

Add the
MIGHTY MUSHIE

The Sustainable Food Choice for Preferred Futures

TEACHER GUIDE

LESSON 1

YEAR 9–10

This resource has been developed by:



Primary Industries Education
Foundation Australia



Australian
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FUND**

LESSON 1

The Sustainable Food Choice for Preferred Futures

> LEARNING AREA


Design and Technologies (Year 9-10)

> AUSTRALIAN CURRICULUM CONTENT

Analyse how people in design and technologies occupations consider ethical, security and sustainability factors to innovate and improve products, services and environments (**AC9TDE10K01**)

Analyse and make judgements on the ethical, secure and sustainable production and marketing of food and fibre enterprises (**AC9TDE10K04**)

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> LESSON OBJECTIVE

Students will learn about:

- The characteristics of mushroom production that make them an ethical, secure, and sustainable food source now and in the future.
- The characteristics of mushroom production that are beneficial to sustainability (economic, social, and environmental).
- The ways that the mushroom industry is invested in responding to challenges and opportunities.

Resources and Equipment

1. Access to laptop/digital devices
2. **Worksheet 1.1 – Social Sustainability**
3. **Worksheet 1.2 – Environmental Sustainability**
4. **Worksheet 1.3a – Economic Sustainability**
5. **Worksheet 1.3b – Economic Sustainability**
6. **Worksheet 1.3c – Economic Sustainability**
7. **Worksheet 1.4 – Mushroom Farm Case Study**
8. **Worksheet 1.5 – Challenges Facing the Mushroom Industry**

ATTRIBUTION, CREDIT & SHARING



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Lesson Guide

Students will:

- Complete a case study of a mushroom farm that promotes and highlights why mushrooms are a sustainable food choice now and in the future (economically, socially, and environmentally sustainable).
- Use data supplied by the industry to understand the contribution of mushrooms to the Australian economy.
- Research an example of how the mushroom industry is responding to a particular challenge.

> STARTER

1. Facilitate a class discussion about what it means to be a sustainable food choice.
2. Suggested questions:
 - a) What factors make a food sustainable?
 - *Resource usage, such as electricity, water, and raw materials. Outputs such as carbon emissions. Food miles would also impact sustainability.*
 - b) Can you name a sustainable food choice?
What makes this a sustainable food choice?
 - c) Can you differentiate between economic, social, and environmental sustainability?
 - *Economic sustainability is that the food choice is produced in an economically sustainable manner and that the farmer can make a profit into the future.*
 - *Social sustainability is that there are social benefits to the food choice.*
 - *Environmental sustainability is that impacts are accounted for and minimised where possible.*



➤ **MAIN**

a) Social sustainability:

1. The data for this activity is based on American mushroom farming systems. Commercial mushroom farming operations are similar globally, but the data should be taken in context.
2. Distribute **Worksheet 1.1 – Social Sustainability**.
N.B. Highlight with students that the source of information is for American grown mushrooms.
3. Using the statistics and conversion chart on the worksheet, students calculate the water used and CO₂ equivalents produced for the production of 1 kg of mushrooms.
4. Students access the following websites to define water footprint and CO₂ equivalents:

- [The Mushroom Sustainability Story](#)

Answers 

b) Environmental sustainability:

1. Distribute **Worksheet 1.2 – Environmental Sustainability**.
N.B. Highlight with students that the source of information is for American grown mushrooms.
2. Students review the article and answer the questions on **Worksheet 1.2 – Environmental Sustainability**.

Answers 

c) Economic sustainability:

1. Distribute the following worksheets:
 - **Worksheet 1.3a – Economic Sustainability**.
 - **Worksheet 1.3b – Economic Sustainability**.
 - **Worksheet 1.3c – Economic Sustainability**.
2. **Worksheet 1.3 – Economic Sustainability** – Students start by following the link to the resource on statistics on the mushroom industry workforce and answer the comprehension questions.
3. Task 1:
 - **Worksheet 1.3a – Economic Sustainability** – students go to the [Australian Hort Statistics handbook 2020/21](#) website.

- Students choose three horticultural crops (one must be mushrooms), and complete the table on the worksheet.

Answers 

- Task 2:

- **Worksheet 1.3b – Economic sustainability** – students go to the [Australian Horticulture Statistics Handbook 2020/21](#) website.

- Students select the same three crops from Task 1 and convert the data into graphical form. Answers will depend on the crops the students choose.

- Task 3:

- **Worksheet 1.3c – Economic Sustainability.**

- Students complete the extended response question.

