



## Module 2: Waste-to-Resource Strategies in Agri-Food Systems

### Student Notes

### Red Notes

#### Lesson A – Beyond the Trash: The Five Pathways of Food Waste

##### Vocabulary in Context: Fill in the Blanks

1. **Organic waste** is material from plants or animals that will naturally decompose.
2. An **anaerobic digester** breaks down food waste without oxygen, releasing methane.
3. **Methane** is a gas more harmful than CO<sub>2</sub>.
4. Converting waste into valuable products supports a **circular economy**.
5. **Aerobic composting** uses oxygen to break down organic waste into compost.
6. Heating organic matter without oxygen to create a charcoal-like product is called **biochar pyrolysis**.
7. **Insect bioconversion** uses insects to convert waste into usable products.
8. The five main pathways are landfill, aerobic composting, anaerobic digestion, biochar pyrolysis, and **insect bioconversion**.

##### Self-Test

1. The most common disposal method for food waste is **landfill**.
2. The process that produces biogas and fertilizer without oxygen is **anaerobic digestion**.
3. **Landfill** produces methane during decomposition without air.
4. A method that creates compost to improve soil health is **aerobic composting**.
5. **CO<sub>2</sub>-equivalent** measures the impact of greenhouse gases.
6. Using insects to process food waste is called **insect bioconversion**.
7. The system that keeps materials in use for as long as possible is a **circular economy**.
8. A stable form of carbon created by heating organic material without oxygen is **biochar**.

#### Lesson B – Carbon Math

##### Vocabulary in Context: Fill in the Blanks

1. **Biogas** is the gas produced by anaerobic digestion and used as an energy source.
2. A product of aerobic composting that enriches soil is **compost**.
3. **Emissions avoided** occurs when a process prevents greenhouse gases from being released.
4. Insect bioconversion can produce **protein** for animal feed.
5. Heating organic matter without oxygen creates **biochar** that stores carbon.
6. The temperature, oxygen level, and moisture during processing are called **process conditions**.
7. Biogas from anaerobic digestion can be used to make **renewable energy**.
8. Applying compost or biochar to soil can increase **fertilizer** availability.

##### Self-Test

1. **Renewable energy** is a form of energy made from organic waste.
2. **Compost** can reduce the need for synthetic soil amendments.
3. A method that prevents greenhouse gases from entering the atmosphere has **emissions avoided**.
4. Waste processed by insects can be turned into **protein**.
5. **Biochar** stores carbon and improves soil health.
6. **Process conditions** affect the quality and quantity of outputs.
7. Using anaerobic digestion to make biogas produces **biogas**.
8. Applying compost helps increase **fertilizer** in soil.

#### Lesson C – Measuring Waste & Calculating CO<sub>2</sub> Impact

##### Vocabulary in Context: Fill in the Blanks

1. Keeping materials in use and reducing waste is part of a **circular economy**.
2. Converting waste into valuable products is an example of **resource recovery**.
3. Preventing harmful substances from entering the environment is called **pollution prevention**.
4. Ensuring people have consistent access to nutritious food relates to **food security**.
5. The **Sustainable Development Goals (SDGs)** are a global set of goals for a better future.
6. Using products more than once is an example of **reuse**.
7. Turning old materials into new ones is called **recycling**.
8. Using resources carefully so they last longer is part of **responsible consumption**.

## Self-Test

1. A system that focuses on eliminating waste and keeping materials in use is a **circular economy**.
2. Creating useful products from waste is an example of **resource recovery**.
3. **Pollution prevention** stops harmful materials from damaging the environment.
4. Access to safe and sufficient food is called **food security**.
5. The **Sustainable Development Goals (SDGs)** guide global efforts for sustainability.
6. Using something again without processing is **reuse**.
7. **Recycling** involves converting used materials into new items.
8. Using resources responsibly to ensure their availability is **responsible consumption**.