THE SOLANACEAE
LESSON THREE
SOLANACEAE - Species *Solanum tuberosum*

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In this lesson we will learn more about one member of the Solanaceae, potatoes. Specifically, we will study how potatoes are grouped and the MORPHOLOGY (exterior) and ANATOMY (interior) of potatoes – the food. Parts of the lesson are underlined. Younger members can ignore these parts. **Make sure you do everything that is in bold print, complete the laboratory and the assignment, and do one of the projects at the end of the chapter.** Bring the project to the next meeting. WORDS PRINTED IN ALL CAPITAL LETTERS may be new vocabulary words. For help, see the glossary at the end of the lesson.

INTRODUCTION

Potatoes – the food -- are TUBERS. A TUBER is an enlarged portion of an underground branch of a stem. Because potatoes are stems, they have typical stem parts. For example, potatoes have dormant true BUDS (eyes), LEAF SCARS (eyebrows), and LENTICELS. Potatoes are grouped using shape, skin color, and flesh color. There are six major groups of potatoes.

(Photo courtesy of Dept. of Plant Sciences, Vegetable Program, University of Saskatchewan)

TYPES OF POTATOES

The six major groups are: Russet, Round White, Long White (also known as White Rose), Round Red, Yellow Flesh, and Blue/Purple Flesh. Some groups are best when baked or mashed, others can be used in any type of potato dish.

A. Russet

The main characteristic of Russet potatoes is their netted (rough) brown skin. They have white flesh. Russets are the most popular potato in the United States. They are sometimes called baking potatoes or Idaho potatoes. They are long and oval in shape. They are grown in the Northwest of the United States and are available all year long.

Russets are high in starch. When cooked, Russets are light and fluffy. They are great as mashed potatoes and baking potatoes. They are good for frying and roasting too.

B. Round White

Round White potatoes are round and have a smooth, light tan skin with white flesh. They are mostly grown in the eastern United States. They are available all year. They are medium in starch. Round White potatoes hold their shape and are ideal in stews. They are a good all purpose potato and can be used in every potato preparation.

C. Long White or White Rose

These potatoes are oval-shaped and have a thin light tan skin. They have white flesh. These potatoes are grown primarily in California and are available in the spring and summer. Their starch level is medium. They have a firm, creamy, almost waxy texture when cooked. They hold their shape when cooked. Long whites are an all purpose potato which can be used in every potato preparation.

D. Round Red

These potatoes are round and have a thin red skin and white flesh. They are available in the late summer and early fall. Red potatoes have a firm, smooth, and moist texture and are very good for salads, roasting, boiling and steaming.

Sometimes Round Red potatoes are referred to as “new potatoes”. However, “new potatoes” are any potatoes which are harvested when the skin is still reddish, before the potato is fully mature.

E. Yellow Flesh

These potatoes are very popular in Europe and are growing in popularity in the United States. They have a smooth, tan skin and yellow flesh. They are available in the late summer and early fall. They have a dense and creamy texture when cooked. They make very good mashed potatoes.

F. Blue/Purple Flesh

These potatoes are widely grown in South America but are not widely cultivated in the United States. They are most commonly available in the fall. They are often used in the United States for snack foods. They have a nutty flavor.

Some references also consider **Fingerling** potatoes as a group. There are many varieties of these small (thumb size), finger-shaped potatoes. They all tend to be low in starch, and great for roasting or making potato salads.

Examples of these groups of potatoes can be seen in Appendix 1 (found at http://www.potatoes.com/Educational-Pubs.cfm)

