Final Report

Mushroom international study tours – inbound and outbound

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Mushroom international study tours – inbound and outbound (MU22010)

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Public summary

This project has enabled Australian mushroom industry personnel to increase their knowledge and grow their professional networks. This was achieved through a series of inbound and outbound study programs aligned with identified needs.

Three inbound study programs delivered low-cost educational activities in Australia for participants from across the industry. The first inbound program was delivered in August 2023 by international expert Erik De Groot. To engage as many industry personnel as possible, content was presented at two events in SA and NSW. Each event was comprised of a workshop covering Phase II and III compost production, crop management, and harvesting efficiency. This was complemented by farm tours at Costa Monarto (SA) and Premier Mushrooms (NSW).

The second inbound program was an online farm hygiene mini-series. Four webinars were delivered in May and June 2024 by local experts Judy Allan and Dr Warwick Gill. The series covered a range of topics related to integrated pest and disease management (IPDM). An additional webinar on hygiene during harvesting was delivered in August 2024, featuring Adam Polisiakiewicz from Sylvan Poland. Webinar recordings and additional resources are available on AGORA, the Australian mushroom industry's pest and disease information repository.

The third inbound program involved a study tour in QLD and NSW with Judy Allan and Dr Michael Wolfin, a mushroom fly expert from The Pennsylvania State University. The tour visited Country Farm Fresh Mushrooms (QLD), SJW Mushrooms (QLD) and Premier Mushrooms (NSW) and delivered two workshops on integrated pest management (IPM). The tour focused on increasing grower knowledge about phorid fly behaviour and how to use predatory mites and nematodes for fly control. A detailed booklet of resources on IPDM is available from the AMGA website.

Two outbound study programs provided partial funding for Australian mushroom industry personnel to travel overseas to increase their knowledge and networks. Through the Mushroom Fund Scholarship Program, twelve recipients were selected over two rounds via a competitive application process. In 2024, six recipients attended the AU + NZ Mushroom Growers Conference in New Zealand. The study program included farm visits to Mercer Mushrooms and Meadow Mushrooms plus conference attendance. The program included international speakers and presentations from Hort Innovation staff and mushroom levy funded project delivery partners. In 2025, six recipients participated in a Mushroom Compost Masterclass delivered by international expert Mark den Ouden. This was comprised of online e-learning modules followed by an immersive study tour with classroom sessions and site visits in the Netherlands, Germany and Belgium. The group visited four compost production facilities, a mushroom farm, and a supplement manufacturer. Scholarship recipients shared their learnings through articles published in MushroomLink and the AMGA Journal.

Using a multifaceted approach, this project has increased mushroom industry knowledge on key topics and improved the accessibility of technologies to improve production efficiencies. Through upskilling of industry personnel, it has supported mushroom growers and compost producers to make more profitable and sustainable products. Connections between local and international researchers and consultants are now being leveraged to deliver ongoing benefits for the Australian mushroom industry.

Keywords

Mushrooms; integrated pest and disease management; mushroom farm hygiene; mushroom compost production; grower knowledge and skills development; KASA; extension and adoption; grower study tours

Introduction

A key outcome outlined in the Hort Innovation Mushroom Strategic Investment Plan (SIP) 2022-2026 relates to Extension and Capability (Outcome 3) - *through improved capability and an innovative culture, the Australian mushroom industry seeks to maximise adoption of investments in productivity and demand*. One of the strategies is to *strengthen industry leadership through initiatives and training* (Strategy 2), with success determined by a key performance indicator demonstrating *increased participation in industry leadership and training initiatives*.

To enable the mushroom industry to achieve this outcome, the Australian Mushroom Growers Association (AMGA) and local expert consultant Judy Alllan proposed to deliver a program of educational study tours leveraging both inbound and outbound formats. The objective of the inbound study tours was to enable internationally recognised topic experts to share knowledge and expertise through workshops in Australia that industry personnel could attend for free or at low cost. The objective of the outbound study tours was to enable selected Australian industry personnel to travel internationally for attendance at a conference or facilitated training course that incorporated visits to mushroom farms and compost production facilities. The outbound study tours would provide partial funding through the Mushroom Fund Scholarship Program via a competitive selection process managed by a Project Reference Group with representatives from industry, AMGA and Hort Innovation.

The goals of the project were to increase the knowledge of Australian mushroom industry personnel, to increase the accessibility of technologies to improve production efficiencies, and to build connections between researchers and consultants in Australia and overseas. By taking this approach, the project set out to deliver against another key outcome of the Mushroom SIP 2022-26, relating to Industry Supply, Productivity and Sustainability (Outcome 2) – *the Australian mushroom industry has improved profitability, efficiency, and sustainability through innovative production systems, reduced costs, and effective risk management*. The project was positioned to target various strategies under Outcome 2 of the SIP based on the most pressing priorities that were identified by growers and compost producers.

