Module 2: Waste-to-Resource Strategies in Agri-Food Systems
References/Resources

YouTube Video Links:

Lesson A

1. Deborah Pagliaccia – Circular Economy & Waste Recovery
   ➤ Circular Economy & Waste Recovery
   Short explainer introducing circular economy and waste-to-resource innovation.
2. National Geographic – Black Soldier Fly Larvae in Action
   ➤ https://youtu.be/giintgC7Nd8?feature=shared
   Shows insect bioconversion of food waste into animal feed.
3. LabToFarm.org – Bokashi Time-Lapse *(coming soon)*
   ➤ (coming soon)
   Demonstrates bokashi fermentation stages over time.
4. Study Hall – What is a Circular Economy?
   ➤ What is a circular economy? | Sustainability 13 of 31 | Study Hall
   A concise explanation of circular economy principles and their importance in sustainability.
5. How to collect and process organic waste for BSF maggot feed
   ➤ How to collect and process organic waste for BSF maggot feed
   A detailed description of how organic waste is collected at the market for BSF maggot feed production.
6. Vimeo Video Link Made by Lab to Farm
   BOKASHI PROCESS: TURNING WASTE INTO FERTILE SOIL

General Module References

These provide overarching frameworks on food waste, circular economy, and waste-to-resource strategies.

1. ReFED – U.S. Food Waste by the Numbers (Insights Engine)
   ➤ https://refed.org/
   Interactive hub with data on how much food is wasted, why, and where it goes.
2. EPA – From Farm to Kitchen: Environmental Impacts of U.S. Food Waste (2021)
   ➤ https://www.epa.gov/land-research/farm-kitchen-environmental-impacts-us-food-waste
   Quantifies resource use and GHG impacts of U.S. food waste.
3. Ellen MacArthur Foundation – What is a Circular Economy?
   ➤ The Circular Economy | Definition & Model Explained | Ellen MacArthur Foundation
   Student-friendly explainer with graphics and examples.
4. Ellen MacArthur Foundation – Circular Design for Food
   ➤ What is circular design for food? | Ellen MacArthur Foundation
   Case studies and multimedia on closing nutrient loops.
5. FAO – Save Food Initiative
   ➤ Home -- SAVE FOOD
   Global statistics, infographics, and case studies on food loss/waste.
6. USDA – Food Loss and Waste Resources for Schools
   ➤ https://www.usda.gov/foodlossandwaste/schools
   Fact sheets, data tables, and school waste-reduction tips.
7. CalRecycle – California Organic Waste & SB 1383 Guidance
   ➤ https://calrecycle.ca.gov/organics/slcp/
   State policy framework and implementation guidance.

8. NIOSH – School Chemistry Lab Safety Guide (2007)
   ➤ https://www.cdc.gov/niosh/docs/2007-107/default.html
   Comprehensive safety guidance for classroom labs.
9. Recycling Agricultural Waste to Enhance Sustainable Greenhouse Agriculture – MDPI, Sustainability (2024)
   ➤ https://doi.org/10.3390/su16146070
   Examines how applying bokashi and biochar (alone or combined) improves citrus nursery growth, soil health, water retention, nutrient availability, and carbon sequestration, while also providing economic benefits.
10. Module 2 Slide Deck & Speaker Notes (LabToFarm)
    ➤ (provided separately)
    Companion teaching slides and pacing notes.
11. How Does Anaerobic Digestion Work? | US EPA
12. Biochar in temperate soils: opportunities and challenges
13. Pacific Biochar

Lesson A – Beyond the Trash: The Five Pathways of Food Waste
Covers the five major waste-valorization pathways: landfill, aerobic composting, anaerobic fermentation (bokashi/digesters), biochar pyrolysis, and insect bioconversion.

1. LabToFarm.org – Bokashi Process
   ➤ https://www.labtofarm.org/bokashi-process
   Step-by-step DIY guide with inoculant calculator and visuals.
2. LabToFarm.org – Biochar in Agriculture
   ➤ https://www.labtofarm.org/biochar-in-agriculture
   Explains benefits of biochar; includes tin-can kiln tutorial.
3. International Biochar Initiative – Biochar Basics
   ➤ https://biochar-international.org/
   Concise overview of production, properties, and safety.
4. Cornell Waste Management Institute – Small-Scale Composting Guide
   ➤ https://cwmi.css.cornell.edu/smallscaleguidance.pdf
   Manual for school/home composting with troubleshooting.
5. US Composting Council – Composting 101
   ➤ https://www.compostingcouncil.org/page/HowUseCompost
   Introduces composting principles, benefits, and applications.
6. SARE Project – Spent Grain to Mushroom Compost
   ➤ https://projects.sare.org/project-reports/fne14-795/
   Case study on upcycling brewery byproducts into mushrooms.
7. Guide to Conducting Student Food Waste Audits
8. Food Recovery Program for Schools
9. Food waste audit in the school canteen
10. A Guide to Conducting Student Food Waste Audits: A Resource for Schools | US EPA
11. Why (and How!) Your School Should Do a Student Food Waste Audit | Sustainable America
12. Food waste audits: key first step to reducing food loss at schools

Lesson B – Carbon Math
Focuses on calculating ΔCO_2-equivalent, ranking waste-to-resource technologies, and evaluating trade-offs.

