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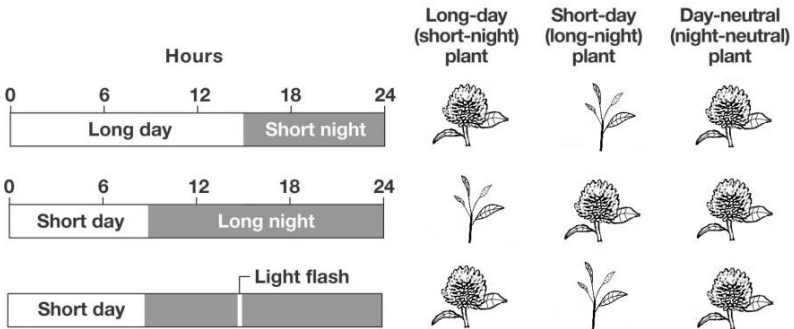
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LIGHT CYCLES

Light cycles are used to simulate the conditions of day and night for indoor plants. We highly recommend the use of a 24-hour timer to create a repeatable light cycle.

Most plants grow in two stages, the vegetative stage and flowering stage. During the vegetative growth stage, the plant is focused on growing in preparation for flowering. Some plants can be left in the vegetative stage indefinitely with no adverse effects. The flower stage is initiated when the light cycle changes into the critical light period, explained below. This change will cause your plant to focus completely on making flowers and seeds for reproduction.

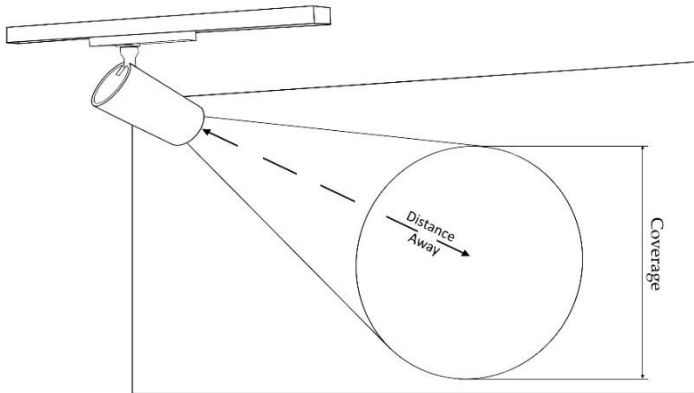
There are three types of plant responses; short-day, long-day, and day-neutral. The first two types have a critical light and dark period associated with them and can vary from plant to plant. This critical period will determine when the plant switches from the vegetative stage to the flowering stage. Day-neutral plants are generally unaffected by light cycles and flower when the plant is mature. If you find that it is difficult to flower a short-day plant due to a light flash at night, we recommend flowering in a closet or grow tent.



Long-day (Short-night)	Short-day (Long-night)	Day-neutral (Night-neutral)
Flowers when exposed to light longer than a certain number of hours.	Flowers when exposed to light for less than a certain number of hours.	Unaffected by day-length; flowers at a certain stage of maturity.
Maintain a lightcycle of under 12 ⁺ hours to promote vegetative growth.	Maintain a lightcycle of over 12 ⁺ hours to promote vegetative growth.	Generally unaffected by the lightcycle. More light may encourage more growth.
Flowering is stimulated if dark period is interrupted by a flash of light.	Flowering is prevented if dark period is interrupted by a flash of light.	Unaffected by flash of light; flowering not based on photoperiodism.
Normally flower in spring and summer when day length is over 12 hours.	Normally flower in early spring or fall when day length is under 12 hours.	Affected more by temperature change, plant maturity, and other factors.
Common examples: • Chrysanthemums • Cockslebur • Cosmos • Dahlias • Green Onion • Soya Beans • Morning Glory • Poinsettia • Soya Beans • Violets	Common examples: • Cabbage • Carrot • Henbane • Larkspur • Lettuce • Onion • Petunia • Poppy • Radish • Spinach • Wheat	Common examples: • Balsam • Beans • Chillies • Cotton • Cucumber • Dandelion • Corn • Potato • Tobacco • Tomato • Rhododendrons

DETERMINING THE DISTANCE AND COVERAGE

Highlands are made with either a wide reflector for plants near the light, or a narrow reflector for plants further away. The following pages provided the recommended distance, coverage, and plant light requirements for a single Highland. To increase the amount of light, for example low light to moderate light, point two Highland fixtures at the same location.



