

Light for African Violets

By Nancy Robitaille

Plants process light just as we use food. Whether from the sun or from artificial sources, green pigmentation (chlorophyll in African violet leaves) absorbs solar energy which allows the plant to either use it for growth or store it for future use. This is why fertilizers are not the true plant food; the only true food plants get is from sunlight.

The Facts of Light

The word “photosynthesis” means the manufacture of carbohydrates (sugar and starch) necessary for growth in plants. The light is used for energy; carbon dioxide and water derived from the air and the soil are the major building blocks. This process occurs only in the green parts of the plant, in specialized organs known as chloroplasts which are rich in chlorophyll making them green in colour.

Growing Violets in Windows versus Growing in Light Gardens

Why even consider artificial light for growing African violets or any other houseplant for that matter? Yes, the sun emits light at a relatively steady rate, but our plants don't always get the benefits of this consistency. Most of us do not live in the tropics where light intensity and day length are different from our own. We experience sharp drops especially during the winter to the point where many plants simply do not get enough light for good growth. In summer our sun can get to extremes where there is more light than the plant can handle. Even cloud cover for days on end can prevent our well placed plants from getting the light they need. Insufficient window light pushes plant hobbyists to look for good quality, inexpensive substitutes for sunlight.

Plants grown in light gardens have the advantage of constant, equal light intensities and durations through the year and throughout the cycles of the plant. It is not necessary for them to deal with rapidly changing temperatures when the summer sun shines down on them or when our cold winter air gets to them through a simple pane of glass. Even dry air is rarely a major problem since large numbers of plants are naturally grouped together in a light garden creating a humid microclimate which African violets adore. Light gardening also allows hobbyists to place plants where they want them to be rather than having to make sure there is a suitably oriented window nearby.

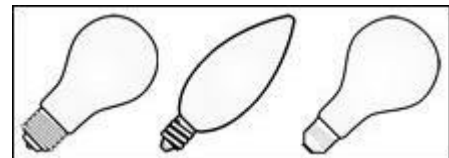
All this is not to say it is not possible to grow beautiful, symmetrical African violets with window light. It has been done and is presently being done by many growers.

Choosing the Right Light

Artificial light is beneficial but what kind is best for our African violets? Let us study the three major kinds available to home growers: incandescent, High Intensity Discharge (HID) and fluorescent.

1. Incandescent Light

Incandescent bulbs are the common light bulbs we use in our homes. These give off about 70% of their energy as heat. Plants grown under these can be easily scorched and also will dry out rapidly. The heat problem means that plants which need a fair amount of light for good growth and bloom, such as African violets, have to be placed so far from the bulb to avoid the negative effects of heat that they are no longer getting enough light intensity for healthy growth and flowering. Either too hot or not enough intensity: it's a truly vicious circle!

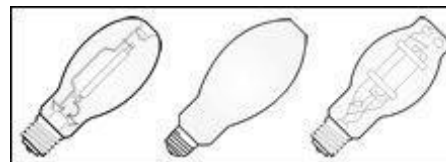


Incandescent bulbs also tend to produce mostly red and far red light rays, a very poor balance which gives weak, floppy growth although it does stimulate flowering. In general, incandescent light is a poor choice for plants depending entirely on artificial light.

Incandescent bulbs can however be very helpful for plants which get some natural light but not enough for good flowering, such as those grown in a north window. These are typically plants which look fairly healthy but which bloom sparsely or not at all. Even an incandescent bulb placed quite a distance away from the plants will supply some extra light that is often enough to encourage the plant to bloom. Such supplemental lighting is often most useful during the winter months.

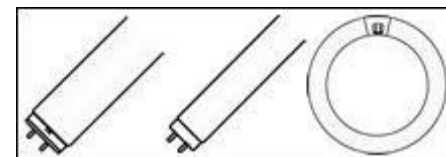
2. High Intensity Discharge (HID)

HID lights, including halogen lamps, sodium lamps, mercury vapour lamps, etc. are currently very popular in large commercial installations such as greenhouses, office buildings, atriums and shopping centres where they are appreciated for the great intensity of light given off. In fact a single HID lamp can brilliantly light every nook and cranny of a fair-sized room. However, the current forms of HID plant lamps are extremely intense, much too hot and too glaring for home use. Undoubtedly useful HID lamps of weaker intensity will be used more and more in home growing in future years.



