

Tulasi Lighting

Introduction:

The purpose of this document is to educate people about the different types of lighting that are available, and to help make an intelligent decision about which lighting system to use for a particular situation. I am not advocating one type of light system over another, nor am I attempting to tell anyone entirely what they should or should not do, as each situation is unique, and ultimately this is a decision one should make on his/her own. With that said, I will recommend that certain practices should be avoided. There are some light systems that are not sufficient for growing healthy plants. All this will be explained below.

Strong light and weak light:

There must be sufficient light strength for Tulasi to grow well. We are not interested in vertical growth, rather we are more concerned with strong stems. If the light is not strong enough, or the distance between the bulb and the plant leaves is too great, then the plant will grow tall and have very weak stems. They will not hold upright on their own. The weight of the branch and leaves will be too much for the thin stems to bear. Thus the stems will droop and hang in different directions. Leaves will be spread far apart, because distance between nodes will be quite far. Please refer to my book about nodes and internodes for a more detailed explanation.

If the plant had sufficient light during its development, and then suddenly experiences a light deficiency, the plant will respond by dropping hundreds of leaves. These leaves will drop even though they are completely healthy and green. I have seen big Tulasi plants drop thousands of leaves after being moved from strong light to low light. She does this because the leaves that developed under the high light levels are not suited to low light levels. This is due to the fact that “sun leaves” and “shade leaves” have completely different morphologies.

Sun leaves are thick and have a relatively small surface area, whereas shade leaves can be quite large and tend to be thin. This is a complicated science, but for simplicity's sake, we will just say that sun leaves are best suited for growing under intense light, and shade leaves are best suited for low light situations. If she moves from intense light to weak light, then she will abandon all sun leaves to make room for production of new shade leaves.

Conversely, if the plant has been brought from low light into very intense light, she does not drop her leaves in large numbers as in the opposite example. In this case, many of the shade leaves will work fine for the intense light, but if the leaves are too large and thin, then they will get a type of sun-burn. This often shows as a silvery-gray color on the leaves. These leaves may stay on the plant for a very long time after being “burned”. This is most common for green Tulasi plants. Purple Tulasis just turn dark purple and adapt nicely to the situation.

Finally, if Tulasi is kept in full-sun all day long, or if she is kept very close to high powered lamps, her growth will be inhibited. This will be noticeable after a while, because you will see very little development of new shoots and leaves over time. She will simply sit and tolerate the intensity until the conditions change.

4 Main Types of light systems:



1) Regular Incandescent

This is the classic light bulb which dates back to the invention of the original bulb by Thomas Edison. These lights are simple. A current passes through a filament and produces light and a great deal of heat. They are highly inefficient and a complete waste of time for growing plants. I have seen “special” modifications to these bulbs at stores like Home Depot. Its special modification is simply a blue piece of glass surrounding the bulb instead of a clear piece of glass. This color filter is somehow supposed to be good for plants, but is actually just a hoax. These bulbs can't help you in anyway at all. Suprisingly and sadly, I see these bulbs in many people's houses being used as the sole light source for their plants. Please do not follow in their footsteps.

High Output T5 Fluorescent Grow Light Systems



2) Fluorescent

There are 3 main types of fluorescent bulbs that we will discuss here.

T-12 bulbs, which have a diameter of about 2 inches (5 cm) and a length of about 4 feet (1.2 m). These are also not good enough for growing nice Tulasi's, because they need to be kept about 1 inch (2.54 cm) from the plant leaves to be effective. To cover a large plant, you would need about 20 of these bulbs to keep her stems from stretching.

The second type is T-5 bulbs. These are much thinner and much brighter than T-12s. They are absolutely wonderful for growing Tulasi. They are most effective in small to medium sized gardens (up to 8 small plants or 4 medium sized plants). They must be kept close to the plants to be effective. They produce very nice plants with fairly sturdy stems.

The third type is Compact fluorescent lights. These are basically T-5 lights that are folded or spun into loops. They are self-ballasted, and can be screwed into a regular light socket, which eliminates the need for a special ballast like the ones for straight-tube lights like T-12s and T-5s. They are also inexpensive and more widely available than T-5s. I have had great success with these lights.

3) High Intensity Discharge (HID)

HID lighting is a great way to cover large gardens with lots of light. They are high wattage and high output systems. They are also considered to be the most efficient option in terms of lumens per watt ratio (see chart below). Two main types are High Pressure Sodium (HPS) and Metal Halide (MH). Of the two types, we would recommend HPS because they produce a higher intensity light



than MH. They also produce a great deal of heat, which may be a blessing or a curse. If you have a cold room during the winter, then you will not need a heater during the day because these lights will heat up a room very quickly. Conversely, a room will often require ventilation during the summer to avoid extreme temperatures inside. Extra high wattage (1000 watts) systems require special air or water cooling modifications. I use 600 watt HPS which are perfect because they put out a lot of light to cover a large area without getting so hot as to require air-cooling. Here is a brief comparison between the two types of HID lights:

HPS: Light spectrum leans towards the reddish color, but nonetheless a full spectrum light. A great spectrum for plant growth and great intensity even at distances up to 5 feet.