Narrow Reflector				
Distance Away		Plant Light Requirements	Light Coverage	
Inches	Meters		Inches	Centimeters
12	0.30	Not Recommended	-	-
18	0.46	Not Recommended	-	-
24	0.61	Full Sun	13	33
30	0.76	Full Sun	16	41
36	0.91	High Light	19	48
42	1.07	High Light	22	56
48	1.22	Moderate Light	26	66
54	1.37	Moderate Light	29	74
60	1.52	Low Light	32	81
66	1.68	Low Light	35	89
72	1.83	Low Light	38	97
78	1.98	Low Light	42	107
84	2.13	Low Light	45	114
90	2.29	Low Light	48	122
96	2.44	Low Light	51	130
102	2.59	Very Low Light	55	140

108	2.74	Very Low Light	58	147
114	2.90	Very Low Light	61	155
120	3.05	Very Low Light	64	163

Wide Reflector				
Distance Away		Plant Light Requirements	Light Coverage	
Inches	Meters		Inches	Centimeters
12	0.30	Full Sun	10	25
18	0.46	Full Sun	15	38
24	0.61	High Light	20	51
30	0.76	High Light	26	66
36	0.91	Moderate Light	31	79
42	1.07	Moderate Light	36	91
48	1.22	Moderate Light	41	104
54	1.37	Low Light	46	117
60	1.52	Low Light	52	132
66	1.68	Low Light	57	145
72	1.83	Low Light	62	157
78	1.98	Very Low Light	67	170
84	2.13	Very Low Light	72	183
90	2.29	Very Low Light	78	198

Common Name	Lighting Requirements	Narrow	Wide
African Violets	Moderate to Low Light	48" - 96"	36" - 72"
Aglaonemas	Moderate to Low Light	48" - 96"	36" - 72"
Aloe	High Light	36" - 42"	24" - 30"
Aluminum Plant	Moderate to Low Light	48" - 96"	36" - 72"
Amaryllis	High Light	36" - 42"	24" - 30"
Anthurium	Moderate Light	48" - 66"	36" - 48"
Aralia, Balfour	High Light	36" - 42"	24" - 30"
Aralia, False	High to Moderate Light	36" - 66"	24" - 48"
Aralia, Ming	High to Moderate Light	36" - 66"	24" - 48"
Arrowhead Vine	Moderate Light	48" - 66"	36" - 48"
Azalea	High Light	36" - 42"	24" - 30"
Begonia, Angel Wing	Moderate Light	48" - 66"	36" - 48"
Begonia, Iron Cross	Moderate Light	48" - 66"	36" - 48"
Begonia, Strawberry	Moderate Light	48" - 66"	36" - 48"
Bird-of-Paradise	High to Moderate Light	36" - 66"	24" - 48"
Bomeliad, Earth Star	Moderate Light	48" - 66"	36" - 48"
Bougainvilla	High Light	36" - 42"	24" - 30"
Brake, Victoria	High Light	36" - 42"	24" - 30"
Bromeliad, Air Plant	High Light	36" - 42"	24" - 30"
Bromeliad, Bird Nest	Moderate to Low Light	48" - 96"	36" - 72"
Bromeliad, Blushing	Moderate Light	48" - 66"	36" - 48"
Bromeliad, Dyckia	High Light	36" - 42"	24" - 30"
Bromeliad, Flaming Sword	Moderate to Low Light	48" - 96"	36" - 72"
Bromeliad, Friendship	Moderate Light	48" - 66"	36" - 48"
Bromeliad, Pineapple	High Light	36" - 42"	24" - 30"
Bromeliad, Star	Moderate to Low Light	48" - 96"	36" - 72"
Bromeliad, Living Vase	Moderate Light	48" - 66"	36" - 48"
Burro's (Donkey's) Tail	High Light	36" - 42"	24" - 30"
Cactus, Christmas	Moderate Light	48" - 66"	36" - 48"
Cactus, Easter	Moderate Light	48" - 66"	36" - 48"
Cactus, Old Man	High Light	36" - 42"	24" - 30"

