Module 6: Agri-Systems Across the Urban-Rural Gradient

Hands-On Activity: Urban/Peri-Urban Light BioLab

Data Collection Worksheet for Module 6 HOA B
Grouping: Pairs or small groups (3–4)
Time: 25–40 minutes (initial setup on Day 1), then monitoring on Days 3 to 10

Class Period: ___ Date: ___ Group: _____ Team Members: _____

Light Treatment Assigned: (Circle one) **Blue** / **Red** / **Blue+Red**
Plant Type: Lettuce (six plants per group, three per system)
Growing Systems: Hydroponic (Urban CE) & Soil + Compost (Peri-Urban)

Materials and Equipment

- **Hydroponic system** (e.g., Ahopegarden Indoor Garden) for urban setting set up.
- **Soil + compost pots** for peri-urban setting set up.
- **LED grow lights** (blue, red, blue+red)
- **Lettuce seeds** (or seedlings)
- **Measuring tools** (Ruler (cm); graduated cylinder or measuring cup (mL); soil-moisture meter or "Wet/Dry" probe; light meter or smartphone lux app (optional); **pH test kit** (optional)
- Notebook or printed data sheet; labels or tape for identifying plants

Baseline Measurements (Day 0): *(Record initial readings before starting the experiment.)*

- **Hydroponic system:** Initial water volume in reservoir (mL): _____; Plant height (cm): _____; Number of leaves: _____.
- **Soil + Compost pot:** Water added at planting (mL): _____; Plant height (cm): _____; Number of leaves: _____; Soil moisture level: _____ (if available).

Monitoring - Observations & Measurements (Every other day (Roughly 3–4 times per week): Record the following during the experiment.

Day	Total Water Added (mL) to Each system Hydro & Soil	Runoff Collected (mL) from Soil pot system	Hydroponic Plant Height (cm)	Soil Plant Height (cm)	Hydroponic Leaves Count	Soil Leaves Count	Notes/Observations (wilting, color changes, etc.)
Day 1	**Hydro** **Soil**						
Day 2	**Hydro** **Soil**						
Day 3	**Hydro** **Soil**						

Note: The same amount of water should be added to **both** systems each day (e.g., 50 mL). The soil pot's runoff should be measured after watering and recorded. The hydroponic system typically will not have runoff; just ensure it has the set amount of water each day.

Final Day Measurements (End of Day 3): *(After the last observation, measure total water use and final growth.)*

- **Hydroponic system:** Water remaining in reservoir (mL): _____
- **Soil + Compost pot:** Total runoff collected over 3 days (mL): _____
- Final plant height – Hydroponic (cm): _____; Soil (cm): _____
- Total growth – Hydroponic (cm): _____; Soil (cm): _____ *(Calculate: Final height – Day 0 height)*
- **Water-Use Efficiency (WUE):**
    - Hydroponic WUE = (Total water added – Water remaining) ÷ Total growth = _____ mL/cm
    - Soil WUE = (Total water added – Total runoff) ÷ Total growth = _____ mL/cm

(Remember: lower WUE means more water used per cm growth (less efficient); higher WUE means more efficient water use.)

Post-Experiment Questions:

1. **Which system had a higher WUE** (more water-efficient growth)? _____
2. **Light effect:** How did your light spectrum seem to affect plant growth and morphology or water use for lettuce? *(Compare your results with other teams' results under different lights.)*

3. **Design recommendation:** Based on the data, what growing method and light would you recommend for:
    - an **urban (city)** farm?
      _____
    - a **peri-urban** farm?
      _____
      (Briefly explain your choices.)

4. **Trade-offs or surprises:** Describe one trade-off or unexpected result you observed (for example, a benefit in one setup that had a drawback in another).

Skills You'll Use:

- Experimental design and hypothesis testing
- Measuring and recording biological data
- Evidence-based reasoning (linking stomata, leaf traits, and light to results)
- Systems thinking: comparing urban vs peri-urban farming strategies