



## AGRICULTURAL SCIENCES

**TITLE:** Effect of Light on Seed Germination, by Terry Coffelt and Dave Dierig, U.S. Water Conservation Laboratory

**SUBJECT:** Science (Biology, Botany, and if data are analyzed Mathematics)

**GRADE LEVEL:** 7-12. Various factors can be made more complicated for older students.

**MATERIAL(S):** Seed of two different types of plants (popcorn and lettuce, for example). Any seed commonly available at a garden supply store such as vegetables and flowers also will work. Cost of the seed is less than \$5. Petri dishes and paper towels or germination papers are needed for seed evaluation. If the experiment is to evaluate the differences in plant growth, pots or the bottoms of two-liter bottles, plus some potting soil, will be needed to grow the plants.

**OBJECTIVE(S):** To demonstrate the effect of light on seed germination and plant growth.

**TIME NEEDED:** The experimental time can be varied from 14-30 days depending on the time available. The longer the time, the more results can be obtained.

### **OVERVIEW:**

#### Background

The effects of light vary from genera to genera and sometimes even between species and varieties. Some seeds are stimulated by light, and others are inhibited by light during germination. Knowing the light requirements of a seed to germinate determines seed depth at planting and the types of seed treatments a seed may need before being sold for planting.

#### Procedures

Place seeds of two (or more) different plants in a petri dish on a moist piece of filter paper or paper towel (about 25 seeds of lettuce per dish or 5-10 seeds of popcorn per dish depending on seed size). Place one half of the seeds from each plant in the dark (a drawer or cabinet, or under the bed) and the other half in a place that will get bright light at least 8 hours per day. Check the dishes every 2-3 days to be sure they are moist. Be sure to check the ones in the dark without exposing them to bright light and as quickly as possible. At the end of 14 days count the number of seeds germinated in the light and dark for each plant. Determine the percentage germination for each.

#### Additional Exercises

Other evaluation methods besides germination also can be used, such as measuring the root and shoot portions of the germinated seed, and planting the germinated seeds and taking weekly measurements of the plants. Students can then determine the effects of light on plant growth as well as seed germination. Other experiments could be conducted that vary the amount of light the seeds are exposed to during the day (1, 2, 4, 8, 12, 16, 24 hours).

## Discussion Questions

Why would seeds behave differently under different light conditions? (Enzyme requirements for germination that are light activated, seed dormancy that requires light to break it, small seed that needs to be near the soil surface to germinate because cotyledons do not contain enough stored energy for the epicotyl to grow to light from deep in the soil, etc.) What are some other factors that might affect seed germination? (Seed size, dormancy, oil content, hard seed coats, etc.)

## Glossary:

Genera (plural of Genus): A class, kind, or group marked by common characteristics or by one common characteristic; specifically: a category of biological classification ranking between the family and the species, comprising structurally or phylogenetically related species or an isolated species exhibiting unusual differentiation, and being designated by a Latin or latinized capitalized singular noun

Species: (a) KIND, SORT (b) a class of individuals having common attributes and designated by a common name; specifically : a logical division of a genus or more comprehensive class

Variety: The quality or state of having different forms or types