Common Name	Lighting Requirements	Narrow	Wide
Cactus, Prickly Pear	High Light	36" - 42"	24" - 30"
Cactus, Thanksgiving	Moderate Light	48" - 66"	36" - 48"
Calathea	Moderate Light	48" - 66"	36" - 48"
Cast Iron Plant	Moderate to Low Light	48" - 96"	36" - 72"
Century Plant	High Light	36" - 42"	24" - 30"
Chenille Plant	High Light	36" - 42"	24" - 30"
Chinese Evergreens	Moderate to Low Light	48" - 96"	36" - 72"
Citrus	High Light	36" - 42"	24" - 30"
Coffee Plant	High to Moderate Light	36" - 66"	24" - 48"
Coralberry	Moderate Light	48" - 66"	36" - 48"
Croton	High Light	36" - 42"	24" - 30"
Crown of Thorns	High to Moderate Light	36" - 66"	24" - 48"
Cyclamen	High to Moderate Light	36" - 66"	24" - 48"
Dracaena, Corn Plant	Moderate to Low Light	48" - 96"	36" - 72"
Dracaena, Dragon Tree	High to Moderate Light	36" - 66"	24" - 48"
Dracaena, Gold Dust	High to Moderate Light	36" - 66"	24" - 48"
Dracaena, 'Janet Craig'	Moderate to Low Light	42" - 72"	36" - 54"
Dracaena, Red Margined	Moderate Light	48" - 66"	36" - 48"
Dracaena, Song of India	Moderate Light	48" - 66"	36" - 48"
Dracaena, 'Tri-color'	Moderate Light	48" - 66"	36" - 48"
Dumbcane	Moderate Light	48" - 66"	36" - 48"
Elephant's Ear	Moderate Light	48" - 66"	36" - 48"
Fern, Asparagus	Moderate Light	48" - 66"	36" - 48"
Fern, Bird's Nest	Moderate to Low Light	48" - 96"	36" - 72"
Fern, Button	High to Moderate Light	36" - 66"	24" - 48"
Fern, Rabbit's Foot	High to Moderate Light	36" - 66"	24" - 48"
Fern, Staghorn	Moderate Light	48" - 66"	36" - 48"
Ferns (Sword, Dallas, Boston)	High to Moderate Light	36" - 66"	24" - 48"
Ferns, Maidenhair	Moderate Light	48" - 66"	36" - 48"
Fig, Creeping	Moderate Light	48" - 66"	36" - 48"
Fig, Fiddleleaf	Moderate Light	48" - 66"	36" - 48"

Common Name	Lighting Requirements	Narrow	Wide
Fig, Weeping	Moderate Light	48" - 66"	36" - 48"
Fuchsia	Moderate Light	48" - 66"	36" - 48"
Gardenia	High to Moderate Light	36" - 66"	24" - 48"
Gloxinia	High Light	36" - 42"	24" - 30"
Goldfish Plant	High Light	36" - 42"	24" - 30"
Hawaiian Ti Plant	Moderate Light	48" - 66"	36" - 48"
Haworthia	Moderate Light	48" - 66"	36" - 48"
Hibiscus	High to Moderate Light	36" - 66"	24" - 48"
Hoya / Wax Plant	High Light	36" - 42"	24" - 30"
Indian Rubber Plant	High Light	36" - 42"	24" - 30"
Ivy, Algerian	High to Moderate Light	36" - 66"	24" - 48"
Ivy, Aralia (Fatshedra)	High to Moderate Light	36" - 66"	24" - 48"
Ivy, English	High to Moderate Light	36" - 66"	24" - 48"
Ivy, Grape	Moderate Light	48" - 66"	36" - 48"
Ivy, Parlor	Moderate Light	48" - 66"	36" - 48"
Ivy, Swedish	Moderate Light	48" - 66"	36" - 48"
Ivy, Variegated Mintleaf	Moderate Light	48" - 66"	36" - 48"
Ivy, Wax	Moderate Light	48" - 66"	36" - 48"
Jade Plant	High to Moderate Light	36" - 66"	24" - 48"
Kalanchoe	High Light	36" - 42"	24" - 30"
Lantana	High Light	36" - 42"	24" - 30"
Lipstick Plant	High Light	36" - 42"	24" - 30"
Natal Plum	High Light	36" - 42"	24" - 30"
Nerve Plant	Moderate to Low Light	48" - 96"	36" - 72"
Norfolk Island Pine	Moderate Light	48" - 66"	36" - 48"
Orchid, Buttonhole	High Light	36" - 42"	24" - 30"
Orchid, Cattleya	High Light	36" - 42"	24" - 30"
Orchid, Dendrobium	High to Moderate Light	36" - 66"	24" - 48"
Orchid, Lady's Slipper	Moderate Light	48" - 66"	36" - 48"
Orchid, Moon/Vanda	Moderate Light	48" - 66"	36" - 48"
Orchid, Oncidium	Moderate Light	48" - 66"	36" - 48"
Orchid, Phalanopsis	High to Moderate Light	36" - 66"	24" - 48"

