

4-H 672

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The Indiana 4H Corn Project

CORN

The Plant, Problems, and Products

Beginner Level



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Corn—The Plant, Problems, and Products

The Indiana 4-H Corn Project—Beginner Level

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Table of Contents

Section I. What You'll Learn and Do in the 4-H Corn Project	
Project Requirements	4
Suggested Fair Exhibits	4
Section II. Let's Learn about Corn	
How Corn Grows and Develops	5
Activities to Learn More About Corn	7
Section III. Protecting Corn from Pest Problems	
Types of Pest Control	9
Field Scouting for Corn Pest Problems	9
Activities to Learn More about Pest Problem Identification	10
Section IV. Discovering the Uses of Corn	
Corn in Feed, Food, and Products	14
Activities to Learn More about Corn's Many Uses	14
Section V. Safety First in Growing a Corn Crop	
Getting the Best of the Farm Accident Beast . . .	16
Activities to Learn More about Farm Safety . . .	16
Appendix	
Sample of 4-H 626, "Crops Projects Record Sheet"	20
Sample of 4-H 672a, "Corn Project Scouting Form"	21
Sample of 4-H 702, "Corn Project Exhibit Scorecard"	23

Note to Parents

The Indiana 4-H Corn Project is intended to teach and challenge your children while providing you an opportunity to help them learn important life skills, such as time management, planning, budgeting, and communicating.

To be meaningful, the project will require your involvement. For instance, your youngsters may need help in selecting project activities, gathering materials, keeping records, and making financial arrangements. They also may need your encouragement to give talks and demonstrations on their project activities.

But your greatest contributions will be your words of praise and support and the time you spend listening to their ideas for each activity.

Read this manual with your children so you all understand the project and its requirements. Then encourage them to select activities that are appropriate to their knowledge and experience. Finally, all of you discuss the activities chosen with the 4-H leader, Extension agent or agriculture teacher. Also, think about how other family members can get involved.

Remember, your 4-H'ers are the ones who must do the work required to complete each project activity. That's how they will gain knowledge, develop useful skills, and perhaps even make a start toward a rewarding career. In the process, you're going to learn something about your youngster's interests and potential as well as become more aware of the needs of young people at different ages.

Section I. What You'll Learn and Do in the 4-H Corn Project

The Indiana 4-H Corn Project has three levels, each with its own project manual. These levels are:

Beginner—first and second years enrolled (suggested for ages 10-11).

Intermediate—third, fourth, and fifth years (suggested for ages 12-14).

Advanced—sixth year and beyond (for ages 15 and above).

This is the beginner-level manual. In it you're going to read about the amazing corn plant and how it works, the pests that attack corn, the many uses of corn, and safety practices when growing, harvesting, and storing corn. Then you're going to have a chance to "learn by doing."

As you plan your project and work on your activities, ask for help from parents, 4-H club leader, other 4-H'ers, crops or corn leader (if your county has one), vo-ag teacher, and county Extension agent.

Project Requirements

Here are the things that you are to do each year in the beginner level of the 4-H Corn Project.

- Plan your project year with the help of your parents, club leader, or corn project leader, and review your progress with them.
- If your county has a 4-H crops or corn club, help the leader decide how many and what kind of meetings your group should have during the year, and be sure to attend those meetings.
- Grow a plot of corn (an acre or more, if possible), and check on it at least three times during the growing season. If you don't have a field or garden plot, see if a friend or neighbor will let you use some land or help him with his crop.
- Complete at least four of the activities presented in this manual your first year and five activities your second year (or at least three the first year and four the second if one of them is field scouting activity #5 or #6). Although you may repeat certain activities your second year, three of the total number that you do must be new ones.
- Make an exhibit from one of the project activities you selected, and show it at the county 4-H fair. Discussed below are the suggested exhibits for the beginner-level corn project.
- Give a talk or a demonstration on some part of your project to your 4-H club (optional).
- At the end of the project year, fill out the first page only of 4-H 626, "Crops Projects Record Sheet" (see page 19) and have your 4-H leader sign it. Add it to your green record book, which you turn in as the leader advises. This is your report of what you did, what you learned, and also what you plan to do next year.

Suggested Fair Exhibits

Here are three beginner-level corn project activities to choose from for making your county fair exhibit and what each one should include. (You cannot exhibit the same activity both years.)

"The Parts of a Corn Plant" (see Activity #4).

