous national and international projects and collaborations. From 2006 to 2010 he was president of the ESN and organized the ESN Symposium in Vienna, Austria.

<u>Current ESN Fellows</u>

Maurice Ritter (1986)
Julia Meridith (1990)
David Hooper (1994)
Pieter Loof (1994)
Nigel Hague (1998)
August Coomans (2000)
Marisa Vinciguerra (2000)
Virginia Ferris (2002)
David Trudgill (2002)
John Webster (2004)
Roger Cook (2004)
Maria Susana Santos (2004)
Richard Sikora (2006)
Antoine Dalmasso (2006)
Roland Perry (2008)
Maurice Moens (2010)
David Chitwood (2014)
Godelieve Gheysen (2016)
Wilfrida Decraemer (2016)
James Baldwin (2016)
Isabel Abrantes (2018)
Danny Coyne (2022)
Pierre Abad (2022)
Florian Grundler (2024)

ESN Córdoba 2024 - student poster and talk prizes

During the 35th Symposium of the European Society of Nematologists (ESN) three student talk prizes and one student poster prize were awarded. Anika Damn (Department of Plant Sciences, University of Cambridge, UK) won with her talk 'SUGR: the SUbcentral Gland master Regulator of plant-parasitic cyst nematodes'. Annika Schildberg (Plant breeding institute, Kiel University, Germany) won with her contribution 'Unraveling the function of the cyst nematode resistance gene *Hs4* in different genomic backgrounds'. The third winner of best talk was Vera Putker (Wageningen University and Research, The Netherlands) with her presentation 'Cellular dynamics underlying *Globodera pallida* effector RBP-1 recognition and function'. The student poster prize was won by Christopher Ogaya (e-nema, Germany) with 'Monitoring the *Photorhabdus* spp. bacterial load in *Heterohabditis bacteriophora* dauer juveniles over different storage times and temperatures: a molecular approach'.

Anika Damn receiving the award from Catherine Lilley

Annika Schildberg

Vera Putker

Christopher Ogaya

(Pictures courtesy of Junior Lusa Kika.)

ESN Governing board

During the ESN General meeting on Thursday 18th April 2024, Cláudia Vicente from Portugal was elected as ESN governing board member. Eric Grenier steps down as secretary and GB member. Eric joined the GB in 2012 and since 2016 he has done an excellent job as secretary. Sebastian Eves-Van den Akker will take over the role as secretary of ESN. Eric will take over the role of IFNS representative from Wilfrieda Decraemer.

Eric Grenier

ESN 2026 host selection

The 36th Symposium of ESN will take place in **Egmond aan zee, The Netherlands**.

Dutch colleagues from Wageningen University will take the lead in organizing the 36th ESN symposium in 2026. The symposium will take place in Hotel Zuiderduin, Egmond aan zee, next to the beach. Proposed dates are June 1st to June 5th (tbc). The organizers aim to keep subscription costs in the same range as for the Cordóba meeting. More information will be announced as soon as available on the ESN website and in the ESN newsletter.

ESN Medal

The European Society of Nematologists Medal recognizes outstanding individuals, groups, or consortia at early to mid-career stages for their contributions to the field of nematology and/or for promoting the objectives of the Society. During the 35th ESN Symposium the ESN medal was awarded to the founding members of the Young Nematologists Network.


NINA GUARNERI


OLIVERA TOPALOVIC


JAAP-JAN WILLIG


XORLA KANFRA


NASAMA MUSA


BORIS STOJILKOVIĆ


ADAM CASEY


UNNATI SONAWALA

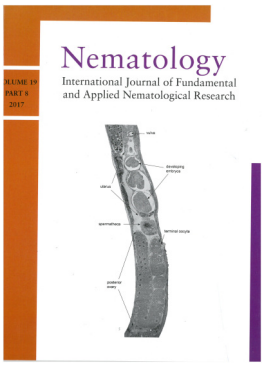

GEERT SMANT

ESN's YNN

Young Nematologists Network (YNN)

Don't forget to become a YNN member using the QR code!

Highlights of issues 1-5 of *Nematology* 26 (2024)



Each volume of *Nematology* contains 10 issues. All articles are available online with a DOI immediately corrected proofs are returned. *Nematology* papers, including the earlier papers of *Nematologica*, are available on Brill's online platform at: http://booksandjournals.brillonline.com/content/15685411

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ESN/SON/ONTA members can subscribe to Volume 27 (2025) of *Nematology* at a special individual e-only member subscription rate.

Below, Roland Perry selects **a paper from each of issues 1-5 of Volume 26**.

