To:	Biofloral Inc. (sorel@sergei-orel.com)
Subject:	U.S. TRADEMARK APPLICATION NO. 85361278 - FLORASUN - GLA 3004 - Request for Reconsideration Denied - Return to TTAB
Sent:	9/3/2015 4:54:39 PM
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UNITED STATES PATENT AND TRADEMARK OFFICE (USPTO)
OFFICE ACTION (OFFICIAL LETTER) ABOUT APPLICANT'S TRADEMARK APPLICATION

U.S. APPLICATION SERIAL NO. 85361278

MARK: FLORASUN

85361278

CORRESPONDENT ADDRESS:
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GENERAL TRADEMARK INFORMATION:
http://www.uspto.gov/trademarks/index.jsp

VIEW YOUR APPLICATION FILE

APPLICANT: Biofloral Inc.

CORRESPONDENT'S REFERENCE/DOCKET NO :
GLA 3004
CORRESPONDENT E-MAIL ADDRESS:
sorel@sergei-orel.com

REQUEST FOR RECONSIDERATION DENIED

ISSUE/MAILING DATE: 9/3/2015

The trademark examining attorney has carefully reviewed applicant's request for reconsideration and is denying the request for the reasons stated below. *See* 37 C.F.R. §2.63(b)(3); TMEP §§715.03(a)(ii)(B), 715.04(a). The following refusal made final in the Office action dated January 12, 2015 is maintained and continues to be final: Refusal under Trademark Act Section 2(d) as to Registration No. 2425875. *See* TMEP §§715.03(a)(ii)(B), 715.04(a).

In the present case, applicant's request has not resolved all the outstanding issue(s), nor does it raise a

new issue or provide any new or compelling evidence with regard to the outstanding issue(s) in the final Office action. In addition, applicant's analysis and arguments are not persuasive nor do they shed new light on the issues. Accordingly, the request is denied.

In addition to evidence previously provided regarding the relatedness of the applicant's and registrant's goods, the attached excerpt from http://thesweethome.com describes grow light fixtures in the nature of 2-foot bulbs and fixtures for "home growers, aquarium hobbyists, and orchid growers." In addition, the attached excerpts from www.bsled.com, http://busybeeleds.com, www.topledgrowlight.com, www.cidly.com, www.ledgrowlightsoutlet.com, www.ledaquagrow.com, www.ledlightplant.com, www.ledlighting4less.com, www.eshinesystems.com, and www.twilightgroups.net show that the same companies provide both LED light, grow lights or light fixtures for horticultural or cultivation use and aquarium lamps through the same channels of trade.

If applicant has already filed a timely notice of appeal with the Trademark Trial and Appeal Board, the Board will be notified to resume the appeal. *See* TMEP §715.04(a).

If no appeal has been filed and time remains in the six-month response period to the final Office action, applicant has the remainder of the response period to (1) comply with and/or overcome any outstanding final requirement(s) and/or refusal(s), and/or (2) file a notice of appeal to the Board. TMEP §715.03(a)(ii)(B); *see* 37 C.F.R. §2.63(b)(1)-(3). The filing of a request for reconsideration does not stay or extend the time for filing an appeal. 37 C.F.R. §2.63(b)(3); *see* TMEP §§715.03, 715.03(a)(ii)(B), (c).

/Verna B. Ririe/
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The Grow Lights We Like

MARCH 4, 2015 MEG MUCKENHOUPT

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After more than 50 hours of research and interviews with five experts—including one who designed plant lighting for Antarctica and the moon—I can say that the Hydrofarm FLT24 2-Ft/4-Tube T5 Commercial System with Bulbs ($92) is

THE BEST DEALS

Our deals are hand-picked and analyzed to the point of obsession. We're constantly sorting through piles of so-called "deals" to find the best ones on the best products.

BACK TO SCHOOL:

COLLEGE CHECKLIST

Over the past two years we've spent more than 150 hours tracking down and testing the best school supplies, gadgets, and dorm-life gear you'll need to make everyone's school year as comfortable and successful as it can be—whether you're preparing the students in your household for their first day of kindergarten or you're going back to campus for a new semester.

Hydrofarm FLT24

Grow Lights We Like

Buy for $90* from Amazon

*At the time of publishing, the price was $91

2-Ft/4-Tube T5 Commercial System with Bulbs ($92) is economical, is low-maintenance, runs cool in small spaces, and provides bright light for stout plants. It's the one we would buy if we were starting seeds indoors.

Grow lights for most

Hydrofarm FLT24

The $91 Hydrofarm FLT24 is economical and low-maintenance, runs cool in small spaces, and provides bright light for stout plants. It's the grow light we'd spend our money on.

$90* from Amazon

*At the time of publishing, the price was $91.

This was not an easy conclusion to reach—as part of our research, we found that a large number of grow light manufacturers and resellers either don't actually *know* how to provide appropriate light output information or they simply don't *want* to tell you. The typical lumen measurement is great for humans with eyeballs, but not directly relevant to what plants can use. Color temperature is also a common metric, which is only slightly relevant to gardeners and still doesn't help tell you how powerful it will be to your plants. The photosynthetic photon flux density, or PPFD, is the best measure. (We discuss these things much later on in the guide). In fact, as we were performing the research for this guide, we had one manufacturer ask *us* for help on measuring PPFD, showing just how opaque this industry is. It's no wonder gardeners are left feeling around in the dark to figure out which lights work best for what they're growing.

If our main choice sells out, the Sun Blaze 2 ft. – 4 Lamp – F24T5-HO – Fluorescent Grow Light Fixture ($80) is a good bet and is only our second choice because there's less information

Also Great

The runner-up

Sun Blaze T5-24

The Sun Blaze is a good runner-up if our main pick is unavailable for whatever reason. It's essentially the same light, but there's less information on its long-term

How to support The Sweethome

Important Specs

Weight:	11.6 pounds
Length:	23 inches
Width:	13.5 inches
Wattage:	96 watts

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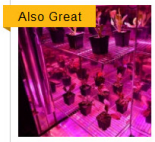
available about its long-term performance. That said, it's essentially the same light as our top pick and gets excellent reviews.

$81 from Amazon

performance.

Lettuce farmers and those who grow other greens are a special case. Growing a plant to maturity indoors requires far more photons than sprouting a seedling. If you're thinking of attempting indoor lettuce, kale, spinach, herbs, or other leafy things, you need stronger stuff than a T5, which simply won't give you enough photons in a day. Go directly to a setup with two BML Light Bar Grow-Max Spectrum lights, and don't look back.

Also Great



$100 from BML

For growing greens

BML Light Bar Grow-Max Spectrum

Go with a setup like this if you plan on growing leafy greens like lettuce, kale, spinach, and herbs indoors.

Table of contents

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- The competition
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Your Guide

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Meg Muckenhoupt is an environmental and travel writer. Her book *Boston Gardens and Green Spaces* (Union Park Press, 2010) is a *Boston Globe* Local Bestseller, and she is co-creator of the Green Spaces: Boston app. She has appeared on NPR's Radio Boston and WCVB's Chronicle, and WGBH's Forum site. She blogs at GreenSpaceBoston.com.

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The Best Garden Trowel
Wilcox 14" Garden Trowel

The Best Grill Tools

The Best Gardening Gloves
Atlas Touch Gloves

The Best Cheap Vacuum

Who's this guide for?

If you're starting your seedlings on a sunny windowsill and you're serious about your gardening, you should buy a grow light instead. You'll see an immediate difference in the color and growth of your seedlings before you put them outdoors for the season. They'll be greener and stockier, with stronger stems, and they'll grow faster than they would with limited, filtered light through your window. If you already have a traditional fluorescent light setup with T8 or T12 bulbs (with a diameter of about 1-1.5 in./2.5-4 cm), you should consider upgrading. Over the course of five years, you'll spend $30-60 more using T5 bulbs than you would with two T8 bulbs, depending on how much your electricity costs. But it's worth it: Your seedlings will get greener and grow faster simply because the T5s will deliver more photons to their light-loving leaves than the T8s. You will see even more of a benefit with crops that require long indoor growing periods before you move them outdoors (tomatoes, peppers, eggplant, artichokes, cardoons, sluggish offspring…).

How we picked and tested

The best grow light is the light that grows what *you* want to grow. It produces enough photons in the right spectrum (400-700 nm) to give plants the energy they need to grow and has enough light at both "red" and "blue" wavelengths to make plants grow dark green leaves and thick stems. (You can read more about this in The light plants need.) The best lights give you just as much light as you need, but not more (because you don't want to waste electricity), and don't produce excess heat. Unfortunately for gardeners, it's difficult to get good information about plant lights (see Why can't you get useful measurements for grow lights?). Lighting companies don't give out relevant measurements, and the typists stuffing up the internet only seem to want to grow either marijuana, salt-water corals, or orchids. (I've been searching for a blog about a garden that combines all three into a single seaside pleasure dome, but I have yet to find it.) Unfortunately, most hobbyist growers—from pot to petunias—do not publish rigorous scientific research into their growing methods. The aquarium lighting folks actually test their setups, but their criteria for a good light is a bit different from a typical tomato-grower's (ditto for orchids). As such, I consulted five different experts to find out what makes a good grow light and what most gardeners need:

- Gene Giacomelli, Ph.D., director of the Controlled Environment Agriculture Center at the University of Arizona, has designed plant lighting for the Antarctic research lab McMurdo Station and a "lunar greenhouse" for use on space missions.
- Ed Harwood, Ph.D., is the chief technology officer and co-founder of AeroFarms, a

The Best Cheap Vacuum
Shark Navigator Lift-Away NV352

The Best Sprinkler
Gardena ZoomMaxx Oscillating Sprinkler on Weighted Sled Base

Categories

- Appliances
- Bathroom
- Bedroom
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- Closet & Laundry
- Garage
- Home Office
- Kitchen
- Lawn & Garden
- Medicine Cabinet
- Nursery
- Office
- Pantry
- Security
- Smarts
- Tools

New Things

September 2, 2015

* There's a new version of the Nest, our

- Ed Harwood, Ph.D., is the chief technology officer and co-founder of AeroFarms, a "vertical farm" supplier that provides equipment for companies growing more than 250 varieties of greens and herbs under LED (light-emitting diode) lights inside warehouses.
- Neil Mattson, Ph.D., is an associate professor and floriculture extension specialist at Cornell University's Department of Horticulture.
- Peter Wardenburg is the president of Hydrofarm hydroponic suppliers.
- Bruce Bugbee is a professor at the Crop Physiology Laboratory, Department of Plant Soils and Climate, Utah State University. He co-authored an article about grow light efficiency with his graduate student Jacob Nelson, my sixth expert.

Basically, if you're growing plants indoors, you can choose between fluorescent, compact fluorescent, metal halide, and high pressure sodium (HPS) lamps or LED bulbs (more on this in the "Types of lights" section). These bulbs vary in size, the amount of light they put out, and what wavelengths of light they emit. Using our experts' plant lighting analysis, I looked for lights that provided the photon output required for regular seedlings, herbs, and tabletop lettuces. After estimating performance, I then calculated the five-year cost of using the fixture including purchase cost, bulb replacement costs, and the amount of electricity needed to give plants the required daily light integral (DLI). (See How we calculated output vs. cost.)

Our pick

Grow lights for most

Hydrofarm FLT24

The $91 Hydrofarm FLT24 is economical and low-maintenance, runs cool in small spaces, and provides bright light for stout plants. It's the grow light we'd spend our money on.

$90* from Amazon

*At the time of publishing, the price was $91.

The results of our research and expert input were unequivocal. If you want to give your seedlings a greenhouse-worthy start, go out and get a four-bulb T5 fixture with 24-watt T5

* There's a new version of the Nest, our favorite smart thermostat. The Nest 3.0 isn't much different from our current pick, but adds a larger, brighter display, and a slightly thinner profile. The price remains $249. We'll bring it in for testing, but we're fairly certain the Nest 3.0 will be our new pick. [Best Smart Thermostat]

* Best Deals: Our pick for best smart thermostat, the Nest 2.0, is down to $199 (from $249). [Amazon]

September 1, 2015

* Please help us out by taking this short survey about your coffee making preferences so we can find the best coffee grinders.

August 28, 2015

* Best Deals: Our budget pick for best slow cooker, the Crock-Pot SCV400B 4-Quart Oval Manual Slow Cooker, is down to $16 (from $22). [Amazon]

Inner Vision for the weekend of August 28, 2015

* In this weekend's edition of Inner Vision, getting the best deal when shopping for a mattress, making your

High Output (HO) bulbs (Plain T5 bulbs at 2-foot lengths are only 14 watts and won't produce as much light.) There aren't that many 2-foot four-bulb T5 fixtures on the market—and even fewer reviews of T5 systems—but the overwhelming favorite among Amazon reviewers is the Hydrofarm FLT24 2-Ft/4-Tube T5 Commercial System with Bulbs ($92). Users praise the light's even illumination over an entire seedling flat, its brightness, and the fat, stocky seedlings they raise with this light. A few reviewers complain about customer service for replacing bulbs broken in shipping. Peter Warburg, Hydrofarm president, recommended T5s for gardeners over different kinds of lights. "For seed-starting, T5s are the most cost-effective. They're practical and affordable … they're the best practical choice."

