AGRICULTURAL EXTENSION SERVICE
NORTH CAROLINA STATE UNIVERSITY | AT RALEIGH

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

OFFICE OF 4-H CLUB WORK
BOX 5157 ZIP 27607

December 19, 1966

MEMORANDUM

TO: N. T. Powell, Dr. P. A. Miller, Dr. R. W. McMillan, George Sheehan

FROM: Emerson Collins EEC

SUBJECT: Television Program on Plant Breeding

The following is an attempt to summarize the ideas expressed at our committee meeting on December 8, in 150 Williams.

It would be very desirable to have time-lapse photography on flowers and plant growth. Also, appropriate pictures of the flowers of four plants. In this connection, we all agreed to contact our friends relative to suitable movies, 35 mm slides, or black and white pictures. Specific examples of these were the sequence of corn pollination (Don Thompson), and the recent Japanese picture on peanut breeding (Don Emery).

Thoughts expressed relative to an interesting or appropriate opening included:

1. Comparison of an original plant in the wild with the present commercial product (this might be the lintless cotton seed versus the present cotton seed or wild species of peanuts in comparison to the present varieties).

2. An approach toward motivating the youngsters to become interested in plant breeding. This included suggestions of pictures showing women picketing food stores because of the high prices.

3. Picture of a house surrounded by beautiful flowers and shrubs and moving to a devastated tobacco field destroyed by black shank, and being observed by a despondent farmer.

4. Opening with a litter of cats or a litter of puppies showing variable markings and speculating on the markings of the mother and father.

5. A chart showing the spectacular increase in corn yields in North Carolina, pointing out the relation of plant breeding in making this type of gain possible and reflecting this to the availability of food in our country and the decreased cost to the producer and the consumer.

6. Depicting consumer preference such as color of strawberries or sweet potatoes, quality of corn meal, etc., and pointing out how the plant breeder has brought about changes to better serve the consumer.

The educational part of the film would include some of the following:

1. Point out the difference between sexes with representative plants.

2. Show models of flowers such as the one used by Don Emery in his teaching.

3. Show a sequence of events in making a cross.

4. Show the results of crosses in the field or greenhouse.

5. Show segregating populations from crosses made previously.

6. Show several examples of quality such as the new peach that is resistant to browning, better colored strawberries, lisene (essential protein) in corn, and also examples of yield increase, disease and insect resistance.

From the standpoint of the contribution of the plant breeder. -

1. Point out how improved production practices on the farm including plant breeding has released large numbers of workers for industry. Contrast the number of agricultural workers in Russia and other less developed countries with that in the United States.

From the standpoint of opportunities for careers. -

1. Point out the increasing population and decreasing farm lands. This means that we must have greater production through higher yielding varieties to maintain adequate food production for the people.

2. Point out the tremendous opportunities and the exciting nature of work in foreign countries facing a population explosion and limited food production. (Use examples from Peru and other countries visited where local pictures are available.)

It is desirable to end each of these telecasts with information on what the viewers can do to apply some of these principles for their own interests and an opportunity to try plant breeding and see how they like it. -

1. Suitable exercises should be prepared so that some of the simple operations can be done by the teenagers. (Crossing white, yellow and red corn, and observing the color of resulting ears).

2. Look into the possibilities of supplying them with F-1, F-2, etc. generations for them to observe segregating populations when planted out in the yard, garden or field.

It was suggested that many of these topics were more suited to movies than to the techniques available in a TV studio. I hope that we will all review films that may have desirable sequences that could be utilized. Also, we should explore the possibility of getting movies taken of desirable sequences that are not now available in existing films.

May I express my appreciation for your participation in this preliminary session. We will attempt to schedule a meeting the first part of January. I would appreciate your bringing with you a list of suitable available material which you know about or can locate by that time.

cc: Dr. T. C. Blalock
Dr. Paul H. Harvey
Dr. Don E. Ellis

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OFFICE OF 4-H CLUB WORK
BOX 5157 ZIP 27607

November 4, 1966

Dr. N. T. Powell
Associate Professor
Plant Pathology
212 Gardner Hall
Campus

Dr. P. A. Miller
Professor
Crop Science
462 Williams Hall
Campus

Dear Phil and Dick:

We are delighted that you have expressed your willingness to work with us in developing a television program, and 16 mm movie on Plant Breeding.

May I take this opportunity to give you some background, and our present position, as a basis for your constructive thinking for our first meeting.

C
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Y

You are probably familiar with the development of the "Science of Plants and Soils" approach where emphasis was placed on rates of nitrogen side dressing, rates of spacing, testing corn hybrids and testing nitrogen level of corn plants as a supplement to the conventional 4-H Club projects with corn, cotton, peanuts soybeans, etc.

This approach to the "Science of Plants and Soils" included exercises for urban as well as rural youth. These include separating soil into sand, silt and clay; germinating seeds; using the tetrazolium test; watching roots grow between a glass jar and a blotter; growing plants without soil, etc.

This approach was then expanded into the "Science of Foods" and the "Science of Wildlife." You will note from the attached list of available exercises that we are now introducing "Preliminary Exercises for Trial and Suggestions" in Civil Defense, Clothing, Economics, Forestry, Heredity, Housing and Home Furnishings, Marketing, Nutrition, and Water Problems.

Attached is a single leaf headed, "Expression of Interest for Specific 4-H Exercises." This was the written expression of opinion of 4-H boys and girls at a leadership training school after I had given a brief outline of some of the fields that we considered including in the exercises. This and other types of expression convinces us that there is considerable interest on the part of 4-H aged boys and girls, their parents, science teachers, school principals, etc.

Last year, a television series was inaugurated on WUNC and three programs were taped before conflict of personalities with our chosen emcee and the station personnel, failure of some of our participants to keep their schedule, resignation of our TV programmer whose replacement did not agree with the format, etc., resulted in halting the program until we had time to reevaluate our position.

We have been fortunate in having Henry Shannon represent Dean Kirkland's office throughout the entire development of the "Science of Plants and Soils" and the following areas. He is very enthusiastic regarding this approach and the value of this material for science teachers. This also gives us a direct line of communication through the science supervisors in the state to all the science teachers. An effort was made to have the science teachers in summer school view the three programs that were made, but scheduling difficulties with the teachers and the television station made this impossible.

Through the courtesy of Hal Reynolds and the "Aspect" Program, these three prepared programs were put on WUNC and then repeated over most of the commercial stations in the state. Mr. Shannon gave us the names of some science teachers and Dr. Blalock alerted these teachers and the 4-H Agents, and asked them to give their reactions to these programs. We were disappointed in the number of replies received, but an evaluation is attached on the sheet headed, "Evaluation of Program."

With this background and experience, we have requested permission to tape two more programs. It is suggested that one be on Plant Breeding and the other on Food Science. The audience is designated as junior high school boys and girls and the objective is now stated to give the boys and girls an idea of what plant breeding is, the importance of plant breeding to them as consumers, the opportunities offered as a career, and finally, to point out some of the exercises that are available for them to work with, and "Be a Scientist at home."

We have accepted the suggestions of the television board that 4-H should not appear in the title, as the image of 4-H may be too rural to attract the urban youth that we would like to reach.

On our previous shows, we accepted the title, "The Nature of Things." Some of us still like the original standard opening suggested by Hy Field before his resignation, but it was not used in the first three films.

This standard opening has been put on 16 mm colored film by Dr. Landis Bennett with the following general idea:

1. Picture of a close-up of cloth. Narration. --Is this a screen or a fence?
2. Zoom back to a 4-H Club girl. Narration. --No, it is a piece of cloth--something that we see every day.
3. A lima bean sprouting. Narration. --Here's another common object, a lima bean -- something we have eaten time andagain. But how often do you see one in this form?
4. A lima bean sprouting. Narration. -- This one has started to grow and soon will be an entire plant.
5. Picture of a cow. Narration. -- Of course, we have all seen cows.
6. Zoom into fistula. Narration. -- But have you every been able to look inside one?
7. Picture of small plant. Narration. -- Or have you ever tried looking at a plant from a different angle. --
8. Root system from the bottom growing on glass. Narration. -- Such as from underneath? If you haven't, join us as we examine objects of every kind to discover more and more --
9. Lens of a camera. Narration. -- This is the eye through which you will see --
10. Title card. "The Nature of Things"

This standard opening might then open up on a small-grain field with the narrator saying, "This is your wheat field, and this is the source of your daily bread." One might then zoom down to a single plant with many wheat grains with the narration.--"This is the job of the plant breeder, to make thousands of grains of wheat grow from the one that is planted. This is important to you because it makes your bread cost less." Picture of a starving child. Narration. --"But more important to you is that you have bread to eat -- when many boys and girls in the world today are slowly starving to death."

May I point out that these are only suggestions that have come to mind, but we are interested in your best thinking on how to accomplish the objectives outlined above.

May I take this opportunity to express my appreciation for your willingness to work with us. I feel confident that we can put together an outstanding program on plant breeding. When the television tape is made, it will be put on 16 mm film and made available for use by all science teachers in the state.

