5 Essential Lighting Tips For Growing Food Indoors

2017-12-01 07:20:47 By Carmela Tyrell

Many people are wondering when a "perfect storm" of problems will cause massive food shortages.

From ISIS infiltrators poisoning our food to large scale weather disruptions in key crop areas to financial system collapse, there is no such thing as an assured food supply in the years to come. Outdoor gardens, farms, and other places where food can be obtained are likely to be looted by desperate people.

While it may seem like a stretch to try and grow all needed food indoors, it is entirely possible. Even if you focus on micro greens or sprout farms, you still need to bring enough plants to maturity and through the seeding stage to grow enough food over long periods of time.

This means that you'll need indoor lighting so that your food bearing plants are as healthy and productive as possible.

1. Light Colors and Ratios

Before discussing the best light colors (or wavelengths) for plants, it is important to understand the difference between the light color spectrum and the physical color spectrum.

The light color spectrum describes light in terms of the frequency of the wavelength emitted, while the physical color spectrum is often described by which frequencies are reflected by the material.

White light is the combination of all colors in the light spectrum while white objects repel or reflect all light frequencies black objects absorb all light. Since most plant leaves are green, they repel all light frequencies in the green range, while absorbing everything else.

The primary colors in the light color spectrum are Red, Green, and Blue; which is distinctly different from the physical primary colors: Red, Yellow, and Blue.

Since green is reflected by plant leaves, a full third of all sunlight is actually of no use to growing plants. The amount of light and intensity produced by the sun is still enough to avoid creating problems for plants, so long as they receive enough sunlight based on their specific needs.

Even though the amount of light produced by artificial lighting methods may seem incredibly bright to our eyes, at least one third or more will be discarded by plants depending on the actual light frequencies produced by the bulbs.

What appears to be "white" light from certain sources isn't actually a full spectrum color and may have far too much green for good plant growth.

Incandescent and fluorescent bulbs not specifically designed with coatings that optimize the light frequencies emitted for good plant growth will be virtually useless no matter how many of them you pack into a specific area.

As an analogy, it can be said that using the wrong frequency for good plant growth is a bit like trying to address an illness like scurvy (caused by Vitamin C deficiency) by doubling or tripling carbohydrate intake.

Until the proper amount of Vitamin C is consumed, nothing else you eat will solve the problem. In a similar way, light is a form of food for plants, and must be delivered in the proper frequencies for optimal growth.

To get the most from artificial lights, focus your efforts on blue and red light, as well as the ratio of blue to red for specific phases of plant growth.

Since this amount may be different for each species of plant, you may have to do some experimenting to figure out which light frequency ratios work best for your plants, as well as how to shift those ratios over the growing season.

Just as an example, however, one study done on tomatoes found that:

- plants grew the fastest and produced the most leaves when the red to blue ratio was 19:1.
- plants produced the most fruit when the red to blue ratio was 5:1.

2. Light Density

Have you ever tried to grow miniature roses indoors and wondered why it never seems to work? As small as these plants are compared to wild and full sized strains, it does not change the fact that roses require far more light intensity than many other plant types on Earth.

Even if you get the right ratio of red to blue light for roses, it doesn't mean the plant will grow properly indoors. If the intensity, (or amount of light packed into a specific area) isn't enough, the rose bush will still fail to grow properly, and will more than likely die.

Our eyes can be as easily fooled into wrong estimations of light intensity just as they can the actual colors actually being emitted by a light source. In this case, once again, the intensity of light that seems incredibly bright to your eyes may seem almost non-existent to the plant in terms of its nutritional needs.

When it comes to plants, the light intensity for plants varies widely. For example, a miniature rose may shrivel up and die in just a month or two on a sunny windowsill while parsley, violets, and other plants better adapted to lower light intensities will thrive.

Information about the general optimal light intensity for many food bearing plants is much easier to obtain than information on optimal light color ratios. All you need to do is look up whether plants do better in full sun, partial sun, or shade.