The Australian mushroom industry is comprised of 43 farms that are responsible for all domestic supply of *Agaricus bisporus*. In 2023/24, total production was estimated at 56,941 tonnes with a value of $382.8 million (source – Australian Horticulture Statistics Handbook 2023/24). The Australian mushroom industry has ten producers of the specialised compost required to grow mushrooms – some facilities make compost solely for their own use while others also sell it to other growers. This highlights that the industry is small in terms of the number of operations and very different in terms of the production system compared to other horticultural crops. For production-centric training to be of value to mushroom industry personnel, it needs to be delivered by people who have expert levels of understanding about the topics of interest. It isn't feasible for individual businesses to organise training sessions like those that can be supported by this project. AMGA coordination enables topic experts to be engaged to plan and manage learning and development opportunities that are cost and time effective for participants and the industry as a whole. Key insights can be captured and shared with a broader cross-section of stakeholders by leveraging communications channels such as MushroomLink and the AMGA Journal. In-person events provide a framework for networking and knowledge transfer that is difficult to replicate in other ways, particularly in terms of the value that industry personnel have derived from previous events where farm visits were a core component – this would be very difficult to organise without AMGA's involvement.

This project set out to leverage this detailed baseline understanding of what makes an impactful learning and development program to design and deliver a series of inbound and outbound study tour activities aligned with mushroom industry needs and key outcomes from the SIP.

Methodology

Overview

The project was planned and delivered by the Australian Mushroom Growers Association and local mushroom industry expert Judy Allan. The focus for each of the five study tour activities was determined by a Project Reference Group (PRG). PRG discussions were informed through consultation with industry, including post-event surveys which were used to collect feedback from participants after each activity. Judy provided additional insights from her work with growers via MU21007.

Mushroom Fund Scholarship Program – Outbound Tours

The PRG was responsible for managing the selection processes for the Mushroom Fund Scholarship Program, which underpinned the two outbound study tours. Scholarships were awarded to six recipients from the Australian mushroom industry for each tour, via a competitive process involving PRG deliberation based on assessment of written applications including answers to the following questions:

- What is your role in the Australian mushroom industry?
- What relevant mushroom industry experience do you have?
- Why do you want to participate in the study tour?
- How will this study tour be beneficial in your role?
- Are you active in any form of leadership in your work or private life? (please specify)

Each scholarship provided partial funding for "on the ground" costs associated with international travel including accommodation, transfers, meals, incidentals, and registration fees. International flight costs were not covered by the scholarships. To be eligible, recipients were required to commit to communicating their learnings with the wider industry.

Framework for Inbound Tours

Registration costs for workshops and farm visits for the first and third inbound study tours were covered by the project for owners and employees of mushroom farms and compost production facilities. Other mushroom industry stakeholders were charged $100 per person to cover their attendance. Each tour involved delivery of a workshop and farm visit in two states to encourage attendance by as many industry personnel as possible. Where required, travel and accommodation costs for participants were not covered by the project. The second inbound tour was delivered online.

Further details about each study tour are provided below, in chronological order of when they were delivered. For each tour, a dedicated registration page (inbound) or application page (outbound) was set up on the AMGA website. Tours were promoted to industry by leveraging appropriate communications channels, with instructions and a link to visit the dedicated page on the AMGA website for more information. Where timing allowed, tour promotions included an article in the MushroomLink magazine (MU21003) which is published quarterly.

First Inbound Study Tour in August 2023: Mushroom Production Review and Update with Erik de Groot

For the first inbound study tour, internationally renowned compost and mushroom production advisor Erik de Groot from Global Agriculture Services was engaged to deliver two workshops in SA and NSW from 28 to 31 August 2023. Under the title of "*Mushroom Production: Review and Update*", Erik covered several topics including Phase II and III compost production, tunnel and growing room filling procedures, crop management, and harvesting. The workshops were complemented by farm tours at Costa Monarto (SA) and Premier Mushrooms (NSW). The program was promoted to industry via EDMs from the AMGA and MushroomLink.

Second Inbound Study Tour in May – June and August 2024: Mushroom Farm Hygiene Mini-Series

Feedback collected in the post-event surveys from the first inbound tour and insights from MU21007 suggested that a focus on farm hygiene would be of interest to growers. To encourage attendance from as many industry personnel as possible, the PRG endorsed an online webinar series to be delivered by Judy and Dr Warwick Gill in four 90 minute sessions on consecutive Thursday afternoons between 16 May and 6 June 2024.

Details about the mini-series program were published in issue 8 of the MushroomLink magazine (Appendix 1). The mini-

series was further promoted via EDMs from the AMGA, MushroomLink, and MU21007. To support participant knowledge development and achieve learning outcomes, Judy and Warwick leveraged additional resources such as videos, articles and fact sheets that they had already produced as outputs from MU21007.

An additional 60 minute webinar on hygiene during mushroom harvesting was delivered on 22 August 2024 by Adam Polisiakiewicz from Sylvan Poland. This webinar was entitled "*The Picker: The Spreader or the Catcher?*" and details were promoted to industry via EDMs from the AMGA and MU21007.

First Outbound Study Tour in October 2024: AU + NZ Mushroom Growers Conference in New Zealand

The AU + NZ Mushroom Growers Conference took place in Auckland from 22 to 24 October 2024. The main event included a farm tour, welcome event, formal dinner, and supplier exhibition area in addition to the two day conference program. The first day featured international speakers covering a range of topics including composting, integrated pest management, selective breeding, peat reduced casing media, and AgTech. Two future-focused panel discussions on automation and alternative casing fostered robust discussions between panellists and the audience. The second day featured presentations and a Q&A panel with Hort Innovation staff, followed by updates from the AMGA and delivery partners across seven mushroom R&D levy funded projects. An optional activity on 25 October involved travelling to Christchurch for an additional farm tour. The full program is available on the conference website.

