Growing Plant-Based Solutions 8-Step PBLP (Grades 7–12)

Objective: To explore the importance of plant health for global food security, biodiversity, and environmental sustainability. Learners will examine threats to plant health (such as pests, climate change, and trade), investigate solutions through science and technology, and design a local or global awareness campaign or intervention to promote plant health.

Round Table

- **Opening Discussion:**
  - Why is plant health essential for people in farming communities around the world?
  - How do drought, pests, or poor soil affect food availability in places with limited resources?
  - How can small changes in how we care for plants have a big impact globally?
- **Purpose:** To introduce the International Day of Plant Health and connect students' local understanding of food and nature with real challenges faced by rural farmers in third-world countries.
- **Materials:**
  - FAO International Day of Plant Health overview
  - Excerpt or summary from a global case study (e.g., on cassava disease in Africa or maize pests in Central America)
  - Photos or short video of farming in a third world context
  - Map showing major agricultural zones and crop types around the world

Reflection Point

- **Discussion Questions:**
  - Have you or your family ever grown your own food or gardened? What challenges did you face?
  - What would happen in a village or small community if plants stopped growing?

- ➢ What do you think a small group of students like us can do to help families grow healthier crops, even from far away?

❖ **Materials:**

- ➢ Reflection journals

Knowledge Setting	
Science (S): Investigating Plant Stress and Environmental Impact	❖ **Objective:** Understand how environmental stressors like climate change, invasive species, and soil degradation impact plant health. ❖ **Activity:** Investigate local and global case studies where plant disease outbreaks or changing climate conditions have disrupted ecosystems. Use observation tools and data to identify visible signs of plant stress in your environment.
Technology (T): Using Digital Tools for Plant Health Monitoring	❖ **Objective:** Explore how digital tools are used to detect, monitor, and prevent plant health threats. ❖ **Activity:** Use plant health diagnostic apps (e.g., Plantix), GIS tools, or remote sensing imagery to track outbreaks or monitor soil and vegetation quality in real time.
Engineering (E): Designing Eco-Innovations for Sustainable Agriculture	❖ **Objective:** Examine eco-engineering solutions that promote sustainable plant protection and soil conservation. ❖ **Activity:** Research real-world examples of irrigation innovations,

	greenhouses, or bio-based pest control systems.
Arts (A): Expressing Ecological Awareness Through Creative Media	❖ **Objective:** Communicate the urgency and beauty of plant health through creative expression. ❖ **Activity:** Study a visual piece (poster, zine, digital art, or short video) that captures both the risks and solutions for plant health. Highlight a specific issue, such as pollinator decline or pesticide overuse.
Mathematics (M): Analyzing Data to Forecast Plant Health Risks	❖ **Objective:** Understand data trends related to plant growth, pest spread, and environmental factors. ❖ **Activity:** Interpret local or global datasets (e.g., rainfall, soil pH, crop yields) to identify patterns over time. Use graphs and ratios to draw conclusions about plant health risks and forecasts.
Social Studies (SS): Understanding Global Agreements and Indigenous Knowledge	❖ **Objective:** Understand the policy, trade, and cultural practices that affect plant health globally and locally. **Activity:** Research the International Plant Protection Convention (IPPC), food trade policies, or indigenous land stewardship methods. Examine how historical and present-day decisions shape plant health outcomes.

Project Examples

Progress Map for Project Delivery	❖ **Step 1: Project Proposal** Students gather foundational knowledge through a collaborative knowledge-setting session to prepare for a project-based learning process. They meet with community partners (if possible) and create a written proposal outlining the project focus and intended community benefit. ❖ **Step 2: Initial Project Proposal and Community Engagement Plan** Students submit proposals and reflect on community input, refining their plans. They outline how the project addresses real-world needs and aligns with learning objectives. ❖ **Step 3: Research Progress Update** Students conduct research and gather data by consulting with community partners to guide their project development and ensure accuracy. ❖ **Step 4: Draft of Final Project** Students compile findings into a working draft of their final project proposal. ❖ **Step 5: Final Project Refinement and Approval for Implementation** Students apply final feedback to strengthen their project and submit it for approval. Approved projects move forward to the community involvement and assessment phases outlined in the SOP.

