

**EUPHRESKO III**Network for phytosanitary
research coordination and funding**Report stay****2024 video contest winner**

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1. Summary

The laboratory placement was in the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) Black Mountain Site in Canberra. My supervisor was Dr. Mike Hodda, a Senior Principal Research Scientist and Team Leader, chief nematologist in the Australian National Insect Collection (ANIC), part of the National Research Collections. The placement was in the period from 23.02.2025 to 07.03.2025 and was almost entirely Canberra based, with limited field activities in the vicinity also carried out during the stay.

The mission aimed to deepen understanding of plant-parasitic nematodes crucial to plant biosecurity. By examining nematode specimens, I improved my ability to identify species and prioritize threats. Discussions with Australian nematologists and biosecurity researchers fostered collaboration, shared expertise, and knowledge on sustainable pest prevention and mitigation strategies.

The field work was mainly composed of tree bark sampling for nematodes, in the vicinity of Black Mountain. These same samples were later used during the laboratory work as well, with the goal of learning of nematode extraction techniques on wood – living nematodes, one of which is *Bursaphelenchus xylophilus*. Additionally, a major part of the lab work included nematode species identification, both morphologically and with molecular methods.

Engaging in discussions with local researchers on the subject was also an integral and very important part of my stay. This provided me with the opportunity to exchange knowledge and insights on different species of plant-parasitic pests. These activities fostered a shared understanding of research efforts and methodologies, comparing problems as well as solutions that work for them. It also helped me understand some of the strategies for mitigating risks posed by plant – parasitic nematodes.

After the end of my stay in CSIRO - Canberra, I had a short visit to the local laboratories of the Department of Agriculture, Fisheries and Forestry in Moonie Ponds – Melbourne. There, I had a quite informative visit concerning biosecurity threats, protection and prevention, as well as quarantine pest interceptions in the state of Victoria.

2. The fellow

I graduated from the Faculty of Forestry in Skopje in 2018, specializing in Forestry. I further advanced my expertise in 2020 by earning a master's degree in forestry sciences in the field of forest health. The title of my thesis was: 'Natural regulators of the pine processionary moth populations in North Macedonia'. Initially, I worked in the private sector. I was employed in horticulture and nursery plant production, gaining hands-on experience in creating, maintaining, and protecting urban and suburban green spaces. After that I was mainly focused in the NGO sector. My role as a professional consultant on various local, national, and international projects allowed me to collaborate with NGOs and private companies focused on environmental protection.

Since 2021, I have been employed as an assistant at the Hans Em Faculty of Forest Sciences, Landscape Architecture, and Environmental Engineering in Skopje, North Macedonia. I am involved in subjects such as Entomology, Forest Invertebrates, and Protection of Wood.

Since 2022, as part of the Department for forest and wood protection I am involved in the national surveys for priority quarantine pests in forests. With those activities I got familiar with the basics of nematology for the first time, since one of the most dangerous potential pests is a nematode species – *Bursaphelenchus xylophilus*. In 2024 I decided to enter the EUPHRESKO III Plant Health TV video contest, with a video on that same nematode species.

The subsequent victory in the contest won me the trip to the CSIRO in Australia and this lab placement.

Connected to my work, I have participated in multiple national and international seminars, conferences and workshops. I am currently an active PhD student.

3. The laboratory

The visit was hosted by the National Research Collections Australia, in their brand-new Diversity building. The collection is home to 15 million natural history specimens that are used by researchers, government and industry to describe, manage and benefit from Australia's rich biodiversity. This includes several different collections: Australian National Herbarium, Australian National Insect Collection, Australian National Wildlife Collection and the Australian Tree Seed Centre. The nematode specimens which were the object of my research visit are part of the ANIC.