Very truly yours,

Emerson R. Collins
Professor Emeritus

ERC:ss

cc Dr. T. C. Blalock
Dr. D. E. Ellis
Dr. Paul H. Harvey

SCIENCE IN 4-H
AVAILABLE EXERCISES IN FOODS, PLANTS AND SOILS, AND WILD LIFE
(See your County Extension Chairman for others as they become available)

Order Number

SCIENCE OF FOODS

FOOD QUALITY

1 FQ-1 - PRESERVING THE INTERIOR QUALITY OF SHELLED EGGS - Eggs are stored under different conditions and the interior quality studied at intervals of storage (1-3)

2 FQ-2 - MAINTAINING THE QUALITY OF SWEET CORN. Fresh harvested sweet corn is prepared in different ways to study the quality after storage. (1-3)

3 FQ-3 - FRESHNESS OF FISH - You will learn how to tell the freshness of fish.(1-3)

4 FQ-4 - BACTERIAL ACTION IN FOODS. A small amount of buttermilk is added to sweet milk. Acidity is determined at intervals to determine how fast the bacterial action develops at room temperature and in a refrigerator. (2-3)

SCIENCE OF PLANTS AND SOILS

COMMUNICATIONS (telling or writing about your exercise)

5 C-1 - COMMUNICATIONS - You are given an opportunity to tell, write or show what you have done in your exercises. This exercise can be one of the four required for a project. (1, 2 & 3)

6 C-2 - MAKE SUGGESTIONS FOR IMPROVING AN EXERCISE - Do you have helpful suggestions on an exercise that you have completed? If so, you can send these suggestions to the author. You will receive a certificate for completing this exercise if your suggestions are accepted. (1, 2 & 3)

CLIMATIC FACTORS (temperature, rainfall, etc.).

7 CF-1-LEARNING ABOUT TEMPERATURES - This is related to growth of plants. Exercise includes trip to U. S. Weather Bureau Station and encourages familiarity with weather maps in daily papers. (1)

8 CF-2 - LEARNING MORE ABOUT RAINFALL - A record is kept of the amount of rainfall related to the growth of plants. The exercise includes a trip to the U. S. Weather Bureau Station. A study of weather maps in the daily paper is suggested. (1)

9 CF-3 - PLANTS' USE OF SUN ENERGY - An advanced study of temperature as related to growth and evaluated in terms of daily effective heat units. (3)

10 CF-4 - LEARNING ABOUT SOIL TEMPERATURE - Soil Temperature readings are made at the same time each day as an aid in knowing when the soil temperature is high enough for seed to germinate. (1, 2)

FIELD EXERCISES (usually for farm youth)

11 FE-1 - TESTING SPACING AND NITROGEN SIDEDRESSING RATES ON CORN - Exercise compares 80, 100, 120, 140 and 160 pounds of N per acre at 4, 6, 8, and 10-inch spacing in the row. (2, 3)

12 FE-2 - TESTING CORN HYBRIDS WITH DIFFERENT SPACINGS - (Conventional farm equipment needed.) Exercise compares 3 to 10 hybrids at 8, 12, 16, and 20-inch spacings in the row. (2, 3)

13 FE-3 - DETERMINE THE BEST SPACING OF COTTON PLANTS - The second part of exercise is about ginning percentage of lint, grade, class, and quality. (2, 3)

14 FE-4 - ESTIMATING COTTON YIELDS - Procedure given for estimating cotton yield per acre. (2, 3)

15 FE-5 - TESTING THE NITROGEN LEVEL OF CORN PLANTS - This exercise determines the level of nitrogen in a corn plant by use of a powder. A red color indicates nitrate nitrogen in the corn plant when the power is applied to the cut tissue. (2, 3)

NOTE: (1), (2), (3), etc. at end of description indicates increasing skill needed for the projects, 1 being for beginners or inexperienced 4-H members.

16 **FE-6 - KNOW YOUR SOIL: FERTILITY RESPONSES IN CORN** - This is a fertility experiment covering about 3/10 acre of land which is designed to show the best level of N, P, and K on corn for a particular field. The experiment is to be related to soil test and soil type. This exercise is 3/4 of a project. (3)

17 FE-7 - GROWTH RESPONSE TO TRACE (MINOR) ELEMENTS - Soybeans are grown with and without the application of manganese, copper, zinc and borax to the soil. This will give an indication as to whether these elements are needed for best plant growth. (2, 3)

18 FE-8 - COTTON VARIETY TESTS - Compares cotton varieties in field test for yield and quality.

19 FE-9 - SETTING AND PRUNING AN APPLE TREE - Procedure is given for selecting, setting and pruning an apple tree. (2, 3)

GROWING PLANTS (germination, fertilization, inoculations, etc.)

20 GP-1 - SEE PLANT ROOTS GROW THROUGH A GLASS WINDOW - Seed are planted between a blotter and the side of a water glass. Sand is put inside the blotter to hold the blotter against the side of the glass. You can watch the seed sprout and the roots lengthen. (1, 2)

21 GP-2 - GROWING SUNFLOWER SEED - Two kinds of sunflower seed are planted, fertilized, and watered when necessary. You can observe how fast a plant grows, how the flower faces the sun, the kinds of insects on the flower, the seed's form, etc. A companion exercise W-1 suggests building a bird feeder and feeding the birds with the sunflower seed produced. (1, 2)

22 W-1 - STRICTLY FOR THE BIRDS - This exercise can follow GP-2 or you can buy sunflower seed from the store, build a bird feeder, feed the birds and make your home a wildlife center. (1, 2)

23 GP-3 - EVAPORATION OF WATER FROM PLANTS (TRANSPIRATION) - A leaf or plant is covered with a glass or plastic bag to show how water is given off (transpired) and condensed on the glass or plastic bag. Calculations are required to show water requirements of plants. (1, 2)

24 GP-4 - PLANT ROOTS & HOW THEY DEVELOP - Soil is placed in a cellophane bag and placed on a window glass. A plant is allowed to grow so that the roots spread out in the bag on top of the glass. You can see the roots develop and expand. (2, 3)

25 GP-5 - SOME PLANTS USE NITROGEN FROM THE AIR - Exercise designed to show ability of certain plants (legumes) to use a plant nutrient (nitrogen) from the air. This is done by adding certain bacteria to seed, planting the seed and watching them grow in comparison with untreaded seed. (2, 3)

26 GP-7A - HOW SOYBEANS DIFFER IN THEIR ABILITY TO USE NITROGEN FROM THE AIR - Some soybean plants do not form nodules, do not fix nitrogen from the air and are called non-nodulators. Normal soybean plants do both. This can be observed by doing this exercise. (2, 3)

27 GP-8A - GROWING PLANTS WITHOUT SOIL - Plants are grown using a mixture of chemical salts to supply the nutrients (food) required. The plants are supported by the roots growing in coarse gravel. Exercise GP-8B adds the trace elements and can be used as a follow-up or for those with more experience. (1, 2)

28 GP-8B - GROWING PLANTS WITHOUT SOIL - A more advanced exercise than GP-8A. Plants are grown with chemical salts while being supported by gravel. With care, plants can be grown to maturity. (2, 3)

29 GP-9 - HOW PLANTS GET THEIR NUTRIENTS - We learn how plants get their nutrients from soil using salt crystals in sodium silicate (water glass) to make a chemical garden. (1, 3)

30 GP-10 - HOW TO CONTROL POLLINATION OF CORN - A study to show how kernels of corn can be affected in shape, color and other characteristics by the pollen from one type of corn on the silks of another type of corn. (2, 3)

31 GP-11 - GROWING A CARROT PLANT FROM THE ROOT - Select a healthy carrot with a green top. Cut off the top and a section of the carrot. Place in water and observe the vegetation growth from the stored material in the carrot root. (1)

32 GP-12 - PLANT COMPETITION - You will learn the best spacing of plant for growth. Also how spacing can control weeds. (1, 2)

NOTE: (1), (2), (3), etc. at end of description indicates increasing skill needed for the projects, 1 being for beginners or inexperienced 4-H members.

GROWTH RESPONSE (weed control chemicals, stimulants, etc.)

33 GR-1 - LEARNING ABOUT HERBICIDES (WEED KILLERS) BY VISITING A STORE WHERE THEY ARE SOLD - Club members visit a store (rural farm supply or city garden and lawn supply center) and study types of chemical weed control materials available. Information on the many different kinds of chemicals and their uses is recorded. (1, 2)

34 GR-2 - LEACHING OF HERBICIDES IN SOIL - Weed control chemicals are applied to different soils. Equivalent of 4 inches of rainfall is added to each. Plants are grown in the soil taken at different depths to show how far the weed control chemical had moved down into the soil. (2, 3)

35 GR-4 - HOW PLANTS RESPOND TO PRUNING - A coleus plant is planted. It is cut, pruned, or cut off in different ways to show how a plant can be shaped by the regrowth. (1, 2)

36 GR-5 - LENGTH OF DAY DETERMINES WHEN CERTAIN PLANTS BLOOM - Soybeans with different maturity dates are planted to show how they react to the length of day. (2, 3)

37. GR-5B - DURATION OF LIGHT - You will learn how to control the time a plant blooms by regulating the amount of light.

38 GR-6 - LIGHT AND PLANT GROWTH - Corn kernels are planted at different depths to observe the response and the length of the first internode as related to the presence of light. (1, 2)

39 GR-10 - DWARFING PLANTS WITH CHEMICALS - You will see how chemicals can affect the growth of plants. (1, 3)

PLANT IDENTIFICATION AND CHARACTERISTICS (identifying plants, studying differences in seed, etc.)