Common Name	Lighting Requirements	Narrow	Wide
Palm, Fan	High to Moderate Light	36" - 66"	24" - 48"
Palm, Parlor	Moderate to Low Light	48" - 96"	36" - 72"
Palm, Sago	Moderate Light	48" - 66"	36" - 48"
Panda Plant	High Light	36" - 42"	24" - 30"
Peace Lily	Moderate to Low Light	48" - 96"	36" - 72"
Peperomia	Moderate Light	48" - 66"	36" - 48"
Philodendron	Moderate to Low Light	48" - 96"	36" - 72"
Philodendron, Split Leaf (Monstera)	Moderate to Low Light	48" - 96"	36" - 72"
Piggyback Plant	High Light	36" - 42"	24" - 30"
Pitcher Plant	High Light	36" - 42"	24" - 30"
Poinsettia	High Light	36" - 42"	24" - 30"
Polka Dot Plant	High to Moderate Light	36" - 66"	24" - 48"
Ponytail Plant	High to Moderate Light	36" - 66"	24" - 48"
Pothos	High to Moderate Light	36" - 66"	24" - 48"
Prayer Plant	Moderate Light	48" - 66"	36" - 48"
Primrose	Moderate Light	48" - 66"	36" - 48"
Primrose, Cape	High Light	36" - 42"	24" - 30"
Purple Passion (Velvet)	High Light	36" - 42"	24" - 30"
Purple Waffle Plant	Moderate to Low Light	48" - 96"	36" - 72"
Rosary Vine	High Light	36" - 42"	24" - 30"
Schefflera (Umbrella)	High to Moderate Light	36" - 66"	24" - 48"
Shamrock Plant	High to Moderate Light	36" - 66"	24" - 48"
Shrimp Plant	High Light	36" - 42"	24" - 30"
Snake Plant	Moderate to Low Light	48" - 96"	36" - 72"
Spiderplant	Moderate Light	48" - 66"	36" - 48"
String-of-Pearls	High Light	36" - 42"	24" - 30"
Tahitian Bridal Veil	High to Moderate Light	36" - 66"	24" - 48"
Tradescantia zebrina	High to Moderate Light	36" - 66"	24" - 48"
Venus Fly Trap	High Light	36" - 42"	24" - 30"
Yucca	High to Moderate Light	36" - 66"	24" - 48"
Zebra Plant	Moderate Light	48" - 66"	36" - 48"

INDOOR GROWING GUIDE

Plants should not be an overlooked element in creating a warm and inviting room; a perfectly placed plant can bring the entire room to life! For beginner gardeners, or even those with a year or two under their belts, the world of garden tools, materials, and supplies can be overwhelming. We provided this guide to help you decide what essentials you need to get started.

Lighting:

Lighting is the most important first step for your plants! This manual will help you determine the appropriate distance, light cycles and more. You can tell if your plant is not receiving enough light if it stops growing, the spaces between the leaves on new growth are much longer than before, the new leaves are smaller, the leaf color is lighter, or older leaves are dead.

It is important that light covers the entire plant, including the sides of the plant. Larger plants may require two or more Highlands to provide adequate light intensity. If you have questions, you can contact Soltech Solutions and we would be glad to assist you.

Temperature:

Temperature is a major factor influencing plant growth indoors. Before picking out your plants, consider the optimal temperature the plant needs. While many plants grow at temperatures around 60°F – 85°F (15°C – 29°C), some tropical plants grow best at temperatures exceeding 85°F. Be careful not to place plants near AC vents or heaters, the change in temperature may kill them.