3. Fluorescent Tubes

Presently fluorescent tubes are the best single artificial light source for growing plants in the home. They give off far more light per watt of electricity used than incandescent lights while emitting relatively little heat. Their linear form allows them to light vast surfaces (A single two-tube fixture can illuminate a veritable indoor garden.), they offer light rich in blue rays for compact, healthy growth while still giving enough red light for good bloom, and they are inexpensive to buy and operate. They are also so good at growing plants that many people no longer trust their prize plants to windowsill growing!



Fluorescent lights do have drawbacks, but, fortunately, they are minor ones. The most obvious one is that, although they give good light over a wide horizontal surface, plants must be placed right up near the light source in order to grow well because the intensity of fluorescent lamps drops below minimum plant light levels only a short distance from the tubes. That means that tall growing plants get plentiful light at their summits while their bottom leaves are literally left in the dark. This is not a problem with African violets; however, as their even, flat, rosette-like growth spreads out neatly, receiving equal light all over. In fact, one could hardly imagine a plant better adapted to growing under fluorescent lights than the Saintpaulia!

Fluorescents Yesterday and Today

Fluorescent lights were first offered to the public in 1938 at just about the same time African violets were becoming popular with the public. In fact, Saintpaulia hobbyists adopted them so quickly that one could also say that the popularity of African violets is largely due to the development of the fluorescent light! The first tubes were a bit dangerous since when broken, the powder coating the inside of the glass tubes was said to penetrate any cut and prevent it from healing properly. Those early tubes are no longer in circulation and current ones pose no problem.

The most common types of fluorescent tubes available today are commercial ones, such as Cool White and Warm White. Although they are not specifically designed for plant growth, they are inexpensive and give excellent results with most plants including African violets. Many growers recommend using a combination of one Cool White tube and one Warm White tube per fixture. There are also many types of fluorescent tubes which were developed for horticultural purposes, among them, Gro-lux, Gro-lux Wide Spectrum, Verilux TruBloom, Naturescent/Optima, Vita-Light, Plant-Grow, Plant-Light, Agro Lite and many more. Many African violet growers swear by Gro-Lux Wide Spectrum tubes. Generally speaking, if you are growing African violets for pleasure or even for local shows, the Cool White-Warm White combination will be more than satisfactory. If, on the other

hand, you're growing for national shows or if your local shows are very competitive, you'll want to experiment with horticultural tubes to find out which combination gives you winning results.

Some Saintpaulia growers may have wondered about the advantages of VHO tubes. The term VHO (Very High Output) refers to high-powered fluorescent tubes which give almost three times the illumination of other types (27 watts per foot as opposed to 10). These lights are especially good for cacti, orchids and geraniums (*Pelargonium*). African violets, however, grow very well with tubes of ordinary intensity and VHO tubes have not been found to be better than those listed above.

Setting Up Your Light Garden

There are many types of light gardens -- a simple lamp suspended over a table, fluorescent-lit bookcases, homemade light gardens, commercial tiered stands, etc. -- and you can grow violets under all of them. Just choose the one that suits your needs, your technical skills and your pocketbook.

In planning your light garden, do try to make sure that the height of either the shelves or the light fixtures is adjustable so that you can vary the distance between the lamp and the plants. For example, the light fixtures could be suspended on chains so they can be raised or lowered as needed. In the case of African violets, you'll probably want to hang a two-tube light fixture about 45 cm (18 inches) above the plant tray, which, taking into account the height of the pot, will put the plant about 30 cm (12 inches) from the tubes. If your fixture has four tubes it gives off a greater intensity of light. I would recommend setting the lamp at 60 cm (2 feet) or more from the plant tray. You'll probably find you'll want to adjust these distances depending on the intensity of the tubes you use and the kind of results you expect.

Some growers have light gardens with one long rectangular tray set under either two or four 40-watt fluorescent tubes. This may be the most efficient solution for fluorescent lighting. One light fixture with such a tray may contain as many as forty young African violets without their leaves touching. As each plant grows, additional rows of leaves are gradually produced, forming a beautiful flat rosette. At this point, more room will be needed for each plant. Because plants under fluorescent tubes grow faster than plants grown on windowsills, you will find it necessary to treat them a bit differently. Those under lights will need more fertilizer and should be repotted more often than those grown in the window. Remember also to dust your tubes frequently or a lot of light intensity will be lost.



