

# Experimental Plants

In the teaching of biological principles, certain plants have demonstrated their usefulness over the years. This leaflet offers a few basic suggestions for the use of these plants in the school laboratory.

Coleus plants are popular for demonstrating many plant functions because they grow rapidly and show environmentally-induced changes readily. One of the most interesting is the variation in color and growth depending upon the length of day and intensity of light. Take six small Coleus plants in pots, making sure that they are of the same variety, and then subject each individual to a variation in day length by the use of opaque covers (these may be constructed of black paper) to shorten day length, and artificial light for extended day length. A control plant should be kept under natural daylight periods. At the end of a few weeks, obvious differences in the color pattern, rate of growth, and type of growth will have occurred. These differences may be correlated with the amount of light the plants have received. All other conditions such as pot size, type of soil, and amount of water, etc., should be the same.

The effect of terminal bud auxin on plant growth is also readily demonstrated with Coleus. Select three to six plants of about the same size and growth habit. One will be a control and will not be touched. The other plants should have their terminal buds removed. At the end of a few weeks, the difference in the growth pattern will demonstrate the importance and activity of auxin from the terminal bud.

Further demonstration of hormone activity can be made using an auxin called indoleacetic acid in a lanolin paste. Remove all of the terminal buds from three plants and use a fourth plant for a control. On one of the experimental plants place the lanolin-indoleacetic acid paste on the cut surfaces, on another place plain lanolin, and on the third do not place anything, leaving the plant alone without its terminal buds. At the end of several weeks compare the growth in all four plants. Make sure all other conditions — temperature, light, soil, size of pot, watering — are the same for all plants.

To demonstrate the importance of carbon dioxide to plants, use a geranium plant that has been kept in the dark for two days. This removes the majority of the starch from the leaves. Upon removing the plant from the dark, cover one of the leaves with clear cellophane, sealing all edges with tape. Then expose the plant to sunlight for several days. At the end of this time, the covered leaf should not give a positive starch test, while the other leaves will.

To test for starch, remove the covered leaf and one of the others. To remove the chlorophyll, which would interfere with the color test, place the leaves in a beaker half filled with alcohol. Place the beaker in a water bath (a larger beaker partially filled with water will be suitable) and boil over a hot plate until the leaves become blanched. Do not use a Bunsen burner or other open flame as the fumes of alcohol are highly flammable. When the leaves are blanched, rinse well in water and place on the bottom of a Petri dish. Cover with Lugol's iodine solution (dissolve 10 g of KI in 100 ml of distilled water, add 5 g of iodine) and leave until darkening is complete. Rinse off the iodine solution and view against a white background. The presence of blackish areas indicates starch.

## **A short list of experiment ideas include:**

- Plants in different environments (light intensity/photo period/color/water)
- Effect of nicotine or second hand smoke
- Hydroponic vs. soil growth
- Artificial light vs. real light
- The effect of music on varying types of plants
- Chemical vs. organic fertilizer
- Factors affecting growth, such as soil temperature or soil pH experiments.
- Effects of pollutants (road salt, sewage runoff)

## Plant Care

Plant	Light	Temperature	Water
African Violet	Moderate to bright light, avoid direct sun.	Moderate to warm 65–75°F	Keep moist, avoid overwatering, water when soil surface is slightly dry to the touch. Keep water off of leaves.
Aloe Vera	Moderate to bright light.	Moderate	Allow soil to dry out a little between waterings. Too much water can kill this plant. Never put water on the plant itself.
Begonia	Light to partial shade.	Moderate	Keep moist; a little less in winter.
Bromeliad–Hybrids Aechmea, Guzmania, Neoregelia, Tillandsia, Vreisea	Moderate. Place within 8 ft. of sunlit window.	Moderate	Allow soil to dry out between waterings.
Bryophyllum	Moderate. Place within 8 ft. of sunlit window.	Moderate	Allow soil to dry out between waterings.
Cactus–Assorted	Bright light. Place within 3 ft. of sunlit window.	Moderate	Allow soil to dry out completely between waterings.
Coffee Plants	Bright light. Place within 3 ft. of sunlit window.	Moderate	Keep soil moist (not wet or soggy) at all times.
Coleus (assorted)	Bright light. Place within 3 ft. of sunlit window.	Moderate	Keep soil moist (not wet or soggy) at all times.
Fern	Diffused, filtered light.	Moderate	Keep soil moist. Do not allow soil to dry out.
Geranium	Bright light. Place within 3 ft. of sunlit window	Moderate	Keep soil moist (not wet or soggy) at all times.
Kalanchoe	Moderate to bright light.	Moderate	Allow soil to dry out a little between waterings. Keep water off leaves. Do not overwater.
Living Stone Plant	Direct sun	Hot	Water every week.
Marsilea	Moderate. Place within 8 ft. of sunlit window.	Moderate	Keep soil moist (not wet or soggy) at all times.
Mimosa	Bright light, some direct.	Moderate	Keep moist. Reduce watering in winter.
Norfolk Pine	Shade to moderate light.	Moderate	Allow top of soil to dry out between waterings.
Podocarpus	Moderate. Place within 8 ft. of sunlit window	Moderate	Allow top of soil to dry out between waterings.
Spider Plant	Light to partial shade	Moderate	Keep moist.
Spiderwort	Moderate to bright light.	Moderate	Allow top 1–2" of soil to dry out between waterings.
Wandering Jew	Bright light, some direct sun tolerated.	Moderate	Keep moist, avoid overwatering. Water when soil surface is slightly dry to the touch.
Zebrina	Moderate to bright light.	Moderate	Allow top 1–2" of soil to dry out between waterings.
Zamia Plant	Shade to bright light.	Moderate	Allow soil to dry out completely between waterings.