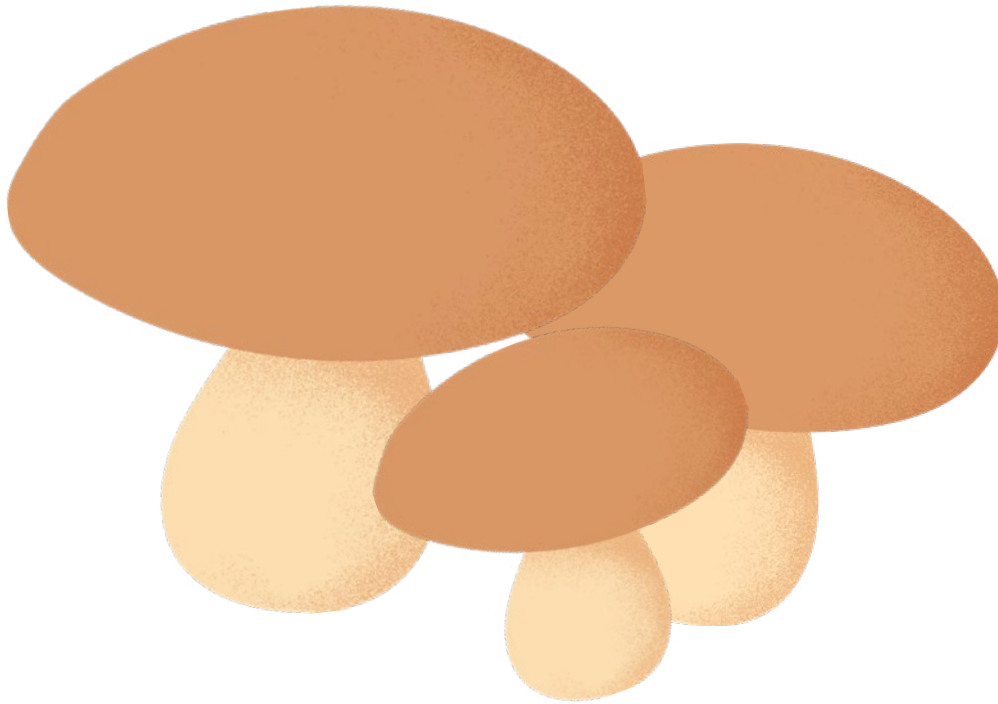# ShroomTech & Beyond

Years 5–10 – Technologies
Year 9 – Work Studies

(Design Technologies; Yrs 5 & 6, ACTDEK021)
Investigate how and why food and fibre are produced in managed environments and prepared to enable people to grow and be healthy

(Design Technologies; Yrs 7 & 8, ACTDEK029)
Investigate the ways in which products, services and environments evolve locally, regionally and globally and how competing factors including social, ethical and sustainability considerations are prioritised in the development of technologies and designed solutions for preferred futures

(Design Technologies; Yrs 7 & 8, ACTDEK032)
Analyse how food and fibre are produced when designing managed environments and how these can become more sustainable

(Design Technologies; Yrs 9 & 10, ACTDEK041)
Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions

(Design Technologies; Yrs 9 & 10, ACTDEK047)
Investigate and make judgments, within a range of technologies specialisations, on how technologies can be combined to create designed solutions

(Work Studies: Yr 9, ACWSCL010)
Identify types of entrepreneurial behaviours and their opportunities for application to 21st century work and enterprise

(Work Studies: Yr 9, ACWSCL014)
Source career information and resources

ShroomTech & Beyond

Talking to mushroom farmer opens up ideas about futures in AgTech

Alice talks with Jess, a mushroom grower from WA. They discuss career paths in agriculture, STEM and women in science — and mushrooms, of course.

This leads us to explore the professionals who design managed environments, how this has changed rapidly in the last generation, and what might be coming for the new gen in farming!!

Duration:

30–45 minutes

Location:

The classroom

Notes:

Note to the teacher:

If you have completed the teaching resource called Fungi Farming first, you won't need to cover how mushrooms are grown indoors (and their lifecycle), and can jump straight into what the risks are of growing in a closed environment, and what opportunities there might be for AgTech.

Getting Started

👁 Watch the interview with **Jess, a mushroom grower from WA.**

❓ Discuss the interview:

- Mushroom farming is called fungiculture.

- Jess manages a farm in Western Australia with about 300 staff reporting to her.

- Jess' farm grows just two foods: Swiss Brown and White mushrooms. They pick them at different stages of their growth cycle.
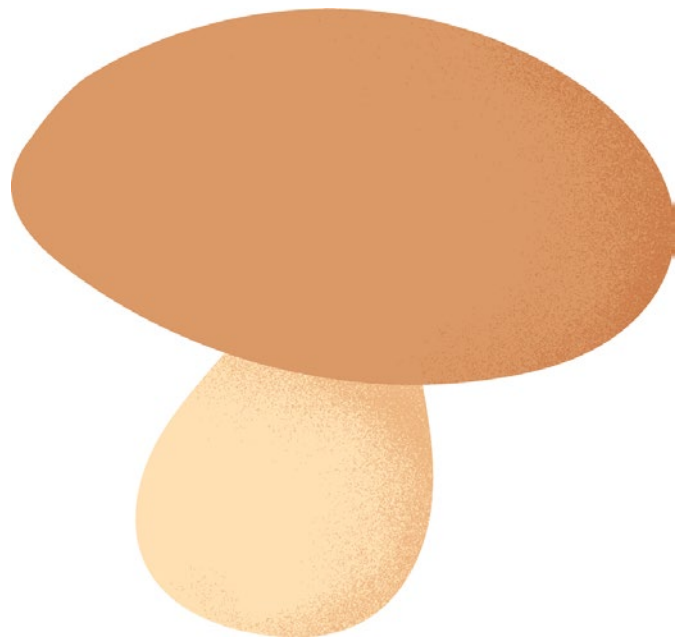
❓ Ask students:

◇ Was there anything Jess talked about that surprised you? What was it?

