Title: IOBC/WPRS Integrated Protection of Fruit Crops Sub-Groups Pome Fruit Arthropods & Pome Fruit Diseases, Wageningen, The Netherlands

Date of Travel: 2025-09-14/18

Name of GCRI Travel Grant Recipient: Hamish McLean, PhD student, Niab

Highlights

- Met colleagues and networked at the registration event.
- Attended joint introduction and pome fruit disease sessions on pathogen biology, epidemiology, and control methods.
- Participated in a field trip to Munckhof workshop, the vermeerderingstuinen propagation gardens, and the Randwijk fruit research centre.
- Engaged in sessions on systems approaches, soil microbiome, and innovative control strategies.
- Joined a workshop on fruit tree canker and sessions on infection risk forecasting.

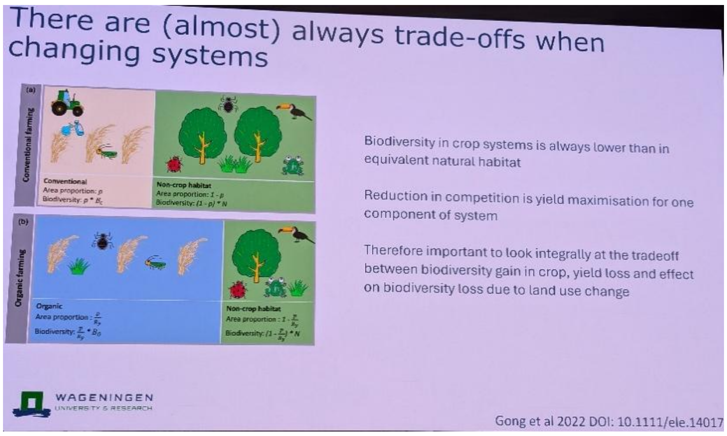
Background

BENEFruits 2025, organised by Wageningen university and research, pcfruit, and the International Organization for Biological Control (IOBC), brought together experts in integrated fruit crop protection. The event featured keynote talks, joint sessions on systems approaches, and specialized sessions on pome fruit diseases and arthropods. This included 33 talks and 33 posters for the pome fruit diseases working group, and 29 talks and 10 posters for the pome fruit arthropods working group. The sessions covered a range of topics including systems approaches, pathogen biology and epidemiology, integrated pest management, control methods, and monitoring and forecasting infection risks. The pome fruit diseases and pome fruit arthropods were held in parallel, and I elected to focus on the pome fruit diseases sessions. This conference was an opportunity to network with scientists doing a wide range of research and to learn up-to-date information and strategies on pome fruit crop protection. This conference was especially valuable to me as an early career researcher because of the networking opportunities and for the wide perspectives on integrated disease management discussed.

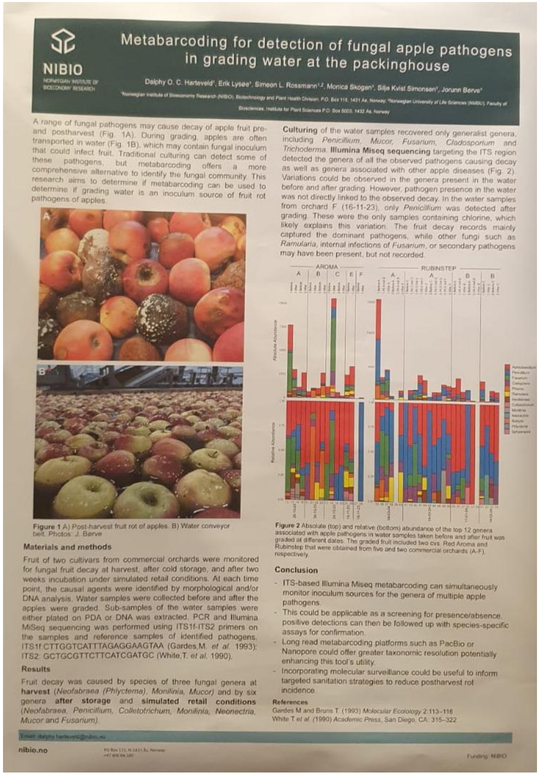
Travel Findings

The opening speakers emphasised a systems approach to sustainable agricultural development. These talks were very well delivered and provided a birds eye view of the problems we face in crop protection and agriculture/horticulture on the whole.

