Basic Plants Environment Series – Leader/Teacher Guide
Michigan State University Cooperative Extension Service
4-H Club Bulletin
Robert George, Environmental Conservation Education
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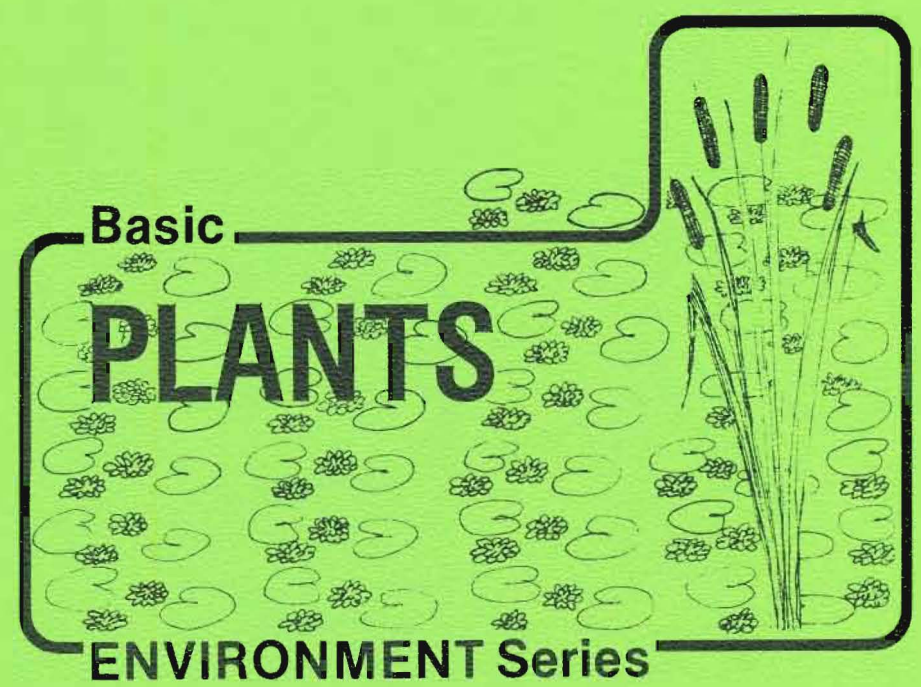

Leader / Teacher Guide

4-H — Youth Programs
Cooperative Extension Service
Michigan State University

LEADER/TEACHER GUIDE

for

PLANTS

by

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Extension Specialist
Environmental Conservation Education

This guide is a result of the pilot program evaluations and assistance of the Michigan 4-H Natural Resources and Environmental Education Developmental Committee.

LEADER/TEACHER GUIDE FOR BASIC PLANTS

To the Leader/Teacher

This unit of the Basic Environment Series is designed both to give members information about plants and to help them use this knowledge in various activities. The intended result of this unit is a member who has the knowledge, abilities, and the environmentally sound attitudes to deal with the plant resources and problems of today's world as well as with the world of the future.

BEFORE STARTING

1. Read the leader/teacher guide completely.
2. Read the member guide completely.
3. Note the additional resources for the plant unit. If any of these resources are desired, materials should be ordered and resource persons should be scheduled at least a month in advance.
4. Decide which discussion questions and activity options will be emphasized. (You may wish to involve your class or group in these decisions.)
5. Be ready to further define or discuss any of the vocabulary words which the students may not know.
6. Choose which of the concepts you will stress and be ready to emphasize these as they are encountered in the text.

OVERALL OBJECTIVES

- To help youths understand green plants and their importance in our lives.
- To investigate photosynthesis.
- To appreciate our many uses of plants.

ORGANIZATION OF THE MEMBER'S GUIDE (4-H 1048)

PROJECT OBJECTIVES

Through the activities and information in this project, each member will be able to demonstrate having learned about:

- Plants as producers.
- Plants that are not green.
- Diversity in successful plant communities.
- How human activity affects plant life.
- Basic processes in plant life.
- Observing natural surroundings.
- Relationships with other parts of the environment.

