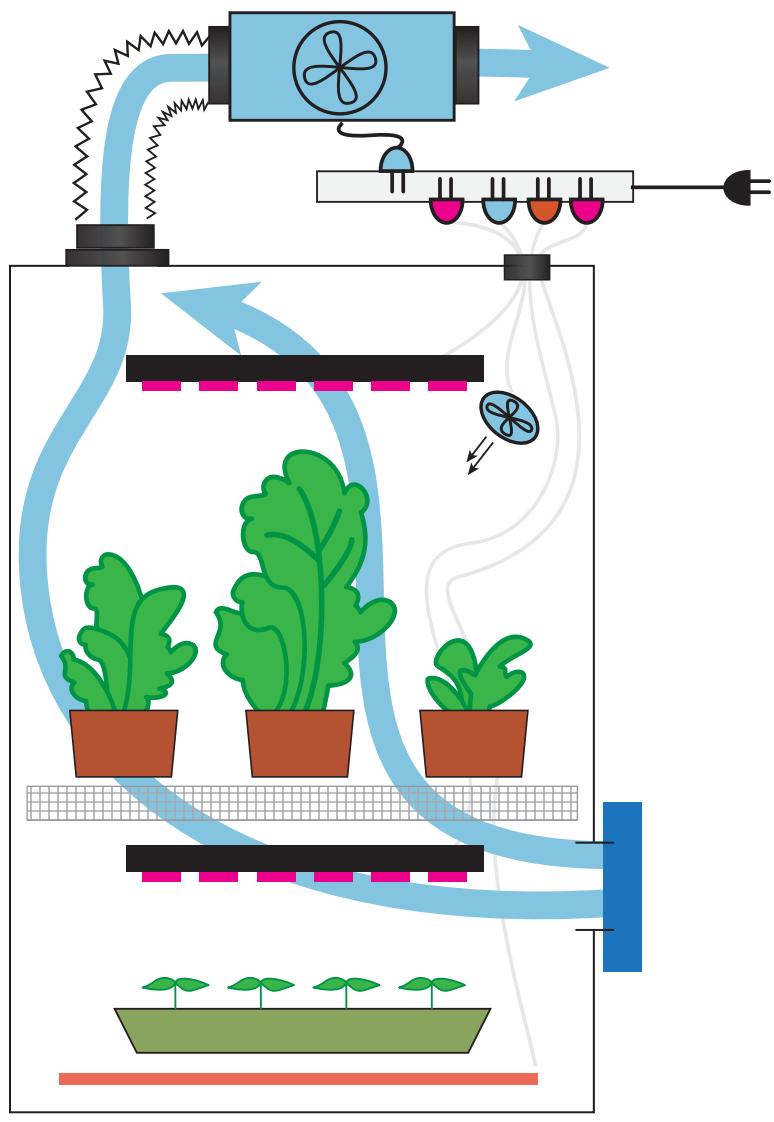


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## ***Optimal light spectrum for plant growth***

Plants respond to specific colors within the light spectrum. What makes plants grow is the production of chlorophyll which uses a specific colored light to supply energy to the plant at different stages of growth.

Some light manufacturers tout different colors will produce leaf growth, while other colors stimulate the plant to flower and offer a convenient switch. These seem a little gimmicky to me when often it's the duration of light which forces flowering (much like a Christmas cactus when the days get shorter).

Plants absorb light through chlorophyll and converts the light to energy. Energy means growth. There are two kinds of chlorophyll contained in most plants, A and B. Each kind responds to a different frequency and wave length of light.

Whereas the peak of chlorophyll A, which wavelength is at 425, the closest (affordable) available LED is a UV 410-420nm. Slightly off of the optimal range. Additionally, Chlorophyll B peaks production at about 460, whereas the available LEDs are in the 450n or 470nm range — slightly off optimal (see figure 7).

In addition, the grow box should have an optional white light (or full spectrum) to inspect the plants. Observing plants under a UV grow light can be dangerous to the eyes and not very effective in monitoring the plant. A white light would be best for monitoring growth and development.

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**Note:** Lights throw off heat and can be a risk for a fire hazard. LED are generally safe with adequate air circulation and if in good repair.

# **Nutrients and care**

Nutrients will be needed to grow a healthy plant whether a sprout or a blooming wonder. Many commercial potting soils are sterile and missing beneficial bacteria and enzymes which are essential for nutrient uptake and growth. Even though I prefer to grow organic, at specific stages of growth I will use additives and chemical fertilizers to stimulate growth.

I buy my chemical fertilizers from NPK Industries, though many good suppliers are out there. They sell all-in-one fertilizers for vegetative growth and another for the flowering stage which are easy to use and very effective. They offer macro-nutrients — nitrogen, phosphorus, and potassium — as individual products. They also have specialized nutrients for each stage of growth.

## **Understanding plant microbes**

Just like the human gut has beneficial microbes, plants also have intricate ecosystems. Such ecosystems enhance the health of the plant as well as building immunity and suppressing pathogens. A relationship forms between the microbes and roots which help the uptake of nutrients. Mycorrhizae is a type of fungus that forms such a relationship. There is certainly a ton of chemistry in growing plants and a lot to learn. Much more than I can offer here.

I prefer to limit chemical additives to correcting disease, or as a quick fix if I see something going terribly wrong. Sometimes a plant can recover rapidly from a nutrient deficiency if given the right intervention. The cannabis industry has given us plenty of choices in fertilizers both chemical and organic. Using chemical vs organic (or a mix) is a personal preference.

Some organic fertilizers carry an offensive smell, so choose wisely if you want to keep an organic garden. If needed, use a carbon filter attached to the exhaust to eliminate offensive smells from organic fertilizers.

# **Transplants**

Growing seedlings for the outdoor garden is a great use of the growbox. As said previously, the box I designed fits a flat of seedlings with ample room around the sides for airflow.