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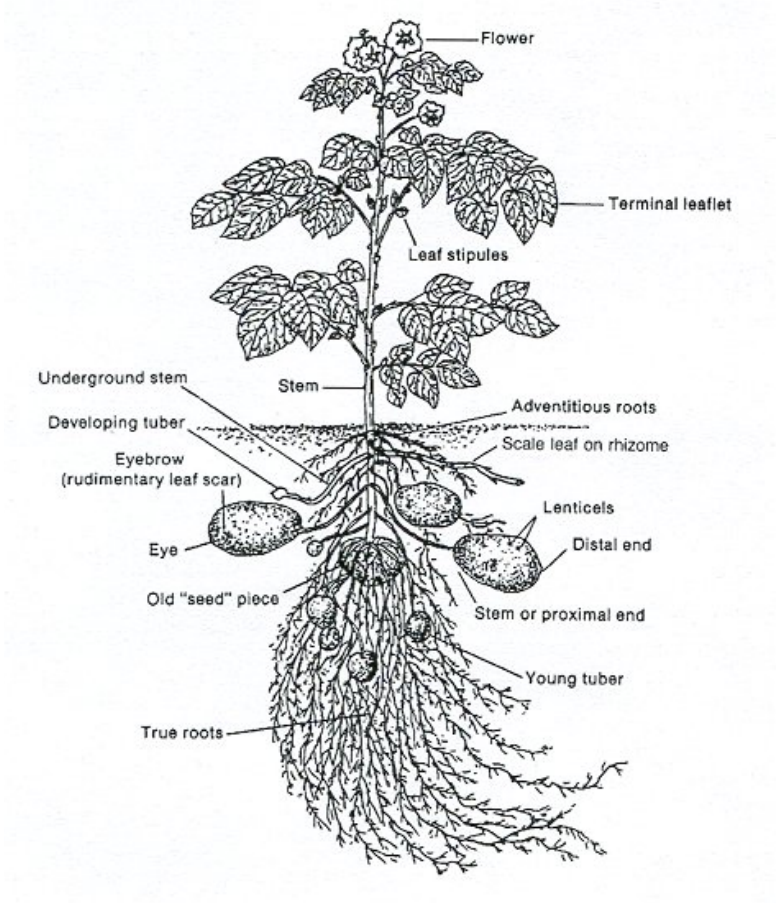
MORPHOLOGY OF PLANT AND TUBER



Potato plants have the same parts (ORGANS) that other plants have.

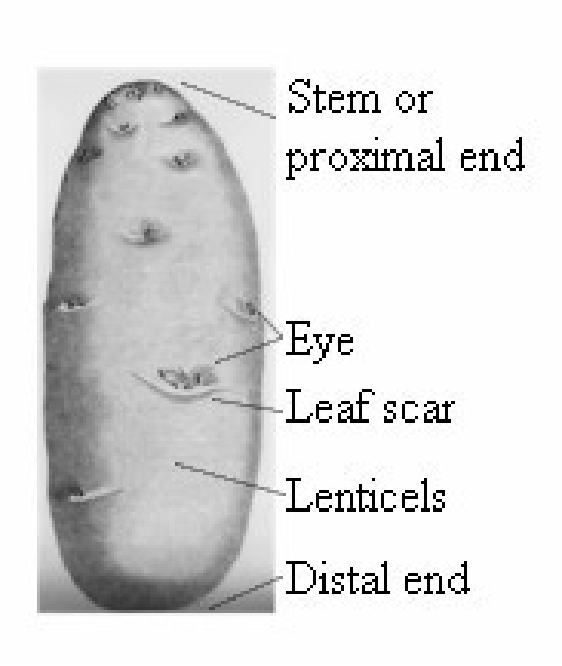
Color the ENTIRE stem brown. Make sure you look at the underground portion of the plant.

Color the leaves green.

Circle all the TUBERS you see on the diagram to the left and the photo below.

Color the flower purple.

(Diagram courtesy of USDA Agricultural Handbook 267 and photo from University of Georgia Department of Horticulture)



(Diagram courtesy of USDA Agricultural Handbook 267)

TUBERS are enlarged stems.

Potato TUBERS have a STEM or PROXIMAL end. This is the end closest to the part of the stem which is not enlarged. The other end is called the DISTAL end. **Label the PROXIMAL and DISTAL ends of the large tuber in the photo on the previous page.**

Most stems have leaves and BUDS, potato TUBERS are no different. Potato TUBERS have leaves (undeveloped) and have LEAF SCARS. Buds form at the base of leaves. BUDS are the EYES on potato TUBERS. TUBERS also have LENTICELS, areas where air can enter.

If you look at some potato TUBERS, you will notice that there are more EYES on the PROXIMAL end of the TUBER. If you allow a potato to sprout, the eyes at the PROXIMAL end will sprout first.

Because EYES are buds, the EYES will grow into new shoots. Potatoes are cut into pieces, an EYE on each piece. EYES are placed into the soil to grow new potato plants. These pieces of potato with EYES are called SEED POTATOES.

Are SEED POTATOES really SEEDS?