Science (S): Identifying Common Plant Illnesses in Staple Crops	❖ **Project Example:** In collaboration with an agricultural co-op or nonprofit working with subsistence farmers, students will research the most common plant diseases and deficiencies affecting staple crops in developing regions (e.g., maize, cassava, beans). Analyze visual symptoms, environmental causes (like drought or poor soil), and treatment options using low-cost or natural methods. Learners will then create a simple, evidence-based plant illness reference sheet that can be printed and shared with rural communities to assist with early identification and prevention.
Technology (T): Mapping Local Plant Health with Digital Tools	❖ **Project Example:** In collaboration with a global agriculture nonprofit or community development organization, learners will research common signs of plant stress and disease affecting staple crops in developing regions (e.g., yellowing leaves, fungal spots, pest holes). They will then design a printed, picture-based plant health guide that uses checkboxes, symbols, and simple language to help rural farmers diagnose problems without needing digital tools. The final resource will be translated (if applicable), laminated, and distributed through community partners as a practical diagnostic tool for low-tech environments.
Engineering (E): Building Low-Cost Solutions for Crop Protection	❖ **Project Example:** In partnership with a rural farming co-op or nonprofit serving smallholder farmers, design and prototype simple, low-cost solutions to

	protect crops from pests, drought, or poor soil. Examples include vertical sack gardens, homemade compost bins, or bottle drip irrigation systems using recycled materials. Test their designs and create illustrated instructions for community partners to replicate, ensuring they can be built with local tools and materials.
Arts (A): Creating Illustrated Plant Health Education Materials	❖ **Project Example**: Partner with an international relief organization or translation service to design illustrated plant health posters or flipbooks. These materials will use images and symbols to teach farmers or students in rural areas about topics like composting, plant rotation, or identifying pests, without relying on advanced literacy. The final product will be distributed to community centers or field clinics to support agricultural education through art and visual storytelling.
Mathematics (M): Tracking Crop Yield to Improve Food Security	❖ **Project Example**: Using sample data provided by international development agencies or local farming networks, students will track changes in crop yield based on variables like rainfall, fertilizer use, or plant disease. Calculate averages, ratios, and trends to predict which methods lead to more stable harvests. Create a basic record-keeping chart (paper-based) that can be used by farmers in rural areas to monitor their own crop health over time and adjust farming practices accordingly.

Social Justice (SS): Preserving Indigenous Farming Knowledge and Food Sovereignty	❖ **Project Example**: In collaboration with a global education partner or cultural exchange organization, learners will research traditional and indigenous agricultural practices from rural communities around the world, such a seed saving, natural pest repellents, or companion planting. They will document these practices in a printed community booklet or storytelling zine designed to celebrate local knowledge and support food sovereignty efforts. This resource can be shared with global partners working to protect cultural traditions while improving food access.

Community Involvement

- ❖ **Objective**: Learners implement their final plant health projects in partnership with organizations that serve under-resourced or rural farming communities.
- ❖ **Activity**: After receiving project approval, students collaborate with a global mission team, agricultural nonprofit, or community development organization to adapt and distribute their resources (e.g., paper-based guides, instructional posters, simple farming tools). Learners may contribute to an actual distribution effort or prepare their materials for translation and use by a partner organization working in third-world countries.

Assessment

- ❖ **Objective**: Evaluate learners' understanding of plant health issues, creativity in low-resource design, and ability to create tools with community impact.
- ❖ **Methods**: Use a rubric to assess research depth, interdisciplinary integration, cultural sensitivity, and readiness for community use. Include student self-assessments, peer reviews, and optional feedback from international or local partners (in person or virtually).

Feedback Loop

- **Activity**: Facilitate structured reflection to help students process the real-world implications of their work.
- **Journal Prompt**:
  - How did working on a global challenge like plant health affect the way you think about food systems or sustainability?
  - Which part of your project would be most useful to someone farming in a low-resource setting, and why?
  - What would you improve in your design to make it more useful, accessible, or scalable in third-world communities?
  - How did learning about indigenous or traditional agricultural methods influence your approach?

Resume Integration

- **Objective**: Help students translate their project experience into future opportunities in agriculture, environmental justice, or global development.
- **Activity**: Learners write resume bullet points that describe their role in creating a plant health solution for use in underserved communities. Host a workshop or provide a template to help them articulate their experience for volunteer applications, mission work, internships, or environmental career paths.

For more 8-Step Project-Based Lesson Plans, check out our website at www.steamsinitiative.org

For all inquiries, please email **info@steamsinitiative.org**

A STEAMS Central, Inc. Program
STEAMS Central, Inc. | STEAMS Initiative
8605 Santa Monica Blvd
#123617
West Hollywood, CA
90069-4109
info@steamsinitiative.org
833-379-6892