The 2024 Mushroom Fund Scholarship Program awarded partial funding to six eligible applicants to attend the main event and optional farm tour. Information about the scholarship program was published in issue 8 of the MushroomLink magazine (Appendix 2). The program was further promoted to industry via EDMs from the AMGA and MushroomLink

Third Inbound Study Tour in March 2025: Integrated Pest and Disease Management with Dr Michael Wolfin

Dr Michael Wolfin (Mike) is an Assistant Research Professor in the Entomology Department at The Pennsylvania State University (Penn State). He studies the behaviour and chemical ecology of mushroom flies, using his research findings to develop and improve on-farm management strategies. He delivered a presentation at the 2024 AU + NZ Mushroom Growers Conference in Auckland, entitled "Development of Novel Integrated Pest Management Methods to Control Mushroom Flies on Mushroom Farms". A recording of his presentation is available on the conference website.

Feedback from the 2024 Mushroom Fund Scholarship Program recipients indicated that Dr Wolfin's presentation was a highlight of the conference. Other industry personnel expressed interest in learning more about his approaches. Based on this, the topic was chosen by the PRG for the third inbound tour. Judy took the lead on working with Mike to plan and deliver the tour, with support from the AMGA and Warwick (via MU21007). Ahead of the tour, this involved liaising with three growers to understand their fly control issues and arrange farm visits. Two growers undertook small trials with predatory mites based on the methods that Mike and his team have developed, so that their experiences and results could be discussed during the farm visits.

The tour visited Country Farm Fresh Mushrooms (QLD), SJW Mushrooms (QLD) and Premier Mushrooms (NSW) and delivered two workshops on integrated pest and disease management (IPDM) in QLD and NSW. Judy compiled a detailed workshop booklet containing resources about IPDM which were sourced from MU21007, MU21003, MU16003, and from Mike and his team's work at Penn State. A printed copy of the booklet was provided to all attendees, with the digital version available from the document library on the AMGA website (login required).

Information about the tour program including the itinerary and link to a dedicated page on the AMGA website was published in issue 11 of the MushroomLink magazine (Appendix 3). The tour was further promoted to industry via EDMs from the AMGA, MushroomLink, and MU21007.

In addition to the grower focused components of the tour, Mike visited the Marsh Lawson Mushroom Research Unit (MLMRU) at the University of Sydney for a meeting with delivery partners and subcontractors across several mushroom R&D levy funded projects (MU21003, MU21004, MU21007, MU23004, and MU24001).

Second Outbound Study Tour from August to October 2025: Mushroom Compost Masterclass with Mark den Ouden

Feedback collected in the post-event surveys from the first inbound tour suggested that a focus on compost production would be of benefit to industry. Internationally renowned compost and mushroom production advisor Mark den Ouden from The Mushroom Office was engaged to design and deliver a bespoke learning program for Australian compost

producers. It was comprised of seven self-paced online e-learning modules, to be completed in August and September 2025, followed by a five-day immersive study tour in Europe from 6 to 10 October 2025. The modules covered raw materials, pre-wet and pre-mix processes, caramelisation, pasteurisation and conditioning, spawning, incubation, and Mollier diagrams. The study tour combined classroom learning sessions with site visits in the Netherlands, Germany, and Belgium to four composting facilities, a mushroom farm, and a supplement manufacturer.

The 2025 Mushroom Fund Scholarship Program awarded partial funding to six eligible applicants with at least 12 months of practical compost production experience. The program was promoted to industry personnel via EDMs from the AMGA and MushroomLink. The AMGA also contacted representatives from all compost production facilities to further promote the opportunity.

Results and discussion

First Inbound Study Tour in August 2023: Mushroom Production Review and Update with Erik de Groot

For the first inbound tour, activities consisted of a workshop and farm visit in SA and NSW. A total of 61 industry personnel took part (36 in SA and 25 in NSW). This was comprised of representatives from ten mushroom farms, one dedicated compost production facility, one supplier, and one project delivery partner (from MU21004).

At each workshop, Day 1 was focused on compost production and filling growing rooms, while Day 2 was focused on growing and harvesting. Small group conversations within these areas of expertise enabled peer-to-peer knowledge transfer and exploration of solutions to current issues being faced on multiple farms. During the site visits, participants gained further insights into practical aspects of mushroom production from farm staff and the facilitators. At the end of the workshop, participants elaborated on the actions they were planning to take based on what they had learnt.

Post-event surveys were completed by 52 participants (85% of attendees). When asked to rate the event overall on a scale from 1-10, the average was 8.3 in SA and 8.4 in NSW. This indicates a high degree of satisfaction in what was delivered.

Participants were asked to outline their three take-home messages. Multiple respondents commented about the value of communication within and between farm departments for achieving good results. Other common responses related to the influence of casing parameters on mushroom yield and quality, the importance of cleaning and farm hygiene, and that harvesting approaches can have a significant impact on yield and profitability. Comments about key considerations during compost production were also provided – this aspect of the workshops wasn't relevant to all attendees, as some mushroom growers purchase their compost rather than making it themselves. Taken together, the survey responses confirmed that learning outcomes were achieved across all of the topics that were covered. Refer to Table 2 for information about how the first inbound study tour contributed to the project outcomes.