Issue 1

DNA barcoding, phylogeny and phylogeography of the cyst nematode species of the *Schachtii* group from the genus *Heterodera* (Tylenchida: Heteroderidae)

Sergei A. Subbotin, Tatiana V. Roubtsova, Richard M. Bostock, Zahra Tanha Maafi, Vladimir N. Chizhov, Juan E. Palomares-Rius and Pablo Castillo

Cyst forming nematodes of the genus *Heterodera* are economically important plant parasites. The *Schachtii* group is one of the largest ones with a total of 18 species parasitising dicotyledons. In this study, comprehensive phylogenetic analyses are provided of several hundred COI and ITS rRNA gene sequences of selected species from the *Schachtii* group, including *H. betae*, *H. cajani*, *H. ciceri*, *H. galeopsidis*, *H. glycines*, *H. medicaginis*, *H. mediterranea*, *H. schachtii*, *H. sonchophila* and *H. trifolii* using Bayesian inference, maximum likelihood, and statistical parsimony. New 124 *COI*, 57 ITS rRNA and 8 *hsp90* gene sequences from 81 nematode populations collected in 19 countries were obtained in this study. ITS rRNA gene has limited discrimination power compared to the *COI* gene. However, partial *COI* gene sequences were identical for *H. trifolii*, *H. betae* and *H. galeopsidis*. Based on the results of phylogeographical analysis and age estimation of clades with a molecular clock approach, it was hypothesised that the majority of the *Schachtii* group species originated and diversified in the Mediterranean Basin biodiversity hotspot during the Pleistocene and then dispersed from this region across the world. The Sino-Japanese Floristic Region is likely one of the centres of diversification for the soybean cyst nematode, which showed distinct population structure.

Issue 2

Automated classification and tracking of microscopic holographic patterns of nematodes using machine learning methods

Rodrigo de P. e S. Ribeiro, Antonio C. Sobieranski, Elaine C.D. Gonçalves, Rafael C. Dutra and Aldo von Wangenheim

Analysing nematode behaviour helps estimate biomechanical parameters for applications like cellular biology, pharmacology and cognitive neuroscience. Portable holographic platforms offer cost-effective, high-resolution, high-frame-rate, wide-field imaging compared to conventional microscopy. Holographic methods can reconstruct original shapes using numerical diffraction, though this is computationally expensive. However, video holography remains challenging due to the fast motion and overlapping of holograms when nematodes swim in crowded environments. In this work the authors address this problem by focusing on automated detection and tracking of nematodes in densely populated environments, using Machine Learning methods. This approach presents an automated computational flow to detect and analyse the behaviour of live nematodes in video directly from the raw holographic signals, without the requirement of phase-recovering methods for diffraction. For this purpose, the authors developed a three-step approach consisting of: *i*) nematode hologram detection; *ii*) temporal tracking; and *iii*) behavioural analysis based on mobility parameters. The results show that the use of a convolutional neural network approach associated with a classic tracking algorithm is a very suitable approach for nematode detection and behavioural analysis for biological assays directly from holograms, even in densely populated environments. The proposed approach has been presented as a promising solution for automated inspection of free-living nematode individuals.

Issue 3

Single nucleotide polymorphism (SNP) marker-assisted breeding of *Heterorhabditis bacteriophora* for improvement of reproductive potential and stress tolerance

Christopher Ogaya, Michelle Ann B. Diano, Innocent Hategekimana, Verena Dörfler, Carlos Molina and Ralf-Udo Ehlers

Recent research on the entomopathogenic nematode (EPN), *Heterorhabditis bacteriophora*, has assessed the possibility to correlate desired beneficial traits with genotype data to pave a way for marker-assisted breeding approaches. A collection of *H. bacteriophora* WT inbred lines has been phenotyped for stress- and virulence-related traits but these are rarely combined in a single line. Thus, unifying these traits in commercial strains is of high priority. This investigation unified beneficial traits in hybrid pools through marker-assisted breeding using single nucleotide polymorphisms (SNPs) associated with reproductive potential, longevity, virulence and cold tolerance. Recombinant inbred lines (RILs) generated from a cross between a stress tolerant WT inbred line (XX21) and a line high in *in vitro* reproduction potential (IL3) were genotyped via SeqSNP and screened for SNP markers associated with beneficial traits. Thereafter, a genotypic pool (X21L3) comprising 22 ILs was formed. The X21L3 pool was subsequently evaluated for the target traits in comparison with the cross parents and a commercial strain HB4. An improvement of oxidative stress tolerance at 2ºC (cold tolerance) was recorded with X21L3 surviving 1 day longer than the best performing parent (XX21). The hybrid pool also survived 1 day longer than the least performing parent IL3 for the trait longevity at 25°C under oxidative stress conditions. A higher dauer juvenile (DJ) recovery (58%) and DJ yield (209,000 DJ ml^{-1}) than the least performing parent XX21 was recorded for the pool. The storage stability in diatomaceous earth formulation at 2°C and 7.5°C was also improved by 2 and 5 days, respectively, in comparison to the least performing parent XX21. This study depicts the potential of precision marker-assisted breeding for beneficial trait improvement of *H. bacteriophora*.