LEARNING THROUGH ACTION

INDIVIDUAL activity is emphasized throughout this project. Through participation in self-conducted action projects, the learning process will be expanded and information learned will be reinforced. The activities are designed to appeal to several areas of interest and varying levels of knowledge development.

GROUP participation in the project activities is easily accommodated and may offer special advantages. This may be of particular value with younger members and for those with little prior experience in self-conducted activity. Guided group activity is also an excellent introduction before individual studies are undertaken.

SUPPLEMENTAL ACTIVITIES

There are many opportunities for supplementing the activities offered in this project. A particular area may be selected for intensive observation. Observations may be conducted over long periods of time to experience changes that occur through several weeks or through the seasons. Annual, biennial and perennial plants may be compared, and their seeds collected for indoor culture. The life habits of plants found in different habitats—ponds, swamps, floodplains, abandoned fields, closely cropped lawns, sand hills—may be compared by identifying soil and moisture indicators and by other relevant information fitting plants into the total environment. Endangered plants should be identified and would be an excellent group display for public demonstration.

VOCABULARY LIST

chlorophyll
photosynthesis
producer
consumer
organic
inorganic
glucose
starch
transpiration
parasites
saprophytes
nitrogen-fixing

KEY CONCEPTS

Several major concepts are developed through this project to promote understanding of the value of plants in our environment:

- Oxygen-carbon dioxide cycle
- Food chains
- Plant and soil fertility
- The water cycle
- Plant growth
- Primary food production
- Nongreen plants
- Plants and air pollution
- Human responsibility

ACTIVITY SEQUENCE

INTRODUCTION

The basic plant project is designed to give a number of learning experiences—activities to help increase knowledge, to reinforce positive attitudes, and to develop some skills in demonstrating the role of plants in our environment.

Interdependence

Throughout this unit, it is important to stress the interactions that occur between air, water, soil, animals, and plants. Treating one part of the ecosystem individually aids member learning. However, it is important that members understand how all of the parts of an ecosystem fit together, each part affecting all of the others.

Nutrition and Additives

The study of plants as the beginning of the food chains leading to humans offers unusual opportunities to explore human nutrition. In addition to the effects of soil fertility, the use of chemicals during growth and the subsequent processing including the use of preservatives and other additives are only a few of the possibilities. The preparation of vegetable food for the table is, of course, an integral part of the study of plants.

Activity 1 - CHLOROPHYLL AND LIGHT (page 2)

EACH MEMBER should perform the experiment to see that the green of chlorophyll fades without the benefit of light energy. This will show that light and chlorophyll interact in producing food, each dependent on the other.

Activity 2 - A GREEN PLANT - "FOOD FACTORY" (page 3)

Design/develop a display to show how green plants are life factories that produce food. Show the role of raw materials, the soil, the green leaf (nature's process-photosynthesis)—producing energy and food.

Activity 3 - OXYGEN FACTORY (page 4)

EACH MEMBER should build an "oxygen factory" and watch plants producing oxygen, so they can *explain* how photosynthesis produces the oxygen necessary for practically all animal life. See suggestions for display.

Activity 4 - SEALED WORLD (page 6)

EACH MEMBER, or teams of two, should construct this total environment. Through this activity, the members will see a stable environment similar in many ways to the sealed world of the earth on which we live.

Activity 5 - HOW PLANTS GROW - 3 experiments (page 8)

EACH MEMBER should experience the first two experiments individually. A notebook including dates and growth measurements is a useful record from which charts and graphs vividly displaying growth rates may be developed.

SEVERAL MEMBERS may share in caring for and observing the growth of a plant from a fruit pit. This extended experiment offers many learning opportunities.