Participants were asked about what they liked and didn't like about the tour. Highlights included the farm visits, the open and informal discussions that Erik facilitated, and the opportunity to interact with other growers and learn from each other. Aspects that could be improved were focusing on less topics in more depth, improving the quality of the handouts, and having presentations from more than one facilitator. In terms of suggestions for future topics, responses to this question revealed interest in a detailed composting course, pest and disease management, farm hygiene, and harvesting.

An introduction to MU22010 and a recap of the first inbound tour was published in issue 6 of the MushroomLink magazine (Appendix 4). In the article, industry personnel were encouraged to contact Judy with suggestions about topics for future events.

Second Inbound Study Tour in May – June and August 2024: Mushroom Farm Hygiene Mini-Series

The farm hygiene mini-series proved to be popular with industry personnel, with up to 82 confirmed attendees per session. The actual number of attendees may have been higher, as it was revealed towards the end of the series that some farms were joining the sessions in groups of up to 8 people. Registrations were received from at least 15 mushroom farms and one dedicated compost production facility. The actual number of farms that engaged with the mini-series may have been higher, as several attendees used their personal email addresses to register.

For the main webinar series in May – June 2024, feedback was collected via written surveys after each of the four sessions. Attendees were asked if they found the webinar useful (Yes or No) and to list their three take-home messages. The summary provided below confirms that the webinars were valuable and that learning outcomes were achieved across

the topics that were covered. Refer to Table 2 for information about how the second inbound study tour contributed to the project outcomes.

Webinar 1 – 16 May 2024

- 15 survey responses – all indicated that the webinar was useful
- Key take-home messages included the importance of farm hygiene for the success of IPDM approaches, that humans and flies are vectors for diseases, and that ongoing staff training and vigilance is required including having processes for monitoring and reporting pest and disease observations – this is everyone's responsibility

Webinar 2 – 23 May 2024

- 16 survey responses – all indicated the webinar was useful
- Key take-home messages included an increased understanding about how to clean properly based on having the right method, equipment and appropriate APVMA registered products that are suited to the task, that it's important to check that cleaning has been done properly, that sanitisers are ineffective when organic material is present, and that PPE needs to be clean to prevent the spread of diseases

Webinar 3 – 30 May 2025

- 12 survey responses – 11 indicated the webinar was useful
- Key take-home messages included how to tell the difference between phorid and sciarid flies, that regular monitoring of fly numbers allows trends to be identified, and that diseases are easily spread through dust on product packaging

Webinar 4 – 6 June 2024

- 6 survey responses – all indicated the webinar was useful
- Key take-home messages included that washing machines are not effective at killing all pathogens, that 8 grams of casing in 100 mL of water is used as a reference for dirty water, and that it's important to monitor for steam coming out of gaps in room seals during cookout

After each webinar, an EDM from AMGA was circulated to registrants with a summary of the content and a link to watch the recording. They have been uploaded to the AMGA YouTube channel in unlisted mode, so the videos are not publicly visible. At the end of the main webinar series, an overview was included in communications with growers via the MU21007 monthly newsletter. Links to the webinar recordings on YouTube can be accessed by Australian mushroom industry personnel via AGORA (login required). As of 5 November 2025, the number of views for each video is as follows:

- Webinar 1 on YouTube – 81 views
- Webinar 2 on YouTube – 48 views
- Webinar 3 on YouTube – 46 views
- Webinar 4 on YouTube – 43 views

This webinar series represents a resource that could be promoted to industry personnel on a yearly basis, as a way to refresh knowledge about farm hygiene. It may also be relevant for businesses that are seeking to improve procedures.

First Outbound Study Tour in October 2024: AU + NZ Mushroom Growers Conference in New Zealand

The 2024 Mushroom Fund Scholarship Program awarded six partial scholarships to the following industry personnel:

- Ian Chu – Owner and Grower at Majestic Mushrooms (NSW)
- Josh Mynard – Growing Manager at Costa Mushrooms (SA)
- Chris Tolson – General Manager and Grower at Premier Mushrooms (NSW)
- Kimberley Tong – Technical Officer at Costa Mushrooms (SA)
- Aaron Vincent – QC Lab Technician at Elf Farm Supplies (NSW)
- Sanjay Patel – Head Grower at Costa Mushrooms (WA)

Profiles of the scholarship recipients were published in issue 9 of the MushroomLink magazine (Appendix 5), as part of a special feature that was released ahead of the conference.

Surveys completed by each recipient after returning to Australia provided evidence that the 2024 Mushroom Fund Scholarship Program contributed to achievement of the project outcomes, as outlined in Table 2.

Answers to the question "Overall, what did you gain from attending the 2024 AU + NZ Mushroom Growers Conference" provided further insights into the value of the experience for each recipient, as follows:

- Overall, the 2024 Mushroom Conference was well organised. The topics covered in the presentations, the networking opportunities, and farm tours were spot on. The topics covered in the presentations were all relevant to my farm and the industry as a whole. I certainly gained some insights on the economic conditions affecting business in general and the outlook ahead, and I also enjoyed the talk about mushroom consumer insights which highlighted the current state of the industry. The new marketing campaign to help the industry was interesting and we'll be watching carefully to hopefully see an upturn in consumption and prices which is currently hurting all growers. The future technology talks and casing discussion were also quite fascinating
- The conference was very informative. All the speakers presented very well, and they covered such a variety of topics across the whole industry. From the talks I gained a broader knowledge about the developments in the mushroom industry. The farm tours were great. Every compost yard has a slightly different process, deals with slightly different raw materials and produces a slightly different product. Then it was great to see at the farm how they were cropping off that compost. Finally, it was good to talk and share experiences with the attendees
- I gained new insights into the mushroom industry that I hadn't seen before
- It was fantastic to catch up with peers within the industry as well as listening to all the amazing talks during the conference. The panel discussions were great
- I gained an insight into the industry and the different individuals and companies involved in enabling mushroom farming on a commercial scale to exist and grow. In particular, the conversations and connections I made will be very valuable, I believe, to the short- and long-term goals I have set myself in my current role. Lastly, I very much appreciated the farm tours as they offered a frame of reference to how the other players in this sector operate and what potential changes or improvements could be made on our own farm
- Thank you so much for giving me this opportunity to learn more deeply about the industry. I met with experienced people and all the speakers gave excellent knowledge which I will utilise in the future