Neil Mattson, Cornell University horticulture professor, raises plants from tissue cultures in his laboratory with T5 lights as well. "It works well for me," he said. "With four lights on a 2-foot [wide] shelf you get much better growth than two." This light does put out some heat, however. An orchid grower wrote that this light fixture raised the temperature of his terrarium by 5-7ºF (3-5ºC). However, most seed-starters have their flats out in the open, not in a glass box. In that case, the temperature increase should be minimal. The Hydrofarm T5's light temperature is rated as 6500 K, or "daylight," which means the light will look slightly bluish-white. You can see the spectrum on this carnivorous plants fan page, or witness a nausea-inducing animation of the colors of different light temperatures on Wikipedia. When you look at your plants under the Hydrofarm T5s, their colors will look about the same as they would if you put them outside at noon. (Interior decorators for vampires will want to hang a dark curtain around the light to avoid evoking unpleasant memories.) If you prefer a woodsy, rustic brown hue for your plant light housing, instead of dazzling white, the Hydrofarm T5 Designer 2Ft 4 Tube Fixture w/ Bulbs -FLP24 ($108) is almost identical to the FLT24 above. Its one point of departure from the FLT24, apart from its distinguished mottled-bronze exterior, is that it features a three-prong outlet at one corner of the light. That outlet allowing growers to "daisy-chain" lights together and control multiple lights with a single timer, which is presumably why it costs $16 more than the white version. You could also just buy a two-outlet timer for $10 when the time comes to plug in a second light, but you'll miss the thrill of viewing a block of gleaming mud-colored metal hovering above your tender seedlings. The choice is yours.

How much will it cost in electricity to run this thing?

Depending on the cost of your electricity, it will cost somewhere between $33 and $100 to run these lights for five years and your seedlings will get plenty of photons—a DLI of 6 over the course of a 16-hour day—to attain their maximum potential. (If you want them to

own wine salt, and The Burning House: a blog where people share the things they'd grab first in a fire.

August 27, 2015

The Best Pregnancy Test

After conducting more than 50 hours of research and having three of our female editors pee on a total of 60 pregnancy tests, we found the First Response manual test is the best option for most people. It gives the most accurate results (and the fastest results) because it's the most sensitive over-the-counter test you can buy. Plus, it's just as easy to read as a digital test and much less likely to give you an error message.

Older New Things

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attain a fairly average seedling potential, run your lights for just 11 hours a day to get a DLI of 4 and save a third of the electricity cost.) With an expected bulb life of 20,000 hours, you should be able to start seedlings for the next 22 years.

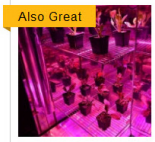
Flaws but not dealbreakers

As mentioned earlier, the Hydrofarm 4-Tube T5 fixture will not bring your tabletop greens to their full potential. If you keep this light on 24 hours a day, you'll still only get a DLI of 9—considerably below the DLI of 12 that greenhouse growers consider necessary for producing lettuce, herbs, spinach, and other greens. If you're hankering for leafy greens, read on to see our choice for lettuce farmers below.

For growing greens

If you really want to grow greens indoors, you're going to have to spend a lot of lettuce … I mean money. As Giacomelli said, "The premium [for indoor plants] is two to three times the price of non-branded tomato or lettuce at the supermarket." Depending on the cost of your electricity, you'll spend anywhere from $600 to $1,200 growing lettuce for five years with two BML Light Bar Grow-Max Spectrum lights ($179 each), the cheapest alternative I found that would provide enough photons per day to grow greens. Mount two bars a foot over your seedling tray, and you'll get a DLI of 12 if you keep these bars on for 17 hours a day and a DLI of 17 if you keep your greens lit for 24 hours a day like Aerofarm and other indoor growers. That's a great DLI for green bibb lettuce, according to researchers at Cornell University's Controlled Environment Agriculture Program, but more delicate greens may suffer "tip burn"—yucky-looking brown edges due to plant stress. Researchers like BML Horticulture for their extensive product information and quality build. Mattson called their Spyder light "the Cadillac of LEDs," and BML's lights tied for the cheapest electrical cost per photos delivered of the LEDs that Dr. Bruce Bugbee tested. Advanced Aquarist reviewer Dana Riddle wrote, "In a day where many LED fixtures are being offered with more and more frills, BML offers no-nonsense lighting at

Also Great



$100 from BML

For growing greens

BML Light Bar Grow-Max Spectrum

Go with a setup like this if you plan on growing leafy greens like lettuce, kale, spinach, and herbs indoors.

this.

Find an error?: Also, If you notice a guide that needs a little freshening up, or has errors, please tweet us at @homesweethome or email us at notes@thesweethome.com and we'll fix it. Thank you.

You gotta jiggle the handle.

fixtures are being offered with more and more lights, BML offers no-nonsense lighting at reasonable prices." Be warned, though, that your interior decorator vampire friends will *love* the color of the Grow Max light bars, which tint everything a sort of bloody pink. If you'd like a little more green in your life, opt for BML Light Bar View-Max Spectrum lights instead. Choose a 90° beam angle for more even light distribution across your seedlings.

The budget options

If all you want to do is get your seedlings up to around ½-inch (1 cm) high, I can tell you from personal experience that a fixture with two T8s will do an adequate job. However, they'll only give you a maximum DLI of 3 if you keep them on 16 hours a day; for a DLI of 4, you'll need to run them at least 23 hours a day. Your seedlings will be a bit pale and leggy compared to plants grown under better lights, and they'll benefit from getting outside as soon as possible. If you're starting small with a single seedling flat, you don't have that many options for shop lights with a reflecting hood that will direct slightly more light downwards and make viewing your plants slightly more pleasurable.

The 2' Hydrofarm 2' Fluorescent Grow Light Fixture FLV22 ($31) and the Lights of America Fluorescent Grow Light System with 2 T8 Grow Bulbs – 2 Foot ($44) appear to be exactly the same light and are the cheapest available options for a 2-foot shop light. The Lights of America fixture comes with two T8 bulbs; you'll have to buy them separately for the Hydrofarm Fixture. Run them for five years for eight weeks a year, and your total cost including electricity will be around $60-83. Just don't come running to me when your Radiator Charlie's Mortgage Lifter tomatoes don't fruit in time for the state fair.

Also Great

A budget-minded light

Hydrofarm FLV22

For getting your seedlings up to around ½-inch (1 cm) high on a budget, the FLV22 is your best option.

$32* from Amazon

*At the time of publishing, the price was $31

How we calculated output vs. cost

Giacomelli was unequivocal: "Are you trying to grow seedlings? Go to Home Depot and buy fluorescent tubes." Other experts had slightly more nuanced views. Harwood and

Mattson observed that although LEDs have improved over the years and now put out as many µmoles/watt of photons as fluorescents, they're still expensive. "For the average person using lights for a couple of months in the spring, it's probably not worth it [to buy LEDs]" said Mattson. As Jacob A. Nelson and Bruce Bugbee wrote: "In large greenhouses with small aisles and uniformly spaced plants, the broad, even output pattern typically emitted from HPS fixtures provides uniform light distribution and good capture of photosynthetic photons. In smaller greenhouses with spaced benches, the more focused pattern typically found in LED fixtures can maximize radiation transfer to plant leaves."

Although these opinions were useful, I wanted to confirm them. If you're starting a commercial greenhouse, you can calculate the cost of lighting with this calculator spreadsheet created by Bruce Bugbee, Ph.D., director of the Utah State University Crop Physiology Lab. For home use, I put together a spreadsheet for different types of bulbs including

- Initial purchase cost (bulb plus fixture)
- Cost of electricity to operate
- Replacement cost (bulb only)

I assumed that you, gentle reader, intend to grow thoroughly legal seedlings, herbs, and table-top lettuce, and that seedlings require approximately 4 moles/m²/day of photons, while lettuce needs least 12 moles/m²/day. I also assumed that you're going to start small, with either one or two standard 21-by-11-inch black seedling flats that look like this. That's 231 square inches, or .14903 m². Four feet is the standard length for grow lights used in the nursery trade, but companies that cater to home growers, aquarium hobbyists, and orchid growers commonly offer 2-foot bulbs and fixtures. Based on their guidance, including Jacob Nelson and Dr. Bugbee's analysis of plant lighting, I made up a spreadsheet calculating the cost of using the lights for five years, using the daily light integral (DLI), the minimum total number of photons necessary each day that researchers recommend for growing seedlings (4 mol/m²/d) and lettuce and herbs (12 mol/m²/d). I analyzed lights suitable for a single seedling flat (approximately 11 by 20 inches or 28 by 51 cm) in a small space—say, hung on a bookshelf. I also read reviews on Amazon, Home Depot, and various aquarium hobby sites to see what users thought of the lights.

I made two sets of calculations for seedlings and lettuce. For average usage, I assumed that growers would have the light on for 16 hours a day for eight weeks every spring for five years, or 3,480 hours. For tabletop lettuce, I assumed that, like AeroFarms' clients, growers would leave the light on for 24 hours a day for five years straight, for 43,800

hours. To calculate the electricity cost of growing seedlings and lettuce, I made two sets of calculations assuming low-cost energy (10 cents per kilowatt hour) and high-cost electricity (30 cents per kilowatt hour). For more miserly users, I also calculated the cost of electricity for just getting plants the minimum daily light integral (DLI). I excluded lights that couldn't provide the minimum DLI for seedlings in 24 hours. I did calculations for the top-rated T5 High Output fluorescent fixtures, standard shop-light T8 fluorescent bulbs, LED, and high pressure sodium (HPS) lights on Amazon and Home Depot, as well as the top three energy-efficient fixtures (in terms of cost per micromole of photos) in each category as evaluated by Jacob Nelson and Bruce Bugbee at the USU Crop Physiology Laboratory. I eliminated lights that were clearly overpowered for home seedlings (such as 1,000-watt HPS lights designed to light a 10' by 10' greenhouse, which would generate enough heat to cook seedlings if they were 1 foot away), but if there were lower-powered lights available from the same manufacturer in the same model line, I included them. I looked at photosynthetic photon flux density data (PPFD) for the lights, which refers to how many photons fall on a square meter of surface in a second, measured in µmoles/m²/sec. In cases where reliable PPFD data was not available, I made separate calculations for the highest and lowest values for photon production per joule for that type of light from the Nelson and Bugbee analysis, multiplied it by the wattage given for that light, and assumed that a narrow surface area underneath the light would be illuminated (an area the length of the fixture with a width equal to 1.3 times the fixture's height above the seedling flat).

What about LEDs?

LEDs are a fascinating technology, but they're still far more expensive than other types of plant lights, and they don't produce enough photons per unit cost to justify their use by most home gardeners. One day, LEDs will produce enough photons per watt of wall-plug electricity to make them economically competitive with fluorescent lights. But as of today, you'll pay a premium to get enough LEDs to grow plants indoors. One expert who chose to speak off the record said to me, "With LEDs, you're paying for future research." Horticulturists and lighting scientists expect that LED lights will become much more efficient over the next decade and start to become competitive with high-pressure sodium and metal halide lights for supplemental greenhouse lighting and indoor growers, but they're not there yet. Still, there's hope for a cooler, more efficient light. As Giacomelli said, "LEDs will improve in the years to come, but HPS [lights] won't." Mattson observed, "It's eight times the [carbon] footprint to grow plants completely indoors vs. in a greenhouse." If you use photovoltaic cells to power your indoor plant lights, you need to cover an area 25 times the size of your plants to power the lights. If you want to try to save

cover an area 25 times the size of your plants to power the lights. If you want to try to save the earth by growing your own lettuce, wait.

The competition

I looked high pressure sodium (HPS) lamps as well. Warburg said, "Most applications in commercial greenhouse use HPS [lights]," and according to Giacomelli, they are still the most practical lights for growing plants indoors. For small-scale home seedling and lettuce growers, though, HPS lamps are expensive and take up too much space. Thanks to their heat output, high-watt HPS need to be kept up to several feet away from young seedlings to prevent the lights from scorching their leaves—and all those watts make for expensive electric bills. I calculated the expected cost of starting seedlings and growing lettuce under a variety of High Pressure Sodium (HPS) lamps rated highly by Amazon users and cited as being most efficient in Dr. Bruce Bugbee's paper. In cases where I did not have PPFD measurements available, I made separate estimates for both high-PPFD and low-PPFD scenarios, based on Bugbee's HPS data.

The lamps higher than 200 watts were obviously overkill. They're designed to light a 3' by 3' area, produce a DLI of 4 in three hours, and need to be suspended at least 24 inches over seedlings according to this Sunlight Supply Information Sheet. I eliminated the G8LED 240 Watt LED Grow Light with Optimal 8-Band plus Infrared (IR) and Ultraviolet (UV) – 3 Watt Chips – All in One for Veg and Flower, the Horizon Grow Light Kit (250 W), and the ViaVolt 250 Watt HPS Grow Light Fixture. That left three low-wattage HPS fixtures: Horizon Grow Light Kit (150 W),Hydrofarm SBM150S 150-Watt Mini Sunburst with HPS Lamp, and the Sun System 150 Watt HPS Reflector, Ballast and Bulb.

They need to be suspended about 12 to 24 inches above plants, depending on your setup's ventilation. All three of these HPS systems are a bit overpowered for seed-starting as well: They'll produce a DLI of 4 in four hours for seedlings, and a DLI of 12 for lettuce in just 16 hours. If you run them for just the amount of time needed to produce the minimum DLI, they're economical. The total cost for five years of seedlings will run from $90-200 for four hours per day of light, depending on your electricity cost, while lettuce will run you somewhere between $450-1000 for 16 hours per day. Heck, as long as you're pumping out that many photons, you might as well keep it on for 20 hours and try out some tomatoes (DLI 15, in the "good" range for lycopersicon).

That said, I am not recommending HPS lights per se because their heat output means that they require more attention. If your plants grow too close to these bulbs, they will be damaged—and if you spill water on the bulb while it's on, the bulb could explode. If you

feel like you'd like to experiment with HPS lights, both the Hydrofarm SBM150S 150-Watt Mini Sunburst with HPS Lamp ($78) and the Sun System 150 Watt HPS Reflector, Ballast and Bulb ($85) received enthusiastic user reviews like, "I LOVE THIS LIGHT!"