Activity 6 - THE RELATIONSHIP OF PLANTS
(Select *one* of the following activities.)

a) ....and *Water* (page 9)
b) ....and *Soil* (page 10)
c) ....and *Air* (page 12)

Activity 7 - COLLECTION - DISPLAY OF NON-GREEN PLANTS (page 14)

EACH MEMBER should be encouraged to collect fungi to emphasize that not all plants are producers. Alternatively, a scrapbook of pictures showing various bacteria, slime molds, algal fungi, and sac fungi with descriptions of their values will point out interrelationships.

Activity 8 - ADOPT A PLANT (page 16)

MEMBERS are encouraged to adopt a plant individually as well as in groups. This offers opportunity for applying creative imagination. An aquarium or terrarium combining animals with the plants may be of special interest.

Special Activity - COMMUNITY PLANTING PROJECT (page 17)

ALL MEMBERS are encouraged to take part in a community activity. It offers exceptional opportunities to publicize the value of plants in our environment and highlight the completion of this Basic Plants Project.

MEMBER ACHIEVEMENT

The demonstration described for each activity is only one of many measures of achievement. Member development is based on a broadened perception of the world of plants and this may be a significant achievement in itself. Members are offered many opportunities to learn about plants, to learn about interrelationships, and to see their own skills develop. The accomplishment of the activities should result in pride of performance which is then visibly displayed through public demonstration.

INDOOR AND OUTDOOR

The activities in this project include some which may be conducted indoors and others for the outdoors. There is no need to limit activity because of the seasons. It should be emphasized to the members that indoor activity is for convenience; field activity is necessary for learning about plants in their real world.

FIELD ACTIVITIES

The learning experiences in this project are focused on activities. It is recommended that outdoor activities be emphasized whenever possible so that members will experience plants in their usual environments, subject to the dynamic conditions of the natural world. There are a number of group field activities which will expand this project, such as visits to well-managed farms, greenhouses, botanical gardens, or nature centers with well-conducted field programs centered on plants and their interrelationships with the rest of the environment.

DEMONSTRATION ACTIVITIES

Public demonstration of achievement is an important part of youth programs. The demonstration descriptions accompanying each activity may be modified to suit the needs of individual members. Some members may become so thoroughly involved in a learning experience that they would like to develop their own ideas for display and recognition. This creative imagination should, of course, be encouraged. As the public displays are intended to provide some definite goals, to show achievement, and to help develop individual self-esteem, competitive instincts should be channeled constructively.

Cut here

After teaching this unit, please take a few moments to complete the following evaluation. It will help us in future revisions of this unit, as well as in the development of related units. Any additional comments would be especially appreciated. Upon completion of the evaluation, please send it to:

Extension Project Leader
Environmental Conservation Education
9 Natural Resources Building
Michigan State University
East Lansing, MI 48824

BASIC PLANTS PROJECT

EVALUATION

How to use this form: Encircle the number after each statement that indicates the degree of understanding the members have attained as you have taught the project.

What the numbers indicate: (Degree of understanding)

1 — none 3 — some
2 — very little 4 — very much

A. *Characteristics, Distribution* and *Status* of *Plant Resources*

1.	Plants have distinctive characteristics by which they can be identified.	1	2	3	4
2.	Plants depend upon water, soil nutrients, sunlight, and air for growth.	1	2	3	4
3.	Climate, soil, and topography influence the natural range and distribution of the different types of plant communities.	1	2	3	4
4.	Plant communities influence their climate and their soil.	1	2	3	4
5.	Plant litter, humus, and roots give soils an exceptional ability to absorb moisture and resist erosion.	1	2	3	4
6.	In forests some organisms are adapted to living in the forest soil, some on the forest floor, some in the undergrowth, and some in the trees.	1	2	3	4
7.	Forests are constantly undergoing change, and as they mature and are harvested or die, some species of plants and animals may be replaced by others.	1	2	3	4
8.	The interrelationships between the plant and animal members of natural communities and their environments determine the characteristics of a particular area.	1	2	3	4
9.	Fires, diseases, insects, people, and animals may be harmful or beneficial to plant communities.	1	2	3	4
10.	Some lands are better adapted for the growing of forests while other lands are best suited for grasses.	1	2	3	4

