Title: Wisconsin Fast Plants as a Model for Artificial Selection

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Target Audience: 9-12; Environmental Science and Biology

Objectives:

AP Environmental

COMPETENCY GOAL 4: The learner will build an understanding of the distribution, ownership, use and degradation of renewable and nonrenewable resources.

4.04 Analyze biological resources.
• Benefits of biodiversity.
• Threats to biodiversity.
• Endangered species management.
• Nutrition and food supplies.
• Green revolution.

Biology

COMPETENCY GOAL 3: The learner will develop an understanding of the continuity of life and the changes of organisms over time.

Objectives

3.01 Analyze the molecular basis of heredity including:
• DNA replication.
• Protein synthesis (transcription, translation).
• Gene regulation.

3.02 Compare and contrast the characteristics of asexual and sexual reproduction.

3.03 Interpret and predict patterns of inheritance.
• Dominant, recessive and intermediate traits.
• Multiple alleles.
• Polygenic inheritance.
• Sex-linked traits.
• Independent assortment.
• Test cross.
• Pedigrees.
• Punnett squares.

3.04 Assess the impact of advances in genomics on individuals and society.
• Human genome project.
• Applications of biotechnology.

3.05 Examine the development of the theory of evolution by natural selection including:
• Development of the theory.

• The origin and history of life.
• Fossil and biochemical evidence.
• Mechanisms of evolution.
• Applications (pesticide and antibiotic resistance).

National Science Standard

Selection

- Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuring selection by the environment of those offspring better able to survive and leave offspring
- Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms.

Description of project:

Students use basic knowledge of selection to meet the needs of a hypothetical plant order.

Specific activities:

1. Watch Video "History's Harvest" (approx. 1 hour)
2. Complete computer simulation about Wisconsin fast plants about plant color.
3. Students are presented with a hypothetical plant order (many different traits are ordered) like they work at a nursery. They then choose a different plant trait and design an experiment to achieve a population dominated by their chosen trait using the Wisconsin fast plant as the model.
4. Present findings and reflect on shortcomings and future experiments.
5. Students review the case study as a group and answer the questions using the concepts they have learned during their project.

References:

Pollan, Michael. *The Omnivore's Dilemma*. 2006.

Understanding Evolution Website (for agriculture):
http://evolution.berkeley.edu/evolibrary/article/_0/agriculture_01

Resources:

Video: available on www.youtube.com , www.howstuffworks.com

Information about Wisconsin Fast Plants (has 15 page lab manual): www.fastplants.org

Case Study for Green Revolution in India:
http://teacherweb.ftl.pinecrest.edu/SNYDERD/APHG/Unit%205/GreenRev.htm