Some T8 fluorescent fixtures are a little different from our main picks, but they aren't any better. The 2-foot Flora Hydroponics Fluorescent Grow Light System ($50) has the same features as the Lights of America T8 fixture, but comes with bulbs that have a light temperature of 5000 K, not 41000 K like Lights of AmericaBout That means that light will look slightly bluer. If that matters to you, go ahead and spend $6 more on this light, but don't expect your plants to notice the difference. If you still haven't spent enough money on T8 bulbs, you could choose spend $20 apiece on "full spectrum" T12 grow bulbs, which will fit into the same fixture, such as the Agrosun T12 or an Agrobrite 24-inch 20-watt T12 bulb. I'm sure they're charming, but they'll only get you to a maximum DLI of 2 if you leave a two-bulb fixture on for 24 hours a day less than a foot away from little leaves. That's enough light to raise ferns, African violets, and orchids, but seedlings of other species won't live up to their full potential. If you have $40 to spend on bulbs and another $40 for a fixture, you should just give up lattes for the week, save up, and buy the $92 Hydrofarm FLT24 2-Ft/4-Tube T5 Commercial System with Bulbs instead.

Types of lights

Grow light catalogs confront you with five different types of lights: fluorescent, compact fluorescent, metal halide, high-pressure sodium, and LEDs. Unfortunately, it can be hard for consumers to directly compare their performance. For the complete story, read The light plants need below.

Incandescent bulbs, the type that Thomas Edison invented and that appear over cartoon characters' heads when they have a brilliant idea, aren't generally used for growing plants because they give out so much heat for the amount of photons they produce. I excluded incandescent bulbs from the list.

Fluorescent bulbs are those tubes that you remember hissing and flickering from school or the library. They're glass tubes filled with mercury glass and coated inside with material that fluoresces—that is, lights up when it's excited by ultraviolet light. When you turn a fluorescent light on, the electrical current makes the mercury atoms emit ultraviolet light, which makes the coating fluoresce. (Canon has a good animation of how this process works on their Science Lab pages.) Fluorescent bulbs can have different colors depending on what substance exactly you use for that coating. Older fluorescent fixtures

flicker because they're not putting enough electrical current through the bulb to get the mercury atoms going.

The reason people use fluorescent bulbs for lighting is that they convert a larger proportion of their electricity to light than incandescent bulbs, so they don't require as much power to illuminate a spot. Since they're using less power, they also generate less heat than incandescents. Lighting companies equivocate about exactly how hot their bulbs get, saying that it all depends on the environment around them, the fixture they're in, etc. I took a laser thermometer to fluorescent bulbs in my house, measuring their temperature after running for two hours at 65ºF (we're cheap with heating oil around here). The surface temperature of a T5 grow-light bulb was around 100ºF; the ancient T12 bulb in the laundry room was around 140ºF. Neither of them will burn the house down, but your tender seedlings wouldn't appreciate it having the T12 bulb too close; water at 140ºF is hot enough to cause a third-degree burn in five seconds, according to the Burn Foundation.

Fluorescent tubes also last longer than incandescent bulbs, running for up to 20,000 hours, about ten times as long as incandescents. You'll see references to T12, T8, and T5 fluorescent bulbs; the T just tells you that you're measuring the diameter of the bulb in eighths of an inch. T12 bulbs are 1.5 inches in diameter, T8 bulbs are 1 inch, and T5 bulbs are ⅝ of an inch and are built a little differently. You can generally plug T8 and T12 tubes into the same fixtures, but not T5 tubes. The smaller-diameter fluorescent tubes put out more light per watt than the larger tubes.

Some T5 bulbs are T5HO, where HO stands for "high output." The T5HO tubes do put out more light than the T5 bulbs, but they also use more energy to do so. You'll get less light per watt from these bulbs, according to this chart put together by the Rensselaer Polytechnic Institute Lighting Research Center. Even more confusing, fluorescent bulbs' light output varies with the room temperature. T8s give out more light at 77ºF, T5s at 95ºF. T5 performance falls off rapidly between 86-68º F (30-20ºC) from 95 percent to 75 percent of their maximum light output. At 59ºF (15ºC), you'll only get 60 percent of the light out of a T5 as you would at 95ºF, while T8s are still putting out 90 percent of their maximum light.

The moral: Keep your seedlings warm. Fluorescents do eventually wear out. As the glass on the tube gradually absorbs mercury, there's less mercury vapor in the tube to create ultraviolet light. Both T8 and T5 bulbs continue to put out about 90 percent of their maximum lumens over the course of their 20,000-hour lives, while T12 output falls to 75

percent by 5,000 hours. For that reason, and the sheer bulk of T12 lights, I excluded those bulbs from my sample.

Compact fluorescent bulbs are also available as grow lights, but they use more energy to create light than the tubes (more watts per lumen). They last about 10,000 hours, or half as long as the fluorescent tubes. The only real advantages to CFLs are that they can be plugged into conventional light sockets and that they contain less mercury than the tubes—but they do contain mercury and need to be disposed of carefully. Because of their inefficiency and relatively short useful life, I excluded them from the grow light sample.

Metal halide (MH) and high pressure sodium (HPS) lamps are both types of high intensity discharge (HID) lamps. HID lamps contain tungsten electrodes inside a tube filled with gas and metal salts. When electricity flows through the lamp, electricity arcs between the electrodes through the gas, melting and heating the metal salts until they form a glowing plasma. They put out a lot of light, but they use of energy (250 to 1000 watts per bulb) and consequently they give off a lot of heat. You can't put a 600ºC HID bulb on top of your seedlings, or your laptop, or pretty much anything except another HID bulb. You need plenty of space and air circulation.

Metal halide lamps are filled with vaporized mercury and metal halides (compounds of bromine and/or iodide). HPS lights contain—surprise!—sodium instead. MH lights put out somewhat more light in the blue part of the spectrum than the HPS lights, which produce more yellow-to-red light. But, as Giacomelli said, most commercial applications use HPS because plants can do reasonably well without the additional blue light.

If you want to see what an HPS light looks like, go to a parking lot at night and look up. HPS lights are frequently used for outdoor lighting, giving everything that special orange glow. Many people find this particular hue aesthetically unpleasing. If you're going to be looking at your plants under lights, consider what color you'd like to see. That said, HPS bulbs are much more popular for horticulture, in part because the MH bulbs last just 10,000 hours on average, compared to about 18,000 hours for the HPS, and their light output decreases fairly rapidly with use. According to this chart, MH bulbs' light output will deteriorate by about 25-51 percent before they're halfway through their expected use. HPS lights will still put out 70 percent of their initial lumens at the end of their useful life. I eliminated MH bulbs from the sample.

LEDs, or light-emitting diodes, are the hot new light. Well, really, they're the cool new light, because they

LEDs shoot out photons at single wavelengths, not

give off very little heat. As How Stuff Works writes, "[LEDs] are illuminated solely by the movement of electrons in a semiconductor material, and they last just as long as a standard transistor."

across a spectrum.

That means that LEDs have very long useful lives: about 50,000 to 100,000 hours, in theory. As Bugbee said, "LEDs are too new a technology to be sure they'll last 20 years."

Unfortunately, there are two important things to know about LED lighting:

1) LEDs shoot out photons at single wavelengths, not across a spectrum.

2) LEDs can't deliver as many photons per watt as other lights … yet.

The first point is important because plants need some light in both the "blue" spectrum (400-500 nm) and the "red" spectrum (600-700 nm) to survive and thrive (see The light plants need, below). But that may not be all they need. There's research suggesting that plants growing under LEDs do better when they get some far-red light (700-740 nm) every day; lettuces grown with a half-hour of this far-red light had 28 percent more mass at the end than controls. Most LEDs don't provide far-red light. Greenhouse growers like this, according to Harwood. "It helps with integrated pest management [IPM]" Harwood said. "LEDs with no infrared cut insect visibility."

Bugs can't see the leaves as well if you leave out near-red and green spectrum lights, Harwood said, and some diseases and funguses are inhibited if you leave out certain spectra as well. "White" LEDs are actually groups of three or more single-wavelength LEDs put together to make light that looks white to humans—and to make your plants look like they belong on earth instead of on Death Zombie Planet.

The second point—that LEDs can't deliver as many photons per watt for a given area—is partly due to the state of technology.

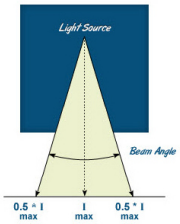
Bugs can't see the leaves as well if you leave out near-red and green spectrum lights…

For incandescent, fluorescent, HPS, and MH lights, if you make a fixture that can withstand more current, you get a brighter light when you put more energy into the system. In LEDs, though, there seems to be a limit to how much light you can get out of a system. After a certain point, the excited electrons start running into each other and producing more heat instead of light, as Popular Science explains.

each other and producing more heat instead of light, as Popular Science explains.

There's plenty of research into making better LEDs, but for now, the options for the consumer aren't very powerful. Instead of making LEDs higher watt, you have to add more of them to get more light to your plants, which costs more and takes up more space. Giacomelli tries to cluster LEDs together to look like an HPS light.

LED manufacturers also talk about the beam angle, or how far the light spreads from the center of the LED. The larger the beam angle, the more ground the light covers, but the less light you're getting per unit area. For the purposes of this review, I'm assuming that you'll be hanging your lights within a foot of your plants, so you'll need a wide beam angle (90º) to get light to the edges of your seedling tray. If you're hanging your light higher, you'll want to choose a narrower beam angle to cover the same surface area.



The light plants need

Grow lights exist to get photons to plants. Unfortunately, it's extremely hard to tell if a grow light will do that from the information retailers list on their web sites. Listings commonly say something like "Lumen output rated up to 8000" or "6400 K bulb" or "280 Watts Super Bright Output." None of these statements really tell you what to know: How many photons will get to your plants' leaves.

As you may remember from high school physics, light is a type of electromagnetic radiation that acts as both a wave and a particle. Light comes in different wavelengths, and the wavelengths that humans can see (called the visible spectrum) roughly measure between 400 and 700 nanometers. Make the wavelengths shorter, say, 350

between 400 and 700 nanometers. Make the wavelengths shorter—say, 350 nanometers—and you'll get ultraviolet radiation, which humans can't see, but is visible to bees, birds, fish, some amphibians, reptiles, and cats. Make the wavelengths slightly longer (700 nm-1 mm) and you'll get infrared radiation. Some snakes, insects, and bats seem to be able to perceive infrared radiation, but not with their eyes—they have special heat-sensing organs.

Plants don't have eyes, though, or heat-sensing pit organs for catching prey … yet. They absorb photons via chlorophyll in their leaves and stems. Plants look green because they reflect light in that part of the spectrum, although they also absorb photons at "green wavelengths" (more on that in a moment).

Plants don't have eyes, though, or heat-sensing pit organs for catching prey … yet.

But wait! There's more! Plants don't just use light to make energy with their chlorophyll. They also have a color pigment called phytochrome that can absorb red light or infrared radiation. If the plant gets too little red light, the phytochrome signals the plant to elongate and grow up toward the sun to get more light. This sequence is how plants "get leggy," as gardeners put it. "Leggy" plants and seedlings are tall, thin, pale, and spindly, and their stems tend to snap. They do not actually grow legs … yet.

In general, sprouting seedlings, greens like lettuce and kale, and low-growing herbs need less light than sun-lovers like tomato plants. Horticultural researchers talk about the daily light integral (DLI), or the total number of photons a plant needs to grow and stay healthy. To find out if your lighting set-up is giving your plants a high enough DLI, multiply the manufacturer's PPFD (µmoles/m²/sec) by the number of seconds you run your lights per day and voila! Light! Thyme needs a DLI of at least 12 moles/m²/day. Cornell University's Controlled Environment Agriculture Center recommends a DLI of 17 moles/m²/day for spinach, while researchers at the University of Arizona recommend a DLI of at least 13 moles/m²/day for leafy greens and seedlings, and 30-35 moles/m²/day for tomatoes and cucumbers. For a more thorough explanation of DLI and a list of minimum requirements for flowers and some herbs and crops, see this Purdue Extension paper on measuring DLI.

Light also controls the blooming in some plants. As BML puts it, "There are long-day plants (which require short nights to flower), short-day plants (requiring long nights) and day-neutral plants which have no specific requirement for the photoperiod."

Now, let's talk about how to think about grow lights. Lots of grow light ads talk about

Now, let's talk about how to think about grow lights. Lots of grow light ads talk about "lumen output." They are not helping. As Gavita Professional Lighting puts it, "Lumens are for humans." Lumens are a measure of the amount of visible light a bulb produces, which is an interesting thing to know, but it won't help you figure out if your grow light works. First of all, what matters isn't how much light a bulb puts out, but how much is actually reaching the surface of your plants. That's measured in luminous flux (also known as lux), or lumens per square meter. Secondly, lumens are measured in terms of light wavelengths that are most visible to humans—an utterly useless measurement for plants. Human eyes are most sensitive to light with a wavelength around 555 nm. We're good at detecting green, orange, and yellow, not so hot at seeing red, blue, or purple. That's one reason why many firefighters wear neon green instead of red hats nowadays; it makes them easier to see in low light.

Plants are different. Here's a graph showing how sensitive human eyes and cucumber leaves are to light in the visible spectrum (wavelengths about 400-700 nm). The cucumber is relatively less sensitive to wavelengths around 500-550 nm than humans, which means that it might not notice when traffic lights turn green. That is, if it had eyes, and a car. But,

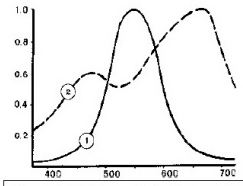


Figure 1. Relative sensitivity of human eye (line 1), and cucumber leaves (line 2) for wavelengths of light (nm).
(from Poot Lichtenergie B.V., 1984)

as you may have deduced from the lack of philodendron mascara options, plants don't have eyes. Instead, they use photons to power their photosynthesis. Photons at some wavelengths are *slightly* better than others for powering your plants; they reflect back some of the photons in the "green" wavelengths right around 555 nm, but they still absorb most of them for energy. With a few key exceptions, plants aren't that fussy about the

exact wavelength you shine on them as long as they get enough photons. (Remember how the Plants in Plants Vs. Zombies have to capture little falling suns to get energy? That's how it works, without the zombies … I hope.)