40 PI & C-2 - HOW PLANTS COME THROUGH THE SOIL - Different kinds of seeds are planted to observe how different seeds germinate and come through the soil. Each kind of seed comes through the soil differently. This exercise will help you understand why plants bend toward light and why some plants survive nature's hazards while others do not. (1, 2)

41 PI & C-2 - INCORRECT CUTTING HARMS SOME PLANTS - Grass is grown in flats or jars. The glass is cut at different heights to show how cutting too close and frequent will decrease growth and vigor of the plants. (1, 2)

42 PI & C-3 - COLLECT 10 USEFUL PLANTS & 10 UNWANTED PLANTS (WEEDS) - You will learn to know some useful plants and some weeds. You will learn how to press and mount plants. Also, how to put them into a notebook for showing to others and exhibiting. (1, 2)

43 PI & C-4 - SHOW THAT PLANTS HAVE OTHER COLORS UNDER THEIR COAT OF GREEN - Plant parts are crushed in alcohol or other solvents and the colors separated on a piece of paper dipped into the solution. (1, 2)

44 PI & C-5 - PLANTS THAT FARMERS GROW IN NORTH CAROLINA - Pictures are clipped from magazines showing the plants grown for sale, grazing, hay or soil improvement in North Carolina. (1, 2)

REPRODUCTION (germination, propagation, cuttings, rootings, grafting, etc.)

45 R-1 - LEARN TO KNOW THE SEEDS OF PLANTS THAT GROW YOUR FOOD AND CLOTHING - The group visits a seed store, selects different kinds of seeds, and germinates them in a paper towel. One can observe the different kinds of sprouts or young plants and how the seeds germinate. You are requested to list 24 plants whose seed are used for food, and 24 things that you use for food that have seeds in them. It will show the importance of seed in your everyday life. (1, 2)

46 R-2A - SPROUTING A SWEET POTATO - A sweet potato is selected and placed in a glass of water. As the plant grows it can be formed or shaped to make a pretty decoration. You will learn where the plant gets its energy and food to grow. (1, 2)

47 R-2B - GROWING SWEET POTATO PLANTS - A sweet potato is placed in the soil and allowed to produce sweet potato plants. The plants can be grown in a pot or in the field. (1, 2)

48 R-3A - THE LIVING SEED - You will learn how to tell whether a seed is alive, damaged, or dead by a chemical test. You will also learn how seed damage affects germination. (1, 2)

NOTE: (1), (2), (3), etc. at end of description indicates increasing skill needed for the projects, 1 being **for beginners or inexperienced 4-H members.**

49 **R-3B - SEED - THEIR GERMINATION AND VIGOR** - Two lots of seed are germinated that have about the same germination test. You can see the difference between the vigor of seeds in the same lot and between the lots. (2, 3)

50 R-3C - SEED - THEIR GERMINATION AND VIGOR - To answer questions about seed germination and vigor raised in exercise R-3B. (2, 3)

51 R-4 - EFFECT OF FRUITING ON RUNNER GROWTH OF STRAWBERRY PLANTS - Strawberry plants are grown to show when runners (new strawberry plants) are produced as related to flowering and producing strawberries. (2, 3)

52 R-5 - HOW PLANTS DISTRIBUTE THEIR SEED IN NATURE - You will learn some of the interesting ways plants distribute their seed to new areas. (1, 2)

53 R-6 - HOW DEEP IN THE SOIL CAN SEEDS GERMINATE - Different sizes and kinds of seed are covered with soil at different depths to show how deep different seeds can sprout and grow. (1, 2)

54 R-9 - HOW NATURE PROTECTS SEEDS - Seeds with a hard seed coat are treated mechanicallly or chemically so that moisture can get through the seed coat and let the seed germinate. (1, 2)

SOIL AND SOIL CONSERVATION

55 S & SC-1A - SAND, SILT AND CLAY OF SOILS - Soil is placed in water, shaken and allowed to settle to see the different size particles in the soil. These particles are called sand, silt and clay. You will be able to see the amount of each in the soil you used. (1, 2)

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ORDER BLANK FOR
Available Exercises in "Science in 4-H"

Name_____

Address_____

County_____ Club_____

Leader_____

Quantity Needed	Order Number	Quantity Needed	Order Number	Quantity Needed	Order Number	Quantity Needed	Order Number	Quality Needed	Order Number
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_____	2	_____	20	_____	38	_____	56	_____	79-82
_____	3	_____	21	_____	39	_____	57	_____	79
_____	4	_____	22	_____	40	_____	58	_____	80
_____	5	_____	23	_____	41	_____	59	_____	81
_____	6	_____	24	_____	42	_____	60	_____	82
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Send to: Fred Wagoner, 4-H Specialist
P. O. Box 5157
N. C. State University, Ricks Hall
Raleigh, N. C.

56 S & SC-1B - SAND, SILT AND CLAY OF SOILS - This is a follow-up on S & SC-1A and permits you to separate the sand, silt and clay so that you can feel and see the difference. This corresponds to taking a clock apart to see the different parts. (2, 3)

57 S & SC-2 - SEE HOW RAINDROPS WASH SOIL - Three to 4-foot white stakes are placed in an area covered with a good sod. Similar stakes are placed in an area of bare soil. Water is sprinkled beside the stakes to see how the bare soil splashes when not covered with grass. You can also see how grass, sticks, stones, leaves, etc., keep the soil from washing away during the rain. (1, 2)

58 S & SC-3 - LAY OFF CONTOURS OR GRADE LINES WITH A TRANSPARENT GARDEN HOSE - This exercise describes a procedure which can produce very good results in running a contour or grade line. Success with this exercise will depend primarily on the skill, patience and cooperation of a team. (3)

59 S & SC-3A - CONTROLLED MOISTURE TENSION: BUILD YOUR TENSIOMETER - The tensiometer works on the principle that water is held in small open pores against the force of gravity. If the small pores can be connected to larger pores we can measure the amount of pull against the force of gravity. We can later demonstrate how water moves through small pores in the soil. (2, 3)

60 S & SC-3B - CONTROLLED MOISTURE TENSION: A TENSIOMETER FLOWERPOT - By use of a tensiometer which we can build, a flowerpot can be watered automatically for long periods of time with an optimum moisture-air relationship. (2, 3)

61 S & SC-5 - USING AN ACIDITY (pH) INDICATOR - Scolutions are used that change color depending on the acidity of the material being tested. You will learn how to use the solutions and determine the acidity of vinegar, baking soda, etc.

PRELIMINARY EXERCISES FOR TRIAL AND SUGGESTIONS

Order Number	
79-82	Civil Defense -- Consists of a series of homemade devices to see or determine the presence of radioactivity:
79	CD 1 - ELECTROSCOPE - A simple device to detect radiation.
80	CD 2 - WILSON CLOUD CHAMBER - Radiation leaves a vapor trail in alcohol vapor.
81	CD 3 - THE SPINTHARISCOPE - Shows radiation by flashes of light. Arrangement of a magnifying glass to see the radiation rays striking zinc sulfide and giving off flashes of light.
82	CD 4 - PLANT RESPONSE TO IRRADIATION - Peanut seed with five degrees of radiation are made available for growing to see mutations.
77	Clothing - CL -1 - ARE YOUR CLOTHES A FIRE HAZARD? Test is made of fabric and a raveled thread of youth's clothing. Fibers are identified by the burn test and evaluated for fire hazard.
83	Economics - E-1 - WHAT COST CREDIT? An exercise to determine cost of credit, including hidden charges.
84	Forestry - F-1A - LEARN THE DIFFERENT KINDS OF LEAVES OF TREES - Identifies trees by leaf shapes, arrangement, thickness, etc. This is one of a series being developed for use by recreation groups.
75	Heredity - HE-1A - BEGINNER EXERCISE TO LEARN HOW TO HANDLE FRUIT FLIES for follow-up exercises in studying heredity.
76	Housing and Home Frunishing - H & HF-1A - LIGHT IS SIGHT - Involves exercises showing the effect of light on sight.
72	Marketing - M-1 - Permits evaluation of different sources of a canned vegetable by the family - recorded by the youth.
74	Marketing - M-3 - Exercise in improving shopping habits at the supermarket.
71	Nutrition - N-1 - A TEST FOR VITAMIN C
78	Nutrition - N-10A - LEARN HOW TO HANDLE WHITE RATS for later studies on heredity.
85	Water - WA-1A - KNOW THE WATER YOU USE - Quick tests are given to evaluate normal problems of water.

62 S & SC-6 - DETERMINING THE ACIDITY (pH) OF THE SOIL - Solutions are used that change color depending on the acidity (pH) of the material being tested. After practicing with vinegar and baking soda, you will be able to determine the acidity of the soil in your yard, garden, etc. (2, 3)

SPECIAL EXERCISES (special area problems for advanced members)

63 SE-1A - SPECIAL EXERCISES FOR "SCIENCE OF PLANTS AND SOILS" - Outlines procedure for setting up special exercises adapted to county needs. (2, 3)

UTILIZATION (plants, soils, etc.)

64 U-1 - USE OF PLANTS FOR FOOD, CLOTHING, HOUSES, ETC. - This is an interesting exercise to identify the common things around the home and store that come from plants. (1, 2)

NOTE: (1), (2), (3), etc. at end of description indicates increasing skill needed for the projects, 1 being for beginners or inexperienced 4-H members.