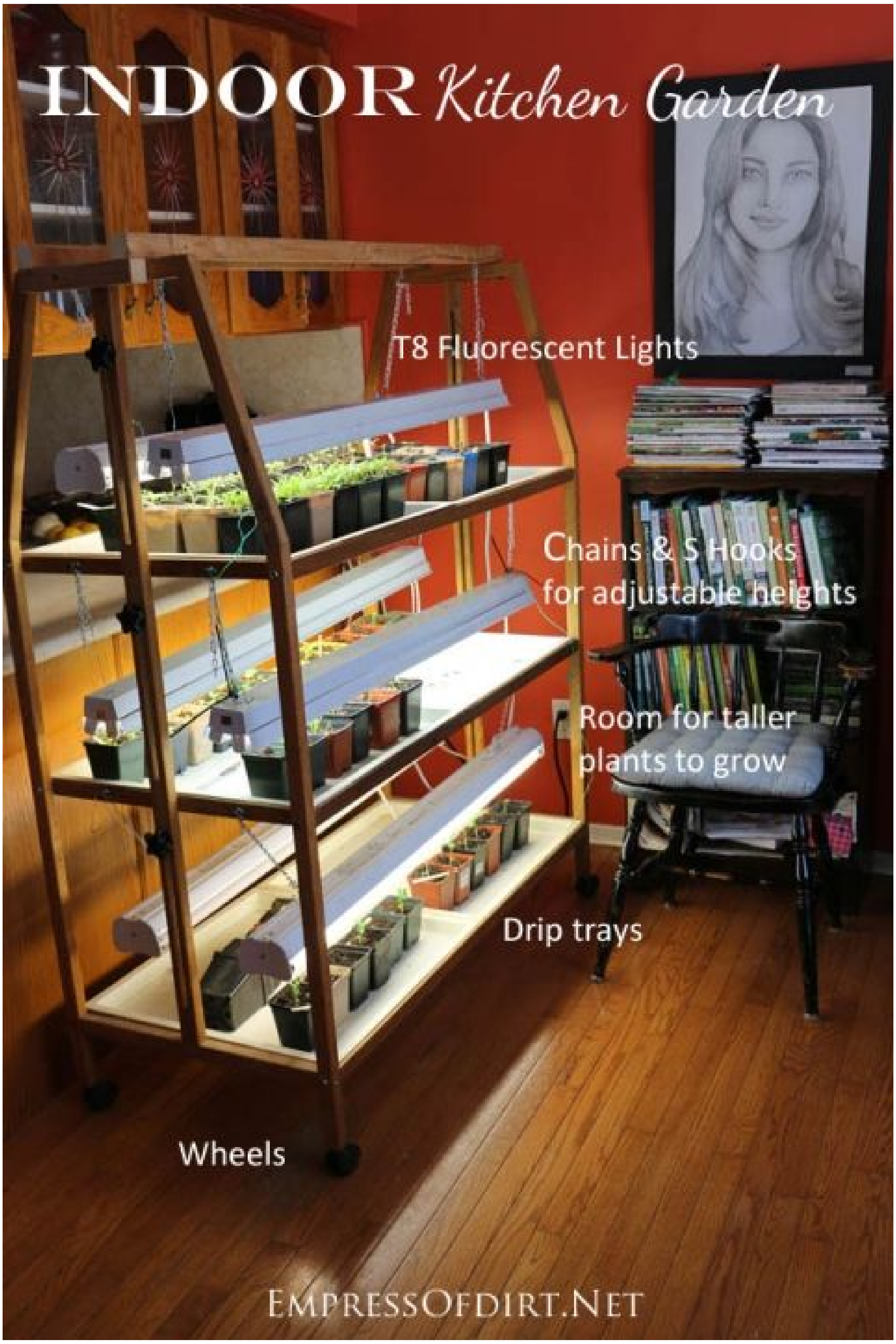
To get started on experimenting with indoor food growing, all you have to do is pick plants that prefer shade. Once you get your lighting system set up, you may be able to start working with plants that do well in partial shade.

While you can use a light meter to help gauge light intensity, you may also need to find a more specialized photometer to make sure that the intensity for each light frequency is correct for each plant species.

This will also take a good bit of trial and error as there is still not much information freely available on this topic. As more people work with indoor hydroponics and growing food indoors, this lack of information may change.

3. Light Duration for Growth Stages

Have you ever noticed that you feel crankier, more tired, or more stressed as the amount of daylight gets shorter? Aside from helping your body make Vitamin D, the amount of light you are exposed to each day also governs many other biological processes.



When you don’t have enough light, it can lead to illness and all sorts of other problems. While you may be able to cope with this readily enough when you are in your youth and middle ages, the later years of life may come with “sundown syndrome”, which may also get worse in the shift from fall to winter (decreasing light duration) versus the shift from spring to summer (increasing light duration).

If there is one area where humans and plants are similar, perhaps it can be said that optimal light duration is very important to both groups of organisms.

A plant will die in a matter of days if it receives no sunlight at all. Since plants also have many biological functions that are triggered by changes in light across the seasons, it is important to simulate this when trying to grow plants indoors.

Here are some things to keep in mind.

- Cold weather crops such as cauliflower or broccoli grow best while light duration is increasing. As a result, you may need to leave the lights on a little bit more each day to stimulate flower production.
- Plants that take a longer amount of time to produce fruit or edible biomass may initially require an increase in light duration, and then actually need a decrease to stimulate either flowering or fruit production. A great deal depends on when the plants are normally expected to sprout during the year as well as when flowers and fruit are normally produced. For example, if you choose to grow tomatoes indoors and start them in November, you will still need to duplicate the increasing light duration common during the spring and summer months, and then decrease it for times when the duration of sunlight would actually be declining.

