

## Light requirement for germination

**Learning objectives:** To observe how light can influence germination in some species.

**Background:** Light is one of the environmental factors that can influence dormancy. Some biologists consider seeds that require light to germinate to be photodormant. Others feel it is just one of many environmental factors (like temperature and water) that are necessary for germination. In general, light requiring seeds tend to be very small. There are only a few tree species that require light. Of the tree species considered on this web site, only river birch has a light requirement.

This demonstration will use river birch seeds to show the impact of light on germination. River birch seeds require light for germination, but lose this requirement after chilling stratification. From an ecological standpoint, seeds on the soil surface in a favorable environmental niche with light (an opening in the forest canopy) would be able to germinate immediately, while those in a less favorable niche (without light) would become part of the seed bank and be able to germinate in the dark after a dormancy release period (chilling stratification).

Honeylocust seeds can also be used as a species that does not require light to germinate as well as the difference in seedling morphology in light and dark grown plants. You will want to show the students how the dark grown plants lack chlorophyll (no need for photosynthesis without light) and stretch tall (imagine as seed that is buried deep in the soil needing to reach the soil surface where the light is). Dark grown seedlings also maintain their hypocotyl hook. The hook only opens in the light. The seedling maintains this hook to protect the growing point while it pushes through the soil (see seedling emergence patterns for more about seedling morphology).



**Procedure:**

1. There are four treatments for the river birch experiment. These include light and dark treatments with or without chilling stratifications.
2. Place ten river birch seeds on moist sand in small plastic containers. Cover two of the containers with a double layer of aluminum foil to exclude light.
3. One set of covered and uncovered seeds should be germinated immediately in an area that receives light and a temperature around 70°F. You expect only the light treated seeds to germinate.
4. Place the other set in the refrigerator for 4 weeks. After chilling stratification, germinate them as before. You expect germination in both the light and dark.
5. For the honeylocust experiment, sow three scarified seeds about 2 inches deep in a greenhouse substrate in containers. Place one container in a well lighted area and one in the dark. The dark treatment could be a cardboard box that has been covered with aluminum foil.
6. Check the seedlings after 2 weeks. You may need to water the dark treated containers before this, but it should be done quickly to minimize light contamination.