SCIENCE OF WILD LIFE

FOOD HABITS

65 FH-1 - SEED AS WILDLIFE FOODS - You will collect and identify seeds that are food for wildlife. You will also make a reference collection of these seeds. (1, 2)

66 FH-2 - WHAT QUAIL OR DOVES EAT - You will examine the crops (craws) of 10 game birds and determine the kinds of seeds they eat. You will add the seeds to your reference collection. (2, 3)

67 FH-3 - A QUAIL OR DOVE FOOD HABITS STUDY - You will make a detailed study of the crops (craws) of hunter-killed quail or doves throughout a hunting season. You will find out what seeds are preferred foods and what seeds are available at different periods of the season. (3)

GUNS AND ANNUNITION

68 G&A-3A - GUNS: BASIC BALLISTICS - In this exercise you will use everyday materials or effects (not firearms) to learn why different types of ammunition are required for different purposes. (1, 2)

69 G&A-3B - GUNS AND AMMUNITION - You will study the different types of firearms and ammunition. You will learn about gun actions, parts of cartridges, parts of firearms, and kinds of sights. (1, 2, 3)

70 G&A-3C - A STUDY AND TEST OF .22 AMMUNITION - You will conduct tests with different types of .22 rimfire cartridges. You will determine the penetration, trajectory, tissue destruction characteristics of each type. (3)

NOTE: (1), (2), (3), etc. at end of description indicates increasing skill needed for the projects, 1 being for beginners or inexperienced 4-H members.

Published by
THE NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE

North Carolina State University at Raleigh and the U. S. Department of Agriculture, Cooperating. State College Station, Raleigh, N. C., George Hyatt, Jr., Director. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

		EVALUATION OF PROGRAM						RATING				
Type of Worker	Grade Level of work	Grade Level Best Suited	"Tone" of Show	% of Viewers Writing in	Value to Teachers	School or home	Should young people be on show	MC	Guest	Subject Matter	Studio Facilit.	Comments
SOIL: Teacher	6th	6 to 8	Little low	10%	Yes	School	Yes	Fair	Fair	Good	Good	
Home Agent	Youth & Adult	6 to 8	Good	1%	Yes	School	No (2	Good	Good	Good	Good	Very interesting
Home Agent	" " "		Simple but informative			School		Good	Good	Good	Good	
Home Agent	9-19	7 to 8	No	2%	Yes	School	Possibly	Good	Good	Good	Good	
Teacher (1	7th	6 to 8	OK	5% unless required for credit.	Yes	School	No	"	"	"	"	Would use film & follow up with exercises
SEEDS: Youth Worker	3-12	6 and above	Yes	15%	Yes	School	Possibly	Fair	"	"	"	
Teacher (1	6th	6 to 8	Yes	15%	Yes (6 to 8)	School	Yes	Poor	Good	Fair	Fair	Soil was better. Only one unfamiliar term unexplained
Youth worker	9-19	8, 9, 10	No	5%	(3	School	Definitely	Fair	Good	Good	Good	
10th grade Student		7	Little Corney	20%	Maybe	School	Yes	"	"	"	"	More experiments, less lecturing
FOOD: 4-H Agent	9-19	7 to 9	Yes	5%	Yes Jr. High	School	No	Good	Fair	Fair	Good	
Youth Worker	3-12	7th & above	No	20%	" " "	School	Yes	Fair	Good	Good	Good	
Teacher (1	7th	6 and 7	Confused on subject	None	Very little	School	Probably	Good	Fair	Fair	Fair	
Ext. Agent		Homemaker	Dialogue OK Exer. corney	1-2%	Not in present form	Home	Definitely	Poor	Good	Poor	Fair	
Home Agent	9-19	Homemaker	Could be	Very few	Not so(?)	School	Yes	Fair	Fair	Fair	Good	
Teacher	8th	8th	Yes (4	1%	Yes	School	Yes	Good	Good	Good	Good	

1) Teaches science course 2) Not on this show 3) Should be of value if handled right through the schools

4) Material could have been definite in what each type of food does for the individual

AGRICULTURAL EXTENSION SERVICE
NORTH CAROLINA STATE UNIVERSITY | AT RALEIGH
SCHOOL OF AGRICULTURE AND LIFE SCIENCES

OFFICE OF 4-H CLUB WORK
BOX 5157 ZIP 27607

May 19, 1966

MEMORANDUM

TO: Dr. Guy L. Jones

SUBJECT: Plants and Soils Material for Recreation Groups

FROM: Emerson Collins ERC

Following up on our conversation, there appears to be considerable demand for Science material at the youth recreation camps held during the summer.

Mecklenburg County, for example, has 6,000 boys and girls signed up and the local Extension group have selected the Science of Plants and Soils as one of six areas that they would like to offer. The exercises that they have selected are not too well adapted for this type of program. I believe that we would have to concede that most of the presently designed exercises are primarily for a different setting.

Since I talked to you, Laurinburg has sent in a similar appeal for Nature Study material for their fifth, sixth and seventh grade groups this summer.

You might be interested in referring to the May 1966 issue "National 4-H News" on page 12. This article entitled "Studying the Nature of Mind and Matter at Camp". They took sixth, seventh and eighth graders and held classes of 1 1/2 hour periods each day in biology, botany, geology, electricity, mathematics, astronomy, energy and computers as well as an introduction in the behavior of science of psychology. Extra curricular programs were given by special outside agencies in science oriented areas such as an electric utility company, a telephone company, and the soil conservation service. The response was excellent.

It would look to me like we are missing a good bet in not developing exercises in plants and soils more suitable for recreation and camping groups. I am thinking particularly along the line of leaf characteristics of plants, collecting and mounting leaves of plants, observing soil profiles, observing erosion, collecting rocks, etc.

We anticipate additional requests along this line and would appreciate any suggestions you have, or material that you can prepare, that we can make available to them this summer or at a later date.

ss
cc Dr. Paul H. Harvey
Dr. Ralph McCracken

4-H CLUB DEPARTMENT
Ricks Hall
North Carolina State

COOPERATIVE EXTENSION SERVICE

TO: Dr Paul N. Harvey
Williams Hall

MEMORANDUM

The Crop Improvement Association has offered $200 for the seed program.

Emerson

- ____ Blalock
- ____ Clark
- ____ Dixon
- ____ Garmon
- ____ Holler
- ____ Moser
- ____ Smith
- ____ Wagoner

- ____ Note and pass to next person.
- ____ Note and return.
- ____ Note and do not return.
- ____ Please handle.
- ____ Please answer.
- ____ For your approval.
- ____ Needs your signature.
- ____ Note opinion and return.
- ____ For your information.
- ____ Note for further discussion.
- ____ Speak to me concerning.
- ____ Return by _____

Date _____ (Sign) _____

Dr Paul K Harvey
Williams Hall

AGRICULTURAL EXTENSION SERVICE
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

OFFICE OF 4-H CLUB WORK
BOX 5157 ZIP 27607

December 5, 1965

TO: DEPARTMENT HEADS

FROM: Emerson Collins EC

RE: Educational TV Programs

A faculty member told about his daughter coming home from school and drawing an interesting sketch of the earth's crust. This was an example of the enthusiasm and interest given one girl by Dr. Ralph McCracken's discussion in her third grade class. Science teachers are begging for this type of help from well-known authorities that can present their subjects in an interesting and informative way. This fact comes to me firsthand from my daughter who teaches earth sciences at the Leroy Martin High School. Also, from many of you, and your staff, that have been called upon to give your help.

There are over one and one-half million boys and girls in the 4-H age group. North Carolina State University can justly be criticized for their sporadic and intermittent parceling out of information to classes of science teachers who know someone at the University. The same thing is true of the biological section of the Science Fair. In talking with those exhibiting at the State Science Fair, the names of the University staff--Furney Todd, Joe Nusbaum, Betty White, etc.--are given as the people they knew and who advised them and made it possible for them to get to the State Science Fair.

We have been granted fifteen 30-minute programs on the educational channel of WUNC. These programs are scheduled to start Tuesday, February 17 and continue on Tuesdays at 5:30 to 6:00 p.m. for the series.

This program, "The Nature of Things", will be produced under the leadership of Mr. William Hon and programmed by Hyman Field of the Raleigh studio of the University of North Carolina's educational television.

The following standard 30-second opening is proposed for each of the programs:

Video	Audio Content
Close up view of a fabric	Is this a honeycomb? Possibly it's a screen or a fence.
Picture of a girl modeling a 4-H project dress	Actually, it was a close-up look at something you see every day--a girl's dress.
A lima bean	Here's another common object. A lima bean--something we have eaten time and again. But how often do you see one in this form?

Video	Audio Content
Lima bean sprouting	This one has started to grow and soon will be an entire plant.
Cow	Of course, we have all seen cows.
Zoom into fistula	But have you ever been able to look inside one?
Picture of a small plant	Or have you ever tried looking at a plant from a different angle--
Root system from bottom	Such as from underneath? If you haven't, join us as we examine objects of every kind to discover more and more--
Lens	This is the eye through which you will see--
Title card	"The Nature of Things"

This fast moving tempo will be continued with a soils program, for example, of a picture of a field showing the multicolored soils from erosion; and, then, zoom down to a soil profile and say, "This is the soil that grows your food and fiber to make you the best-fed nation in the world."

A program on plant breeding, for example, might show a good field of wheat. The picture would then zoom down to one plant with three thousand grains of wheat produced from the one that was planted. The narration might be, "Producing three thousand seeds from one is part of the job of plant breeding that makes your loaf of bread cost you less--but more important, it makes bread available to you in a world where many boys and girls go to bed hungry because there is no bread."