If you want to think about light the way a plant would, if plants had thoughts, you need to measure light in terms of photosynthetically active radiation (PAR). PAR is adjusted for the wavelengths that plants use for photosynthesis. PAR is expressed in units of photosynthetic photon flux density (PPFD), a measure of how many photons fall on a square meter of surface in a second: micromoles/meter squared/second, or µmol/m²/s, also known as "einsteins" with a small e. (Remember from high school physics how light is both a wave and a particle? Did you ever really understand that? We're talking about the particle part now.) PPFD for land in full sunlight in the middle of the summer is about 2000-2500 µmol/m²/s . Many sites like to give their lights' spectrum in terms of "color temperature" or Kelvin, usually expressed as something like "bulb 6400 K." That's slightly helpful for gardeners, but only slightly. It tells you what color the light will look and what proportion of the light will be at what wavelength, but it doesn't tell you how many photons will be arriving at your plants' leaves.

Why can't you get useful measurements for grow lights?

So why do plant light sellers insist on telling customers their lights' lumens, and not PPFD? It's not that difficult to take light measurements. For about $500, you can buy the same Licor 190 PAR meter that Utah State University Crop Physiology Laboratory faculty used to evaluate HID and LED plant lights, and measure how many µmoles/m²/s at standard intervals to get a PAR map, like the excellent examples at BML. It can be a little tedious, but it wouldn't take more than an hour or two. Yet very few manufacturers seem to do this.

There are at least two reasons why this might be the case:

1) Some retailers don't understand how light affects plants very well. Many garden suppliers talk about how many lumens their lights supply and nothing else (here are two examples). As I've discussed, this number doesn't tell you anything about how well plants grow. Some lighting companies don't even know *how* to measure light—or at least they don't bother telling their staff that it's possible. One marketing rep wrote to me, "We're very interested in getting the PPFD measurements for our grow lights so is there any way you could help us get them? Do you know someone who can do the measurements for us or do you have a possibility to do the measurements yourself?

Please let us know." I'm sure the marketing rep isn't at fault, which is why I'm not disclosing the company's name. But if an auto salesman said to me, "No, I don't know how many miles this car could go on a gallon of gas. We don't have an MPG meter. Could you test this car out and let me know?" I would leave the premises very, very quickly.

2) Some retailers seem to be afraid of what you would find if you *did* do the measurements. There are some sad excuses out there.[1]

Care and maintenance

Assuming you don't back into your lights with an anvil, your grow lights shouldn't need any care for years. If your plants start looking a little pale, the problem is probably a bulb that is reaching the end of its life, not the fixture itself. You may not be able to see the difference in the quality of the light with your human eyes, but your plants will notice if there's less light reaching them. Replace a bulb and see if things improve. For a gross measure of the energy reaching your plants, use a light meter app on your phone (there are plenty available for Android and iPhone that use your phone's built-in light sensors). It won't be accurate, and it won't measure the photons reaching your plants, but it will give you an idea of whether replacing a bulb is making a difference.

Most indoor growers hang their lights on adjustable cables or chains over their plants so that they can raise the lights as their plants grow. Hang fluorescent lights and LEDs just a few inches above seedlings; HPS lights produce more heat and need to be placed farther from plants—at least a foot for 150-watt HPS lights. When in doubt, put your hand under the light at plant level. If it feels hot, hang the light farther away.

All fluorescent bulbs contain mercury and will release mercury into the air when you break them. They need to be recycled at special facilities for toxic waste, although many hardware stores and municipal public waste departments will accept them. To find out how to recycle fluorescent bulbs—or anything else—visit search.earth911.com.

Wrapping it up

The Hydrofarm FLT24 2-Ft/4-Tube T5 Commercial System with Bulbs will get your seedlings started fast, keep them cool and looking natural under its white light, and make them grow until you're ready to share them with the sun—all at less than 100 watts. Green in your garden, green in your pocket. What's not to like?

Footnotes:

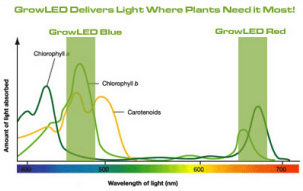
Footnotes:

1. Example A

We agree that measurement of PAR (Photosynthetically Active Radiation) using a quantum meter is a better method of testing light output for growing plants than using a standard light meter, but it is not the best method. The BEST method is to try the product and determine that it actually works. If a marketing rep said, "We're not going to give you evidence that our product works, so you'll just have to try it," would you buy that product? If so, I recommend you go back to No-MPG-Autos and apply for a sales job. They need people like you.

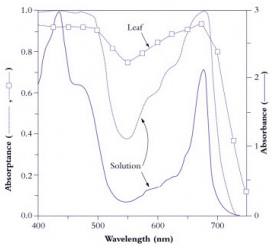
Example B *LED Plant Light Bar FAQ: I would like to compare LED-PlantBars to high-pressure sodium lamps. What is the micromols per square meter per second (µmol·m-2·s-1) of photons, or the PAR watts/square meter of each bar? Direct comparisons are not possible since LED-PlantBars only emit those light wavelengths needed for plant growth and health.* This answer is nonsense. Plants use photons from all wavelengths between 400-700 nm for photosynthesis, and PAR meters are designed to correct for plants' ability to use different wavelengths. Your plants need to have a certain number of photons from that spectrum to hit their leaves every day. If these LED-PlantBars don't give out enough photons, it doesn't matter how pretty they wavelengths look, the plants won't grow. If you don't measure µmol·m2·s(otherwise known as PPFD), you don't know how many photons are reaching a surface below the light. And metaphorically, you're right back at No-MPG-Autos, negotiating an auto loan who says you can't compare their auto loans to other auto loans because NMA calculates its interest in troy ounces of gold, not dollars, when the real issue is the percentage rate.

Example C *LED Light FAQ's "Only a small percentage of the light produced by an HID light is absorbed by plants which means that 80 percent of the Lumens are wasted."* This sentence doesn't make any sense—and if it did, it wouldn't be true anyway. Plants don't grow on lumens, they grown on photons. If you rewrote this sentence "80 percent of photons are wasted," you'd probably be misinterpreting the graph at the top of this Wikipedia page on PAR, which makes it look like the middle of the spectrum is useless to plants. Unfortunately, the Wikipedia graph is based on graph from unpublished data from a 1999 textbook, so it's hard to tell exactly what was being measured. Here's a typical gaudy color version of the graph from an LED sales site:



Wavelength of light (nm)

Wow! That graph really makes it look like plants just can't use most visible light. And it's wrong. That graph is probably based on how chlorophyll *in a solution* responds to light, not how *plants* respond to light. Yeah, sure, chlorophyll A and B don't absorb photons with a wavelength of about 550 nm very well—but leaves have a *lot* of chlorophyll. As the Australian Society of Plant Scientists wrote, "Leaf absorbance has a hyperbolic dependence on chlorophyll content. For most leaves, 80–85 percent of 400–700 nm light is absorbed and it is only in leaves produced under severe nitrogen deficiency where there is less than 0.25 mmol Chl m–2 that absorbance falls below 75 percent." There's also evidence that plants change the balance of different types of chlorophyll and pigments in their leaves in response to the light that hits them. Here's a graph that compares leaves vs. chlorophyll.



In short, plants use light from all across the visible spectrum pretty well, and light at 550 nm isn't "wasted." Jump back.

Hydrofarm FLT24

Grow Lights We Like

Buy for $90* from Amazon

*At the time of publishing, the price was $91.

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Sources

Gene Giacomelli, Ph.D., Director of the Controlled Environment Agriculture Center at the University of Arizona, **Interview**

Ed Harwood, Ph.D., Chief technology officer and co-founder of AeroFarms, **Interview**

Neil Mattson, Ph.D., Associate professor and floriculture extension specialist at Cornell University's Department of Horticulture, **Interview**

Peter Wardenburg, President, Hydrofarm hydroponic suppliers, **Interview**

Bruce Bugbee, Professor at the Crop Physiology Laboratory, Department of Plant Soils and Climate, Utah State University, **Interview**

Nelson, J. & Bugbee, B, Economic Analysis of Greenhouse Lighting: Light Emitting Diodes vs. High Intensity Discharge Fixtures, **PLOS One**, June 6, 2014

Munns, R., Schmidt, S., & Beveridge, C., Leaf anatomy, light interception, and gas exchange, **Plants in Action, 2nd edition**, 2014

Hernandez, R., Plant Lighting Basics and Applications, **University of Arizona**

Annex 45, Guidebook on energy efficient electric lighting for buildings: Chapter 5: Lighting Technologies, **2010**

Torres, A., & Lopez, R.G., Measuring Daily Light Integral in the Greenhouse, **Purdue Extension**, 2010

Ricardo Hernández, Plant Lighting Basics and Applications, **The University of Arizona**

Sander W. Hogewoning, Emilie Wientjes, Peter Douwstraa, Govert Trouwborst, Wim van Ieperen, Roberta Croce, and Jeremy Harbinson, Photosynthetic Quantum Yield Dynamics: From Photosystems to Leaves, **American Society of Plant Biologists**, 2012

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gmwebster

I hate to gripe, but in the age of marijuana legalization, dancing around the issue of the best grow lights for MJ is just silly.

tony kaye

What do you mean by dancing around the issue?

yashrg

Why does this article now say originally published: March 4, 2015?

tony kaye

Must be an error. Checking right now

Davilyn Eversz

Probably need to re-think your view on LED's. A good LED light like Hydrogrowled will grow anything. You can even grow watermelon to fruiting stage. There is a YouTube video of some high school kids that grew 181 cucumbers on one plant. Research is nice but if you don't actually have experience growing with T5s or LEDs, articles

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SP Series

336X-PRO 168W LED Grow Light

Item No.SP128D

module design. Plug-and-Play isolated power driver, Air-circulation system Exclusive

SP Series

21X-PRO 35W LED Grow Light

Item No.SP129D

Modular internal build superior thermal management Power-Link X2 Lens 6-band spectrum ultra low

SP Series

84X-PRO 140W LED Grow Light

Item No.SP110D

Exclusive Design: Daisy-chain power cord design. New technology in fans Small light

SP Series

126X-PRO 210W LED Grow Light

Item No.SP111D

module design. Plug-and-Play isolated power driver, Air-circulation system Safe to operate

SP Series

Sun Series

Sun-Series 800w led

Sun-Series 300w led

Grow Lights With 270

Item No.S109D-800w

800w Led Grow Light 3W Leds, Bridgelux and Epistar Chip Effective Light Spectrum

Sun Series

Grow Lights With 100

Item No.S108D-300w

300w Led Grow Light 3W Leds, Bridgelux and Epistar Chip Effective Light Spectrum

Sun Series

Sun-Series 270w led Grow Lights With 90 x

Item No.S108D-270w

270w Led Grow Light 3W Leds, Bridgelux and Epistar Chip Effective Light Spectrum

Sun Series

Sun-Series 135w led Grow Lights With 45 x

Item No.S107D-135w

135w Led Grow Light 3W Leds, Bridgelux and Epistar Chip Effective Light Spectrum

Sun Series

UFO Series

UFO 140W LED Grow Light With 80 x 3W

Item No.SP151D

Lerd Grow Lights 2014 5 Watt Cree Self-checking.CE&RoHS Cree Chips Small Light Decay

UFO Series

UFO 210W LED Grow Light With 120 x 3W

Item No.SP152D

Led Panel Round 450mm Grow Light module design. Plug-and-Play 3W Cree LED chips Safe to

UFO Series

UFO 420W LED Grow Light With 240 x 3W

Item No.SP153D

420W Diy Cree Led Grow Light 1.Air-circulation System 2.Small Light Decay 3.Cree Chips. 4.Self-

UFO Series

Helios Series

Helios 420W Led Grow Light With 240 X 3W

Item No.H163D

Helios Led Grow Light Fan Driver 1.Air-circulation System 2.Small Light Decay 3.Cree Chips. 3.Self-

Helios Series

Helios 140w Led Grow Light With 80 X 3W

Item No.H158D

Safe to operate Exclusive Desig Self-checking CE&RoHS Daisy-chain power cord design

Helios Series

Helios 140w Led Grow Light With 80 X 3W

Item No.H159D

Smart control and customized ratio 3w cree chip Wide voltage design Patent certificate OEM and

Helios Series

Helios 210W Led Grow Light With 120 X 3W

Item No.H160D

decreasing 50% noise Small light decay, long lifespan Safe to operate 3W Cree LED chips

Helios Series

E-GROW Series

E-Series 210w led Grow Lights With 120

Item No.E165D

Massive Growing Green Led Grow Light 210w Effect Perfect Large Lighting Grow Light Coverage 3

E-GROW Series

E-Series 280w led Grow Lights With 180

Item No.E157D

1.3 Minutes for Disassembling and Reassembling. 2.Latest LED optic lens. 3.Unique technique of

E-GROW Series

E-Series 210w led Grow Lights With 120

Item No.E156D

1.3 Minutes for Disassembling and Reassembling. 2.Latest LED optic lens. 3.Unique technique of

E-GROW Series

E-Series 140W led Grow Lights With 80 x

Item No.E155D

1.3 Minutes for Disassembling and Reassembling. 2.Latest LED optic lens. 3.Unique technique of

E-GROW Series

Chloroba Series

ChloroBA C 300w led Grow Lights With 100

Item No.ChloroBA C

Tips: 1. indoor used only 2. Don't use in dripping water or dripping irrigation place to avoid light

ChloroBA C2 255w led Grow Lights With

Item No.ChloroBA C2

Specifications Plug-and-Play LED Grow Light 1) Creative Prism Principle 2) Three-in-One Design

Chloroba Series

Chloroba Series

ChloroBA C 500w led Grow Lights With 100

Item No.ChloroBA C1

500W Led Grow Light Led Qty 100pcs 5W Led Chip CE ROHS PSE Certification 3 Years

Chloroba Series

Led Aquarium Light

BS 120W Led Aquarium Light With

Item No.BS056D

- Cool White(14000K) & Blue (460nm) combined in one unit, no need additional T5/T8 for actinium

Led Aquarium Light

+86-755-29975185
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info@bsled.com

bysen

:F/3, A bldg, XingFaIndustrial park,
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Industrial LED Lights, grow, aquarium, high bay, flood, street,shoe box

Busy Bee Leds LLC

We sell commercial and Industrial grade LED Lighting,

for many different applications.

