



Plants, Light, and LEDs: Putting It All Together

Part 5 – Do Growing Systems Matter? Trying to avoid a recipe for disaster



Topics

- What is a “growing system”?
- What kinds of growing systems are available?
- Aren’t all growing systems different forms of the same thing?
- Does it matter which growing system I use?

What is a “growing system”?

A “growing system” is any set of equipment and procedures used for the management of growing plants. It can be as simple as growing tomato plants in your yard and watering them twice a week, or as complex as a fully automated commercial growing system in an industrial warehouse. For the purposes of this document, though, we’ll limit the definition of “growing system” to the equipment and procedures typically found in commercial greenhouse operations which include some form of man-made light generation, usually as a supplemental light source.

As these types of growing systems can be scaled to almost any sized operation, many of them have become available to plant enthusiasts in the home. For that reason the information here is useful to anyone interested in growing plants with a growing system that employs supplemental grow lighting.

What kinds of growing systems are available?

In commercial greenhouses growing systems are, to an extent, customized to match the plants that will be grown. For home use, many resellers offer prepackaged growing systems that are somewhat generic and may be used for growing many types of plants. Finally, all growing systems will include some form of environmental control features.

There are two basic types of greenhouse plant growing operations: those in which the plants are grown in some type of container, and hydroponic systems in which no container is used.

For container growing systems, commonly used when the plants grown will be resold, the container may be anything from a planting bed, to planting flats, to individual plant pots. In these systems the growing medium can be either soil or a soilless mix (i.e. a mixture

of sand, peat moss, vermiculite, or perlite), and may require a sterilizer to ensure the soil or soilless mix is weed and disease free.

Hydroponic systems are typically favored for production of crop plants, such as vegetables, because costs are lowered when soil and containers are eliminated, and the resulting plants are also cleaner. In these systems basic plant support may be provided by a small block of coconut coir, or rock wool, or, in some hydroponic systems, no supporting medium is needed.

There are many different types of hydroponic systems available, too many to list in this brief overview. One system of particular note because of its popularity is NFT, or Nutrient Film Technique. NFT systems attempt to provide the best of both worlds, offering excellent root aeration while keeping them continuously supplied with nutrient solution. To do this the plants are grown along sloped channels through which a thin film of nutrient solution runs constantly from top to bottom.

A number of environmental control systems are commonly included in greenhouse growing systems. Air temperature is controlled, usually by use of fans and vents, due to the prohibitive cost of air conditioning systems. In colder climates greenhouses may need additional heating, generally delivered by hot water or steam systems. CO₂ levels can be enhanced to improve plant growth. Fans may be used to improve air circulation and mixing. Supplemental lighting systems may also be included to extend day length or to provide higher light levels for improved growing. The most common lamps used for supplemental lighting are HPS (High Pressure Sodium), MH (Metal Halide), and



fluorescent tubes. A more recent addition in supplemental lighting for commercial greenhouses are LED-based grow lamps, which offer good performance with low energy use, and without adding to the heat load of the greenhouse.

All of these growing system components can be mixed and matched to create whatever type of environment is required.

Aren't all growing systems different forms of the same thing?

In their most basic sense, all growing system simply provide a plant with light, air (particularly CO₂ and oxygen), water, and nutrients. So to the extent that the various component parts of the growing system you envision are compatible, there are few limitations on the form your particular growing system can take.

There are, however, a few limitations that must be considered when designing a growing system, especially if supplemental grow lighting will be used. The most common forms of

supplemental grow lighting, HPS, MH, and fluorescent, consume a great deal of electrical energy, which is both costly and in short supply. They also generate waste heat, adding to the heat load of the greenhouse, which in turn increases cooling expenses. Fortunately these problems can be alleviated by the newer LED-based grow lamps, which

not only reduce the heat load but use much less electricity to operate. In fact, LED-based grow lamps are the only type of supplemental grow lamp available that can operate on solar or wind generating systems. This can be a major help for commercial greenhouses in areas that rely on supplemental grow lighting, but where electricity is in such short supply that they are unable to expand their operations

when relying on conventional grow lamps.

Does it matter which growing system I use?

For the most part plants will adapt to whatever growing system you provide, giving generally good results. For plants with particular needs it may be necessary to match the growing system to the plant, but this usually isn't a problem.

Which growing system you choose does become important, though, if you intend to use LED-based supplemental grow lighting. While good results are generally achieved when using LED-based grow lighting in combination with any growing system, it has been found that superior results are realized when LED grow lighting is used in combination with NFT hydroponic systems.

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