Reflections from each of the recipients on what they gained from attending the conference were shared with industry via an article published in issue 11 of the MushroomLink magazine (Appendix 6). The MushroomLink project (MU21003) also produced a video interview with each of the recipients that was filmed at the conference, which is available on YouTube.

Third Inbound Study Tour in March 2025: Integrated Pest and Disease Management with Dr Michael Wolfin

The third inbound tour was comprised of activities in QLD and NSW. For the QLD component, the MU22010 project team (Judy Allan and AMGA staff Leah Dennis and Carly Rosewarne) were accompanied by Mike, Warwick and growers Robert Tolson (Premier Mushrooms) and Steve Willemse (SJW Mushrooms) on a visit to Country Farm Fresh Mushrooms in Ballandean. Grower Neil Newman provided insights into his compost production and mushroom growing facilities. Farm walks at dawn and dusk allowed Mike to share knowledge about mushroom fly behaviour in the external environment and how this can be leveraged for improved fly control. Productive discussions with a representative from biological control agent supplier Bugs for Bugs provided Mike with an opportunity to share knowledge about how to use *Stratiolaeleps scimitus* (formerly *Hypoapsis miles*) predatory mites as part of an IPDM program. Bugs for Bugs now have a product page dedicated to mushroom flies that includes a downloadable fact sheet and handbook written by Mike and his team.

The main component of the third inbound tour used a similar model to the first inbound tour, comprised of a workshop and farm walks. In QLD the group was hosted on farm by Steve and in NSW the group was hosted by Robert. A key learning from Mike is that mushroom fly behaviour is different on each farm. Understanding what to look for and where to look is an important consideration. Steve and Robert provided insights into their historical experiences with managing mushrooms flies and their initial trials with predatory mites, which were implemented with support from Judy in the lead-up to the study tour. Participants in the NSW tour also visited the Sylvan Australia facility which is the largest producer of mushroom spawn in Australia. The workshops were co-delivered by Mike and Judy using an interactive approach that allowed participants to share observations and ask questions. Warwick set up a portable microscope for participants to look at live samples of predatory mites and e-nematodes. Opportunities for networking were available during session breaks and over dinner in addition to the farm walks.

Across the third inbound tour, a total of 35 industry personnel took part (8 in QLD and 27 in NSW). This was comprised of

representatives from twelve mushroom farms, one dedicated compost production facility, three suppliers, and one project delivery partner (from MU21004). Hort Innovation Senior Industry Services Manager Dumi Mhlanga attended the NSW component. Post-event surveys were completed by all grower participants in QLD and 21 participants in NSW (78% of NSW attendees). When asked to rate the event overall on a scale from 1-10, the average was 9.4 in QLD and 9.3 in NSW. This indicates a high degree of satisfaction in what was delivered. Refer to Table 2 for information about how the third inbound study tour contributed to the project outcomes.

Participants were asked to outline their three take-home messages. Multiple respondents commented on the importance of monitoring fly numbers, insights into how to use predatory mites and e-nematodes in IPDM strategies, that IPDM can be an effective way to reduce the use of crop protection products, and the concept of invaders vs emergers for phorid flies. Participants were also asked about what they liked and didn't like about the tour. Highlights included the farm walks, opportunities to interact with other industry personnel, and information about developments in crop protection products for fly control [1]. Most respondents indicated "none" or didn't provide an answer to the question about what they didn't like. Suggestions about topics for future events included discussions on results from farm trials, updates on new developments, information on sustainable mushroom farming, how to improve mushroom quality, and harvesting.

A recap of the third outbound tour was published in issue 13 of the AMGA Journal (Appendix 7 – pages 11-13). A digital version of the workshop booklet is available from the document library on the AMGA website (login required).

Second Outbound Study Tour from August to October 2025: Mushroom Compost Masterclass with Mark den Ouden

The 2025 Mushroom Fund Scholarship Program awarded six partial scholarships to the following industry personnel:

- Dongyoung Park – Compost Manager at Costa Mushrooms (SA)
- Gari Dzingirayi – Senior Grower at Costa Mushrooms (VIC)
- Glen Robson – General Manager at Elf Farm Supplies (NSW)
- Munya Nyanhanda – Yield Improvement Technician at Costa Mushrooms (VIC)
- Nick Fittock – Production Manager at Elf Farm Supplies (NSW)
- Wayne Wilkinson – Production Operations Manager at Costa Mushrooms (WA)

Profiles of the scholarship recipients were published in issue 14 of the MushroomLink magazine (Appendix 8).