Commercial led lighting has finally reach its milestone. Replacing old high energy use Metal Halide fixtures with LED Lighting is no longer being seconded guessed.

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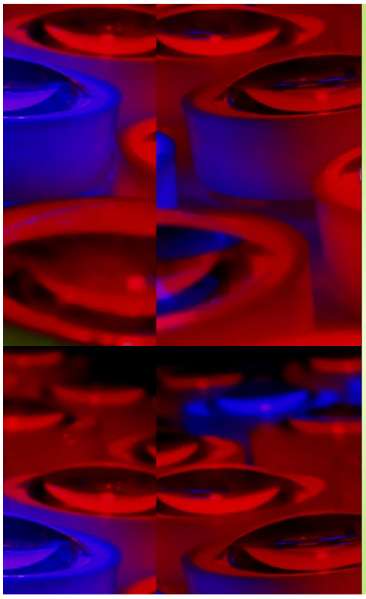
Led Grow Lights



We started in the Grow Light business 6 yrs ago, and now we are also deep into the business focused on other indoor and outdoor high power LED lighting. like high bay led lights , low bay led light, street lights, flood light, sports lighting, parking lot, retrofits, shoe box, canopy, and large industrial application lighting systems.

Visit All Products Page

High Bay

LED Flood Lights

CLICK TO SHOP ON (EBAY)

(BUSY BEE BLOG)

Stinger ST Series LED Grow Light

led grow lights

- Yellow Jacket LED Grow Light
- Stinger series Grow Light

Reef/Aquarium/coral Led Lights

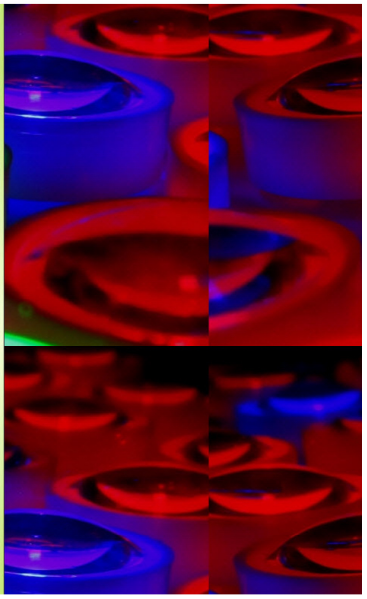
- Black Dragon Series Reef Light

Industrial Led Lights

- Suttons Bay High Bay Light
- High Application High Bay Led Light
- Obliterate Series Sports stadium light UL DLC
- Shoe Box Led Lights
- Deuce LED Flood Light High bay
- LED Flood Lights 30w-200w
- Wall Pack Led Lights coming soon
- Coming soon M204 LED Street lights
- Coming soon LED Tubes 4ft

Retrofit kits, Explosion Proof, Par Led Lights

- RetroBay



Stinger ST Series

@ BBL wants their led lights affordable! We want the average and even below average income person to be able to afford a led Light. This is why we started Busy Bee Leds.

We strive for The best product for the best price period, or we die trying.

Replace your old High Bay HID HPS fixtures with our efficient LED High bay low bay lights. Or your Flood and stadium Led Lights.

Busy Bee Leds LLC

U. S. A.

We strive for The best Product for the best Price period or we die trying.

We have the best led lights replacements for high bay, low bays, street lights, flood lights, sports lighting parking lots, retrofits, retrofit kits..

International Express: Fedex, DHL, UPS, TNT and EMS. By air to major airports of the world.
If you have preferred carrier, please notify us in advance.

busybeeled@gmail.com

- RetroMax LED retrofit kit UL/DLC
- Coming soon LED Tubes 4ft
- Fish LED Lights Coming soon

Flood Led Lights

- Obliterate Series Sports stadium light UL DLC
- Deuce LED Flood Light High bay
- LED Flood Lights 30w-200w

On Sale

Deuce 150w BB-HBFL150

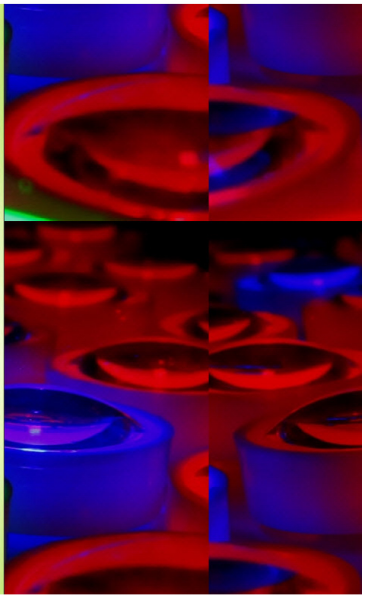
Old Price: $313.00

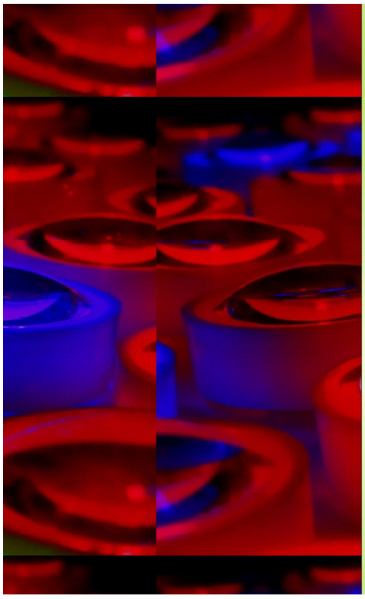
Price: $263.00

You save: $50.00

Deuce 200w BB-HBFL200

Old Price: $325.00





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SKYPE-busybeeleds

Text me your questions 24/7 and we will reply to you asap!

(323) 834-2879

Industrial Led Lights, high bay lights, low bay lights, grow lights, reef lights, led warehouse lighting , led manufacturing lighting, led street, sea ports etc.

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Old Price: $325.00

Price: $298.00

You save: $27.00

Deuce 300w BB-HBFL300

Old Price: $427.00

Price: $397.00

You save: $30.00

Parking lot 150w

Old Price: $358.00

Price: $348.00

You save: $10.00

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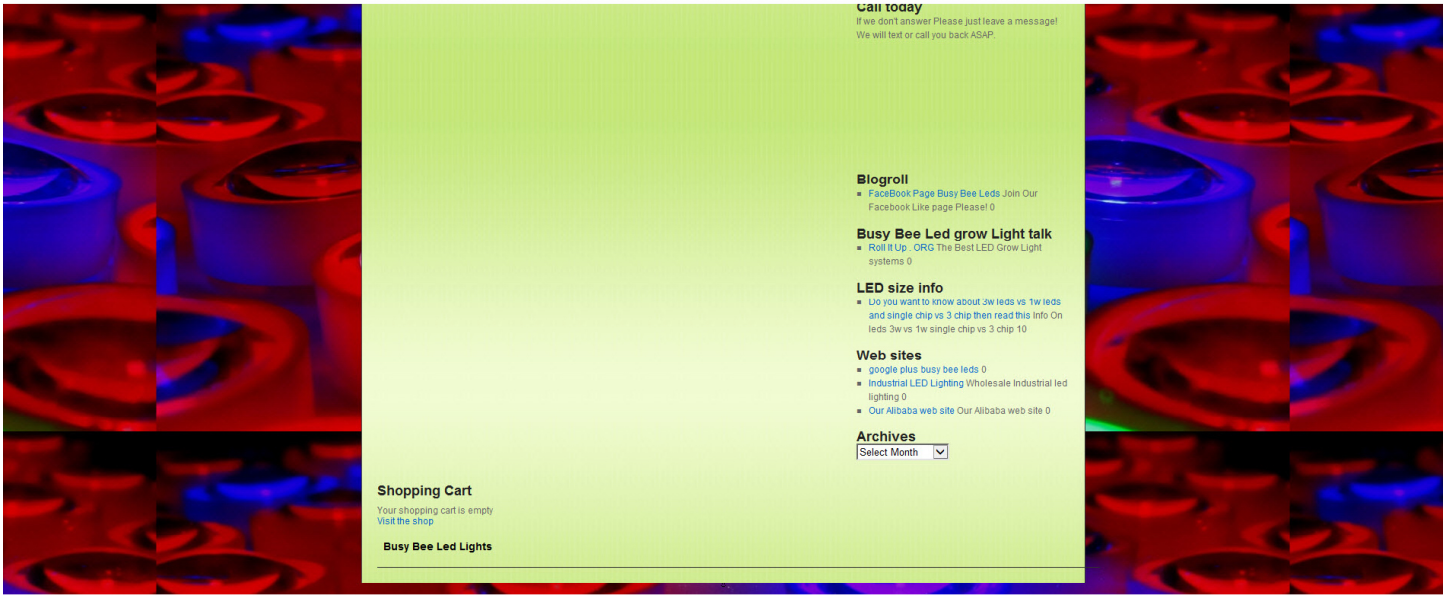

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We will text or call you back ASAP.

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- Website Changed
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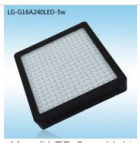

COMPANY INTRODUCTION

Top LED grow light is a company base in China Mainland. It has been built since 2009. And LED grow light and LED auqairum light are our main products. After 4 years develepment, we have been the NO.1 led grow light supplier now.

Now we have warehouse in United Kingdom,United States and Australia. Three warehouse has enough stock lights for customers demand. We plan to have more warehouse all over the world next two years, then help more customers save more.

Besides, we have finished some big grow projects in Greece, Canada,Netherlands, Germany, United KingDom, United States and Canada, We hope to get more projects and we will give them our best professional suggestions to there project, we have enough experience now, and we are learning more.

RECENTLY SOLD

Mars II LED Grow Light 400w
Add to Cart

Mars II LED Grow Light 700w
Add to Cart

Reflector LED Grow light 96x3w
Add to Cart

Reflector LED Grow Light 48x3w
Add to Cart

LED Grow Light 100x3w

Mars II LED Grow Light 700w
(5)

Mars II LED Grow Light 900w
(3)

Mars II LED Grow Light 1200w
(8)

Reflector LED Grow Light 48x3w
(4)

WHICH NEW ITEMS CUSTOMER WANT TO BUY

Mars II 1600W LED grow light
Mars II 1600w
(4)
$599.99

Reflector LED Grow light 96x3w
96x3w
(13)
$166.59

Mars II LED Grow Light 900w
Mars II 900
(3)
~~$352.79~~ $330.99

Mars II LED Grow Light 400w
Mars II 400
(6)
~~$192.07~~ $179.99

Reflector LED Grow Light 48x3w
48x3w
(4)
$97.99

Mars II LED Grow Light 700w
Mars II 700
(5)
~~$293.99~~ $274.99 As low as: $274.66

Reflector LED Grow Light 192x3w
192x3w
(3)
$307.71

Reflector LED Grow Light 144x3w
144x3w
(6)
$251.85

LED Grow Light 100x5w
Add to Cart

Mars II LED Grow Light 900w
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yo-yo hanger
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Reflector LED Grow Light 192x3w
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Mars II 1600W LED grow light
Add to Cart

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Contact Information

if you have any questions, distributor inquiries or anything else we need to be aware of, you are welcome to contact Topledgrowlight via email, phone or chat.

15Building,NanGang Industrial Park,ShiYan,Baoan District,ShenZhen,518108,China

+86 28 66259020
Monday-Friday 9:00am-6:00pm

sales@topledgrowlight.com

www.Topledgrowlight.com

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Aquarium Led Lights

3 FULL 3 Year Warranty

Questions? LIVE Chat

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Reflector LED Grow Light 48x3w
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LED Grow Light 100x3w
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Mars II LED Grow Light 900w
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Aquarium Led Lights

Price: $140.00 and above

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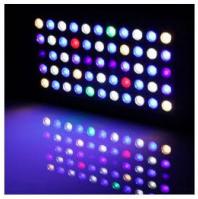
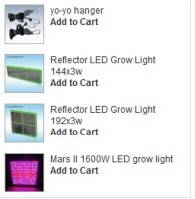


165W Dimmable LED Aquarium Grow Light Full Spectrum Fish Tank Reef Coral

Description :

- Dimmable 165W LED Aquarium Light with Beauty Lens for each led.
- Dimmer One(28 LEDs): 8 x Cool White 12,000k, 6 x Neutral White 7500k, 6 x Warm White 3500k, 2 x Red 660nm, 2 x Green 520nm, 4 x Violet 420nm
- Dimmer Two(27 LEDs): 7 x Royal Blue 450nm, 20 x Blue 460nm
- Two Dimmers, two power cords and two on/off switches to control blue &white separately
- Output Optimized for PAR, Sufficient Lights Spectrum, Super Light Penetration
- PAR of the light is: 28PAR for Lens can output more PAR
- 3 Watt Epistar LED.
- LED Output Power: 55pcs*3watt
- Dimension: 400mm*212mm*60mm
- Working temperature: -20 to 40 Degree Celsius
- Input voltage: AC85V-265V
- Lifespan: 50000-100000hours



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Reflector LED Grow Light 144x3w
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Reflector LED Grow Light 192x3w
Add to Cart

Mars II 1600W LED grow light
Add to Cart

- The range of power consumption under 110V: 123W-130W; 220V: 120W-126W
- Black painted casing.
- The LED Spectrum ratio can be changed for big order (more than 2pcs).