An enthusiastic personality, preferably from the Experiment Station staff, will be asked to present a view of the exciting and stimulating things in their particular field (agricultural engineering, animal science, botany and bacteriology, crop science, economics, entomology, Extension home economics, food science, forestry, genetics, horticultural science, marketing, plant pathology, poultry science, rural sociology, soil science, zoology, etc.)

This presentation will be followed by demonstrating some of the 4-H exercises available and listed on the attached sheets. The viewing audience will be advised that these exercises are available by writing to the station to which they are listening. These exercises were first tried in five pilot counties in 1962 and have been modified on the basis of suggestions from the field.

You will note that we are attempting to change the image of 4-H in that these exercises are available to anyone interested in trying them. We know that they are being used by Cub Scout leaders and others. When the exercises are completed, they are free to submit them to the 4-H Club Office for credit or enroll as a 4-H Club member. The responsibility of the University is viewed as all boys and girls in the State.

These programs will be put on video tape and held for use by science teachers when they are equipped for television in their classes. Further, high-quality kinescopes (sixteen millimeter movies with sound track) will be prepared for use by science teachers and 4-H and other youth group leaders. Thirty-five millimeter color slides will be made of the rehersal. These will probably be made into film strips to be used by science teachers either with a prepared script or a taped narrative.

We are told that boys and girls can be influenced early in selecting their future interests and occupations. Improving the image and creating interest in agriculture and life sciences is a real challenge to North Carolina State University. Showing what we have to offer will be a big step in making recruiting easier for outstanding students.

The image of 4-H was indicated when a member of the education TV advisory board asked if it would be advisable to leave the name of 4-H out of the title because many boys and girls of that age would turn the television off thinking this was only for rural boys and girls. Similarly, the image of agriculture was reflected when Durwood Baggett, County Extension Chairman of New Hanover County, suggested that his daughter use the 4-H exercise on germinating mono- and dicotyledonous seeds for her science fair project. Her image was reflected in her comment, "Daddy, they would just laugh at me." She yielded to persuasion and came home from the fair beaming and said, "They just crowded around my project." One new image of agriculture was created by this experience. How can we reach the other 1,499,999 boys and girls with our story of agriculture--the living science?

May we express our appreciation to all of you who have been so cooperative in our preliminary discussions of this project. I firmly believe that no department can afford not to participate in this type of program. So little effort for such great dividends. Hyman Field, William Hon, or I will look forward to discussing this further with you at your convenience.

AGRICULTURAL EXTENSION SERVICE
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

OFFICE OF 4-H CLUB WORK
BOX 5157 ZIP 27607

December 20, 1965

TO: PARTICIPANTS IN THE EDUCATIONAL TV PROGRAM ENTITLED "THE NATURE OF THINGS"

FROM: E. R. Collins EC

RE: Educational TV Programs

Attached is a copy of the proposed scheduling of the educational TV programs on "The Nature of Things". It will be necessary to put the program on video tape ten days earlier than the program date. Some shifts can be made in these dates where the proposed date is difficult for you.

The following summary will cover some of the points I discussed with you relative to the program:

1. Will Hon is participating in the programs and acting as MC.

2. Hyman Field, and an artist, have been assigned approximately half-time to work with you and Will Hon to develop the programs.

3. A very versitile setting has been developed. The same setting will be used for all fifteen programs.

4. The programs start Tuesday, February 15 at 5:30 to 6:00 p.m. and continue each Tuesday on Channel 4 for the series.

5. The programs will be 28 minutes in length, giving time for a commercial for those who wish to use the programs on their commercial time.

6. The first half of the program is designed for career exploration and to point out the exciting and marvelous possibilities in a particular field. The last half of the program will point out what the viewers can do, and several exercises will be demonstrated from the group available. It is hoped that where exercises are not available for an area that you will work with me to develop some by the time of the showing.

7. The programs will be put on video tape approximately ten days to two weeks before the actual show time. It is suggested that the department involved review the air presentation to see if they are satisfied with the effort. Where the program appears satisfactory, kinescopes (16 millimeter movies with sound track) will be made from the video tape. We also plan to make 35 millimeter colored slides. These will be made available with a typed script and also a narrated tape.

8. We plan on contacting science teachers; and if possible, we plan on setting up a State contest for the students that write a theme on one or more of the presentations.

9. The following standard 30-second opening is proposed for each of the programs:

Video	Audio Content
Close up view of a fabric	Is this a honeycomb? Possibly it's a screen or a fence.
Picture of a girl modeling a 4-H project dress	Actually, it was a close-up look at something you see every day--a girl's dress.
A lima bean	Here's another common object. A lima bean--something we have eaten time and again. But how often do you see one in this form?
Lima bean sprouting	This one has started to grow and soon will be an entire plant.
Cow	Of course, we have all seen cows.
Zoom into fistula	But have you ever been able to look inside one?
Picture of a small plant	Or have you ever tried looking at a plant from a different angle--
Root system from bottom	Such as from underneath? If you haven't, join us as we examine objects of every kind to discover more and more--
Lens	This is the eye through which you will see--
Title card	"The Nature of Things"

10. This fast-moving tempo will be continued with a soils program, for example, of a picture of a field showing the multicolored soils from erosion; and, then, zoom down to a soil profile and say, "This is the soil that grows your food and fiber to make you the best-fed nation in the world." A program on plant breeding, for example, might show a good field of wheat. The picture would then zoom down to one plant with three thousand grains of wheat produced from the one that was planted. The narration might be, "Producing three thousand seeds from one is part of the job of plant breeding that makes your loaf of bread cost you less--but more important, it makes bread available to you in a world where many boys and girls go to bed hungry because there is no bread."

11. The remainder of the first 14 minutes is envisioned as a fast-moving, exciting look at the interesting possibilities and importance of the subject to young boys and girls.

12. The last 14 minutes would be a presentation of some thing that the boys and girls can do to make them more familiar with the field. (We hope that it will be possible to get some 4-H exercises written for each field presented. These could be mimeographed in order that they might be available at the time of the showing.)

13. These exercises or "things they can do" would be available through the station to which they are listening or through the 4-H Club Office.

14. We feel that the greatest impact can be made with these programs when the industry involved is familiar with the program and is an active participant. It is strongly suggested that each department contact one or more segments of their industry to contribute the price of the video tape (used for high-quality TV showings), kinescope (16 millimeter movie with sound track), 35 millimeter slides, and narrative tape accompanying the slides. The tape, kinescope, and slides are estimated to cost approximately $300.00.

15. Credit will be given all sponsors of these fifteen programs by a card listing the industry contributors at the end of the program.

16. Hal Reynolds will distribute these programs through the already established channels for "Aspect".

17. It is anticipated that one of the major contributions, over time, will be the use of the 16 millimeter movies with sound tracks. You might begin thinking in terms of sponsors for additional copies of these films (kinescopes) with an estimated cost of about $100.00 each.

May I take this opportunity to express my appreciation for the excellent spirit of cooperation you have shown in agreeing to work with us on this program. One did not need to read between the lines at the National 4-H Club Congress to get the idea that some sponsors feel that 4-H is not expanding as rapidly as they think might be desirable.

The Mississippi representatives felt that the science of plants and soils used by the schools was written more by educators than agronomists and horticulturists. They questioned the accuracy of some of the material.

Louisiana has had good acceptance of their "Plants and Soils" publication through the schools. Their original printing of eighty thousand copies has been reprinted twice.

The future lawyers, legislators, and business leaders are now forming their image of agriculture at the 4-H age level. We hope that this effort will be a small start to show the importance of agriculture in their lives, point out some of the reasons why they are the best-fed and clothed nation in the world, and point out that continuing support to the land-grant college system is essential to maintain our leadership in an overpopulated and hungry world.

mm

Enclosure

"THE NATURE OF THINGS"

Proposed Educational TV Program
(Tentative Air Dates)

Program Date*	Subject	Leader
February 15	Soil	Ralph McCracken
February 22	Seed	Foil McLaughlin
March 1	Entomology	H. E. Scott
March 8	Marketing	Ruby Uzzle
March 15	The Study Area	Edith McGlamery
March 22	Plant Breeding	K. R. Keller
March 29	Open	
April 12	Food Processing	W. M. Roberts
April 15	Horticulture	John H. Harris
April 19	Herbicides	A. D. Worsham
April 26	Wood Products	Eric Ellwood
May 3	Poultry	W. C. Mills
May 10	Fertilizer	Jack Baird
May 17	Nutrition	Eloise Cofer
May 24	Pathology	J. C. Wells or H. R. Garriss

*These programs will be put on video tape approximately ten days earlier.

AGRICULTURAL EXTENSION SERVICE
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH
SCHOOL OF AGRICULTURE AND LIFE SCIENCES

OFFICE OF 4-H CLUB WORK
Box 5157 Zip 27607

September 15, 1965

Memo to: 4-H Science TV Committee

From: Emerson Collins E.C.

Re: 4-H Science TV Committee Meeting September 10, 1965

We would suggest the following procedure as a summary of the meeting on September 10:

1. Determine whether you are interested in having your department participate in the special TV lessons originally set up for "Science in Plants and Soils" and now expanded to "Science in 4-H."