The pathogen biology and epidemiology section focussed on *Venturia inaequalis* (apple scab), *Venturia pirina* (pear scab), *Erwinia amylovora* (fire blight), *Colletotrichum* (bitter rot), *Neonectria ditissima* (apple canker), and *Botrytis* (postharvest rot). Of particular concern for UK growers was the report by Daniele Prodorutti described the recent spread of *Venturia asperata* in apple in France and Italy. This pathogen causes scab-like symptoms similar to *Venturia inaequalis* and has been found on scab-resistant apple cultivars. This pathogen has not yet been identified in the UK but should be watched carefully as it could cause problems in the future and circumvent the good progress in apple scab management. Research by Melanie van Driel and Kiki Kots described spore germination and symptom development of *Venturia pirina* (pear scab). These experiments improve our fundamental understanding of the biology of pear scab, filling an important research gap. Their finding of the importance of temperature in spore germination will improve research methods and disease forecasting. Amber van Loosbroek's work on the recurrence of *Elsinoë piri*, which causes lenticel spot in Natrya apples is important for improving our understanding of a lesser known pathogen which could lead to future problems. Currently this pathogen has only been identified on Natrya apples which are not important to the UK, and especially in organic orchards. More research is critical to better understand this emerging pathogen. Dalphy Harteveld conducted experiments on the germination and infection of *Neonectria ditissima* (apple canker) spores at low temperatures. This research is important for understanding canker epidemiology in colder climates in northern Europe. This could be used to improve disease risk models which will facilitate growers in cold climates.



The control methods session focussed on using alternative control strategies to mitigate the increasing regulation of fungicides. This included sanitation, pruning, hot water/steam treatment, plant defence induction, and comparisons of individual and combined chemical controls. These alternatives are particularly relevant to UK growers as they seek sustainable solutions under increasing regulatory pressure. S. Koechli explored the effects of reduced synthetic protection products on pome fruit growing. While this strategy reduced synthetic protection products by 52%, and reduced the risk potential to loging organisms in surface water by 37%, yields were considerably less and fruits were smaller. This loss is partly compensated for by reduced spending on plant protection products, alternative control methods can be labour intensive. Reiny Scheper presented her experiments on using irrigation to prematurely initiate *Venturia inaequalis* ascospore release in apple orchards. They found that irrigating the orchard floor 24-48 hours before rain or during dry periods reduced ascospore release during subsequent rain and reuced infection incidence. *Venturia inaequalis* ascospores require long periods of wet conditions to successfully germinate and by initiating ascospore release in dry conditions, this reduced inoculum during favourable conditions. This is a very interesting approach to inoculum removal, but requires accurate forecasting and depends on dry periods. Arne Stensvand reported on experiments using thermotherapy to treat *Neonectria ditissima* infections in apple wood. They found that steaming or sumberging in hot water at 45 – 50 ℃ for 2 hours significantly reduces macroconidia count and viability. This presentation propted much discussion and it was reasoned that thermotherapy could be easily implemented to treat graft wood and bud wood and potentially even whole trees when transplanting. Anita Shoneberg conducted a comprehensive comparison of plant protection products for the control of *Erwinia amylovora* fireblight. They found that combined application of Blossom Protect, Buffer Protect NT, and Myco-Sin was synergistic and had the best efficacy. They suggested that an acidic environment inhibits growth of *E. amylovora*, while maintaining viablility of antagonistic yeast *Aureobasidium pullulans*.



The soil and microbiome session focussed on the relationships between soil properties and microbiome on apple tree decline and *Neonectria ditissima* apple canker. Matevz Papp-Rupar presented research investigating the effects of a range of physiochemical properties on canker severity. He also presented research on microbiome amendments where arbuscular micorrhizal fungi (AMF) and *Trichoderma* were added to ‘Gala’/M9 roots at planting. While results are still pending, these studies could inform strategies to enhance root health and disease resilience—an area of growing interest for UK growers seeking sustainable alternatives to chemical control. This session also featured my own presentation on my research on the effects of scion genotype on the microbiome and apple canker expression. We found that the root microbiome varied widely between sites. Planting season also affected the microbiome, indicating that differences in the initial microbiome established at planting can persist long-term. Scion genotype only had minor effects on the microbiome. We also found some significant associations of some root-associated taxa with canker expression which uncovered beneficial effects of some plant growth-promoting fungi and bacteria.

The postharvest disease session showcased novel strategies aimed at reducing losses and improving sustainability in storage systems. Megan Farquar presented research on the efficacy of essential oils against pear postharvest pathogen *Diplodia seriata*. Thyme and clove oil were most effective at low dose. Essential oils will need to be tested further to determine economic viability, but they provide a potential, and demonstrably effective, organic disease management product. L. Engelbrecht presented work on the use of ozone for management of postharvest pear moulds.