The Collections building has an extensive laboratory infrastructure required for all of the necessary research concerning the specimens of all the different species of organisms. My lab work was mostly concentrated in the "Live Lab" which is used for bringing fresh (very often even live) specimens from the collection points on the field. It is isolated from the other laboratories and from all of the collections in order to prevent contamination of the more delicate material and the specimens in the collections. This laboratory is equipped with state-of-the-art equipment and materials for examining different live organism samples. The equipment, among other things, includes, dissection tools, compound and stereo microscopes, fridges, freezers, incubators, centrifuges, autoclaves etc.

Additionally, during a small part of my stay, I also worked in the pre-PCR and post-PCR laboratories which are used and equipped for molecular analysis of organism samples.

4. The mission

The primary goal of the scientific visit was for me to get more familiar with nematology, more specifically, plant parasitic nematodes. These are an integral part of all biosecurity concerns, for Australia but for North Macedonia as well. A fantastic opportunity to learn about nematodes was examining some of the nematode specimens in the ANIC collection. Through microscopic morphological examination of existing nematode samples in the collection, I would learn about different visual traits of the plant parasitic nematode species. Using comparative analysis of different images, I would learn to tell apart nematode groups and prioritize the biosecurity threats accordingly.

The second goal was for me to engage in discussions with local nematologists, entomologists and biosecurity researchers. This opportunity holds immense potential for fostering collaboration between two very different countries and helps in advancing scientific goals overall. These discussion - aimed to share expertise and insights related to current and potential plant parasitic pest species were to establish a common understanding of current research efforts, methodologies, and findings, with an emphasis on addressing region-specific challenges and opportunities. One key benefit for me was to learn about different strategies for mitigating the risks posed by plant-parasitic species, especially nematodes, which are significant agricultural pests. Additionally, these meetings would help me gather knowledge and experience in enhancing biosecurity measures that would potentially prevent or reduce their introduction and spread. Fostering scientific collaboration is extremely important. By

working together, researchers can achieve greater impact and contribute to improved plant protection in agriculture, forestry and natural ecosystems.

Another part of the mission was to visit local environments and try to draw parallels between the ones around Canberra specifically, and the ones in my home country. Since the region I was visiting is not a prominent agricultural region, the environments I visited were mostly forests, either planted or natural habitats.

As already mentioned, during my stay at the CSIRO site in Canberra I also had the opportunity to meet with Australian nematologists and plant biosecurity officers on site, as well as via video link. The aim was to discuss issues on the subject that are of interest to both Australia and Europe. Both regions share common goals in nematode management, such as conserving and improving plant health and developing sustainable agricultural and forestry practices. Collaboration between scientists and policymakers is vital to address these challenges effectively.

5. Benefits

The scientific visit was invaluable for me in improving my knowledge and understanding of nematology, particularly plant-parasitic nematodes. These often-overlooked tiny organisms can at times be critical to biosecurity concerns. This applies both to Australia and North Macedonia. Examining nematode specimens from the ANIC collection offered a unique opportunity to analyse the morphological traits of various nematode species. This hands-on experience enhanced the ability to distinguish between nematode groups through comparative analysis of microscopic images, enabling better prioritization of biosecurity threats. Such skills are crucial for implementing effective measures against the introduction and spread of these plant pests.

Engaging in discussions with local experts proved equally impactful. These conversations fostered collaboration between scientists from distinct regions, different continents even. This is paving the way for shared expertise and insights into plant-parasitic pest management. It also introduced me to new scientific circles, ones that I will be surely benefiting from. Understanding strategies for mitigating risks posed by nematodes is vital to ensuring sustainable agricultural and forestry practices and improving plant health.

Exploring local environments further enriched the mission. Drawing parallels between the ACT's ecosystems—primarily the forest habitats around Canberra—and those in North Macedonia contributed to a broader perspective on plant health in varying ecological contexts. Visiting such environments deepened understanding of the interplay between natural ecosystems and agricultural landscapes, highlighting the importance of holistic plant protection strategies.

6. Open data

Photographs of the stay are made open and are available from the Euphresco Digital Research Object Portal:

<https://drop.euphresco.net/data/5f23e251-dadb-4989-bc1c-30f5c7aa8cd1/>

7. Other

NA.