2. The following procedure is suggested for those electing to participate:

   A. Check with the departmental committee set up as the overall 4-H Science Planning Committee. (This committee was to be set up by the Departments following Dr. Blalock's letter of August 20, 1965.)

   B. Prepare a brief outline of what you would like to present.

   C. Estimate when you would be ready to review your proposal with the TV group. (Hyman Fields is the professional structurist for WUNC. We will also work with Hal Reynolds since these programs are agricultural in nature.)

   D. Estimate when you would like to kinescope the program.

   E. Indicate the approximate length of the program and whether it would fit well as a companion to some other program.

   F. Send this material to Emerson Collins at the 4-H Office in Ricks Hall.

We appreciate the fact that so many of you could fit the September 10 meeting into your busy schedule. A word of clarification of this program may be desirable.

The continuing poor image of Agriculture exists even though preservation of food by radiation, the use of radioisotopes to produce mutations in crop breeding, "tagged" phosphorus, isotopes of nitrogen, X-rays of soil minerals, iodine 131 in determining the future potential of heifers for milk production, and other agricultural research will challenge the science of any engineering research.

WE HAVE NOT SOLD THE SCIENCE OF AGRICULTURE AND HOME ECONOMICS TO THE PEOPLE.

The general acceptance and reaction to the "Science of Plants and Soils" has led the Administration to consider the advisability of expanding this to "Science in 4-H" with "Science of Plants and Soils" one of approximately 14 headings such as "Science of Clothing," "Science of Animals," "Science of Wildlife," etc. This could include all those interested in this approach.

In a letter under date of July 16, 1965, Dr. Blalock asked the reaction of the departments to this broad "Science in 4-H" idea. As indicated in Dr. Blalock's letter to you on August 20, 1965, the response from the departments was gratifying and that there appeared to be sufficient support to move ahead. In this letter, he proposed:

1. Each department set up an overall 4-H Science Planning Committee.*

2. That a Science TV Committee meet on September 10 to consider taking advantage of the TV time approved by the Faculty Study Panel for the "Science in Plants and Soils."**

I hope that this has given you a better understanding of the background for the 4-H Science TV Committee meeting on September 10, and permit you to follow up on the suggestions coming out of the meeting. Please refer back to the suggested procedure at the first of this letter.

I hope to get to talk to each of you personally in the near future and get your suggestions on how to change the image of agriculture from the mule, plow, drudgery of the home, large families of backwoods children growing up in isolation and poverty, to the Science that it is. Even the poorest farmer in North Carolina is better off than the people in the ghettos of the cities.

*Several departments have already set up these committees. It will be the function of this committee to determine what the important science applications are in the department, give a priority rating for the development of suitable exercises, and prepare the exercises as rapidly as practical. Also, to work with committees, such as this 4-H Science TV Committee to see that there is a balanced program of publicity, service to the agents and clubs, and suitable exercises available.

**Tentative Schedule--

November, 1965--Start working on lessons

January, 1966--Make the Videotapes and kinescopes

February and March, 1966--Broadcast.

ERC/mr

CC: Specialists in Charge
Heads of Departments

AGRICULTURAL EXTENSION SERVICE
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

OFFICE OF 4-H CLUB WORK
Box 5157 Zip 27607

August 20, 1965

TO: Certain Extension Specialists, District Agents and Department Heads

FROM: T. C. Blalock, Assistant Director, 4-H Club Work T. C. B.

RE: 4-H Science TV Committee

We now have a wonderful opportunity to expand our emphasis on Science in 4-H. Dr. Emerson Collins, who gave such enthusiastic leadership to the Science of Plants and Soils program, has agreed to work with us on a part-time basis to expand this idea to include all departments. I contacted each subject matter department regarding their interest in this approach and have been gratified by their response. We feel we have an indication of sufficient support to now move ahead with this program.

One phase of this expanded program is a proposed series of 16 Science TV Lessons. They would involve all departments and would show the broad scope of sciences in food and fiber production, processing, marketing and consumption. We plan to kinescope the program so that they could be widely used by industry, other TV stations and by Extension Agents for training leaders.

To plan and coordinate these TV Lessons we need a committee with representation from every department. Attached is a list of people I am asking to serve on this committee. You are being asked to represent your area, and I hope it will be possible for you to accept this assignment. You will, no doubt, want to visit with other members in your department for their ideas. Each department is being asked to set up an overall 4-H Science Planning Committee.

The first meeting of the Committee will be held on Friday, September 10, at 1:30 p.m. in Room 310 Ricks Hall. We need to begin work on these programs very soon so I hope you'll make a special effort to attend.

TCB/mr
Encl.
CC: Specialists in Charge

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS, NORTH CAROLINA STATE UNIVERSITY AT RALEIGH, 100 COUNTIES AND U. S. DEPARTMENT OF AGRICULTURE COOPERATING

4-H Science TV Committee

Dr. E. R. Collins, Chairman

Dr. Jack Baird

Dr. Carl Blake

Robert Boal

Mrs. Helen Branford

John Christian

Grover Dobbins

Howard Ellis

Hugh Fields

T. W. Flowers

D. G. Harwood

John H. Harris

Thelma Hinson

Dr. Marion L. Jones

Frances Jordan

Paul Marsh

Mrs. Edith McGlamery

Dr. Robert McGuire

Mrs. Ruby Miller

Nita Orr

Dr. Emily Quinn

Hal Reynolds

Dr. Frank Sargent

Dr. H. E. Scott

Dick Smith

Dr. Ed Smith

Virginia Wilson

Agronomy Specialist
WILLIAMS HALL

AGRICULTURAL EXTENSION SERVICE
COOPERATIVE EXTENSION WORK IN AGRICULTURE & HOME ECONOMICS
NORTH CAROLINA STATE COLLEGE · RALEIGH, NORTH CAROLINA

March 23, 1965

MEMORANDUM

TO : Dr. Carlton Blalock

FROM : E. R. Collins ERCollins

Contacts relative to my availability after retirement makes it desirable to follow up on our conversation relative to my part in the further development of science in 4-H.

Probably my greatest interest in work after retirement is the challenge presented in attempting to develop a comprehensive approach to science in agriculture and home economics that will challenge the interest and enthusiasm of our rural and urban youth. It would be hoped that this program would improve the image and support of agriculture. Also, point out the importance of agriculture to our future citizens regardless of their occupation.

We have gained a lot of experience through our work with the "Science of Plants and Soils". These exercises and record book present a workable program that has been accepted with some enthusiasm. Weaknesses are showing up that could have been overcome with our present knowledge and experience.

I have had the opportunity to see some of the preliminary efforts of other states resulting from the activity of Dixie Paulling and Lloyd Rutledge of distributing our "Science of Plants & Soils" to other states. Although these appear amateurish, they include some good ideas that could be incorporated in our program.

My present proposal for approaching this project would be to visit other states that have made obvious improvement in developing their 4-H Club work along the lines of science. These could be selected on the basis of the information available to Dixie Paulling and Lloyd Rutledge. An alternate to this suggestion would be to have the Washington 4-H office call in representatives from the states showing interest and enthusiasm in the development of this type of program. This would give us an opportunity to share experiences and thoughts for the benefit of all concerned.

The agents, and my experience, would convince me that departmental lines must be minimized or we will lose a major part of the usefulness of this science approach. There would appear to be little justification for separating out field crops, forest trees, shrubs, horticultural crops, soils, wild life, entomology, pathology, home economics, etc., in a study of the Science of Plants. The study of photoperiodism, or the effect of day length on plants, is an interesting and challenging study. It would appear more logical to have this study grouped under photoperiodism than to have this topic on soybeans under agronomy, and Easter lilies under horticulture. It would appear equally confusing to the public to study how to increase the protein

level of wheat to improve its milling qualities, under agronomy, and then to study the action of yeast in rising bread under home economics. The strength of the protein being a factor in the latter. The unselfish contribution of the departments to such a program would be a matter of motivation and adminstration policy.

Under our present set-up we are confronted with some outstanding exercises developed by Hugh Fields, with no apparent relationship to the Science of Plants and Soils. The School of Agriculture has temporarily solved their problem by calling itself the School of Agriculture and Life Sciences. This does not appear to be as good a heading for our use as "Science of Plants, Soils, Animals, Home, and Field". Some exercises would logically fit best under "Science of Soils", for example, and could probably be so designated.

I am personally familiar with two examples where the ideas in two of our Science of Plants & Soils Exercises have won first place in high school science projects. Several requests from high school students for our hydroponics exercise would also indicate that there is a real opportunity with this group.

May I take this opportunity to formally request that I be given the opportunity to explore ways and means of developing a coordinated and comprehensive program based on science. This program would include exercises to challenge the imagination and interest of rural and urban youth to supplement, rather than to compete with, the present science in the school system. The exercises would be presented with varying skill levels. The low skill levels would be designed to create interest. The higher skill level exercises would lead the exploring mind to MS and Ph D level investigations.

Should this proposal be accepted, I would suggest that it start September 15, 1965, on an informal agreement to be terminated with 15 days notice, or less, when the administration feels that unsatisfactory progress is being made, or that I feel that I am not making enough progress to justify continuing.

It is unfortunate that it is necessary to ask for a tentative decision at this time. However, I feel that it is unfair to leave the impression that I will be available September 15, if this is not to be the case. I feel confident that I would prefer the challenge of this 4-H project to other available outlets for my continuing energy and enthusiasm after a retirement from administrative responsibility.