Initial tests have indicated that ozone has some efficacy, but their experiments are still ongoing. It will be interesting to find out the results of this study and whether ozone can be used as part of a postharvest disease management system.

In the monitoring and forecasting infection risks session, Ulrike Persen presented investigated the ability of dogs to detect plant pathogens that cause apple fire blight (*Erwinia amylovora*) and chestnut blight (*Cryphonectria parasitica*). They trained dogs on infected plant material and found that the dogs could accurately detect infection even when asymptomatic. This is a very interesting disease monitoring strategy—and the dog pictures caused quite a reaction in the audience! This technique could be used for rapid screening of plant material for specific diseases.

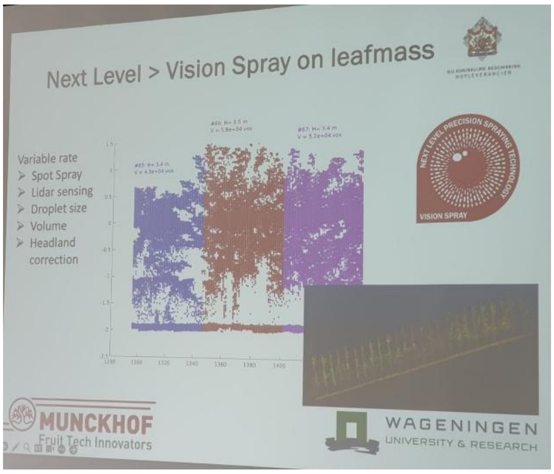
Field visit

On Tuesday 2025-09-16 we went on a field trip to visit the Munckhof production facility and vermeerderingstuinen propagation gardens followed by a tour of the Randwijk fruit research centre.

At the Munckhof production facility we received a presentation about the high-precision sprayers they produce. The new generation of high-precision sprayers control the spray rate of individual nozzles which, Munckhof argues, allows for good coverage with less waste. This technology requires accurate orchard maps which Munckhof make by combining data from drones and lidar. This also allows growers to target sprays to regions of the orchard where disease is present, further reducing waste, and saving product for later application. While this technology promises improved productivity and efficiency and reduced waste, and business opportunities for mechanical and digital services, the importance of open standards for data management to give growers control over the data produced from their orchards should be considered carefully with increasing adoption of this technology. We toured the production facility where the sprayers are manufactured which gave us the opportunity to see the whole production line in action and view the sprayers and harvesting machines being built.

Next, we toured the vermeerderingstuinen propagation gardens. Here, they keep propagation material for a wide range of apple rootstock and scion cultivars and multiply and certify plants for sale to growers all over the world. I found the differences in disease management perspectives between growing propagation material and growing trees for fruit striking. The propagation material has to be clear of disease to prevent contamination of material. In fruit production the aim of disease management is reducing disease pressure to maintain yield and growers are not necessarily aiming to completely eradicate disease from their orchards.

In the afternoon, we toured the Randwijk fruit research centre where we split into small groups to tour different parts of the facilities and watch demonstrations. This facilitated discussion and allowed for more personalised tours. I found the experiments on rain covers particularly interesting. They had built a retractable rain cover which deploys when it detects rain and retracts when it’s dry. In this experiment, they found that the rain covers reduced incidence of scab and canker, but increased incidence of mildew.



Top: Finished triple sprayer ready for testing to ensure consistent spray volumes. **Left**: Spray coverage map illustrating the benefits of variable nozzles which will only spray areas where leaves are detected by lidar. **Right**: harvesting machine with experimental counter to map yield data within the orchard.

Personal statement

Attending BENEFruits 2025 was invaluable for expanding my knowledge of integrated disease management and networking with international experts. This gave me the opportunity to learn about the latest orchard disease management research and understand the differences in apple growing between different countries.

Networking with other scientists enabled me to reconnect and make new connections which will hopefully be useful in the future.

The research presented at this conference is highly relevant to UK horticulture because it addresses emerging disease threats, sustainable control strategies, and innovative monitoring techniques that can improve orchard health and productivity. Studies on pathogens such as *Venturia asperata* and *Elsinoë piri* highlight potential risks to UK apple and pear production, emphasizing the need for proactive management. Advances in forecasting infection risks, microbiome-based approaches, and alternative control methods—such as thermotherapy, essential oils, and irrigation strategies—offer practical solutions to reduce reliance on synthetic fungicides amid tightening regulations. Insights into precision spraying technologies and soil health highlight the importance of integrated systems approaches for long-term sustainability. Together, these findings provide UK growers with tools and knowledge to adapt to evolving challenges, maintain crop quality, and enhance resilience in a changing regulatory and climatic landscape.

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