Issue 4

Arrival and survival of nematology in Canada

John M. Webster

This Open Access Forum article traces the initiation and development of research into plant-parasitic and entomopathogenic nematodes in Canada going back 170 years. In impressive detail the article charts the rise, fall and rise again of research into these nematode groups, and links the fluctuations with changes in agricultural priorities and developments in research techniques. John Webster highlights the major achievements and provides interesting details of the scientists involved up to the present day. The article is dedicated to the late Ralph H. Estey, McGill University, Canada, with whom John Webster started the manuscript.

Issue 5

Evolution of modes of nutrient absorption in entomoparasitic nematodes of the order Tylenchida revealed by structural and phylogenetic analysis

Ayumi Takahashi, Yuta Fujimori, Natsumi Kanzaki, Ryoji Shinya and Taisuke Ekino

Adult female entomoparasitic nematodes of the order Tylenchida have degenerate digestive organs and body surfaces that lack cuticles and are covered with microvilli. These morphologic features indicate that tylenchids absorb nutrients via the integument. A previous study hypothesised that the nutrient intake of entomoparasitic tylenchids evolved from oral to transdermal in a step-by-step manner, and this evolutionary process is reflected in the development of the integument ultrastructure of these species. However, the evolution of the nutrient absorption of entomoparasitic tylenchids remains unclear. This evolution has not been phylogenetically examined because of a lack of information on the integument structure associated with phylogenetic relationships. In the present study, the authors examined the integument ultrastructure and molecular sequence of four entomoparasitic tylenchids: *Bradynema* sp., *Contortylenchus* sp., *C. genitalicola* and *Deladenus* sp. The body surface of *Bradynema* sp. was covered with microvilli, suggesting that *Bradynema* sp. absorbs nutrients via the integument. By contrast, the body surfaces of *Contortylenchus* sp., *C. genitalicola* and *Deladenus* sp. were covered with a thin cuticle-like layer and well-developed epidermis without microvilli, suggesting that these species absorb nutrients only partially via the integument. The authors also classified the nutrient absorption mode based on the integument ultrastructure and molecular phylogenetic analysis of entomoparasitic tylenchids in previous studies. The maximum parsimony analysis supported the step-by-step evolution hypothesised in the previous study. However, the parsimony analysis also generated new evolutionary processes in which atavism and/or saltation occur instead of stepwise evolution.

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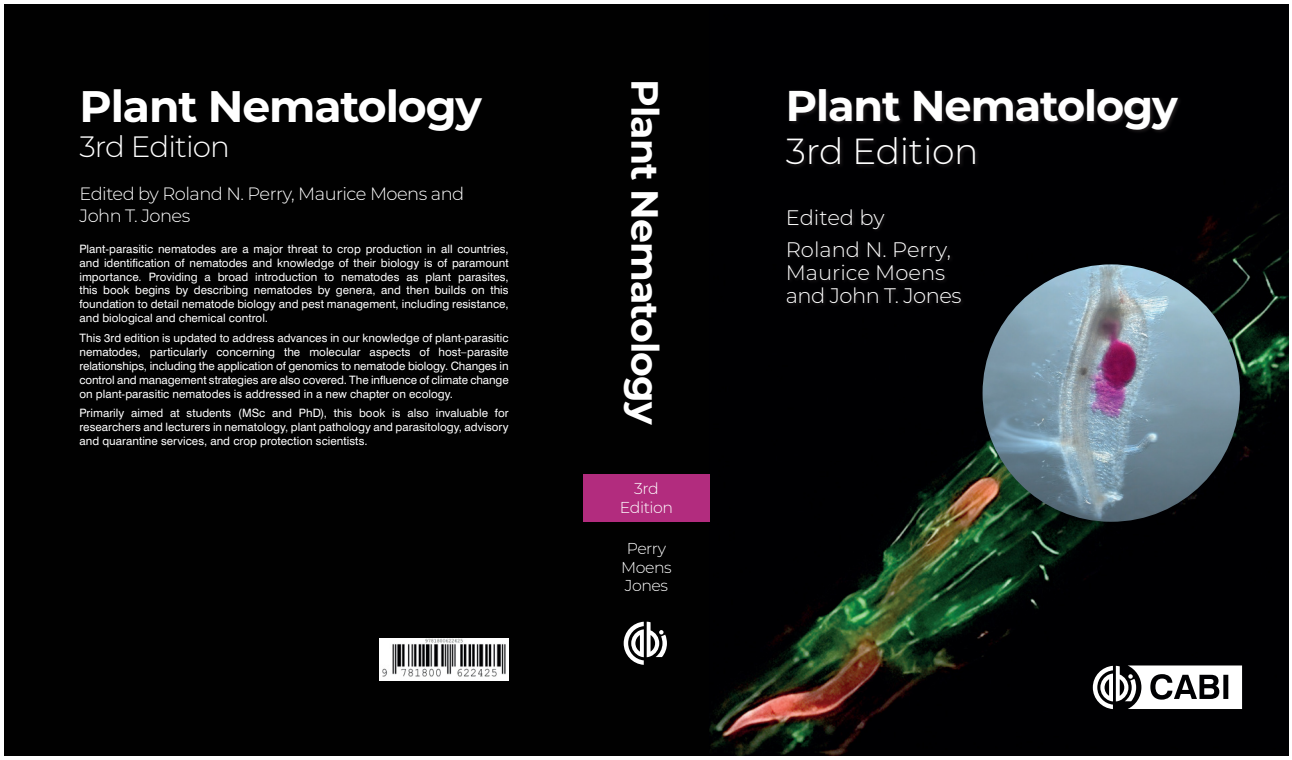
The Chinese Society for Plant Nematology and the Sichuan Society for Plant Nematology (SSN) appointed Professor Lieve Gheysen as Honorary Fellow for her contribution to educate and train Chinese students in plant-nematode interactions. This award was given on April 11th during the 2024 SSN Symposium in Chengdu, China.