Many people that start off with indoor food gardening try to compensate for inadequate light intensity and color ratio by keeping the lights on 24/7. Consider this is about as useless as trying to work around the clock and expecting that having a light on at all times will help you stay awake.

As with your own body, plants also need a period of darkness each day in order to shift into different biological processes.

This may include making tissue repairs as well as management of cellular bioclocks that keep track of light duration as a means of determining when to trigger flower or fruit production. If you do not provide suitable dark hours for the plants, they will grow very poorly before dieing off.

4. Light Imbalances and Diseases

Aside from having a major impact on the plant itself, light also has a major impact on other organisms that may attack the plants.

For example, a disbalance in red, green, and blue ratios can easily create the perfect conditions for mold, mildew, fungal, and algae growth. While your plants are suffering from a lack of the proper ratio, it may be perfect for these organisms.

Since your plants will also be in a less than optimal health condition, it will also increase the chance they cannot fight off infections.

Today, there is a good bit of research being done on how plants communicate among each other. Did you know that a tree that is chopped down actually transmits this information to surrounding trees and plants within a matter of seconds?

Even though there is very little information on plant communications with insects and other organisms, it is entirely possible that pathogenic species are drawn to sick plants that emit signal that indicate they are weak or stressed. Without a question, improper lighting conditions stress plants and make them weaker.

Since many plants have both subtle and not so subtle (thorns or toxins in the leaves, stems and roots) defenses to deter predators, it should come as no surprise that a weakened plant will draw both disease bearing organisms and insects that are predatory to the species in question.

As a prepper, you must also consider seed production and the health of the next generation of plants. Chances are, you already realize that a fetus developing in a starving mother will more than likely be weak and sickly.

Starvation during these critical development times can also lead to an increase in genetic disorders and other problems. In a similar fashion, when plants do not get enough light, there is no telling what condition any seeds produced will be in.

This, in turn, means that you must always carefully test any new batches of seeds and keep records to see if they are as hearty and productive as the original seeds that were used in the first generation.

While many other factors may impact seed viability and the next generation of plants, do not discount the lighting conditions experienced by the plant that produced the seeds in the first place.

5. Pros and Cons of LED Grow Lights

Today, most indoor food production enthusiasts recognize the fact that LED lights can be very useful. Since there are many different kinds of LED lights on the market, however, it is important to understand the pros and cons of LEDs so that you have a better chance of picking the best ones for your needs.

Very Easy to Adjust Light Frequency Ratios

LEDs are one of the cheapest and easiest ways to produce light with different color frequencies.

As such, you can purchase strips of red and blue LEDs that enable you to change the ratio of red to blue with very little effort. You can purchase lights with a pre-set ratio of LEDs, as well as look for strips of single colors so that you can adjust them manually over the duration of the growing season.

Light Intensity Can be Adjusted With Less Heat Buildup

Even though you may need halogen bulbs or other high intensity lights for some plant species, these bulbs tend to produce a great deal of heat. Since light intensity also decreases rapidly with distance, there is a definite limitation for using CFLs, Halogens, and other light bulbs.

By contrast, LEDs produce far less heat, and can be placed much closer the plants. You can also place strips of LED bulbs closer together in order to increase light intensity.

Requires Less Electricity

In many cases, LED bulbs require as much as 80% less electricity for the same level of illumination.

LED Bulbs Contain Heavy Metals

If you thought problems associated with Mercury in CFLs was a problem, you may not realize that most LED bulbs contain Nickel and a range of other toxic metals. While one LED on your computer may not pose a health hazard, Nickel and other metals escaping from LEDs can increase problems with asthma and other breathing disorders.

Even if LEDs are rated for indoor use, there is no way to know if they are leaking metals into the air over time.

Needless to say, if you are planning to grow crops indoors in order to avoid ingesting pollutants, it will not be of much use to expose plants to toxic metal gases from LED bulbs sitting so close to them.

Hard to Spot Problems With Plants

If you have ever tried to see the difference between certain shades of pink and orange, or other similar colors in low light conditions, then you may already understand how easy it is for LEDs to skew your visual perception.

In this case, the red and blue light emitted by the LEDs may make it harder for you to see fungal, bacterial, and other infections in their early stages.

Be sure to close the LEDs and examine the plants under a different lighting source in order to spot these problems as quickly as possible. Needless to say, if the infestation is related to lighting, you may also need to make adjustments in order to avoid future problems.

Overall, you will find that finding the best lighting for indoor crop production can be a bit challenging. Unless you plan on setting up a series of mirrors and prisms to channel sunlight into your growing room, and then break it down to optimal frequencies, you will have to rely on different light types on the market.

While LEDs are emerging as the industry leader for growing plants indoors, you should still look at the main factors that determine optimal lighting before committing to just one source of illumination.

No matter whether you choose one type or a combination of bulb types, the fundamentals of color frequency, light intensity and duration must still be optimized for each plant and its growth cycle.

This article has been written by Carmela Tyrell for Survivopedia.

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