Answers 

d) Mushroom Farm Case Study

- Distribute **Worksheet 1.4 – Mushroom Farm Case Study**.
- As a class, watch the [VIC Farmer Time – Mushroom Production with Farmer Georgia](#) (8:13). Students make notes of information and data that they consider to be classified as social, environmental, and economic sustainability.
- Students complete **Worksheet 1.4 – Mushroom Farm Case Study**.

Answers 

e) Challenges Facing the Mushroom Industry

- Distribute **Worksheet 1.5 – Challenges Facing The Mushroom Industry**.
- Students read the sources of information on **Worksheet 1.5 – Challenges Facing The Mushroom Industry** to learn about two examples of challenges facing the mushroom industry, then conduct individual research into other challenges facing the mushroom industry using the suggested bullet points.
- Students create a digital report (Canva, Google Doc, Google Slide Prezi, etc.) that summarises a challenge/s that the mushroom industry is facing.
- Once completed, students add a link to their report on the worksheet.



PLENARY

Use a KWL chart with students to summarise their learning.

- What do they know (K)?
- What do they want (W) to know?
- What have they learned (L)?

Student Resources

1. [Worksheet 1.1 – Social Sustainability](#)
2. [Worksheet 1.2 – Environmental Sustainability](#)
3. [Worksheet 1.3a – Economic Sustainability](#)
4. [Worksheet 1.3b – Economic Sustainability](#)
5. [Worksheet 1.3c – Economic Sustainability](#)
6. [Worksheet 1.4 – Mushroom Farm Case Study](#)
7. [Worksheet 1.5 – Challenges Facing The Mushroom Industry](#)



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Answers

WORKSHEET 1.1 – Social Sustainability

- **lbs to kg conversion:** $1/0.453 = 2.21$
Therefore **2.21 lbs = 1 kg**
 - **lbs to gallons of water used:** $2.21 \times 1.8 = 3.978$
Therefore **1 kg mushrooms uses 3.978 gallons of water**
 - **Gallons to litres:** $3.978 \times 3.78 = 15.04$
Therefore **1 kg mushrooms uses 15.04 L of water**
- **lbs to kg conversion:** $1/0.453 = 2.21$
Therefore **2.21 lbs = 1 kg**
 - **kg to lbs of CO₂ equivalents:** $2.21 \times 0.7 = 1.547$
Therefore, **1 kg produces 1.547 lbs CO₂ equivalents**
 - **lbs of CO₂e. to kg of CO₂e:** $1.547 \times 0.453 = 0.7$
Therefore, **1 kg of mushrooms produces 0.7 kg CO₂ equivalents**
- CO₂ equivalents** – Tracking total emissions from electricity and fuel used for composting equipment and growing operations.
- Water footprint** – The amount of fresh water that any given process or activity uses.

WORKSHEET 1.2 – Environmental Sustainability

- Horse manure
 - Chicken litter
 - Straw
 - Mushroom stumps
 - Molasses
 - Almond husks
 - Corn cobs
 - Cotton hulls
- Explain how mushroom substrate may be different depending on geographical locations and available raw materials.

(Answers for Worksheet 1.2 continued following page...)

Answers (continued)

3. 1. • Mine reclamation projects • Green roofs • Landscaping
2. • Gardening • Vegetable crops • Mushroom industry
4. Mushroom farmers reuse and recycle water, monitor their energy usage, and plan to use energy during off-peak times. Technology is also playing a role in ensuring optimum growing conditions are being consistently met.

➤ WORKSHEET 1.3a – Economic Sustainability

1. Sixth
2. Third
3. 70,000
4. 3,500

➤ WORKSHEET 1.3b – Economic Sustainability

Answers will vary on student choices.

➤ WORKSHEET 1.3c – Economic Sustainability

Suggestions for inclusion can include:

- Can lead to the identification and analysis of trends in production and consumption over time.
- Tracking data allows growers and stakeholders to monitor production and link trends to external factors such as drought, floods, seasonal demands, import and export influences, and economic factors. This information can lead to better risk analysis and management.
- Stakeholders use the data to monitor the supply and demand equilibrium and link this to increased or decreased production.

Answers (continued)

➤ WORKSHEET 1.4 – Mushroom Farm Case Study

1. *Agaricus* mushrooms. White and brown mushrooms

2.

Economic	Social	Environmental
<ul style="list-style-type: none">• Employs 85 staff.• Produces 10 tonne of mushrooms/week.• Increasing growth in the organic market for a sustainable product.	<ul style="list-style-type: none">• Mushroom punnets are made from recycled pulp.• Actively look to reduce the amount of plastic used for packaging.	<ul style="list-style-type: none">• Compost site recycles agricultural waste.• 1 kg of mushrooms produce 4 kgs of spent mushroom compost.• Spent mushroom compost is sold to nurseries and Bunnings.

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