Fluorescent light gardens can vary from commercially made lightstands through similar homemade stands to this economical setup of shop lights on a disused table.

Light Needs Can Vary

When growing a number of varieties of African violets, which are, after all, just variations on a single plant, one of the curious phenomena noted is that different cultivars have different light needs. I suppose it is a bit like people: some of us can take full summer sun without any reaction while others need protection from even weaker spring rays or we'll burn. It is, therefore, very helpful to know that

the intensity of light given off by fluorescent tubes varies. Plants placed dead centre will receive more light than those at the edge of the light garden while the dimmest spots of all are found at either end of the tubes. Also, you can raise light-loving plants on inverted pots to give them better light. By playing with these inherent differences in intensity, you can find a perfect place for all your African violets. What's more, you can also accommodate everything from cacti to ferns in the same light garden if you so desire.

Chloroplasts, the organs which make photosynthesis possible, are found in all green parts of the plant and notably in the leaves which are the main agents of photosynthesis. But are they located equally through all leaves? Variegated African violets with a lot of white areas have few chloroplasts in their leaves and, in variegated sections, little or no photosynthesis occurs. In the case of variegated violets, then, the green portion of the leaf must do additional duty. This is why variegated plants need more intense light than green plants. Place variegated plants near the centre of the tubes or a bit closer to the light source than plants with entirely green leaves.

The colour of a plant's flower is a good indicator of the light it needs. Generally speaking, Saintpaulias with pink, white or other pale-coloured flowers should be placed at the edges and the ends of the light garden where the light is less intense. Plants with flowers of darker shades -- purple, dark blue, red, etc. -- will do better at the centre of the fixture. The same goes for leaf colour: darker leaves generally need more light than paler ones. Problems may arise when you have a pink or white flowered plant with dark leaves as darker leaves need more light, yet light-coloured flowers may become limp under centre lights. Obviously some adjustment to the rule will be necessary, but by moving your plants around according to their reactions, you'll find a spot for any African violet under lights.

Young seedlings and baby plants, according to some sources, need more light than mature plants. These should be placed closer to the light source by placing them on an overturned pot. Be very careful that they do not receive too much light and become bleached.

Effects of Too Much Light

Sometimes non-variegated Saintpaulias begin to change from a normal green to a yellowish hue. This is an indication that they are receiving too much light. When the plant is removed from its light source, its normal colouration should return. Plants which are subject to this sort of problem simply need less light than the others and should be placed at the ends of the tubes.

When African violets receive far too much light, their growth may become unnaturally compact with the leaves bunched and tightened in the centre. In fact, the symptoms of excess light may mimic those of the dreaded cyclamen mite. If you suspect the plants have received too much light, take them out of the stand and isolate them. If mites are involved, other symptoms will develop like streaked flowers, overly hairy foliage, ash grey centres, etc. If no other symptoms develop within a few weeks, replace the plants under lights but in a less central spot or a bit further from the tubes.

You can also give them shorter days thus decreasing the amount of light they receive. Variegated violets react differently when they receive too much light. Their foliage may turn solid green, much as the foliage of some types of variegated violets (those with Tommie Lou type variegation notably) turns green during the heat of summer. Once again, supplying fewer hours of light, putting them at the sides or at the ends of the tubes or setting the tubes further from the plants will allow them to return to their variegated form.

Changing the Tubes

After the first few months, tubes burn at about ten percent less than their original brightness and after about eight months, the lights are burning at about three quarters of their original intensity. They will, however, stay at this same intensity for much of the rest of their useful life of about two years. That is why, if you grow show plants, it is advisable to replace one of the tubes in each two tube light fixture at the end of the first year, then the other tube at the end of the second year, continuing to alternate in that way each year at the same time. That way your plants will be getting

about the same light intensity at all times. In order not to forget which tube should be changed, it is always wise to write the date on each new tube, using a blue or black marker.