I would appreciate the opportunity of discussing this with you personally at your convenience.

ERC/ds
cc: Mr. George Smith
Dr. George Hyatt
Dr. Ralph McCracken
Dr. P. H. Harvey

NORTH CAROLINA STATE
OF THE UNIVERSITY OF NORTH CAROLINA
AT RALEIGH

AGRICULTURAL EXTENSION SERVICE
OFFICE OF 4-H CLUB WORK

RALEIGH, N. C.

July 16, 1965

To: All Specialists in Charge

From: T. C. Blalock, Assistant Director, 4-H Club Work T. C. B.

Re: An Opportunity to Expand our Emphasis on Science in 4-H

We are all aware of the increasing emphasis on science in all walks of life. The engineers have capitalized on this trend to glamourize their field. Even though agriculture has progressed relatively much further in science than engineering, we have not taken advantage of this accomplishment. The time would appear right to make a concerted effort to change the image of young boys and girls toward the science of agriculture and the home. The opportunities this would offer for improving the image of agriculture are unlimited.

You are all familiar with the leadership Dr. E. R. Collins has given to the 4-H Science of Plants and Soils Project. The enthusiasm with which this project has been received indicates that our 4-H'ers are ready for this approach. As excellent as the series is, it is, nevertheless, only a beginning. We need to expand the idea to include all subject matter areas. We would visualize this as a supplement to our present projects--not as a replacement for them.

As you know, Dr. Collins has retired as Specialist in Charge of Agronomy. He has expressed an interest, however, in continuing to work on a part-time basis to assist us in coordinating a program on science in 4-H that would include all departments. Before proceeding too far, we need some sort of reaction from you and an indication of whether or not we could count on the active support of your group.

Briefly, some of the things that we're thinking about are as follows:

1. Expand the present idea of the "Science of Plants and Soils" to include all other subject matter areas such as "Science of Animals," "Science of Clothing," "Science of Food," "Science of Nutrition," etc.

2. Prepare a series of 16 Science TV lessons involving all departments. These would show the broad scope of sciences in food and fiber production, processing, marketing and consumption. The programs would be kinescoped for use by industry, other TV stations and for training leaders.

3. Pilot counties would be selected from each Extension District for an intensive testing program. The agents from these counties would be brought to the University at the outset for training and orientation.

4. The agri-business industry would be actively involved in supporting and implementing the program. Preliminary contacts have indicated tremendous interest on their part.

Attached is a copy of the first printing describing the available exercises in "Science of Plants and Soils." We now have exercises from Horticulture, Dairy, Food Science, Crop Science, Soil Science, and Wildlife. Other departments have also indicated interest.

I would appreciate it if you would discuss this proposal with your staff and particularly your Department Head since if we go ahead with this idea we will be calling on the total staff for assistance. Let me have your reaction before August 1. It's quite important that I hear from you since your reaction will determine whether or not we attempt to launch this project.

TCB/mr

Encl.

CC: Department Heads
Extension Administration

Available 4-H Club Exercises in "Science of Plants & Soils"

KEY FOR CLASSIFYING EXERCISES:

C	Communications (telling or writing about your exercise).
CF	Climatic Factors (temperature, rainfall, etc.).
FE	Field Exercises (usually for farm youth).
GP	Growing Plants (germination, fertilization, inoculations, etc.).
GR	Growth Response (weed control chemicals, stimulants, etc.).
PI & C	Plant Identification and Characteristics (identifying plants, studying differences in seed, etc.).
R	Reproduction (germination, propagation, cuttings, rootings, grafting, etc.).
S & SC	Soil and Soil Conservation.
SE	Special Exercises (special area problems for advanced members. These projects can be prepared at the local level).
U	Utilization (plants, soils, etc.).
W	Wildlife

EXERCISES AVAILABLE

C-1	COMMUNICATIONS - You are given an opportunity to tell, write or show what you have done in your exercises. This exercise can be one of the four required for a project. (1, 2 & 3)
C-2	MAKE SUGGESTIONS FOR IMPROVING AN EXERCISE. - Do you have helpful suggestions on an exercise that you have completed? If so, you can send these suggestions to the author. You will exercise a certificate of completing this exercise if your suggestions are accepted. (1, 2 and 3)
CF-1	LEARNING ABOUT TEMPERATURES - This ir related to growth of plants. Exercise includes trip to U. S. Weather Bureau Station and encourages familiarity with weahter maps in daily papers. (1)
CF-2	LEARNING MORE ABOUT RAINFALL - A record is kept of the amount of rainfall related to the growth of plants. The exercise includes a trip to the U. S. Weather Bureau Station. A study of weather maps in the daily paper is suggested. (1)
CF-3	PLANTS' USE OF SUN ENERGY - An advanced study of temperature as related to growth and evaluated in terms of daily effective heat units. (3)
CF-4	LEARNING ABOUT SOIL TEMPERATURE - Soil Temperature readings are made at the same time each day as an aid in knowing when the soil temperature is high enough for seed to germinate. (1, 2)
FE-1	TESTING SPACING AND NITROGEN SIDEDRESSING RATES ON CORN - Exercise compares 80, 100, 120, 140 and 160 pounds of N per acre at 4, 6, 8, and 10-inch spacing in the row. (2, 3)
FE-2	TESTING CORN HYBRIDS WITH DIFFERENT SPACINGS - (Conventional farm equipment needed.) Exercise compares 3 to 10 hybrids at 8, 12, 16, and 20-inch spacings in the row. (2, 3)
FE-3	DETERMINE THE BEST SPACING OF COTTON PLANTS - The second part of exercise is about ginning percentage of lint, grade, class, and quality. (2, 3)
FE-4	ESTIMATING COTTON YIELDS - Procedure given for estimating cotton yield per acre. (2, 3)

NOTE: (1), (2), (3), etc. at end of description indicates increasing skill needed for the projects, 1 being for beginners or inexperienced 4-H members.

Published by

THE NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE

North Carolina State of the University of North Carolina at Raleigh and the U. S. Department of Agriculture, Cooperating. State College Station, Raleigh, N. C., George Hyatt, Jr., Director. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

October 1964

FE-5 TESTING THE NITROGEN LEVEL OF CORN PLANTS - This exercise determines the level of nitrogen in a corn plant by use of a powder. A red color indicates nitrate nitrogen in the corn plant when the powder is applied to the cut tissue. (2, 3)

FE-6 KNOW YOUR SOIL: FERTILITY RESPONSES IN CORN - This is a fertility experiment covering about 3/10 acre of land which is designed to show the best level of N, P, and K on corn for a particular field. The experiment is to be related to soil test and soil type. This exercise is 3/4 of a project. (3)

FE-7 GROWTH RESPONSE TO TRACE (MINOR) ELEMENTS - Soybeans are grown with and without the application of manganese, copper, zinc and borax to the soil. This will give an indication as to whether these elements are needed for best plant growth. (2, 3)

FE-8 COTTON VARIETY TESTS - Compares cotton varieties in field test for yield and quality.

FE-9 SETTING AND PRUNING AN APPLE TREE - Procedure is given for selecting, setting and pruning an apple tree. (2, 3)

GP-1 SEE PLANT ROOTS GROW THROUGH A GLASS WINDOW - Seed are planted between a blotter and the side of a water glass. Sand is put inside the blotter to hold the blotter against the side of the glass. You can watch the seed sprout and the roots lengthen. (1, 2)

GP-2 GROWING SUNFLOWER SEED - Two kinds of sunflower seed are planted, fertilized, and watered when necessary. You can observe how fast a plant grows, how the flower faces the sun, the kinds of insects on the flower, the seed's form, etc. A companion exercise W-1 suggests building a bird feeder and feeding the birds with the sunflower seed produced. (1, 2)

GP-3 EVAPORATION OF WATER FROM PLANTS (TRANSPIRATION) - A leaf or plant is covered with a glass or plastic bag to show how water is given off (transpired) and condensed on the glass or plastic bag. Calculations are required to show water requirements of plants. (1, 2)

GP-4 PLANT ROOTS & HOW THEY DEVELOP - Soil is placed in a cellophane bag and placed on a window glass. A plant is allowed to grow so that the roots spread out in the bag on top of the glass. You can see the roots develop and expand. (2, 3)

GP-5 SOME PLANTS USE NITROGEN FROM THE AIR - Exercise designed to show ability of certain plants (legumes) to use a plant nutrient (nitrogen) from the air. This is done by adding certain bactera to seed, planting the seed and watching them grow in comparison with untreated seed. (2, 3)

GP-6 SELECTING AND SETTING AN APPLE TREE - Directions are given for selecting a good quality "whip" to plant and on how to plant it. (2, 3)

GP-7 HOW BACTERIA FIXES NITROGEN FROM THE AIR FOR PLANT USE - Soybeans are inoculated to show how they nodulate (form lumps on the roots) and supply the plant with nitrogen. (2, 3)

GP-7A HOW SOYBEANS DIFFER IN THEIR ABILITY TO USE NITROGEN FROM THE AIR. - Some soybean plants do not form nodules, do not fix nitrogen from the air and are called non-nodulators. Normal soybean plants do both. This can be observed by doing this exercise. (2, 3)

GP-8A GROWING PLANTS WITHOUT SOIL - Plants are grown using a mixture of chemical salts to supply the nutrients (food) required. The plants are supported by the roots growing in coarse gravel. Exercise GP-8B adds the trace elements and can be used as a follow-up or for those with more experience. (1, 2)

