



Plants, Light, and LEDs: Putting It All Together

Part 6 – Putting It All Together
SOLAROASIS - the last piece of the puzzle



Topics

- What does SOLAROASIS grow lighting offer?
- These lamps don't look bright enough.
- Comparing LED grow lamps to conventional lamps.
- Growing systems that work.

In the earlier parts of this paper we have shown that plants have very specific lighting requirement in order to support both growth and development. We also looked at the characteristics of conventional grow lighting products and discovered that they are merely modifications of standard room lighting products which are very inefficient grow lamps. In this part we'll look at how

SOLAROASIS is striving to meet the special challenges encountered in designing long-lasting, efficient plant grow lighting products.

What does SOLAROASIS grow lighting offer?

Superior Engineering

Our engineering staff have been designing and developing

LED-centric lighting appliances for the consumer market since 1992. This gives us a particular expertise in creating highly optimized LED lamp circuitry, which translates into products delivering optimal light intensity while maintaining the long service life expected of LED lighting.

Research and Development

SOLAROASIS received the first patent for an LED-based plant grow light designed specifically for use in commercial greenhouses and the home. By combining our knowledge of plant physiology with years of field testing, we created a blend of light colors designed to promote both plant growth and development. By targeting specific plant processes with



colors of light plants use efficiently we improve the efficiency of our products, which translates into savings in the greenhouse.

Engineering Forward and Backwards

Whenever possible, technological advances made during the development of future products are backward engineered into the current product line. This incremental development in two directions ensures our products are always as good as they can be. Historically this has meant that successive generations of our grow lighting products have increased light output while decreasing both energy use and waste heat.

Going Beyond Off-the-Shelf

SOLAROASIS products are manufactured in the USA from the finest electronic components we can procure. When the correct component isn't available, for instance if LEDs manufactured for general lighting aren't generating the particular wavelength of light we require, we work with manufacturers to custom manufacture components to our specifications. At the same time we are directing the development of radical new LED designs for use in our future products.

Just-in-Time Production Keeps Products Fresh

Using just-in-time production techniques means that as products are improved, the improvements move into production immediately. There's no point in stockpiling products only to have them fall behind the latest technology. We carefully schedule production runs to supply enough product for current needs, and no more.

Supporting Outside Research Efforts

Each year SOLAROASIS provides time and expertise to both public and private researchers, helping them keep their own research projects on the cutting edge of their fields. University

researchers, major research institutes and exciting technology start-ups have all benefited from our help. Helping other researchers often helps us see ways to improve our own technology, adding yet more depth to our research efforts.

Intelligent Product Design is Safe, Versatile, and Scalable

By itself a new technology has a lot of potential, but it isn't a solution. Additionally, LED products aren't constrained by the limitations of standard "glass bulb" lighting designs. Because of this, LED grow lighting designs must carefully balance the parameters of the target operating environment, the various ways in which the product may be used, as well as any special requirements of the customer, in order to maximize the potential of the technology.

The intelligent design of SOLAROASIS grow lighting products is the clear choice in LED grow lighting for commercial growers.

Low Voltage = Greenhouse Safety

Concerns for greenhouse worker safety lead greenhouse operators to favor low voltage devices for their growing operations. SOLAROASIS low voltage supplemental grow lighting is the safer alternative to standard, high voltage grow lighting.

Alternative Power Ready – With the growing availability of small scale alternative power generators, such as solar and wind power, commercial growers have more options than ever before to reduce or eliminate the need for outside power. SOLAROASIS grow lighting products are a perfect match for all kinds of alternative power generators.

Sleek Bar Design Reduces Crop Shading – If the supplemental grow lighting in your greenhouse is blocking more light than it delivers, there's no point in using it. To be as efficient as possible, supplemental greenhouse grow



Experimental laboratory appliance designed and fabricated by SOLAROASIS engineering for the Salk Institute

lighting should block as little sunlight as possible. The sleek bar design of SOLAROASIS grow lighting products ensures our grow lighting delivers maximum supplemental lighting while minimizing crop shading.

These lamps don't look bright enough

When the only grow lighting options available created a great deal of "white light" components that look very bright to the human eye, an obvious assumption was that the lights that appeared brighter were also supplying more grow lighting. And to a certain extent this was true. But with the development of the first generations of SOLAROASIS LED grow lighting this rule-of-thumb doesn't work well at all.

As we noted in part 4, the colors of light that appear very bright are not used as efficiently by plants, while those colors of light plants use for things like photosynthesis are at the very fringes of human visual perception and don't look nearly as bright as they really are. Because of this, there is a common misperception that the current generation of SOLAROASIS LED grow lights, with their color mix that narrowly targets the light colors plants use most efficiently, don't look bright enough to actually grow plants. In fact, the opposite is true. The human eye simply isn't sensitive enough to the light colors produced by SOLAROASIS LED grow lighting to accurately compare its growing power to that of standard grow lamps.

Comparing LED grow lamps to conventional lamps

There are two problems encountered when trying to compare LED grow lamps to conventional grow lamps. The first problem is that it is difficult to accurately measure the light output



of manmade light generators, and nearly impossible to accurately measure the light output of LED light sources of any type. The second problem is that the only standard available for

comparing the ability of manmade grow light generators is sunlight, which is nothing like any form of light from manmade light generators.

When all of the colors of light delivered by a manmade light generator are accurately measured and then weighted by how well they are absorbed by plant pigments it's possible to do a rough comparison of manmade grow light generators. When measured this way, SOLAROASIS grow lighting compares very favorably to other types of grow lighting currently used in commercial growing operations. When the energy savings from using efficient LED grow lighting are also taken into account the scales tip in favor of SOLAROASIS grow lighting.

Growing systems that work

In part 5 we learned that some types of supplemental grow lighting work better with one type of growing system, while other types of lighting work better with another type of growing system. This is likely due to the differing amounts of waste heat created by the various types of supplemental grow lighting and how sensitive a particular growing system is to air temperature.

When using SOLAROASIS supplemental grow lighting products the best results are achieved in combination with NFT (Nutrient Film Technique) hydroponic systems. NFT systems have a number of advantages, using very small quantities of water and fertilizer, and very simple, inexpensive equipment.

These days commercial growers can choose among many types of supplemental grow lighting products. Which type is best for a particular growing operation depends on many factors, including initial capital cost, longevity, and operating expense, as well as the availability of electricity and hazardous waste disposal issues. SOLAROASIS LED grow lighting products, with low energy use, alternative energy-ready design, and no hazardous waste disposal problems, offer many advantages to the commercial grower. But most importantly to anyone considering trying modern LED grow lighting, SOLAROASIS LED grow lighting has also been proven both in the field and in independent studies to produce plant growth comparable to many types of standard grow lighting widely used in commercial greenhouses.

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