For those growers who grow for pleasure only, you can wait much longer before changing tubes. When a large black ring appears on the ends of the tube it is close to the end of its life and should be replaced. You can even wait until the tube burns out entirely. Remember though that when one tube gives up the ghost, both tubes will go out since the basis of fluorescent operation is that electricity flows from one tube into the next. If the circuit is broken by one tube burning out, even the good one will stop glowing. Some growers mistakenly change both tubes at this point, which could give your plants a case of "sunburn" due to the suddenness of the increased light intensity. One should only change the burnt tube. If you're not sure which one to replace, remove one tube and insert the new one: if the lamp doesn't come back on immediately, you'll know it was the other tube that needed replacing.

When you see Cool White tubes on sale, don't hesitate to stock up. Hardware stores often offer them at bargain prices. Likewise plant tubes are sometimes offered on sale and should be purchased without hesitation, even if that means picking up several years supply, as they can otherwise be very expensive. Fluorescent tubes can be stored for decades without losing their quality. At the current time, prices seem to be going down for Warm White tubes, so you may want to stock up on those as well.

When using a new tube for the first time, it is recommended that you leave it on for only one hour because each tube is very intense at first and could do damage to the plants if left on for a full day. The next day it may be used for a full twelve hours or so. This might be called "breaking in" or conditioning.

A Question of Day-Length

Usually African violets require between 12 to 17 hours of artificial light per day (Reference: Edward Bradford, *African Violet Magazine*, January-February 1990) for good growth and flowering. Anything more than that is just wasted energy, as the leaves have reached their saturation point after about 17 hours of continuous illumination. At any rate, although plants don't really "sleep" at night, other essential processes in plant growth do take place during the dark part of the daily cycle. That is why it is not a good idea to give a plant 24 hours of light a day.

Most growers never use a full 17 hours of light on their Saintpaulias, though, as the last hour of light gives little in the way of improvement in growth or flowering. Before shows, when a maximum number of blooms is desired, many people set their timers on 16-hour days. During the rest of the year, the lights are usually turned on 12 hours a day.

When you're out of town and want to slow down your plant's growth so they won't require as much water, you can turn your lights down to 9 or even 8 hours a day. African violets are even capable of blooming under such short days, although not very heavily. This shows that Saintpaulias are "day neutral plants" as opposed to many plants which are "long day plants" (requiring nights of less than 12 hours in order to bloom) or "short day plants" (requiring nights of more than 12 hours in order to bloom).

Temperature and Light

Fluorescent lights generate far less heat than any other light source, but, nevertheless, do give off some. Generally speaking they are not hot enough to cause much of a problem in temperate climates -- even less so when, as is so often the case, plants are grown in already cool basements.

However, growers in warm climates often have a great deal of trouble with excess heat, especially during the summer months. This can easily be cured by reducing the number of hours of artificial light to 6-8 per day. Some have even gone further and turn their light gardens on only at night when the air is cooler. Small fans can also be used to reduce heat and provide air circulation. These should not be directed at the plants but should be set up just to maintain good air movement in the

room. Fans not only reduce heat but, since they increase air circulation, they reduce excess humidity, essential when plants are being grown in humid basements. Some growers in hot climates use air conditioning and say that this in no way harms their plants.

Many growers use a timer in order that the light garden goes off and on at specific hours of the day or night. It is true that timers are useful in growing healthy, floriferous plants, but they present one big problem. The ones I have been able to find, other than the heavy-duty types designed for outdoor use, have only two-holed female plugs yet fluorescent lights and light gardens require three-pronged (grounded) male plugs. If used with no grounding of the metal of the fluorescent fixture in conjunction with the hazard of water in the trays, these plugs can give the grower a minor but nevertheless annoying shock. I know this from experience.

Cost of Operating a Light Garden

What are the electrical costs of running fluorescent lights? Expenses vary widely depending on the cost of electricity where you live. A recent article in *African Violet Magazine* (May-June, 2002, "How Much Does Your Plant Hobby Cost?" by Allison Brigham and David Jepsen) states that the cost of one shop light for one year is \$24.88. This depends on the cost of electricity in your locality, of course.

Conclusion

Maintaining African violets under lights makes them much easier to grow, but they still need a great deal of attention. This includes repotting two or three times a year, proper watering, fertilizer added to each watering, foliar feeding (spraying with warm, lightly fertilized water) and rotating plants so they receive even light on all sides. Just combine the basics of Saintpaulia culture with the advantage of light gardening and you'll have blooming violets all year long!

Good growing!

Reprinted from *Chatter*, the Journal of the African Violet Society of Canada, Volume 48, Number 1, January-March 2003.

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