Display a full-grown corn plant (including roots), with the plant parts correctly identified and labeled, using shipping tags or 3 × 5 cards.

"Identifying Some Pests of Corn" (see Activities #5, #6, and #7). On each of two shipping tags or 3 × 5 cards, put a picture of a corn insect (or the actual bug itself), its name, and the plant part it attacks. Do the same for two corn diseases. Then on a full-grown corn plant that you've prepared for exhibiting, attach the four tags or cards to the specific plant parts affected by those insects and diseases.

"Effects of Planting Depth on Corn Growth"

(see Activity #3). Exhibit four containers of growing corn that were seeded at the same time but at 1-inch, 2-inch, 3-inch, and 4-inch depths, with a record of your observations displayed on an 8½ × 11 card.

Your county's 4-H corn project exhibit requirements may be different than these, so check first with your club leader or 4-H fair book. Also, if your county uses 4-H 702, "Corn Project Exhibit Scorecard" (see sample), review it carefully to see what the judges will be looking for.



Section II. Let's Learn About Corn

Corn is the great American crop. It's native to the western hemisphere and was very important in the diets and cultures of several Indian civilizations, including the Incas, the Mayas, and the Aztecs. Europeans learned about it from the Indians and eventually introduced it to the other continents.

Corn is now grown more places in the world than any other food plant. It ranks behind only rice and wheat in the number of acres grown worldwide.

Of all major crops, corn does the best job of converting the sun's energy into food. But it also has many other uses. Hundreds of items, ranging from soap to wallpaper, are made from corn and its by-products.

Corn has always been an important crop in the United States. We produce well over one-half the world's supply. Much of it is grown in the fertile soil and favorable climate of the north central U.S. This area is called the Corn Belt.

Indiana is one of the top corn-producing states in the nation. Hoosier farmers plant about 6 million acres of corn each year and usually harvest a grain crop that averages close to 115 bushels per acre. That's nearly 700 million bushels a year!

How Corn Grows and Develops

Corn is a tall member of the grass family, which includes such "cousins" as wheat, oats, sorghum, foxtail, and bluegrass. Like wheat and oats, corn is an *annual* grass. That means it cannot regrow from the same root system, so it dies after one growing season.

The corn plant has a strong, solid stem (stalk) and long, narrow leaves that are attached alternately on opposite sides up the stem. A full-grown plant usually reaches 7-10 feet tall, has 20-23 leaves, weighs (when dried) around 1¼ pounds, and has a root system estimated to be about 6 miles long. A corn plant will "drink" some 35 gallons of water in producing one or two ears that yield about 1/2 pound of grain.

The scientific name for corn is *Zea mays*. Just as there are different kinds of livestock (beef, dairy, swine, poultry, sheep), there are different kinds of *Zea mays*. They include flint, flour, pod, dent, pop, and sweet corn. The last three are common to Indiana. And just as each type of livestock has many breeds, so each type of corn has many different varieties. Activity #1 gives you a chance to find in what ways dent corn varieties differ from one another.

The Corn Seed (Figure 1)

A corn seed is one of nature's most amazing energy-storing devices. It weighs only 1/100 of an ounce, yet will grow into a 7-10 foot tall plant that produces 600-1000 seeds just like the one from which it grew.

Seeds of a corn plant are the *kernels* that you find on an ear of corn. They are arranged in rows along the ear. There may be as few as eight or as many as 36 rows, with the usual number ranging between 14 and 22.

A corn kernel is made up of three main parts—the seedcoat, the endosperm, and the embryo. In Activity #2, you cut open a kernel and identify them. Each part plays an important role in producing a new corn plant.