Humidity:

Some indoor plants need high humidity and excellent air circulation for optimal growth. Humidity below 20% is considered low, up to 50% is medium, and above 50% is high. Many plants come from tropical regions and require high humidity. Since most homes have low humidity levels, you can do a few things to increase humidity.

- Place plants close together. Plants naturally humidify the air around them.
- Set your plants on a tray of pebbles filled with water.
- Use a humidifier.

Take caution when misting plants, especially if your plant has hairy leaves. Your plant may be more susceptible to disease and mildew. You may want to consider adding a fan to increase air circulation.

Pots & Containers:

To start your garden, you need the right type of container for your plant. The container should have drainage holes; water should be able to drain out. Plants cannot sit in waterlogged soil or they will die.

Watering:

Often overlooked, watering your plants properly is important. When dealing with how much water to apply, consider the plant type, plant size, container size, soil moisture and light intensity. For most plants, when deciding when you should water, feel the soil by pushing your finger about 1-2 inches below the dirt's surface. If the soil is still moist, do not water the plant. Overwatering can lead to root rot, mildew, and disease. Water meters are available at most greenhouses to simplify watering.

Soil:

Do not use topsoil or soil from your garden! We recommend that you find a high quality, pre-mixed soil at your local garden stores that was designed for container gardening. Topsoil and garden soil have very poor drainage abilities and you may introduce unwanted pests in your home. If you find your soil does not drain well, you can add perlite, coarse sand, or peat moss to increase drainage. Different plants grow better in different soil, make sure you know which soil you plant needs before planting.

Buying New Plants:

Buying new plants is always fun, but make sure to look for healthy looking plants with medium to dark green foliage. Avoid plants with unnatural yellow or brown leaves. Look for pest, especially small white mites on the undersides of the leaves. Remove the plant from the pot and examine the root system. Healthy roots generally are visible along the outside of the soil and have an earthy smell. Brown or black roots, especially if they have a foul smell, are signs of a problem.

Acclimatization:

Acclimatization is the adaptation of a plant to a new environment. Changing the environment the plant is accustomed to will stress the plant and may cause damage, prevent growth, or even kill the plant. The greater the difference between the previous environment and the new environment, the greater the stress the plant endures.

Pruning:

Pruning your plant is a great way to encourage dense growth while maintaining an optimal size and shape. Plants concentrate growing on the top and outer parts; pruning these growth areas regularly will encourage growth closer to the inner parts of the plant. Although not all houseplants need pruning, most will benefit from some attention, even if it's simply removing dead leaves or diseased or damaged stems.

Pest Management:

Like all plants, indoor plants will occasionally come under attack from pests. If you notice a plant dropping leaves or otherwise looking ill, take a close look. Chances are, it is infected with unwanted pests. If not quickly treated, infestations can be very severe, spread quickly and kill your plants.

Some of the most commonly encountered arthropod pests found on plants are those that feed on plant juices. These pests include aphids, scales, mites, leafhoppers and plant bugs. Some of these pests can even act as vectors of plant diseases.

To remove the infestation, we recommend diluted organic Neem Oil or Mighty Wash. Both can be bought in stores or online. You should first test these in a small area before using them on the plant. Some plants are sensitive to the sprays and you could kill them. You can also treat the plants by wiping leaves and stems with insecticidal soap. Heavy infestations may be too difficult to treat, consider discarding these plants.

Fungus Gnats:

These gnats are a common pest of plants grown indoors, especially where humidity and moisture are high. You normally notice one or two gnats flying around your plants or near windows and you think nothing about it. Before you know it, they lay eggs in the wet soil and multiply.

To rid your plant and home of fungus gnats, you need to let your plant soil dry out between watering. Fungus gnats do well in damp soil, allowing your soil to dry out an inch or two down will kill larvae and inhibit egg development. We found that yellow sticky paper is the best method of killing flying adults. For plants that can tolerate neem oil, we recommend adding a small amount of Neem oil when you water your plants. Neem Oil will help kill eggs and larvae deep down in the soil. It may take over a month to fully rid our home of Fungus Gnats.