11. Forests have certain characteristics which make them attractive for recreational activities. 1 2 3 4

B. *Understanding* the *Uses* of *Plant Resources* and their *Importance to People*

1. Plants (forest lands and grasslands) were primary sources of building material and influenced the development of the Middle West. 1 2 3 4

2. Green plants yield many essential products for people to use. 1 2 3 4

3. Many communities are highly dependent upon local forests, forest industries, and forest recreation for economic stability. 1 2 3 4

4. New uses for the products of the green plants are being discovered through research and development. 1 2 3 4

5. Plants are important in helping to protect watersheds from floods and droughts. 1 2 3 4

We invite your comments and suggestions.
Please use an additional sheet if necessary.

SELECTED REFERENCES

Soil Conservation Society of America (SCSA) Better Environment Booklet - "PLANTS, How They Improve Our Environment" - with Teaching Guide, SCSA, 7515 N.E. Ankeny Road, Ankeny, IA 50021.

FILMS, SLIDES, PUBLICATIONS:

Environmental Protection Agency (Region V), One North Wacker Drive, Chicago, IL 60606.

Michigan Department of Natural Resources, I and E Division, Mason Building, Lansing, MI 48926.

Michigan United Conservation Clubs, P.O. Box 2235, Lansing, MI 48911.

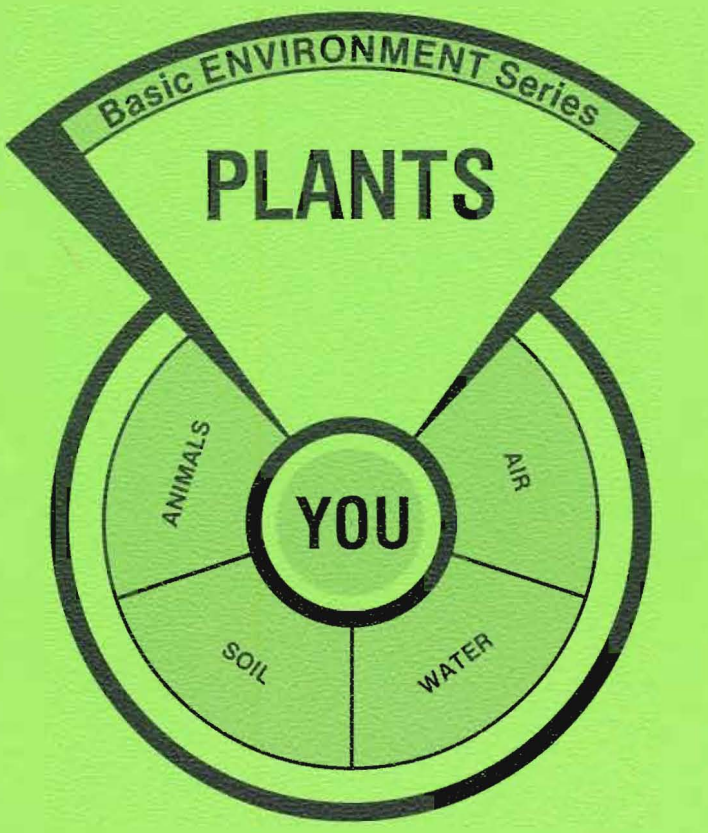
National Wildlife Federation, 1412 16th Street, N.W., Washington, DC 20036.

Kellogg Bird Sanctuary, Environmental Education Project, Augusta, MI 49012.

National Audubon Society, 1130 5th Avenue, New York, NY 10028.

Environmental Conservation Education, 9 Natural Resources Building, Michigan State University, East Lansing, MI 48824.

Local Soil Conservation District - Contact your county Extension agent, or USDA Soil Conservation Service Office.



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