On the overseas component of the study tour, scholarship recipients were joined by three further participants from Australia and three from Canada, New Zealand and the Netherlands. It was facilitated by Mark den Ouden from The Mushroom Office with co-ordination support provided by Carly Rosewarne from AMGA. During the five-day program, topics from the pre-tour e-learning modules were reinforced through classroom sessions held in the Mushroom Pavillion at the Museum De Locht in Melderslo, Netherlands. This was complemented by site visits to composting facilities at Walkro in Belgium, Hooymans Substrates in the Netherlands, Mjko in Germany, and CNC Milsbeek in the Netherlands. At Mjko the participants also toured a mushroom farm and saw how automation is being adopted. A visit to Havens in the Netherlands included a tour of their mushroom supplement production facility and insights into their work on Near Infra-Red (NIR) spectroscopy for analysis of supplements, straw, chicken manure, and compost.

Surveys completed by the recipients after returning to Australia provided evidence that the 2025 Mushroom Fund Scholarship Program contributed to achievement of the project outcomes, as outlined in Table 2.

When asked "On a scale of one to ten, how would you rate the overall experience?", the average response was 9.6. Further insights into the value of the experience were as follows:

- I gained a great deal from this course and was exposed to advanced mushroom cultivation techniques in the Netherlands. One key observation was how their technology has progressed — despite being competitors, Dutch growers openly share their knowledge and experiences, fostering a collaborative, win-win environment that drives continuous improvement. At the same time, I recognised that Australia has several strengths. Australian farms generally place a stronger focus on safety, manage risks more effectively, and operate highly efficient Phase 1 composting processes

[1] At the time of preparing this report, the crop protection products discussed at the workshop are not registered by the APVMA for use on mushrooms.

- Hygiene has to be viewed differently, overlooking this can lead to serious problems for the business. Testimonies were had of how other composters managed to control *Trichoderma* outbreaks simply by hygiene. We could not gain access into certain areas due to hygiene protocol – this level of non-compromise impressed me
- I had only heard about indoor Phase 1 facilities before, so it was a great opportunity to see them in person. It was even more impressive than I expected — there was no noticeable smell near the compost yard, which truly surprised me. The high level of automation was also remarkable, as it significantly reduces manual labour and potential safety risks
- From the site visits, I observed that they use either NIR or wet lab analysis to monitor daily changes — and it's working effectively. From this perspective, we are also using data, but in a more limited way. My plan is to establish optimal data benchmarks for our farm and begin adjusting our daily analysis to align with those targets. Over time, I aim to build a more comprehensive internal database to define and refine these optimal parameters
- We often ask each other, "What are the three most important factors in mushroom growing?" The answer is always, "Compost, compost, and compost." Then comes the next question: "What are the three most important factors in compost?" — and again, the answer is, "Prewet, prewet, and prewet." I had never thought about the next question — "What are the three most important factors in prewet?" — but through the masterclass, I learned that they are temperature, water, and oxygen

A summary of the Mushroom Compost Masterclass including insights from the scholarship recipients will be shared with industry via an article to be published in issue 16 of the AMGA Journal (Appendix 9).

Outputs

Table 1. Output summary

Output	Description	Detail
First inbound study tour	Mushroom Production Review and Update with Erik de Groot	Attended by 61 industry personnel from 13 businesses, including 10 mushroom farms and a compost producer. A survey was used to collect feedback from participants after the event.
Second inbound study tour	Farm Hygiene Mini-Series with Judy Allan and Dr Warwick Gill	Five online webinars were attended by at least 82 industry personnel from at least 15 mushroom farms and a compost producer. Surveys were used to collect feedback from participants after each webinar. Links to view the recordings are available on the AGORA website (login required).
First outbound study tour	2024 AU + NZ Mushroom Growers Conference in New Zealand	Six industry personnel received partial funding from the 2024 Mushroom Fund Scholarship Program to attend the conference. Surveys were used to collect feedback from each of the recipients upon returning to Australia.
Third inbound study tour	Integrated Pest and Disease Management with Dr Michael Wolfin	Attended by 35 industry personnel from 17 businesses, including 12 mushroom farms and a compost producer. A survey was used to collect feedback from participants after the event. The workshop booklet is available from the document library on the AMGA website (login required).
Second outbound study tour	Mushroom Compost Masterclass with Mark den Ouden	Six industry personnel received partial funding from the 2025 Mushroom Fund Scholarship Program to attend the masterclass. Surveys were used to collect feedback from each of the recipients upon returning to Australia.
Articles in MushroomLink magazine and the AMGA Journal	Communications with Australian mushroom industry stakeholders about project activities	• Appendix 1. *Mushroom Farm Hygiene Mini-Series*. MushroomLink: issue 8, pages 12-13 • Appendix 2. *Mushroom Industry Overseas Study Tour Scholarship Program*. MushroomLink: issue 8, pages 14-15 • Appendix 3. *The Fly Doctor is Flying In*. MushroomLink: issue 1 pages 18-19 • Appendix 4. *Mushroom Production Workshop*. MushroomLink: issue 6, pages 36-37 • Appendix 5. *Introducing the 2024 AMGA Conference Scholarsh Winners*. MushroomLink: issue 9, pages 47-51 • Appendix 6. *Reflections from the 2024 Mushroom Fund Scholarship Recipients*. MushroomLink: issue 11, pages 20-23 • Appendix 7. *Dr Michael Wolfin's Tour Down Under*. AMGA Journal: issue 13, pages 11-13 • Appendix 8. *Introducing the 2025 Mushroom Fund Scholarship Recipients*. MushroomLink: issue 14, pages 18-22 • Appendix 9. Mushroom Compost Masterclass. AMGA Journal: issue 16.