New edition of Plant Nematology



https://www.cabidigitallibrary.org/doi/book/10.1079/9781800622456.0000

Commemoration of the centenary of the discovery of entomopathogenic nematodes - Logroño (La Rioja, Spain)

From April 10th to 12th, 2024, a special congress was organized at Riojaforum in Logroño (La Rioja, Spain) to celebrate the 100th anniversary of the discovery of the entomopathogenic nematode *Steinernema kraussei*.

The event was organized by the Institute of Vine and Wine Sciences (ICVV) (with participation from the CSIC), the University of La Rioja, the Government of La Rioja, and the University of Barcelona.

The aim was to highlight the advances made in past decades, identify future challenges, and promote international collaboration in studying entomopathogenic nematodes and their symbiotic bacteria, both in basic and applied research, in collaboration with industry partners.

Group photo of the event participants at the entrance of Riojaforum (Logroño, La Rioja, Spain)

Over 90 researchers, technicians, students, and entrepreneurs from 24 countries participated. There were 32 oral presentations in 10 specialized sessions, 15 flash presentations, and 31 posters showcasing notable research. Four invited lectures were given by leading experts in the field, “the legends in the EPN history”: Ramon Georgis (USA), Noel Boemare (France), Raymond Akhurst (Australia), and Randy Gaugler (USA).

The invited "legends" Dr. Raymond Akhurst (CSIRO, Canberra, Australia) on the left and Dr. Noël Boemare (University of Montpellier, INRAE, Montpellier, France) on the right. In the middle, Dr. Raquel Campos-Herrera (ICVV-CSIC, Logroño, La Rioja, Spain), congress coordinator.

A day before the congress, on April 9th, a dissemination day "Nematodes in vineyards: issues, challenges, and soil health bio-indicators", aimed at the wine sector, was held in La Rioja. Six internationally renowned researchers participated in this event, each specializing in vineyard health and sustainability topics.

These events have been an excellent opportunity to highlight the growing importance of this field and disseminate the latest advances in nematode research, especially entomopathogens, which play a crucial role in the sustainable control of pests in vineyards and other agroecosystems.

Raquel Campos-Herrera

75th International Symposium on Crop Protection

On May, 21st 2024, the 75th edition of the International Symposium on Crop Protection (ISCP) was held at the faculty of Bioscience engineering of Ghent University, Ghent, Belgium. This year, 312 participants from 18 countries were present. This one-day meeting is one of the oldest symposia on crop protection. During this jubilee edition, Monica Höfte and Pieter Spanoghe gave an impressive overview over crop protection based on contributions and keynotes over the past 75 years. In his keynote 'Nature-based solutions for selected Solanceae crop pests', Baldwyn Torto shared promising results from research in sub-Saharan Africa. After coffee break participants could select from a wide variety of oral contributions given in 8 parallel sessions ('Innovative crop protection systems', 'Phytopathology: control', 'Phytopathology: characterisation', 'Herbology', 'Formulation and Application Technology', 'Agricultural Entomology and Acarology', '**Nematology**' and 'Pesticide Residues: Toxicology and Ecotoxicology') and a poster session.