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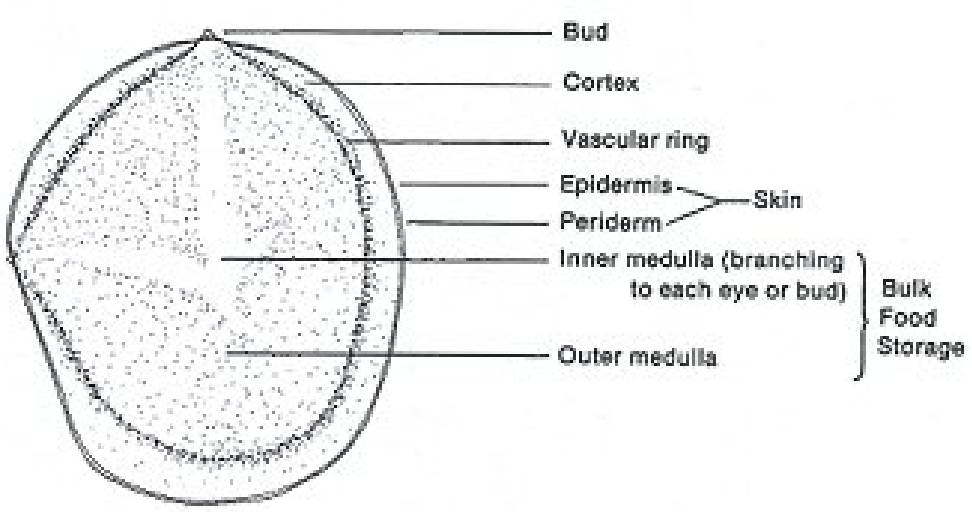
ANATOMY OF POTATO TUBER

The TUBER skin is composed of two layers. The outer layer is called the EPIDERMIS and is a single layer of cells. This layer is usually colorless. Under the EPIDERMIS there are several layers of corky cells called the PERIDERM. The cells in the PERIDERM layer usually contain pigments that produce the color of the skin in red and blue potatoes.



(Drawing courtesy of Manitoba Agriculture, Food and Rural Initiatives)

Below the PERIDERM is the CORTEX. Next to the CORTEX is the VASCULAR RING. The VASCULAR RING contains the cells that transport food products to the TUBER from the above ground stems. Inside the VASCULAR RING is the MEDULLA. The MEDULLA represents the primary storage area for the potato TUBER. Excess food produced by the potato plant is transported to the MEDULLA through the VASCULAR RING. Cells in the MEDULLA increase in number and size as they are supplied with food, causing the TUBER to increase in size.

LABORATORY FOR LESSON THREE

1. Look at the potatoes on the table. Separate them into russets, long white, round white, round red, yellow flesh, and blue/purple flesh potatoes.

2. Take one of the potatoes, study it and make a drawing below. Make sure you draw all the eyes. Label your drawing with: EYES, LENTICELS, PROXIMAL END, DISTAL END, LEAF SCARS.

DRAWING OF TUBER

3. Cut a tuber in half, study it, and make a drawing below. Label your drawings with: EPIDERMIS, PERIDERM, CORTEX, MEDULLA, VASCULAR RING. Include any buds.

ASSIGNMENT FOR LESSON THREE

1. Using the information on the previous pages and Appendix 1, complete the chart for this lesson (available at http://www.geauga4h.org/clubs/plantmasters_project.htm).

2. Please grow some sprouts. Place a potato in the light. For more details, see Appendix 2. Everyone should bring their sprouted potato to the next meeting.

PROJECTS FOR LESSON THREE

1. Choose a recipe for a dish using potatoes. Decide what type of potato you should use and buy the correct type. Prepare the potato dish. Write a recipe card. Make sure you ask your family what they thought of the dish and include the type of potato you used.

2. Go to several stores and write down the names of the different types of potatoes you can find. Note their shape and skin color and texture.

3. Grow a Bonsai Potato plant. See the Appendix 2.

APPENDICIS FOR LESSON THREE

Appendix 1 can be found at http://www.potatoes.com/Educational-Pubs.cfm
Appendix 2 can be found at http://greatscott.com/potato/

GLOSSARY FOR LESSON THREE

anatomy – The study of internal structure of plants (animals too).
bud – Future stem, which in turn can produce leaves and/or flowers
cortex -The tissue forming an outer part of an organ or structure.
distal - Away from the point of origin or attachment
epidermis – Outermost layer of an organ
eyes – Buds on a potato tuber
leaf scar – Scar on stem where a leaf had been
lenticels – Areas where air can enter
medulla – The inner part of an organ or structure.
morphology – Study of the external structure of plants (animals too)
organ – Functional and structural part of a plant (leaf, flower, stem, root, fruit, …)
periderm - An outer layer of plant tissue.
proximal - Near the point of origin or attachment
seed – Plant part containing the plant embryo
seed potato – A potato tuber kept for planting, from which a new potato plant grows
stem end – Portion of the tuber closest to the stem
tuber – an enlarged stem

vascular ring – Ring shaped structure which conducts water and food.