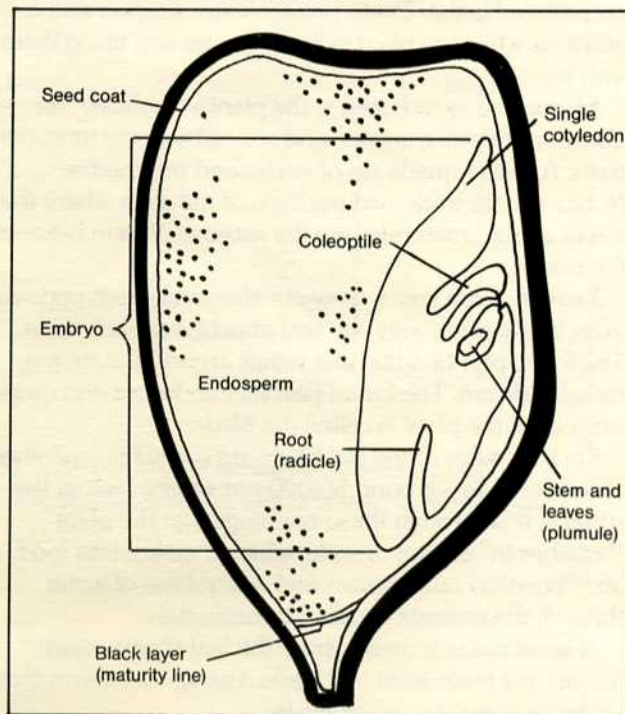
The *seedcoat* (pericarp) is a hard, outer shell that protects the seed both before and after planting. It keeps bacteria and fungi from getting into and destroying the kernel.

The *embryo* contains the tiny plant and the scutellum. That plant has 5-6 miniature leaves, called the plumule, and a root, called the radicle. When the seed is planted and germinates (that is, starts to grow), the scutellum provides food for the tiny new plant until it breaks through the soil surface.

The *endosperm* makes up about four-fifths of the kernel's weight. Its main job is to provide food for the young plant (seedling) until its roots and leaves grow big enough to make food on their own.

Most dent corn seeds are yellow; but some that you buy from a seed dealer may be stained red or pink. This colored coating means that the seeds have been treated with a chemical to protect them from disease. The chemical is poisonous, so don't put kernels in your mouth!

Figure 1. Inside of a corn seed



The Corn Seedling (Figure 2)

When a corn kernel is placed in warm, moist soil, the moisture is absorbed through the seedcoat, and the kernel swells. Chemical changes take place in the embryo causing the plumule and radicle to start growing. In 2-3 days, they break through the seedcoat.

The plumule is enclosed in the *coleoptile*, which protects the emerging leaves from damage as they push up through the soil. Also, *seminal roots* soon join the radicle to help anchor the plant and supply it with nourishment until the primary root system is ready to take over.

The seedling appears at the soil surface between 3 and 7 days after germination, depending on soil moisture, soil temperature, and how deep the seed was planted. You can learn about the effects of planting depth on seedling emergence in Activity #3.

Once through the soil surface, the plant grows quickly. About one week later, it should be well established, with two leaves fully expanded and a primary root system to feed and support it.

The Mature Corn Plant (Figure 3)

Here we're going to talk about the roots, stem, leaves, and flowering parts of a corn plant. In Activity #4, you look for and label these parts on a real plant.

Roots. The seedling's radicle and seminal roots are soon replaced by a *primary root system*. By the time the corn plant is about 18 inches high, the roots have grown down to 18 inches deep and out 18 inches on each side of the row. Eventually, the top 8-10 inches of soil become a mass of roots.

After the plant has tasseled, additional *brace roots* grow out from the stem right above the soil surface then down into the soil. These provide extra support and nutrients while the plant is forming ears and filling them with kernels.

Stem. The stem (stalk) is the plant's "highway" for transporting water, sugars, and soil nutrients to its upper parts. A stem is made up of *nodes* and *internodes*. Nodes are the thickened portions of the stem where the leaves attach; internodes are the sections of stem between the nodes.

Leaves. Corn leaves grow out alternately from opposite sides of the stem, with one leaf attached at each node. The lower part of a leaf that wraps around the stem is called a *sheath*. The broad part that sticks out and drops away from the plant is called the *blade*.

On both sides of the leaf blade are many tiny openings called *stomata*—around 50,000 per square inch of leaf surface! It is through these openings that the plant "breathes in" carbon dioxide, which it makes into food, and "breathes out" oxygen and water. Loss of water through the stomata is called transpiration.

A small collar formed where the leaf sheath wraps around the main stem is a *ligule*. The special leaves that protect the ear are called *husks*.