James Price (James Hutton Institute, UK) opened the nematology session with an interesting talk on the molecular basis of the potato cyst hatching cascade and the role of an annexin-like protein. Herbivorous and bacterivorous nematodes moderate each others effect on plant productivity via root trait coordination and N mineralization as shown by Junwei Hu (Ghent University, Belgium). Pella Brinkman (WUR, The Netherlands) discussed how soil measures have stronger effects on nematode communities than the type of agricultural system and Lirette Taning (ILVO, Belgium) presented some interesting effects of (biological) agents on plant-parasitic nematodes in tree nurseries. The importance of Integrated Nematode Management (INM) as part of Integrated Crop Management was highlighted by Leendert Molendijk (WUR, The Netherlands) and illustrated by Richard Sikora (Bonn University, Germany) during his talk on new technologies for INM being used to improve root health in crop production systems in sub-Saharan Africa. Farzana Tampa (Ghent University, Belgium) discussed the prevalence of *Meloidogyne graminicola* in rice nurseries in Bangladesh and identified resistant and susceptible rice varieties. A survey on plant-parasitic nematodes in coffee growing areas in Kenya was presented by Joseph Maosa (Ghent University, Belgium) with a putative new *Pratylenchus* species being found. The nematology session was completed with a contribution of Keith Davies (University of Hertfordshire, UK) who presented a model that accounts for the host-parasite specificity observed between the nematode cuticle and *Pasteuria* endospores and the role that plant exudates may play in the manipulation of this highly specific interaction.

The nematology sessions was chaired by Richard Sikora and Keith Davies. Richard gave his first oral presentation at this conference in 1972 and attended countless meetings thereafter. The ISCP offers a perfect platform for young scientists to get their first experiences in presenting their work and the Ghent atmosphere surely contributes in the fact that you want to come back. The 76th edition will take place on May, 20th 2025. If you are reluctant to come over for a one-day conference, you might consider combining it with a visit to one of the nematology research groups in the Ghent area (ILVO and Ghent university) or simply enjoy Ghent.

Ralf Ehlers, Rolo Perry, Urs Wyss and Keith Davies enjoying Ghent (courtesy of Lea Wyss-Wortmann).

Upcoming meetings

6th Symposium of Potato Cyst Nematode Management, 10th - 11th September, Harper Adams University, Edmond, Newport, UK

This symposium will cover many aspects, including international distribution, genetic diversity, sampling and decision making, population dynamics, diagnostics, integrated management, biology and application of resistance, use of effectors, rotational control, chemical control, biological control and novel control methods such as RNAi and biofumigation.

https://web.cvent.com/event/56a2ab8b-e15c-452b-8262-46b5cad84d84/summary

39th Brazilian Nematology Congress - 54th ONTA meeting, 1st - 5th September 2024, Foz do Iguaçu, Brazil

With the theme "Nematodes beyond the Mercosur Border", the Brazilian Nematology Congress will be held together with the Annual Meeting of ONTA (Organization of Nematologists of Tropical America). The joint event expects to bring together more than 600 experts in the field, including researchers, students, consultants and professionals from various national and international companies.

https://39cbn.com.br/index.php

Advances in Nematology, 5th December 2024, Linnean Society, Londen

This event is hosted by the Association of Applied Biologists Nematology Specialist Group and invites contributions from areas encompassing all the applied biology of nematology (molecular biology of nematodes or hosts, ecology, epidemiology, management of plant-parasitic nematodes, entomopathogenic nematodes and emerging diagnostic methods).

https://web.cvent.com/event/6b23c987-80a5-4f34-a9ee-3ccd41a6e61f/summary

76th ISCP, Tuesday 20th May 2025, Ghent, Belgium

A one-day event with parallel sessions on nematology, agricultural entomology and acarology, phytopathology, herbology and formulation and application technology, pesticide residues, toxicology and ecotoxicology.

https://www.ugent.be/bw/plants-and-crops/iscp/en

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Information needed for the newsletter

The ESN Governing Board would like this newsletter to be a Forum that is more widely used by the membership to share news and information. So, if you have any information and/or images that might be of interest to ESN members please send a note to the editors (Wim Wesemael - wim.wesemael@ilvo.vlaanderen.be or Bart Vandenbossche - b.vandenbossche@e-nema.de). All that is needed is a small amount of text in a word file or an email message, along with an accompanying image.