Outcomes

Table 2. Outcome summary

This project has contributed to the following outcomes and strategies from the Mushroom SIP 2022-26:

- Outcome 2 – The Australian mushroom industry has improved profitability, efficiency and sustainability through innovative production systems, reduced costs, and effective risk management
    - Strategy 1 – Enhance the efficiency of mushroom production systems including casing, compost, labour and energy
    - Strategy 2 – Improve on-farm sustainability and efficiency including through waste product development and recycling opportunities
    - Strategy 5 – Develop and optimise fit for purpose pest and disease management strategies including IPM and biological agents as part of mushroom production systems
    - Strategy 6 – Support an Australian mushroom centre of excellence for compost and mushroom production RD&E
- Outcome 3 – Improved capability and an innovation culture in the Australian mushroom industry maximises adoption of investments in productivity and demand
    - Strategy 2 – Strengthen industry leadership through initiatives and training

Outcome	**Alignment to fund outcome, strategy and KPI**	**Description**	**Evidence**
The mushroom industry, mushroom SIAP (advisory mechanism) and Hort Innovation are provided with clear priority areas and recommendations to inform longer-term RD&E investments addressing efficiencies in all areas of mushroom production, recycling farm outputs, sustainability, and packaging alternatives	<u>Outcome 2, Strategy 5</u> KPI – Increased adoption of IPDM and reduction in crop loss through sustainable management practices <u>Other</u> Improved mechanisms for developing and managing investments through providing feedback to the R&D SIAP and Hort Innovation via MU23004 (Mushroom RD&E Coordinator)	• MU21007 – a contract variation to this project was approved by the R&D SIAP in March 2025 to engage Dr Michael Wolfin to deliver online webinars in 2025 and in-person workshops in 2026, driven by grower interest in IPDM that was developed through MU22010 (this project)	• Survey feedback from industry personnel who participated in the first outbound tour and the second and third inbound study tours has provided strong support for an ongoing focus on IPDM and collaboration with Mike, particularly in terms of extension and adoption activities that leverage his insights and research findings • Via MU23004 – Mike and the MU21007 project team are being consulted for input into mushroom R&D levy investment priorities related to IPDM. Mushroom RDEC Carly Rosewarne is also leveraging relationships with industry personnel that were developed through MU22010 to identify priorities

The mushroom industry is able to diversify and adopt new technologies	Outcome 2, Strategy 1 KPI – Availability of new knowledge for growers to reduce input cost per tonne of yield Outcome 2, Strategy 2 KPI – Growers using novel technology to add value Outcome 2, Strategy 5 KPI – Increased adoption of IPDM and reduction in crop loss through sustainable management practices	• The importance of farm hygiene has been emphasised throughout this project, with industry personnel provided with details of practical strategies that can easily be adopted to minimise the impact of pests and diseases. Good hygiene practices enable businesses to remain profitable and operate more sustainably by reducing their use of crop protection products and minimising crop losses • During the first outbound tour, scholarship recipients received information about new technologies (e.g. MycoSense Spotlight, 4Ag Robotics) • As a result of the third inbound tour, two growers trialled the use of predatory mites for phorid fly control. Further adoption is being driven by Mike's involvement in MU21007 • Based on interest from participants, the use of NIR spectroscopy in compost production was included as a focus area of the second outbound tour. It was discussed during each of the site visits, where the hosts explained what they do and the value it provides. At Havens, one of their scientists gave a detailed presentation on the technology and the development of methods and databases for analysis of different raw materials and products	• Survey feedback after all study tours indicated an increase in KASA (knowledge, attitudes, skills and aspirations) relating to farm hygiene • Survey feedback after the first inbound tour indicated an increase in KASA relating to new technologies • Growers who trialled predatory mites for phorid fly control shared their experiences with other industry personnel during the third inbound tour • Survey feedback after the second outbound tour indicated an increase in KASA relating to NIR spectroscopy and processes involved in compost production

Inform current and future RD&E projects by connecting Australian researchers and consultants with international counterparts	Outcome 2, Strategy 5 KPI – Increased adoption of IPDM and reduction in crop loss through sustainable management practices Outcome 2, Strategy 6 KPI – evidence of industry support and engagement for driving RD&E	• Through the third inbound tour, relationships with Dr Michael Wolfin now exist across multiple projects (MU21003, MU21007, MU24001, MU24005) • Through the second inbound tour, AMGA has built a relationship with Mark den Ouden. This can be leveraged for future learning and development activities for industry personnel	Relationships with Dr Michael Wolfin are being leveraged as follows: • MU21003 and MU21007 – publications in MushroomLink based on research at Penn State • MU24001 and MU24005 –Dr Meghann Thai from the University of Sydney and Umberto Calvo from Applied Horticultural Research were invited by Mike to attend the Penn State Mushroom Short Course in Oct 2025. Meghann participated in a panel discussion on casing alternatives • Further engagement of Mark den Ouden is supported by feedback from the second outbound tour where all scholarship recipients would recommend Mark's online and in-person courses to others
Ensure Australian mushroom growers are able to provide a more profitable and sustainable product by upskilling key industry personnel via a three-year project of inbound and outbound study tours	Outcome 3, Strategy 2 KPI – increased participation in industry leadership and training initiatives	• The first inbound tour was attended by 61 industry personnel from 13 businesses • The second inbound tour was attended by at least 82 personnel from at least 16 businesses • The third inbound tour was attended by 35 personnel from 17 businesses • The Mushroom Fund Scholarship Program supported 12 recipients from 6 businesses to attend the first and second outbound tours	• Attendance numbers were determined by observation • The mushroom farms that have benefitted from this project through participation in at least one study tour represent approximately 90% of Australia's total *Agaricus bisporus* production
Increase the knowledge of Australian mushroom industry personnel and increase accessibility of technologies to improve production efficiencies	Outcome 2, Strategy 1, 2, 5 and 6 Outcome 3, Strategy 2 KPIs – as listed for previous responses	Refer to previous responses as outlined above	Refer to previous responses as outlined above

