Eco-Columns in Action: Modeling Ecosystem Interactions and Human Impact

Objectives

- Build a model ecosystem
- Discuss ways that students can create experiments based on the model
- Learn to use a uHandy® Pro Mobile Microscope
- Learn to use Accu-Scope® EXM-150 Monocular Microscope with Darkfield/Brightfield Illumination

Building Toward 3-Dimensional Learning

The activities in this workshop address the following dimensions of the Next Generation Science Standards:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models ▪ Develop, revise, and/or use a model based on evidence to illustrate and/or predict relationships between systems or between components of a system.	**ESS3.C: Human Impacts on Earth Systems** ▪ The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.	**Energy and Matter** ▪ Energy drives the cycling of matter within and between systems.[1]

1. NGSS Lead States, Next Generation Science Standards: For States, By States *(Washington, DC: The National Academies Press, 2013), retrieved from www.nextgenscience.org or ngss.nsta.org*

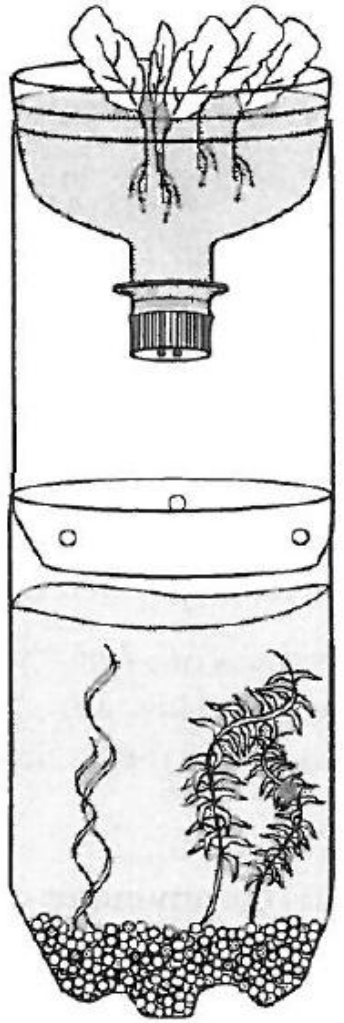
Safety Requirements

- **Personal Protective Equipment (PPE)**
  - Gloves and safety goggles have been provided.
  - You will need to wear your PPE for the duration of the activities.
- **Safety Tip**
  - Clear your workspace of phones, papers, books, and other personal items.
- **Water**
  - This workshop involves the use of water and other liquids. Please make sure that anything you don't want to get wet is put away.

Eco-Columns: A Compact Ecosystem Model

Structure: Two main layers

- Terrestrial zone
- Aquatic zone
- Optional: Middle chamber for decomposers

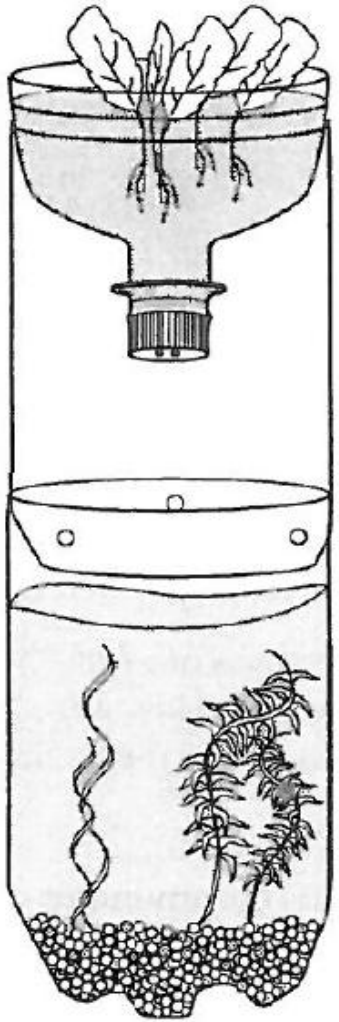


Benefits of Using an Eco-Column

- **Models Real Ecosystem Interactions**
  Students observe energy flow, matter cycling, and organism interdependence in a controlled system.
- **Supports Inquiry-Based Learning**
  Students design experiments, test hypotheses, and analyze results.
- **Aligns with Next Generation Science Standards**
  - Science & Engineering Practices: Developing and using models
  - Core Ideas: Human impacts on Earth systems
  - Crosscutting Concepts: Energy and matter cycles
- **Promotes Sustainability Awareness**
  Students explore biodiversity and resource management through hands-on observation.