1. EPA – WARM Model (Waste Reduction Model)
   ➤ https://www.epa.gov/warm
   Calculator for landfill vs. alternative pathway emissions.

2. IPCC – AR6 Emission Factors (2022)
   ➤ IPCC_AR6_WGIII_SPM.pdf
   Latest CO_2-equivalent factors for waste scenarios.
3. Project Drawdown – Composting Solution
   ➤ https://www.drawdown.org/solutions/composting
   Evaluates CO_2-reduction potential and adoption pathways.
4. Project Drawdown – Biochar Solution Entry
   ➤ https://www.drawdown.org/solutions/table-of-solutions
   Analyzes climate impact, scalability, and adoption of biochar.
5. LabToFarm.org – Bokashi & Biochar Trial Snapshots
   ➤ https://www.labtofarm.org/
   Classroom-ready data on carbon/nutrient outcomes.

Lesson C – Measuring Waste & Calculating CO_2 Impact
Students learn to conduct audits, compare footprints, and design waste-to-resource prototypes.

1. USDA/EPA/Univ. of Arkansas – Guide to Student Food Waste Audits
   ➤ Student_Food_Waste_Audit_FINAL_4-6-2017.pdf
   Step-by-step manual for cafeteria waste measurement projects.
2. USDA Team Nutrition – Reducing Food Waste Infographic
   ➤ Reducing Food Waste: What Schools Can Do Today Infographic
   One-page visual of school strategies to cut waste.
3. LabToFarm.org – Student Worksheets & Guided Notes
   ➤ (provided separately)
   Scenario maps, carbon tables, and campus audit tools.
4. Biochar-based adsorption for heavy metal removal in water: a sustainable and cost-effective approach - PubMed

Optional Add-Ons for Student Exploration
For deeper inquiry, data analysis, podcasts, and regional or global case studies.

1. ReFED – Food Waste Monitor (Interactive Dashboard)
   ➤ https://refed.org/
   Platform for advanced student data analysis projects.
2. LabToFarm.org – Podcast Series
   ➤ https://www.labtofarm.org/podcast
   Episodes linking bokashi, insect farming, and current research.
3. Gunders, D. – *Waste-Free Kitchen Handbook* (2017)
   ➤ (book; retailer/library link as available)
   Practical tips for household food-waste reduction.
4. San Diego Food System Alliance – Wasted Food Action Plan (2020)
   ➤ lwsd-fdap-progress-update-final
   Regional strategy for waste reduction and resilience.
5. FAO – Food Waste Infographics
   ➤ FAO Knowledge Repository
   Visual resources for debates and classroom discussion.

Teaching Slide References Links

1. EPA, 2021
   ➤ https://www.epa.gov
2. ReFed, 2011
   ➤ https://refed.org/

3. Munjur et al., 2018
   ➤ (PDF) CONSTRUCTING A GREEN CIRCULAR SOCIETY
4. LabToFarm, 2025
   ➤ Bokashi Process | labtofarm.org
5. Bethel, 2025
   ➤ Revolutionizing waste: How black soldier flies transform food waste into sustainable solutions
6. Jans, 2019
   ➤ Cellugy: Compostable Petroleum-Free Bioplastic Offers an Alternative to Conventional Plastic Packaging
7. Amhuru , 2025
   ➤ https://amhuru.com/the-role-of-mycelium-in-compost-production/
8. TradeKorea, 2000
   ➤ biodiesel oil | tradekorea
9. Fayah, 2024
   ➤ Organic Chicken Manure Pellets - High-Quality Fertilizer for Organic Gardening
10. Chauhan et al., 2023
    ➤ Soil Microbiome: Diversity, Benefits and Interactions with Plants
11. Abo-Sido et al., 2021
    ➤ Microbial transformation of traditional fermented fertilizer bokashi alters chemical composition and improves plant growth | bioRxiv
12. Pagliaccia et al., Sci Hortic. (2024)
    ➤ https://www.labtofarm.org/_files/ugd/002354_6bf15310560e4b14b37973868909a879.pdf