Learn More

$144.99

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165W Dimmable LED Aquarium Grow Light Full

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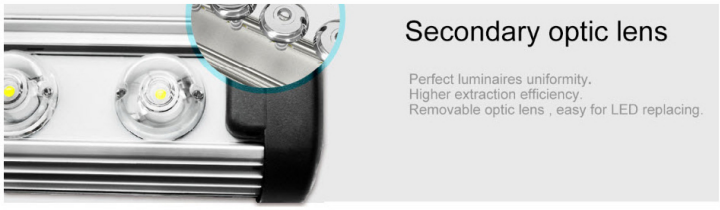
Aquabar

Features

New Generation Aquarium Bar



Secondary optic lens

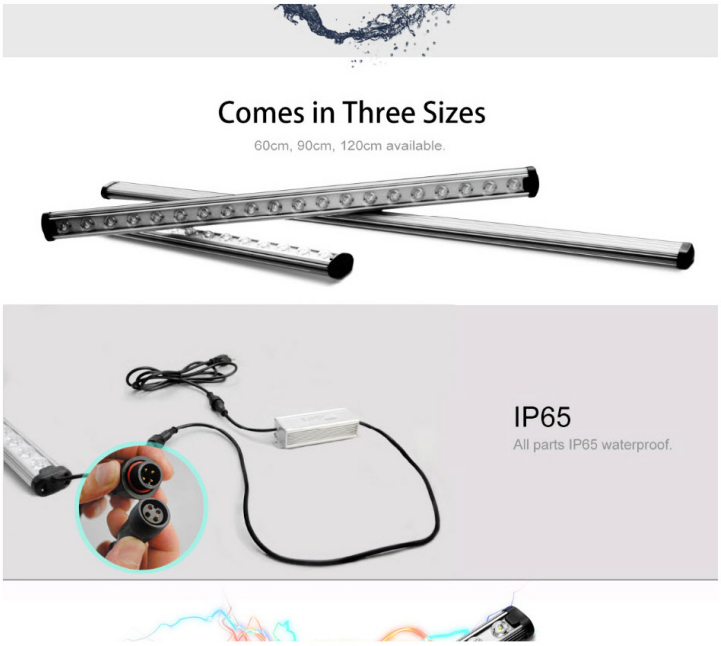
Perfect luminaires uniformity.
Higher extraction efficiency.
Removable optic lens , easy for LED replacing.

Hang up and play, removeable eye buckles.

Easy Installation

Stainless Aluminum Body

All aluminum body, stainless against seawater.


Comes in Three Sizes
60cm, 90cm, 120cm available.
IP65
All parts IP65 waterproof.

Low DC voltage,
electrical shock proof.

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ZL 201120333059.4 ZL 201120333047.1 ZL 201130310840.5

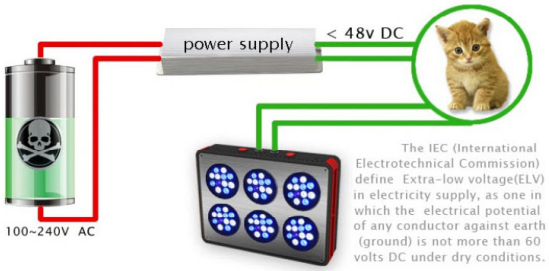
Input Voltage

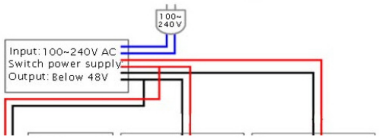
100-240V AC power input, 50/60HZ working frequency, suitable for global residential energy environment.

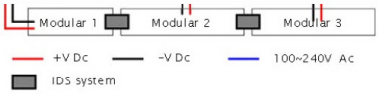
Apollo is designed to be used globally, you will have peace of mind by knowing this light is a universal suitable equipment.

Safety

Our products apply advanced isolated power drivers that are of UL standard output voltage which is lower than 76V DC.

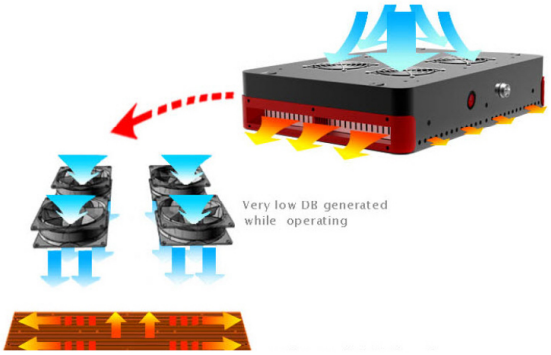


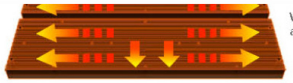




Low Temperature

Revolutionary heat dissipation design, availably alleviate the internal thermal cycle,10-15℃ lower than its predecessors in performance.



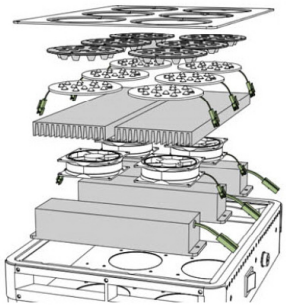


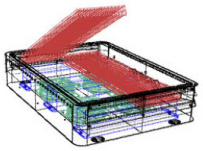
With 2 CM thick high quality aluminum fin heat sink .

Modular Assembling

Modular assembling, no-glue and no-glass design, very easy for repairment and maintenance.

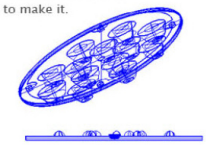
Only few steps to assemble up the whole fixture.

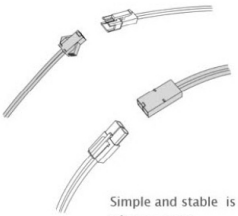




DIY feature comes from here.

Even Kids know how
to make it.



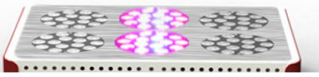


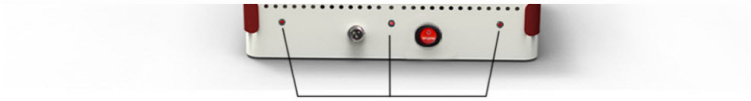
Simple and stable is
what we want.

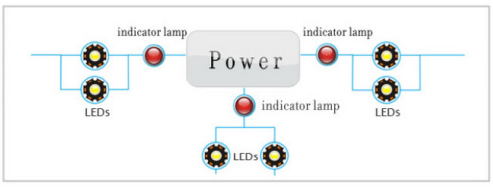
I D S

Intelligent Detection System ensuring the whole equipment working in a good state.

This is a smart system, it tells how is the LED working and indicates to you if problem occurs.







Connection scheme

When indicator light is on,
→ LED operating nomally .

When indicator light is off
→ Conection defect .

When indicator light is blinking
→ Power driver malfunction .

Colorful Outlook

Aluminum face shield design,a vailable for a variety of colour combinaiton.

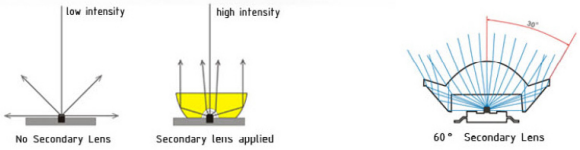
Case: red ,black, white Side:red, gray, white,black
Face shield: red,black, silver, blue

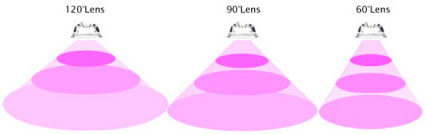
Lens

Built with secondary optical lens, the penetration is more outstanding.

The secondary optical lens make the beam angle controllable, which

enable the LEDs to address highly uniformed PPF to plants ,thereby the total volume of the energy used was substantially reduced.





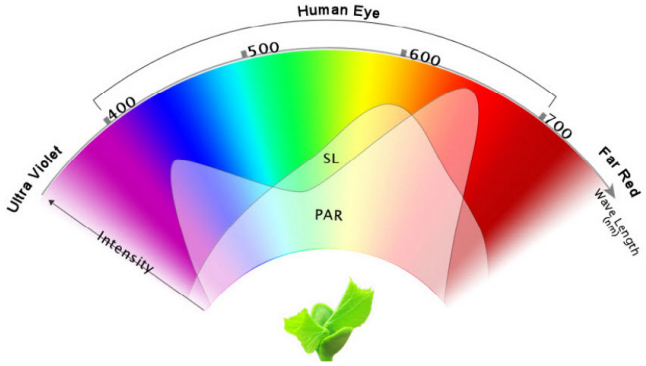
With the secondary optical lens used,the light can penetrate from plant's conopy to root easily .

60 degree, 90 degree, 120 degree are available according to your specific requirement.

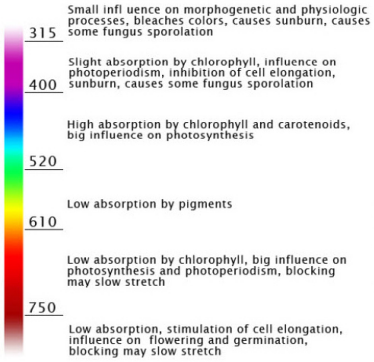
LEDs

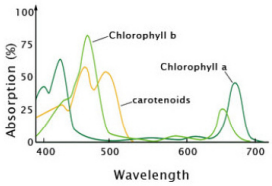
Apollo LED Grow Lights select first-rate LEDs as light source , ensuring the superior high quality and long lifespan . Apollo addressing various photosynthetic aspects helping in plant's growth.
The LEDs are available in a variety of wavelengths and spectra can be customized to provide the most nutrient light source for your plants.

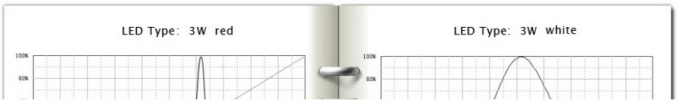
Photosynthesis is driven by PAR

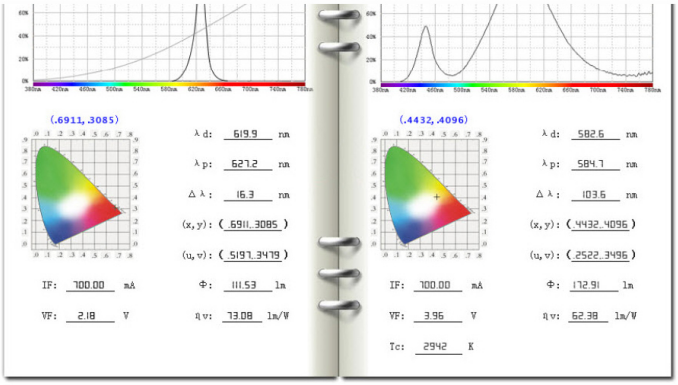


SL solar light
PAR photosynthetically active radiation









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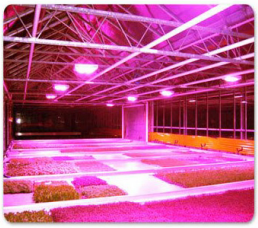
Applications

The application of LED Grow Lights



LED grow lights are by not means the future for indoor farming. WHY? Because they are so much superior than all those traditional horticulture lighting ,even the essential working priciple is different. LED grow light affect the plants 's growth both in the speed and size , they enhancing the plant's photosynthesis and save energy because they do not generating wavelengths that plants do not need , thus give out less heat radiation and delivering maximum PPF to the targeted plants.So that is to say LED grow lights are light wavelength specific but not broad wavelength like comes out of a "white" light like HPS, MH, Flourescent, etc.

In this sense, LED grow lights will replace all those currently using HPS (high pressure sodium) and MH (Metal Halide) because they offer better control of light spectrum .

CIDLY LED grow lights provide the optimal specifications for plants to match the photosynthetic curves of Chlorophyll A and B, the two essential ingredients which drive photosynthesis, shower your plants with the most nutrient rays. The tests show 95% of the light from our LED grow lights can be absorbed by plants, while HPS or MH have only got 10% .

The application of
LED Aquarium Lights

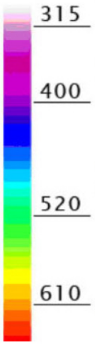
LEDs are the most energy efficient solution to pop up your reef tank'scolour , they are designed to replace Metal Halide lights and Tube lighs because they only use about half the electricity of traditional aquarium lighting.
LED Aquarium Lights out weigh those traditional aquaiurm lighting also in that they offering a long service life over 50,000 hours, your cost will be saved because you don not need to replace any bulbs during its long lifespan.
CIDLY LED Aquarium lights offer the most professional and efficient aquarium lightingsolution to all the aquarium hobbyists. The aesthetic design and superior quality distinguish our products apart from other LED aquarium lights on the market, and will really bring the anima to your tank. Rated from 9W- 750W, our aquarium lights are available in many different sizes and wattage, ideal for meeting the needs from small nichi to a jumbo tank.
CIDLY LED Aquarium lights are dual cords design, controllable in white and blue by two switches, this feature allows you to create your own customized reef aquarium tank, provide you a bravo lighting experience.CIDLY LED Aquarium lights are definitly the cutting edge fixtures.