Challenges of Using an Eco-Column

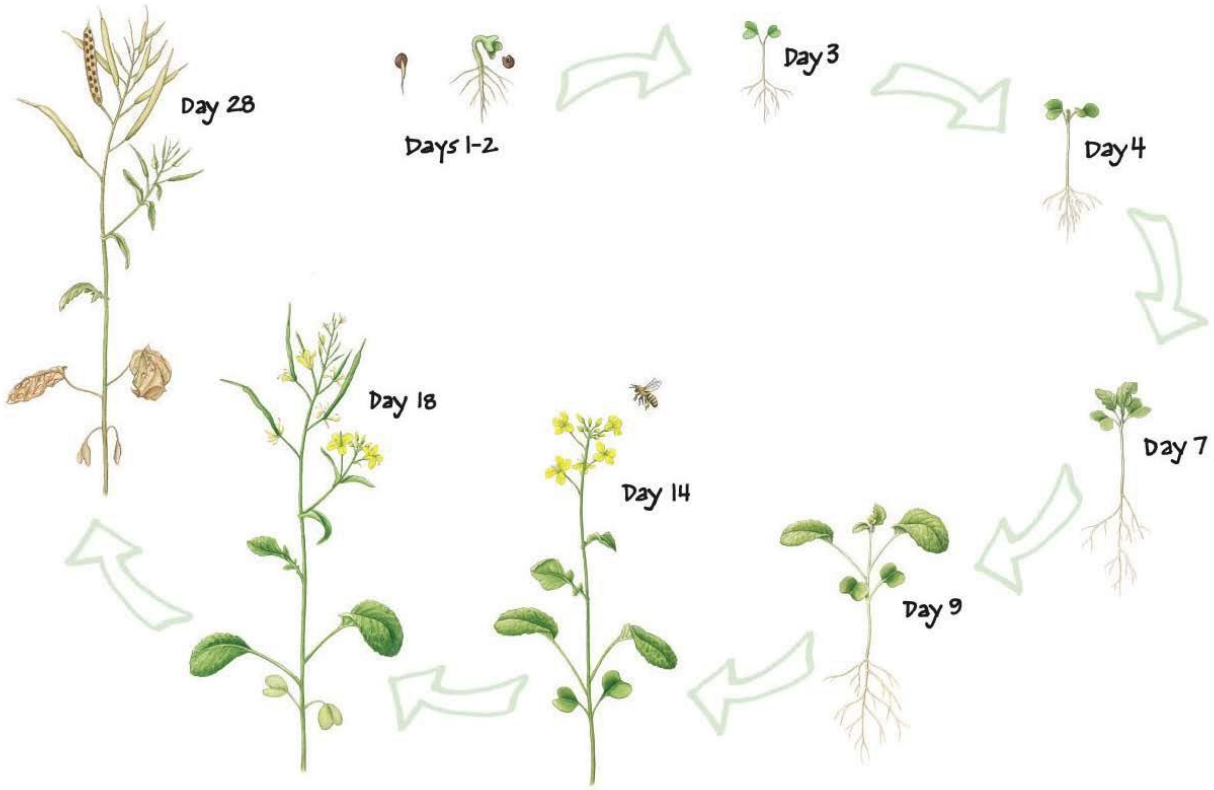
- System can be physically unstable.
- Changes occur slowly.
- Plants may take 2+ weeks to establish.
- Detecting measurable differences between experimental setups can be difficult.



New Stable Design

- **Wisconsin Fast Plants®**
  - Fast growing
  - Shallow roots
  - Sensitive to growing conditions
- **Wick**
  - Allows water and nutrient flow
  - Filters the soil
- **Hay Infusion**
  - Cultivates microorganisms
  - More complex ecosystem interactions
  - More responsive to experimental conditions
  - Builds microscopy skills

Why Fast Plants®?



- 3 days to germination
- 7 days to true leaves
- 14 days to flower
- 30 days to seed development
- 40 days to reseeding
- Very sensitive to environmental conditions