Figure 2. Two stages of a corn seedling

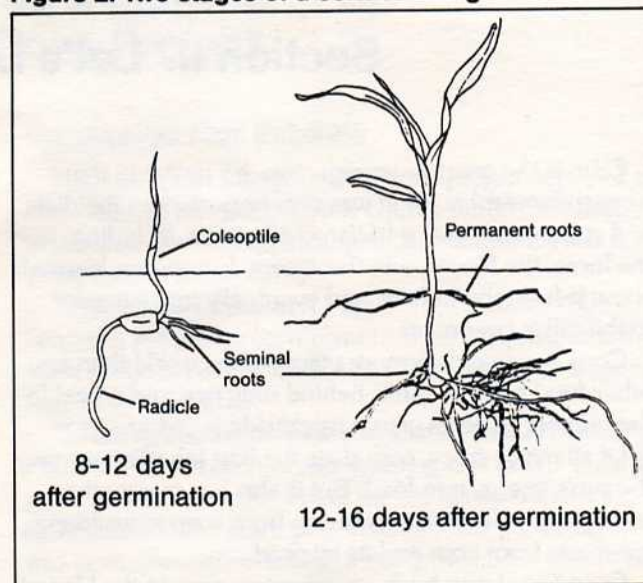
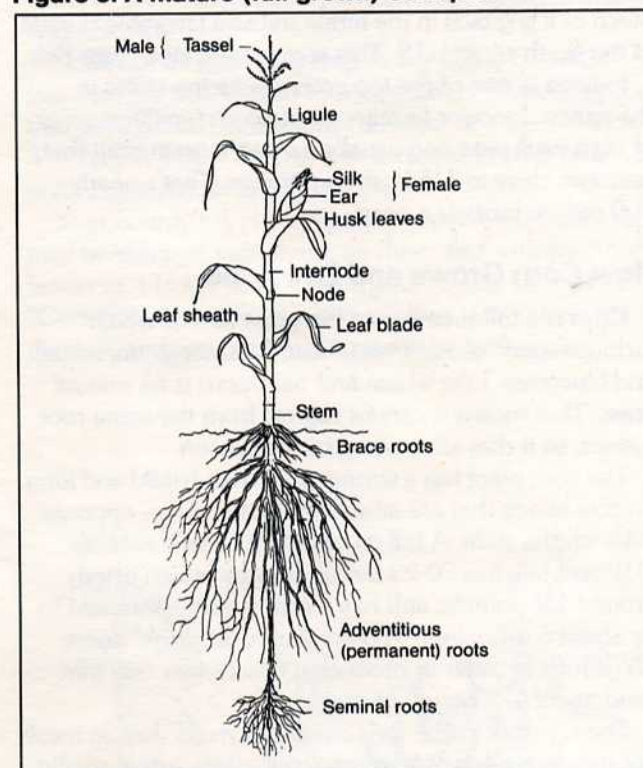


Figure 3. A mature (full grown) corn plant



Flowering Parts. With corn, the male and female "flowers" are on the same plant but separated. The male flowers (anthers) are found in the *tassel* and produce pollen—some 18 million tiny grains of it! The female flowers (ovules) are found in the *ear shoot* and produce *silks*, which extend out from inside the husk to catch the pollen.

The tassel begins shedding pollen several days before the silks emerge and continues for several days after they emerge. Each silk is covered with tiny hairs that trap and hold the pollen grains. These grains then grow down the silk to fertilize the ovule, and kernel starts to form.

Activities to Learn More about Corn

Activity #1, Discovering Some Differences Among Corn Varieties

A. Visit a local seed corn dealer. Write down the names of five dent corn seed varieties that are offered for sale, and find out the main advantages and disadvantages of each one.

Variety Name (Example: Brand X 23679)	Advantages	Disadvantages
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

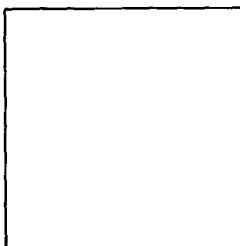
- B. Which one would you choose to grow and why?
- C. Show to your 4-H Leader for his/her review and approval.

Activity #2, Identifying the Parts of a Corn Seed

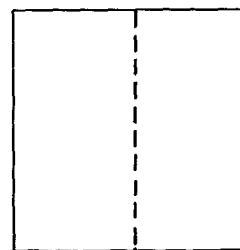
- A. Soak several kernels of corn in warm water for about one hour, split them in half, then let them dry.
- B. In Box A, sketch what the inside of one of the kernels looks like. To the left of the box, write down the three seed parts. Then draw a line from each name to where it is in the seed you sketched. Glue or tape the seed half in the left hand part of Box B.

Parts of the Seed

Box A



Box B



- C. To the other seed half, apply a drop of iodine, let dry, then glue or tape it in the right hand part of Box B. Iodine turns starch black. Starch is the main food for the young plant. What part of the seed turned black?
- D. Show to your 4-H leader for his/her review and approval.