◇ What are the risks in growing one food item that needs a carefully designed and controlled environment?

◇ What opportunities do you think there are in fungiculture?

◇ Are there other foods you see rising in popularity (through health interest, popular diets or fashion) that – like mushrooms – could lead to a career in specialist growing?

◇ Do you think international trends and changes in diet affect what Australian farmers grow?

● Students will take questions like these and choose one to research. But first, AgTech.

Exploring AgTech

- Go to 01:32 when Jess talks about new software developed by an intern on her farm.

- In fungiculture, the humidity of the air (known as Relative Humidity) needs to be kept within a constant range of 88–91%.

- Mushrooms are super sensitive to humidity so the RH (Relative Humidity) is kept steady. If humidity levels get too low they go scaly (dark flakes on the cap — people won't buy them). If humidity gets too high, mushrooms can get bacteria blot (they go slimy brown). Also, in high humidity mushroom growth slows right down.

- So the air and soil need to be just right.

- [?] Discuss: How can tech, such as digital monitors, linked smart devices (the Internet of Things) and sensors help us?

- ◇ Wireless linked devices (smart tags) can track key growing conditions such as light levels, relative humidity, air temperature, soil temperature and pH. When linked together with software that analyses and reacts to data, the next step is to add in technology that adjusts conditions when they're going outside the optimal zone for our crop. For example, spray misting when humidity is too low.

AgTech for the future of food

- [?] Discuss the meaning of the term 'AgTech' (Agriculture technology).

- ◇ Technology in this context relates not just to software and digital technologies, but also to processes and techniques.

- ◇ Technology can be a more efficient process, or a way of doing things that better ensures the quality and food safety of a farmed product (like marvellous mushrooms!)

- ◇ Technology, processes, designed environments and monitoring systems can be applied to all stages of food growing, from propagation (starting new plants) to growth, harvest, quality control, production efficiency, packaging, and waste management.

- Explore what students saw in the Ph! visit to a mushroom farm, or in the resources listed under 'Teacher Resources' below.

- Students find other examples of AgTech, including equipment and technology, processes and efficiency, quality assurance, and the careers that make it all happen, from data analysts to accountant, communications pros and horticulturists. Farming is complex!

Researching tech and careers

- Students research ONE of the following topics of their choice OR one of the careers in the list below. They produce a presentation or poster showing the opportunities for this technology or career, what it involves (a brief description) and an argument about the most-needed capabilities, skills and knowledge for professionals working in these emerging technologies.

1. Automation in the almond picking and processing industry.

2. Technological developments in the dairy industry.

3. Drone technology in organic pest management.

4. Wireless technology on cattle stations, such as stock tracking systems.

5. Creating a controlled environment to grow specialist leafy greens hydroponically.

- Students research and present a poster, short presentation or paper about their chosen topic. Encourage them to use written and video resources from authoritative sources such as those listed under TeacherResources.

Careers in AgTech

- Jess is Head Grower, which is just one of the many careers in agriculture.

- If time permits, have students explore one or more of these following non-traditional careers in agriculture:

◇ software developer
◇ drone operator
◇ water engineer
◇ biosystems engineer
◇ robotics engineer
◇ geneticist
◇ microbiologist
◇ soil scientist

◇ data analyst
◇ farm manager
◇ hydrologist
◇ geologist
◇ mobile app developer
◇ geospatial analytics specialist

Teacher Resources

Uses and displays of AgTech:

- Conveyer belts to move banana bunches to the processing facility. Dole: https://youtu.be/_l7sak6VIq8

- Water channels down which apples float gently, where they are washed and waxed so they are shiny(!) SuperFresh Growers: https://youtu.be/YAUeQHghUUs

- Machines to shake olives or nuts off trees. Macadamia tree shaker: https://youtu.be/8eOIM-l1114

- RFID trackers (wireless tags) on cattle on large stations. (Just like your FitBit.) CSIRO: https://blog.csiro.au/the-latest-fashion-on-the-field-livestock-wear/

- Bioengineered insects 'primed' with their own naturally occurring phemerones to eat a crop pest. Training nematodes: https://futureofag.com/training-nematodes-f245d903fc73

- Using Drones in Agriculture – A group of uni students explain the general field: https://youtu.be/5k0jc86gtPM

- Tasmanian farmers using drones to make irrigation more efficient. ABC News: https://www.abc.net.au/news/2017-07-27/drone-technology-on-farms/8746272

- Waste farming for biofuels – high-tech algae farming: https://futureofag.com/algae-farming-f0fb3782d8ff

- Future farming careers: https://www.ffa.org/career-success/predictions-top-5-agriculture-careers-in-2020/

- Top careers in AgTech: https://www.agcareers.com/infographics/top-agricultural-careers-in-agricultural-technology-infographic-64.cfm