The application in
Scientific Research

We have been in LED Grow Light industry for more than four years, and we endavor to find out the best lighting solution for plant's growth. In 2011, we cooperated with with Chinese Academy of Agricultural Sciences in "Plant Factory" program, this program is

aming to invent a "factory" which can hopely solving the commissariats shortage probelm around the world. The Plant Factory brings the indoor farming and vertical farming technique to a revolutionary level, its main idea is to cultivate plants verticaly in many independent units of skyscrapers so as to conserve the land resources to the fullest extent and achieve maximal yield. The program is making progress and helping many growers in their schemes.

After the long term research and many plants growing experiments, we find out the different light wave lengthes or spectrum contribute to plant's growth respectively as follow:



Small influence on morphogenetic and physiologic processes, bleaches colors, causes sunburn, causes some fungus sporolati .

Slight absorption by chlorophyll, influence on photoperiodism, inhibition of cell elongation, sunburn, causes some fungus sporolation.

High absorption by chlorophyll and carotenoids, big influence on photosynthesis .

Low absorption by pigments.

750 **Low absorption by chlorophyll, big influence on photosynthesis and photoperiodism, blocking may slow stretch .**

Low absorption, stimulation of cell elongation, influence on flowering and germination, blocking may slow stretch.

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Contact
info@cidly.com
+86 136 9228 2525
E Building, Shuitian Dingfeng Techpark,Shenzhen, China

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- Economic LED grow lights
- LED grow lights spectrometer
- LED Nutrition light-500W
- 190 W PPF-800 LED grow Light
- 3-30W LED Grow Lights
- Commerial & Industrial LED grow
- Par and LED grow lights

LED AQUARIUM LIGHTING

- LED Aquarium Lights
- SmartAQ LED Aquarium Lights
- Evergrow LED aquarium lights
- 120w LED Aquarium Lighting
- LED T8 T5 Aquarium Tube

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LED Grow Lights factory Outlet, The Best Price and Quality

High Power Led grow lights

LED Grow Lights Outlet has the largest selection of individual grow lights for LED greenhouse lights, LED horticultural light, indoor growing, grow chamber retrofit and plant research.

1/3 start stop << >>

Whether you have a small hydroponics nursery or a multi-million dollar horticulture operation, we offer a wide selection of the highest quality LEDs and LED Grow Lights Systems.
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LED Grow Lights Outlet Promise

- Variety of products to suit your growing need.
- Custom lighting systems built to your specifications
- 3-year warranty and 60-day money-back guarantee - unmatched in the industry!
- The best price and the best quality
- Wholesale pricing for business customers

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Research and Development
LED Industry News
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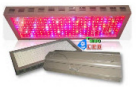
NASA Report
Boston Expo

High Power Led Grow Lights Models

New Design ! Nutrition LED Grow Light



ChlorBa's Nutrition Light Series! Check out the NEW design!

Minifarm indoor grow system

Indoor grow everything

Automatic control

Today ONLY! AIBC's 300WRBO711

Buy Two lights at $698/each

600W RBO711/RB81-660

Start at $998

300W RBO711/RB81-660

Start at $686

120W RBO711-660

Start at $199

90W RBO711/RB81-660

Start at $179

Intelligent LED Aquarium Light

Start at $195

120W LED Aquarium Lights

Start at $299

News: We designed and manufacture super slim dimmable LED grow panel for NASA lunar simulator project.

News: AIBC is an exclusive sponsor of the LED grow lighting Expo at Boston Achitectural College Indoor landscape Gallary.

Low watts LED grow lights bulbs and panels

3 watt to 30 watt low power LED grow lights

All LED spot lights, Par38 lights are standard base (E26 or E27) and easy to hook up to your home socket light base. There are no ballasts.

3W Red Spot

3W Blue Spot

4W Red Par38

4W Blue Par38

4w Red Blue Par38

5w Blue/Red Spot

9W 225Red-panel

9W 225Blue-Panel

9W 225Red-blue-panel

9W RB63L

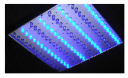
9W RB81F

15WRB123L

15WRB93F

30w Red Panel

30w Blue Panel



30w RB Panel Remote

7W RB-wholesale only

12W RB-wholesale only

Important tool: Our exclusive calculator for LED Grow Lights will calculate how many LED lights you really need to achieve optimal growth. So easy to use, just plug in your grow dimensions and we'll do the rest!

We Know LED Technology Better Than Anyone

LED Grow Lights Outlet isn't your average distributor. We're owned and operated by experienced technicians, scientists and engineers who are trained in the latest LED technology. Our solid product knowledge and trusted relationships with manufacturers allows us to offer the latest LED lighting products, competitive prices and the strongest warranties in the industry.

The depth of our knowledge and research allows us to continually upgrade and revolutionize the marketplace. We can customize any LED Grow Lights and Systems to fit your specific color spectrum and growth needs. Our Live Support team is here to answer all your questions. That's just our way of helping your business succeed.

NEW PRODUCT! Super-Bright Aquarium Light-Click Here to Learn More

Do You Know the Amazing Benefits of LED Growing?

1. **Incredible Energy & Cost Savings** A 90W LED UFO Grow Light produces as much light as a standard 400W HPS (High Pressure Sodium) light. According to the US Dept. of Energy, the average price of power is 10.7 cents per kilowatt-hour. For one year of use (12 hours per day) a 400 W HID light adds $187.46 to your bill while a 90W LED Light adds ONLY $42.18!! That's nearly 80% less!!

2. **Little or NO Heat Produced** Unlike traditional lights, LED Grow Lights produce virtually no additional heat. In a side-by-side study, a single-unit LED light had NO significant impact on room temperature after 2 months of continuous use!

3. **Eco-Friendly** Unlike HPS and MH (Metal Halide) lamps, LED lights do not contain filaments and other toxic metals which are difficult to recycle and harmful to the environment.

4. **Last Longer than Standard Lamps** An average HID light lasts an estimated 10,000 hours (2.3 years) compared to an LED Light's extended life of 60,000 hours (11.4 years).

4. **Last Longer than Standard Lamps** An average HID light lasts an estimated 10,000 hours (2.3 years) compared to an LED Light's extended life of 60,000 hours (11.4 years).
5. **No Ballast Needed** Unlike other lighting sources that require ballasts that have limited life spans of 3-4 years, LED Grow Lights are fully functioning units that require no additional ballast
6. **No Need for Heavy Reflectors** Built-in directional adjustments mean no need for costly, hard-to-install parabolic reflectors. The result is a lighter weight, convenient and versatile LED Grow Light.
7. **LED Grow Light Outlet EXCLUSIVE** While Tri-band spectrum lighting is superior to dual-spectrum, LED Grow Light Outlets offers an amazing **4-Band Spectrum**: red-blue-orange-white... ALL IN ONE LIGHT!

IMPORTANT! Things to Consider When Buying LED Grow Lights

Some buyers may be tempted to work directly with Chinese manufacturers in an attempt to get a better price. **WARNING: Buy** from experienced distributors who know the risks of dealing directly with international sources.

For your safety, consider this:

· Did you confirm that your source is a legitimate operation, licensed to export products? Did they guarantee product quality and provide a warranty?

· Did you visit the factory in person— not just the Website? Some factories are non-existent...others exploit workers and do not follow building codes.

· Beware of requests for advance payment or any hidden costs. Beware of quotes lower than $100/per 90W UFO—this is likely to be a scam.

You can trust that LED Grow Lights Outlet is committed to delivering top-quality products in a professional manner AND with the industry's best product guarantee and warranty.

Don't just take our word for it...

Read what our satisfied customershave to say!

(For serious buyers, sourcing large quantities, we recommend you read our Full Report on **How to Avoid International Commerce Fraud**. To request a **FREE report**, send us an email.)

Videos

Shenzhen Houyi Lighting Co., Ltd

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New products

LED Grow Light | LED Aquarium Light | LED Commercial Light | LED Swimming Pool light

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Pool lights expert---producing and offering only high quality lights

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We are committed to providing high quality LED Underwater Light to bring water with brilliant colors. LED Underwater Lights are widely used for underwater decoration, such as swimming pool, public fountain, etc, which has become increasing popular in hotel, public square, stadium, tourist place ... We select high power LED lamp to create maximum bright...

The advantages of houyi LED High Bay Lights-High Luminous Efficiency

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We have patent professional optical reflector with a large beam angle available, it creates good Lux value and with patent optical reflector, it ensures good irradiated area. 1.We offer more color options to create better lighting effects; 2.Our new

optical reflector, it ensures good installed area. 1.We offer more color options to create better lighting effects, 2.Our new color combination providers users or distributors more options to decorate swimming pools or fountains in th...

The advantages of houyi LED High Bay Lights-High Quality Assurance

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Houyi holds strong ability in research and development of COB technology which Houyi LED high bay light enjoys superior luminous efficiency and best quality performance and quality assurance. Over 5-year rich experience in research and development of COB technology ensures strong quality assurance of our LED high bay light, it largely guarantees the long li...

Houyi high quality dimmable led aquarium lights

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We adopt world famous brand LED chip for our LED Aquarium Light to ensureexcellent quality performance, and we received perfect satisfactions among our clients around the world. 1.Perfect color uniformity achieved by application of latest secondary lens 2.High luminous efficiency ensured by high power LED lamp and quality LED chip The specifications of...

Houyi led high bay lights-An increasing popular ideal lighting fitting...(2)

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Houyi LED high bay lights adopt the latest COB technology to achieve higher luminous efficiency and lower power consumption and the new heat dissipation design makes our LED high bay light enjoys much longer lifetime than normal high bay light in the market. The specifications of led grow lights: ...

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szgreenlight
admin@ledaquagrow.com
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F3/B2, Yi-Jia-Yang Industrial Park, Huaming Rd, Dalang, Longhua, Shenzhen, China

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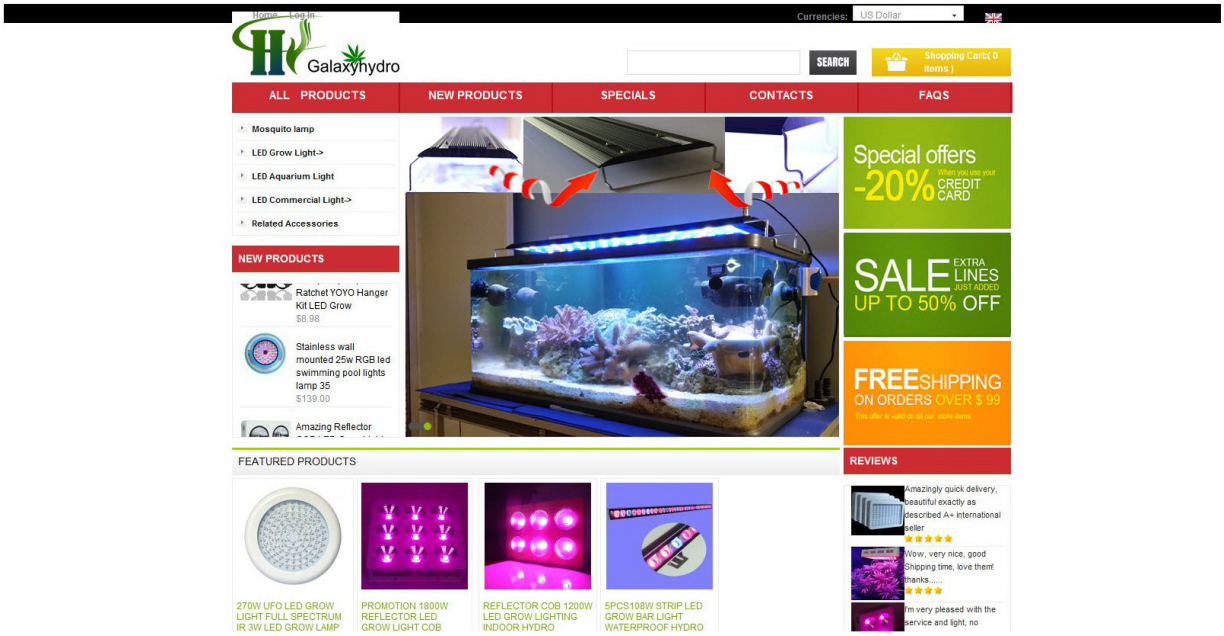
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270W UFO LED GROW LIGHT FULL SPECTRUM IR 3W LED GROW LAMP
PROMOTION 1800W REFLECTOR LED GROW LIGHT COB
REFLECTOR COB 1200W LED GROW LIGHTING INDOOR HYDRO
5PCS108W STRIP LED GROW BAR LIGHT WATERPROOF HYDRO
Amazingly quick delivery, beautiful exactly as described A+ international seller
Wow, very nice, good Shipping time, love them! thanks.....
I'm very pleased with the service and light, no

Feedback

IR 3W LED GROW LAMP PLANTS
~~$94.50~~ **$84.50**
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GROW LIGHT COB PANEL HYDRO MEDICAL
~~$799.00~~
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INDOOR HYDRO COMMERCIAL
~~$559.00~~
Sale:$540.55
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WATERPROOF HYDRO PLANT
$299.90
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FREE SHIPPING APOLLO-LED PANEL, FULL SPECTRUM LED GROW LIGHT
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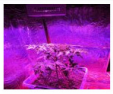

COB 200W LED GROW PANEL REFLECTOR LIGHT FULL SPECTRUM MEDICAL
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2PC 300W LED GROW LIGHT 9 BAND REAL 3W

problem recommending to anyone

Shipment was perfect!!! 1Product is the best OW YEAHHH!!! THANK YOU

Item that I wanted was received, fast shipping, good experience.