Monitoring and evaluation

Table 3. Key Evaluation Questions

Key Evaluation Question	Project performance	Continuous improvement opportunities
To what extent has the project increased the knowledge of Australian mushroom industry producers, and employees, and increased accessibility of technologies to improve production efficiencies?	Feedback from surveys after each tour have indicated that participation in project activities has led to an increase in KASA across the topics that were covered.	The next project should implement a process for monitoring whether increases in KASA have led to practice change, including an understanding of barriers to adoption.
To what extent has the project increased the knowledge of Australian mushroom researchers and consultants, and built connections with international researchers?	The project has increased the knowledge of Australian mushroom researchers and consultants on IPDM through engagement of Dr Michael Wolfin and involvement with the third inbound tour as organisers or attendees. Connections with Mike have subsequently been built across several mushroom R&D levy funded projects (MU21003, MU21007, MU23004, MU24001, MU24005).	Better communication between mushroom R&D levy project delivery partners about upcoming and ongoing activities will support further knowledge development and collaboration.
To what extent has the project met the knowledge, attitude, skills and aspirational needs of growers and the wider industry?	Across the topics that were covered by the study tours, the project has met the KASA needs of industry personnel, as evidenced by feedback from the post-event surveys.	The next project should explore how to deliver value to more levy paying businesses, which may require a multifaceted approach based on identification of specific KASA needs.
To what extent were growers, supply chain stakeholders and industry perspectives included in the project? Did the project team engage all relevant stakeholders (growers, supply chain and industry) in the project, where applicable?	Input from industry was used to inform the selection of study tour topics, including insights from the post-event surveys and direct engagement with industry personnel. The PRG included a grower/compost producer, a farm input supplier, an industry consultant and representatives from the AMGA and Hort Innovation.	The next project should recruit at least one person onto the PRG who received support from the Mushroom Fund Scholarship Program during this project. Members of this group are not typically engaged in PRGs across mushroom R&D levy funded projects. They are ideally placed to contribute to discussions and decision making for the next project. This would also support their ongoing professional development. The next project should also explore recruitment of a small grower representative.
To what extent have project findings been disseminated through other relevant communication projects?	The project published eight articles in MushroomLink and one article in the AMGA Journal. Additional information was shared with mushroom industry stakeholders via MU21007.	The next project should continue to work closely with the industry communications project to promote upcoming events and share project findings. This could include a strategic discussion about the most effective approaches to engage with stakeholders based on insights from MU21003 and MU21007.

How widely disseminated and appropriate was the scholarship EOI process?	The 2024 Mushroom Fund Scholarship Program was promoted with an article in the MushroomLink magazine and EDMs from MushroomLink and the AMGA. The 2025 Mushroom Fund Scholarship Program was promoted by EDMs from MushroomLink and the AMGA. The MushroomLink magazine is published quarterly, and the timing meant that the 2025 Program could not be promoted in an article. Instead, the project team contacted compost producers to encourage them to apply.	Where possible, the next project should take the magazine publication timeline for the industry communications project into account so that opportunities can be widely promoted. Some industry stakeholders have requested a change to how funding for outbound tours is disbursed. This should be explored through consultation as part of the next project.
What efforts did the project make to improve efficiency?	• The industry communications project (MushroomLink – MU21003) and MU21007 were leveraged for efficient dissemination of information • Existing outputs from MU21007 and MU16003 such as fact sheets and articles were redistributed as learning materials to support the second and third inbound tours • The first outbound tour leveraged the AU + NZ Mushroom Growers Conference by providing partial funding to attend an event that was already being delivered with support from MU22007 • The second outbound tour leveraged an existing online learning course available through The Mushroom Office. Completion of this course prior to the international travel component ensured that the scholarship recipients had the baseline knowledge required to make the most of their experience	The next project should consider how to leverage existing resources and events to achieve efficiency gains.

Recommendations

The following recommendations should be considered for the next project:

- An iterative approach to planning and delivering the project should be used, rather than trying to make too many decisions at the outset. This will allow the project to pivot based on emerging priorities and industry feedback
- More time is required between contract execution and submission of the project planning documents, so that this important process isn't rushed
- There is value in leveraging online delivery approaches in addition to in-person activities. Across the project, this balances accessibility with the benefits of networking and site visits that were highlighted in post-event surveys
- The M&E plan should be revised if the contract is varied or the focus of the project changes. This will streamline the reporting and make it easier to evaluate the end-of-project outcomes and impact

Intellectual property

No project IP or commercialisation to report.

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Appendices

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