



Acorns to Oaks

Germination Experiment Guide

LandSmart Objectives

Students will:

1. Design an experiment to test variables affecting plant growth and survival.
2. Analyze experimental data to describe how cause and effect relationships impact plant growth.
3. Construct an explanation based on experimental observations that supports the claim that plant growth is driven by energy input and produces plant matter (tissues, sugar, carbon.)

LandSmart Goals

Students understand:

1. Oak trees, primarily Valley Oak, are a keystone species that provide essential ecosystem functions.
2. Changes in land use and management have resulted in the overall decline of oak woodland habitats, species richness, and diversity.
3. People can take actions to voluntarily steward natural resources in their own communities.

Next Generation Science Standards:

MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Warm-Up Activity:

Form pairs of students. Give each pair the exact same materials, this can be blocks, straws, or equal lengths of rope (anything really.) Each student sits back to back, one student will be the builder, and must build a shape such as a house or star. Builder then describes the shape of the object they have constructed, and the other student must recreate this by description only without seeing the original. Afterwards, students should compare structures. This is part of the 'Experimental Method' where trials are constructed, designed, and communicated so that they can be repeated by others to establish trends and patterns.

Instructions:

Limit the students options to four variables - sunlight, water, soil, nutrients. Set up a control group for the class by planting three tubes with one acorn per tube, and enough soil to fill 2/3 of the tube (soil can be potting mix or dug from anywhere inconspicuous on campus.) These samples should be placed in a window, or outside, and given one cup of water at the end of each week (more may be needed when the acorns begin to form roots and leaves.) Encourage students to make predictions (hypothesis) for each variable being tested.

Sunlight: Sunlight is essential for photosynthesis, oaks vary in their tolerance to shade. Test the effect of sunlight by placing one acorn tube in the shade or indirect sun (indoors is fine), one in a window sill, one under a cardboard box, and one under a small lamp if possible.

Soil: Soils are an important part of any ecosystem and provide a substrate for plants to grow. There are over 64 different types of soils found in Napa County. Examples of ways to test soils are using sand, gravel, clay, mulch, and suspension of an acorn in water. The team should try to vary the types of soils - not necessarily the amounts.

Water: Over 50% of the mass of a tree is composed of water, test how water impacts plant growth.

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Instructions (Continued)

Water: Have students manipulate the water variable and observe the effects. Some suggestions are to not water an acorn tube at all, water one tube with half the weekly amount (1/2 cup), place one tube in a cup filled with standing water, and/or mix a tablespoon of salt into the water.

Nutrients: Trees and plants intake small amounts of mineral nutrients from the soil to boost growth. Test this variable by adding fertilizers to the acorn tubes. Liquid fertilizer can be added to the regular watering schedule in differing amounts (over, under, and no fertilization.)

Student groups should test at least two modifications and a control set.

It is recommended that you inspect acorns for insect damage (pin holes), and drop them in a cup of water before planting, any acorns with holes, or that float, will not germinate.

Acorns should be placed horizontally in tubes, and covered by 2" of soil, control plants should receive one cup of water per week, or more if they are drying quickly.

Record results weekly using the attached sheets, student groups should draw or photograph their samples once or twice a month.

At the end of the 12 week period, each group should summarize their results, and present their hypothesis, variables, and conclusion to the class.

For assistance with your classroom experiments, contact the Napa County Resource Conservation District at (707)252-4188

Acorns to Oaks Data Sheet

Group Names:

Briefly describe the numbers of acorns tested and your method here:

Variable Being Tested (circle one): Sun, Water, Soil, Nutrient	Acorn Group 1 (Control)	Group 2	Group 3
Week 1 (write in observations, measure any growth)			
Week 2			
Week 3			
Week 4			
Week 5			
Week 6			
Week 7			
Week 8			
Week 9			
Week 10			
Week 11			
Week 12			