Fast shipping great item description very happy with my purchase

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LIGHT 9 BAND REAL 3W LEDS IR

$189.50

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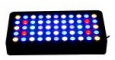

165W DIMMABLE FULL SPECTRUM LED AQUARIUM LIGHT MARINE REEF CORAL

~~$158.60~~ **$99.50**

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600W PANEL INDOOR PLANT GREENHOUSE HYDROPONIC SYSTEM

~~$259.70~~ **$210.00**

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270W UFO LED GROW LIGHT FULL SPECTRUM IR 3W LED GROW LAMP PLANTS

~~$94.50~~ **$84.50**

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300W IR FULL SPECTRUM LED GROW LIGHT INDOOR HYDROPONIC

~~$144.70~~ **$97.90**

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NEWS

RGB LED Underwater Light

LED Aquarium Light With Wifi Controlled By Cellphone or Tablet

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Indoor Lighting

As our name suggests, we deliver **high quality**, state-of-the-art LED lighting at the lowest possible prices.

Based in Northern California, our team consists of professional lighting engineers, energy consultants, and a sales & support staff committed to providing world class products and service.

Why do business with us?

For the End User
Our LED lighting products deliver tremendous value and performance with rock solid support.

For the Distributor/Retailer
Our products give your customers access to **high quality** LED lighting at very attractive prices while our dedicated support staff ensures you receive orders quickly with superior after sales service.

Featured Products

Today's Super Deal!

LED Tube Light

more info
Reg. Price $35.00
Sale Price: $30.00
Savings: $5.00

Lower your energy costs by 50% with our LED T8 tubes. A standard T8 fluorescent tube uses 36 watts. Our UL listed bulbs use only 18. Simple installation. Superior light output. Unique design featuring rotatable end caps allow the bulb to be rotated in the fixture so you can aim the light where you want it. See why contractors, electricians and 1000's of others are switching to

support staff ensures you receive orders quickly with superior after sales service.

Private Label / OEM & Customization Services
Do you have an LED product you would like us to produce under **YOUR BRAND**? Do you already manufacture a product and want to offer your customers LED lighting as an upgrade option? We can help. We can provide private label, customization and OEM services. Call us toll free at 855.533.5377 or email sales@ledlighting4less.com

If you are an institutional buyer, facilities/operations manager, retailer, distributor, need volume pricing or require OEM/Private label or customization services, please call us toll free at 855.533.5377 or email sales@ledlighting4less.com.

In addition to General Illumination (white lighting), we are the recognized leaders in LED grow light technology and our award winning AquaUFO™ aquarium lights offer the best performance/value option in the industry.

Please visit **www.HobbyLEDs.com** to see our full line of LED products for the *RC/Hobby, Off-Road, Horticulture, Aquarium and DIY markets*

1000's of others are switching to our T8 LED tube lights.

Top Sellers

LED Strip Light Kit
Our Price: $49.99

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AquaUFO + Red
List Price: $249.99
Our Price: **$199.99**
Savings: $50.00
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Featuring our proprietary blend of **6500K white, 660nm**

AquaUFO LED Aquarium Light
List Price: $249.99
Our Price: **$199.99**
Savings: $50.00
more info
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The AquaUFO™ 90 watt Reef Capable LED aquarium light

Featuring our proprietary blend of **6500K white, 660nm red and 460-470nm lunar blue LEDs**, the all new AquaUFO +Red™ LED aquarium light exceeds the performance of a 500 watt Metal Halide and outperforms other LED aquarium lights costing twice as much.

Featuring the same massive 2 watt LEDs that all our AquaUFO™ models are known for; light penetrates deep into the tank producing eye popping colors and fantastic shimmer effects. Your fish, plants and corals will never look better and the growth rates of your plants and corals will astound you.

The AquaUFO™ 90 watt Reef Capable LED aquarium light exceeds the performance of a 500 watt Metal Halide and outperforms other LED reef capable lights costing twice as much. Simply put, it will rock your tank.

The AquaUFO™ features massive 2 watt 6500K and Lunar Blue LEDs that penetrate deep into the tank producing eye popping colors and fantastic shimmer effects. Your fish, plants and corals will thrive & flourish

New Feature! Dual power switches and dual power cords allow actinics and whites to be controlled indpendently. Bring your blues on in the morning, add the 6500ks at high noon, etc.

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Grow Spot LED Grow Light
List Price: $74.99
Our Price: **$39.99**
Savings: $35.00

more info

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The energy squeezing GrowSpot™ LED grow light uses just 12 watts of power and provides the perfect blend of light needed for **fast & vigorous plant growth**. GrowSpots fit into any standard light socket making them extremely versatile and easy to use. Four models to choose from. **Mixed Spectrum / BloomBooster / Vigorous Veg / 6500k Daylight White.**

GrowPro 300 Watt LED Grow Light
List Price: $649.99
Our Price: **$499.99**
Savings: $150.00

more info

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The commercial grade GrowPro 300 rivals the output of a 600 watt metal halide or HPS grow light. Featuring massive, multi-watt LEDs and broad spectrum coverage for a 16 sq ft garden, plants grown under the GrowPro 300 produce lush leaves with big buds, fruits and flowers.

BloomBooster / Vigorous Veg / 6500K Daylight White.
Just screw one in and you're ready to **Glow Your Own®**. The results will amaze you.

GrowPro 600 Watt LED Grow Light
List Price: $999.99
Our Price: **$799.99**
Savings: *$200.00*

more info

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The commercial grade GrowPro 600 LED grow light exceeds the output of a 1000 watt metal halide or HPS lamp. Featuring massive, multi-watt LEDs and broad spectrum coverage for a 25 sq ft garden, plants grown under the GrowPro 600 produce lush leaves with, big buds, fruits and flowers

GrowPro UFO 90 Watt LED Grow Light
List Price: $229.99
Our Price: **$179.99**
Savings: *$50.00*

more info

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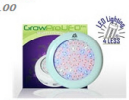

The #1 selling LED grow light of all time is more powerful than ever!Featuring multi-watt chipsets and broad spectrum coverage, the GrowPro UFO™ LED Grow Light replaces a 400w HPS and provides coverage for a 9 sq. ft. growing area. No ballasts or reflectors needed – just plug it in and you're ready to **Glow Your Own®**

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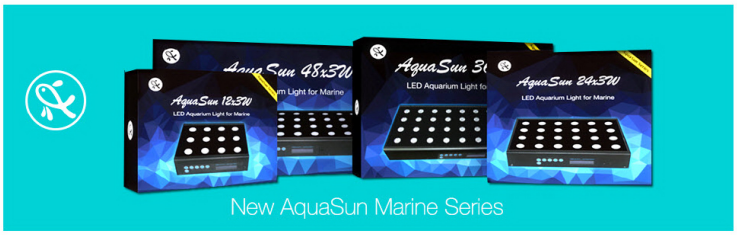

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Spider™ COB LED Grow Light

Excellent uniformity and High Par Value output , Ideal product to replace the traditional HPS/HID.

Model Number:Spider04
Type of Light Source:High Power COB Chip
Quantity of LED:4pcs 108w COB LED
Input Voltage(V):AC100-240V
Input Current(mA):600mA
Frequency:Frequency50/60Hz
Power(Theory):360W
PF:0.9902/110V(0.9621/220V)
Wavelength Range:270~850nm
Color of Lamp:Body Black
Beam Angle:60/90/120 degree
Lumen output:17280lm
Par Value:200mm:6054.9μmol
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Super™ High Power LED Gorw Light

Excellent uniformity and High Par Value output , Ideal product to replace the traditional HPS/HID.
Model Number:S6
Type of Light Source:High Power 3w Chip
Quantity of LED:180pcs 3w high power LED
Input Voltage(V):AC100-240V
Input Current(mA):600mA
Frequency:Frequency50/60Hz
Power(Theory):576W
PF:0.99/110V(0.97/220V)
Wavelength Range:370~850nm
Color of Lamp:Blue
Beam Angle:140 degree
Lumen output:20160lm
Par Value:300mm:2700.9μmol
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Apollo™ High Power LED Gorw Light

Excellent uniformity and High Par Value output , Ideal product to replace the traditional HPS/HID.
Model Number:A16
Type of Light Source:High Power 3w Chip
Quantity of LED:336pcs 3w high power LED
Input Voltage(V):AC100-240V
Input Current(mA):600mA
Frequency:Frequency50/60Hz
Power(Theory):1008W
PF:0.99/110V(0.97/220V)
Wavelength Range:370~850nm
Color of Lamp:Red
Beam Angle:140 degree
Lumen output:3813.6lm
Par Value:300mm: 4800.52 μmol
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Classic™ High Power LED Gorw Light

Excellent uniformity and High Par Value output , Ideal product to replace the traditional HPS/HID.
Model Number:TL-01
Type of Light Source:High Power 3w Chip
Quantity of LED:45pcs 3w high power LED
Input Voltage(V):AC100-240V
Input Current(mA):600mA
Frequency:Frequency50/60Hz
Power(Theory):135W
PF:0.99/110V(0.97/220V)
Wavelength Range:370~850nm
Color of Lamp:Black/White
Beam Angle:60/90/120 degree
Lumen output:3000lm
Par Value:1200mm: 10.8 μmol
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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High™ Power LED Gorw PAR Light

Excellent uniformity and High Par Value output , Ideal product to replace the traditional HPS/HID.
Model Number:TL-16
Type of Light Source:High Power 3w Chip
Quantity of LED:16pcs 3w high power LED
Input Voltage(V):AC100-240V
Input Current(mA):500mA
Frequency:Frequency50/60Hz
Power(Theory):48W
PF:0.9/110V(0.88/220V)
Wavelength Range:370~850nm
Color of Lamp:Black/White
Beam Angle:60/90/120 degree
Lumen output:2000lm
Par Value:1200mm: 6.8 μmol
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

Life Span(hrs):50000Hrs

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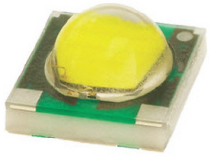

Grow™ Accessory

Excellent uniformity and High Par Value output , Ideal product to replace the traditional HPS/HID.
Model Number:TL-A-LED
Type of Light Source:CREE XPE2
Quantity of LED:1
Input Voltage(V):AC100-240V
Input Current(mA):700mA
Frequency:Frequency:50/60Hz
Power(Theory):3W
PF:/
Wavelength Range:630nm/460nm/610nm/
Color of Lamp:/
Beam Angle:120 degree
Lumen output:Depend on Color
Par Value:/
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Dolphin™ Aqua Series

Cree LEDs with Meanwell UL power supply , touch intelligent screen make your life better.

Model Number:Crab1
Type of Light Source:CREE XPE
Quantity of LED:36
Input Voltage(V):AC100-240V
Input Current(mA):600mA
Frequency:Frequency50/60Hz
Power(Theory):108W
PF:>0.99
Wavelength Range:460nm/14000k/420nm/630nm
Color of Lamp:Black
Beam Angle:30/60/90/120 degree
Lumen output:3600lm
Par Value:380x180x45mm
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Programmable™ Series LED Aquarium Light

Programmable controller with rich spectrum to make your coral , fish more colorful!
Model Number:TLA-02
Type of Light Source:EPI
Quantity of LED:55
Input Voltage(V):AC100-240V
Input Current(mA):550mA
Frequency:Frequency50/60Hz
Power(Theory):175W
PF:>0.99
Wavelength Range:460nm/14000k/420nm/630nm/DIY
Color of Lamp:Black/White(can be selected)
Beam Angle:60/90/120 degree (extra lens)
Lumen output:17500lm
Size:300mm:440x212x67mm
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Knob™ Dimmable Series LED Aquarium Light

Knob dimmer can get the ideal brightness based on your requirements, to make your coral , fish more colorful!
Model Number:TLA-02N
Type of Light Source:EPI
Quantity of LED:55
Input Voltage(V):AC100-240V
Input Current(mA):550mA
Frequency:Frequency50/60Hz
Power(Theory):175W
PF:>0.99
Wavelength Range:460nm/14000k/420nm/630nm/DIY
Color of Lamp:Black/White(can be selected)
Beam Angle:60/90/120 degree (extra lens)
Lumen output:17500lm
Size:440x212x67mm
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Classical™ Aqua Series

High cost performace, affordable, stable quality products for your coral, fish, plants etc!.
Model Number:TLA-01
Type of Light Source:EPI
Quantity of LED:50
Input Voltage(V):AC100-240V
Input Current(mA):550mA
Frequency:Frequency50/60Hz
Power(Theory):150W
PF:>0.99
Wavelength Range:460nm/14000k/420nm/630nm/DIY
Color of Lamp:Black/White(can be selected)
Beam Angle:60/90/120 degree (extra lens)
Lumen output:15000lm
Size:465x125x67mm
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Par™ Aqua Series

The Aquar PAR Lights are suitable for the small tank or you need the high penetrate !
Model Number:TLA-P12
Type of Light Source:EPI
Quantity of LED:12
Input Voltage(V):AC100-240V
Input Current(mA):450mA
Frequency:Frequency50/60Hz
Power(Theory):36W
PF:>0.88
Wavelength Range:460nm/14000k/420nm/630nm/DIY
Color of Lamp:Black
Beam Angle:60/90/120 degree (extra lens)
Lumen output:1200lm
Size:D122x121mm
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

Life Span(hrs):50000Hrs

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Aqua™ Accessory

The Accessories include the timer, par light fixture, hanging kits, auqarium light fixture, holder etc. !
Model Number:TLA-AS01
Head Materials:PC
Plug:AU/US/EU/UK
Input Voltage(V):AC100-240V
Head:Single/Double
Holder materials:Aluminum Alloy/ Plastic
Goose length:300mm/600mm
Goose Cover:Black/Silver
Removable:Removable
Socket:E27
Power cord length:600mm
Loading Bearing:2KG(Max.)
IP rate:/
Working Environment:-25~55 degree
Life Span(hrs):50000Hrs

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Sent:	9/3/2015 4:54:40 PM
Sent As:	ECOM104@USPTO.GOV
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Please follow the instructions below:

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