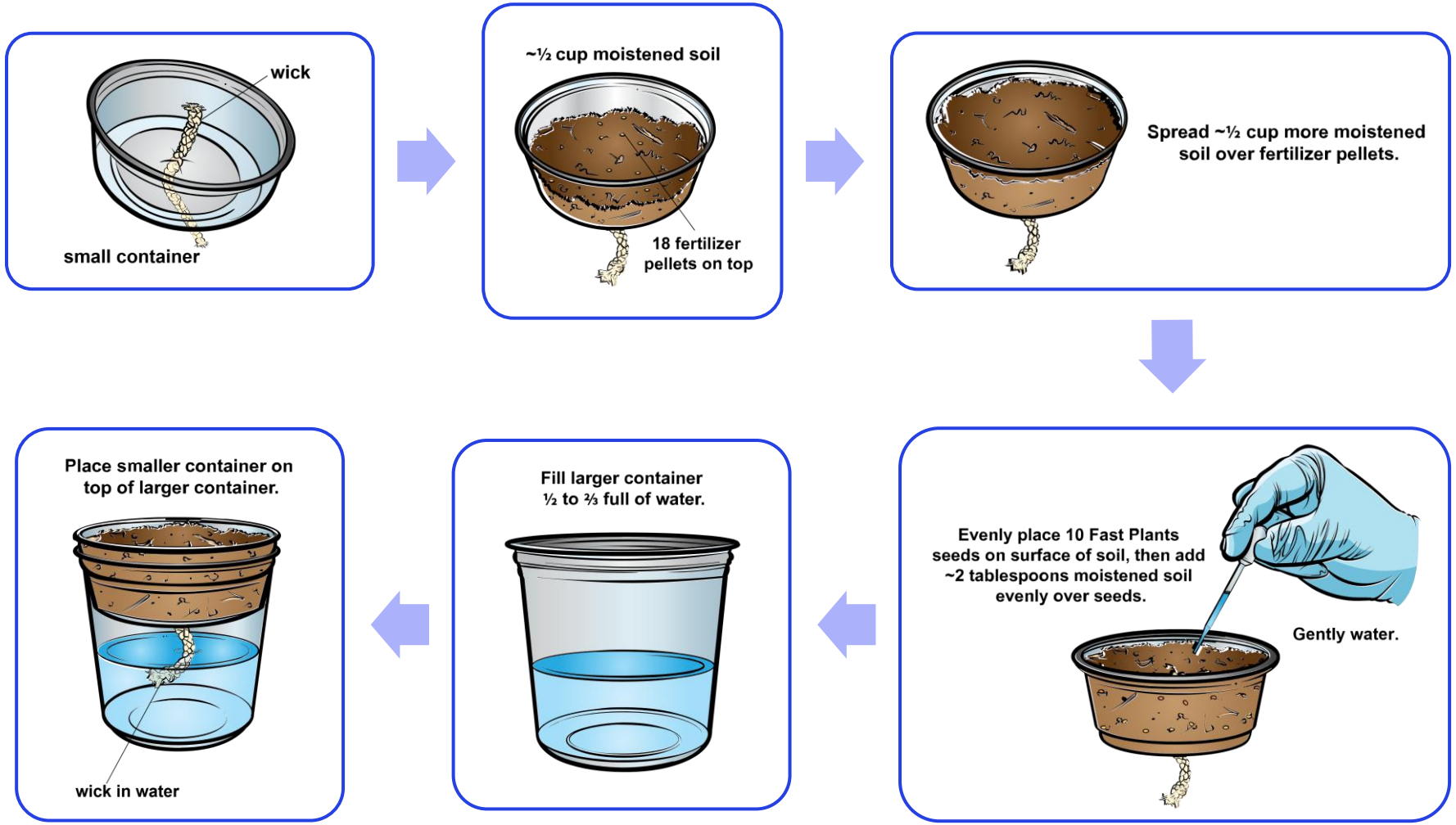
CAROLINA
UNLEASH LEARNING

What Do You Want to Do with Your Ecosystem?

- Observe an ecosystem
- Study ecological succession
- Explore the effects of fertilizer on aquatic systems
- See how detritivores affect plant growth

CAROLINA
UNLEASH LEARNING

Instructions



Workshop Review

Hay Infusion Kit

Item #131206

Self-Watering Plant Growing System, Class Set

Item #158937

Wisconsin Fast Plants® Standard *Brassica rapa* Seed

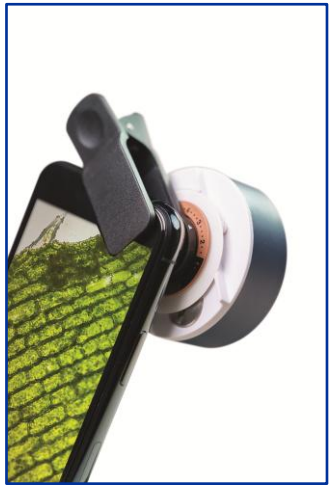
Item #158804

Workshop Review

Equipment used to view water from your eco-column

Accu-Scope® EXM-150 Monocular Microscope with Darkfield/Brightfield Illumination

Item #591943



uHandy® Pro Mobile Microscope

Item #597030

uHandy® Darkfield Stage and Accessories

Item #597034

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