GP-8B GROWING PLANTS WITHOUT SOIL - A more advanced exercise than GP-8A. Plants are grown with chemical salts while being supported by gravel. With care, plants can be grown to maturity. (2, 3)

GP-9 HOW PLANTS GET THEIR NUTRIENTS - We learn how plants get their nutrients from soil using same principle that grows this garden. (1, 2)

GP-10 HOW TO CONTROL POLLINATION OF CORN - A study to show how kernesl of corn can be affected in shape, color and other characteristics by the pollen from one type of corn on the silks of another type of corn. (2, 3)

GP-11 GROWING A CARROT PLANT FROM THE ROOT - Select a healthy carrot with a green top. Cut off the top and a section of the carrot. Place in water and observe the vegetation growth from the stored material in the carrot root. (1)

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GR-1 LEARNING ABOUT HERBICIDES (WEED KILLERS) BY VISITING A STORE WHERE THEY ARE SOLD. - Club members visit a store (rural farm supply or city garden and lawn supply center) and study types of chemical weed control materials available. Information on the many different kinds of chemicals and their uses is recorded. (1, 2)

GR-2 LEACHING OF HERBICIDES IN SOIL - Weed control chemicals are applied to different soils. Equivalent of 4 inches of rainfall is added to each. Plants are grown in the soil taken at different depths to show how far the weed control chemical had moved down into the soil. (2, 3)

GR-4 HOW PLANTS RESPOND TO PRUNING - A coleus plant is planted. It is cut, pruned, or cut off in different ways to show how a plant can be shaped by the regrowth. (1, 2)

GR-5 LENGTH OF DAY DETERMINES WHEN CERTAIN PLANTS BLOOM. - Soybeans with different maturity dates are planted to show how they react to the length of day. (2, 3)

GR-6 LIGHT AND PLANT GROWTH - Corn kernels are planted at different depths to observe the response and the length of the first internode as related to the presence of light. (1, 2)

GR-8A CHEMICAL WEED CONTROL IN LAWNS WITH 2, 4-D. - Broadleaved weeds such as dandelion, plantain, winter cress, creeping Charlie and weeds such as wild garlic and onion make many lawns unsightly. These weeds can be cheaply and easily killed with the weed-killer 2, 4-D. This exercise explains how to kill weeds without having to spray. Simple methods such as the 2, 4-D wax bar, the gloved hand, and spot treatment are used. (1, 2 and 3)

GR-8B CHEMICAL WEED CONTROL IN LAWNS WITH 2, 4-D. - This exercise is more advanced than GR-8A and includes using the sprayer to apply 2, 4-D to lawns. Proper calibration and use of the sprayer are covered as well as safe use of 2, 4-D. (2, 3)

GR-9 HOW DO HERBICIDES (CHEMICAL WEED KILLERS) KILL PLANTS?. - With more and more chemical weed killers being used by farmers and city people alike, it is important to know a little about how the herbicides kill plants. This will help us to use them more effectively and safely. This exercise demonstrates the use and effects of a contact and a growth regulating chemical on plants. (2, 3)

PI & C-1 HOW PLANTS COME THROUGH THE SOIL - Different kinds of seeds are planted to observe how different seeds germinate and come through the soil. Each kind of seed comes through the soil differently. This exercise will help you understand why plants bend toward light and why some plants survive nature's hazards while others do not. (1, 2)

PI & C-2 INCORRECT CUTTING HARMS SOME PLANTS - Grass is grown in flats or jars. The grass is cut at different heights to show how cutting too close and frequent will decrease growth and vigor of the plants. (1, 2)

PI & C-3 COLLECT 10 USEFUL PLANTS & 10 UNWANTED PLANTS (WEEDS) - You will learn to know some useful plants and some weeds. You will learn how to press and mount plants. Also, how to put them into a notebook for showing to others and exhibiting. (1, 2)

PI & C-4 SHOW THAT PLANTS HAVE OTHER COLORS UNDER THEIR COAT OF GREEN - Plant parts are crushed in alcohol or other solvents and the colors separated on a piece of paper dipped into the solution. (1,2)

PI & C-5 PLANTS THAT FARMERS GROW IN NORTH CAROLINA. - Pictures are clipped from magazines showing the things grown for sale, grazing, hay or soil improvement in North Carolina. (1, 2)

R-1 LEARN TO KNOW THE SEEDS OF PLANTS THAT GROW YOUR FOOD AND CLOTHING - The group visits a seed store, selects different kinds of seeds, and germinates them in a paper towel. One can observe the different kinds of sprouts or young plants and how the seeds germinate. You are requested to list 24 plants whose seed are used for food, 24 things that you use for food that have seeds in them. It will show the importance of seed in your everyday life. (1, 2)

R-2A SPROUTING A SWEET POTATO - A sweet potato is selected and placed in a glass of water. As the plant grows it can be formed or shaped to make a pretty decoration. You will learn where the plant gets its energy and food to grow. (1, 2)

R-2B GROWING SWEET POTATO PLANTS - A sweet potato is placed in the soil and allowed to produce sweet potato plants. The plants can be grown in a pot or in the field. (1, 2)

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R-3A THE LIVING SEED - You will learn how to tell whether a seed is alive, damaged, or dead by a chemical test. You will also learn how seed damage affects germination. (1, 2)

R-3B SEED - THEIR GERMINATION AND VIGOR - Two lots of seed are germinated that have about the same germination test. You can see the difference between the vigor of seeds in the same lot and between the lots. (2, 3)

R-3C SEED - THEIR GERMINATION AND VIGOR - To answer questions about seed germination and vigor raised in exercise R-3B. (2, 3)

R-4 EFFECT OF FRUITING ON RUNNER GROWTH OF STRAWBERRY PLANTS - Strawberry plants are grown to show when runners (new strawberry plants) are produced as related to flowering and producing strawberries. (2,3)

R-5 HOW PLANTS DISTRIBUTE THEIR SEED IN NATURE - You will learn some of the interesting ways plants distribute their seed to new areas by studying them. (1, 2)

R-6 HOW DEEP IN THE SOIL CAN SEEDS GERMINATE - Different sizes and kinds of seed are covered with soil at different depths to show how deep different seeds can sprout and grow. (1, 2)

R-7 HOW TO GERMINATE SEEDS WITH A HARD SEED COAT - Seeds with a hard seed coat are treated mechanically or chemically so that moisture can get through the seed coat and let the seed germinate. (1, 2)

SE-1A SPECIAL EXERCISES FOR "SCIENCE OF PLANTS AND SOILS" - Outlines procedure for setting up special exercises adapted to county needs. (2, 3)

S & SC-1A SAND, SILT AND CLAY OF SOILS - Soil is placed in water, shaken and allowed to settle to see the different size particles in the soil. These particles are called sand, silt and clay. You will be able to see the amount of each in the soil you used. (1, 2)

S & SC-1B SAND, SILT AND CLAY OF SOILS - This is a follow-up on S & SC-1A and permits you to separate the sand, silt and clay so that you can feel and see the difference. This corresponds to taking a clock apart to see the different parts. (2, 3)

S & SC-1C PROPERTIES OF SAND AND CLAY - You will see how fast water moved through sand and clay. Also how much water each will hold and how long a plant will grow without adding more water. (1, 2)

S & SC-2 SEE HOW RAINDROPS WASH SOIL - Three to 4-foot white stakes are placed in an area covered with a good sod. Similar stakes are placed in an area of bare soil. Water is sprinkled beside the stakes to see how the bare soil splashes when not covered with grass. You can also see how grass, sticks, stones, leaves, etc., keep the soil from washing away during the rain. (1, 2)

S & SC-3 LAY OFF CONTOURS OR GRADE LINES WITH A TRANSPARENT GARDEN HOSE - This exercise describes a procedure which can produce very good results in running a contour or grade line. Success with this exercise will depend primarily on the skill, patience and cooperation of a team. (3)

S & SC-4 A CONTROLLED MOISTURE TENSION: BUILD YOUR TENSIOMETER - The tensiometer works on the principle that water is held in small open pores against the force of gravity. If the small pores can be connected to larger pores we can measure the amount of pull against the force of gravity. We can later demonstrate how water moves through small pores in the soil. (2, 3)

S & SC-4 B CONTROLLED MOISTURE TENSION: A TENSIOMETER FLOWERPOT - By use of a tensiometer which we can build, a flowerpot can be watered automatically for long periods of time with an optimum moisture-air relationship. (2, 3)

S & SC-5 USING AN ACIDITY (pH) INDICATOR - Solutions are used that change color depending on the acidity of the material being tested. You will learn how to use the solutions and determine the acidity of vinegar, baking soda, etc.

S & SC-6 DETERMINING THE ACIDITY (pH) OF THE SOIL - Solutions are used that change color depending on the acidity (pH) of the material being tested. After practicing with vinegar and baking soda, you will be able to determine the acidity of the soil in your yard, garden, etc. (2, 3)

U-1 USE OF PLANTS FOR FOOD, CLOTHING, HOUSES, ETC. - This is an interesting exercise to identify the common things around the home and store that come from plants. (1, 2)

W-1 STRICTLY FOR THE BIRDS - This exercise can follow GP-2 or you can buy sunflower seed from the store, build a bird feeder, feed the birds and make your home a wildlife center. (1, 2)

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