MH: Light spectrum leans towards the blue color. A good light for some plants but I have found that it is not effective at distances above 3 feet. If it is kept closer than that, it is too hot for the plant to handle. Therefore the only solution is to get an air-cooled system and keep it 2-3 feet from her leaves.



4) Light Emitting Diode (LED)

This is an emerging technology and is difficult to say whether or not they are worth the extra cost to purchase them. Someone recently asked me about these lights so I will paste my response to them right here:

I will give you two answers: one short and one long

Short answer: I have not enough experience or information or reliable testimonials to say whether LEDs are good for growing Tulasi or not.

Long answer: If I had the money to outfit my entire grow house with LEDs, I would have done it a long time ago. I am a big advocate of LEDs for any type of use. The benefits you mentioned below are just a few of the many (electricity savings, long lasting, no heat, targeted light spectrum, durable, versatile, easy to mount, safer, more environmentally friendly, the list goes on...). On paper, and in theory, these lights are superior to anything else. But many growers are not impressed by the light output, as they claim that the light is not intense enough to compare with other lights. Of course there is a long-standing debate about total lumen output vs. usable lumen output. This refers to the fact that HID lamps produce enormous amounts of light that have absolutely no value to the plant (mostly yellow and green light). LEDs, as you know, are targeted to specific wavelengths of light because plants use mostly red and blue light to do photosynthesis. So in theory, you are getting a good amount of light for the plant, but it doesn't seem that way if you compare it to HPS lamps. You are correct that there are other colors that she uses, but it is minimal amounts of orange, etc. that she uses. Many good LED grow lights actually incorporate other colors in small quantities other than just red and blue, and these seem to be more well designed and scientifically based than lamps with just plain blue and red bulbs. I would love it if someone would buy some of these lights and let me know how it works for them. Many people just won't do it because they are so expensive to purchase initially. Over time, YOU WILL GET YOUR MONEY BACK in savings. Plain and simple, LEDs pay for themselves. I wish you good luck and hope that you find this information helpful.

Comprehensive Lamp Chart for Tulasi

Lamp Type	Fluorescent			High Intensity Discharge (HID)					Light Emitting Diode (LED)
Lamp Sub-Type	T-12, T-8 (4 ft./1.2 meter) Length	T-5 (4 ft./1.2 meter) Length	Compact Fluorescent (CFL)	Metal Halide (MH)		High Pressure Sodium (HPS)			Many Lamp Types
Wattage (per bulb)	34	54	105	400	1000	400	600	1000	Variable
Lumens	2300	4800	7000	38000	110000	50000	90000	130000	Variable
Lumens/Watt	67	89	66	95	110	125	150	130	Variable
Heat	Cool	Medium	Medium	Hot	Very Hot	Hot	Hot	Very Hot	Very Cool
Air-cooled	No	No	No	Recommended	Yes	No	Optional	Yes	Some high wattage systems require it
Color	Cool white	All	All	Cool white	Cool white	Warm white	Warm white	Warm white	Targeted colors
Targeted Spectrum	No	No	No	No	No	No	No	No	Yes
Correct Distance	2 inches (5 cm)	2-12 inches (5-30 cm)	2-12 inches (5-30 cm)	2.5-3 ft.	2.5-3 ft.	3-5 ft.	3-5 ft.	3-5 ft.	Variable depending on system

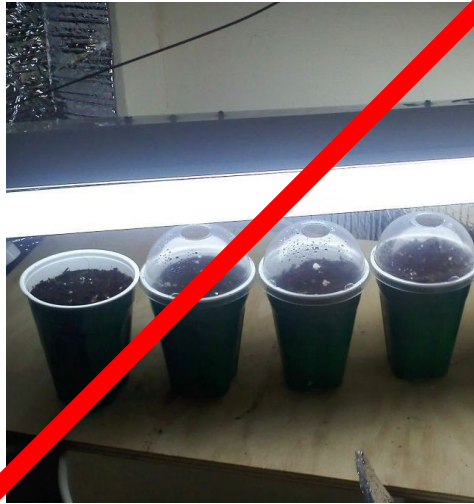
The Good, the Bad, and the Ugly:

GOOD



Great set-up combining HPS and MH light systems with first-class reflectors. A+

BAD



Not a good set up. This T-12 light system is very weak and almost useless.

UGLY



This is the worst set up. This desk lamp is not designed for growing. Please do not consider this as an option.



This 105 watt CFL is very bright and will keep Tulasi strong and healthy. Also comes in spiral shape.



This 25 watt CFL is too small to be effective.



Incandescent bulbs are very inefficient and will not produce enough light.

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