

Getting Ready to Grow Under Lights

Perhaps the most basic fact about green plants is their need for light.* Without light, photosynthesis can't occur and plants are unable to make the food they need to survive (and produce the oxygen we need to breathe in the process). Different kinds of plants have differing light needs. Some, like plants that have adapted to the dim light reaching a forest floor, may prosper under very low levels of light. Examples of these kinds of plants abound in the foliage plants we often grow as "houseplants" on our windowsills. But most of the plants we grow for food need a much higher intensity of light to thrive, which is why vegetable gardens do best in full sun, and why the seedlings of food plants we start indoors need bright light as soon as they emerge from the soil.

However, light levels indoors, even on a sunny windowsill, are much lower than outdoor levels. And the seasonal decrease in both day length and sunlight intensity that happens every fall and winter in the northern hemisphere makes indoor growing even more of a challenge. Supplementing natural light with light from florescent fixtures is an easy and generally inexpensive way to keep the plants in your classroom growing well. (LED and high intensity discharge bulbs are also used to light plants, but are not practical choices for most classrooms due to their cost.)

Here are some things to keep in mind when you choose fluorescent plant lights for your classroom.

The Facts of Light Bulbs

Tube-shaped fluorescent bulbs are generally the most practical choice for plant lights. There are several types of tube-shaped fluorescent tube bulbs, each designated with a letter and number. The "T" tells you the shape of the bulb is tubular; the number indicates the diameter of the tube. **T-5 bulbs** are a little over half an inch in diameter. They are the most efficient in terms of light output and energy use, and their light output degrades very little over the life of the bulb. Although they may cost a little more to purchase, T-5 bulbs are the best choice for grow lights and the most economical in the long term.

Larger diameter (1-inch) **T-8 bulbs** are also available and cost a little less initially than T-5 bulbs, but they are less efficient and their light output degrades more over time. Older, 1½-inch diameter, much less efficient **T-12 bulbs** are no longer manufactured, in accordance with federal energy efficiency regulations. If you have existing fixtures made for T-8 or T-12 bulbs, you can buy kits from lighting suppliers to retrofit these fixtures so that they will take T-5 bulbs.

Compact fluorescent grow lights are also available. These are generally smaller fixtures that work well to light individual or small groups of plants.

Red Light, Blue Light, Green Plant

Next, you need to consider the spectrum of light that the bulbs put out. This is important because plants respond to different parts of the light spectrum in specific ways. The blue end of the spectrum promotes vegetative growth, while the red portion promotes flowering.

The color temperature of the light emitted by bulbs, measured in degrees Kelvin (K), describes the spectrum of light that will fall on your plants. Many T-5 bulbs are full-spectrum bulbs with a color temperature of around 6500 K, emitting light that is similar to light spectrum plants receive growing outdoors in daylight. These are a good choice for general plant growth and seedling starting. If you are particularly interested in promoting flowering – perhaps you have an orchid or an African violet collection – you can add a 3000K T-5 bulb that will add light in at the red end of the spectrum.

The Light Cycle

Even though the light from fluorescent bulbs may look bright to your eyes, it's much less intense than the light plants receive when growing outside. To make sure your indoor plants or seedlings get enough light to keep them growing strong, hang the bulbs so that they are just a few inches above the tops of your plants. As the plants grow, raise the level of the bulbs to keep them at the same distance above the plants. You can purchase single or multi-tiered plant light stands with easily adjustable fixtures or, if you're handy, you can rig up a system to raise and lower your light fixtures.

Keep the lights on 14-16 hours a day, not around the clock. Just as when they are growing outside, plants do best with a daily period of darkness. The easiest way to do this is to connect your lights to an inexpensive timer that will cycle the lights on and off on schedule.

How long will your grow lights last? Check the bulbs to see the number of hours they are rated for. Most T5 and T8 bulbs are rated for 10,000 hours or more. While their light output will degrade over time, with T5 bulbs especially this loss is quite low, so you should get at least a couple of years of service from your bulbs, even more if you only use them seasonally. Like all fluorescent bulbs, these grow lights contain mercury so be sure to recycle them at an appropriate facility when it's time to replace them; don't discard them in the trash.

* Notice we said "green plants." In fact, there are some plants that don't contain chlorophyll and can grow without light. The eerie looking, white **Indian pipe** or **ghost plant** (*Monotropa uniflora*), found in deeply shaded, moist woods throughout most of the United States, is one striking example. How do these plants survive if they can't manufacture their own food? They are parasites that take up nutrients indirectly from the roots of trees using mycorrhizal fungi as intermediaries. Mycorrhizal fungi found in the Indian Pipe's roots extend their threadlike hyphae through decaying matter on the forest floor to connect up with the roots of trees and deliver nutrients from the roots back to the Indian Pipe. The trees made these nutrients through the process of photosynthesis, so the ghost plants ultimately depend on green plants for survival, without being green themselves.