



# White Paper

## Benefits of Light Deprivation

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## Background

An historical agricultural practice in use for many centuries has gained widespread acceptance among current cannabis growers. Light deprivation is a method of changing the light cycle of flowering plants. The greenhouse uses blackout curtains to block light and deprives the crop of an extended photoperiod.

Prolonged periods of consistent darkness are nature's trigger for marijuana flowering. To induce flowering, plants need to be placed under 12 hours of darkness along with 12 hours of light each day. This process can be managed using shades or curtains along the sidewalls and roof of a greenhouse. The plants are tricked into thinking summer is over and that it is time to ripen.

The grower can receive potential extra harvests within the yearly growing season, and reduced operating costs through lower utility bills. In this white paper, we provide you with additional information on the significant benefits of light deprivation.

## Crop Efficiency

Without light deprivation, a cannabis grower can produce two or three harvests per year. By using light deprivation, the harvest total increases to three or four harvests per year. Here is a sample scenario based upon the following assumptions:

- 10 sq. ft. of growing plants = 1/2 lb. of harvested product
- Price = \$800 per lb. (wholesale)

When a grower produces three harvests per year from a 20,000 sq. ft. growing space, then crops may yield 3,000 lbs. per year with a wholesale value of \$2.4 million. With an extra harvest due to light deprivation, this revenue figure increases to \$3.2 million (four harvests) with a net growth of \$800,000 per year. The cost for the light deprivation system including installation is approximately \$90,000 with a nearly 9:1 return-on-investment within the first year, which is a remarkable gain.

This scenario helps explain the widespread popularity of light deprivation in cannabis growing. In any other type of manufacturing or agricultural process, obtaining this degree of efficiency gain or return-on-investment is nearly impossible. As a result, equipping a cannabis greenhouse with a high performing light deprivation system has become a standard practice.

## 2-Layer vs. 3-Layer

There is a common misconception among cannabis growers regarding the degree of darkness necessary from a light deprivation system. The blackout does not need to be 100% dark to obtain the expected efficiency gains. Often, growers struggle with the purchasing decision regarding 2-layer or 3-layer curtains. In a 2-layer curtain system, there is one layer of aluminum fabric with an additional layer of cloth fabric compared to two additional cloth fabric layers with the 3-layer system.

According to Dr. David Story, a researcher with Wadsworth Control Systems in Arvada, CO, the 2-layer system is sufficient from a plant perspective. He added that many growers prefer the 3-layer to ease their mind. Wadsworth performed a study using two different greenhouses, which is summarized below:

2-Layer	3-Layer
<ul style="list-style-type: none"> <li>• Outdoor solar reading of 1,250 micromoles</li> <li>• Spectrometer reading of 0.803 micromoles</li> <li>• Light reduction of 99.93%</li> </ul>	<ul style="list-style-type: none"> <li>• Outdoor solar reading of 1,030 micromoles</li> <li>• Spectrometer reading of 0.199 micromoles</li> <li>• Light reduction of 99.98%</li> </ul>

The study measured the difference in light reduction between the two fabric layers, and determined a modest result of .05%. With a 30 cent per sq.ft. price difference, the cost to equip the greenhouse is fairly small regardless of the number of fabric layers. Humans can perceive light inside a building structure while plants perceive no additional light benefit.

Many effective blackout systems have pinhole light leaks. If the grower believes the extra fabric provides additional comfort with marginal light reduction, then the 3-layer fabric may be the best option. However, many growers find the light performance of a 2-layer fabric to be adequate.

Seeking a darkness level beyond the capability of a greenhouse blackout system is often an inefficient use of time and resources. Obtaining darkness in excess of the 99.98% level in the 3-layer blanket does not usually provide a reasonable return-on-investment.

### Utility Cost Savings

Regardless of the number of fabric layers, major utility savings will occur. According to curtain manufacturer, Ludvig Svensson, the overall utility costs with a greenhouse are 50-75% lower than in an indoor warehouse growing environment. Heating costs are a significant portion of these combined utility costs. A light deprivation system inside a greenhouse can reduce heating costs by at least 50%.

Light deprivation systems are utilizing the power of natural sunlight, an abundant source of free energy, and can still create a dark environment. The use of sunlight reduces the role of artificial lighting. In a greenhouse, there are 25% fewer light fixtures used in the growing operation. This lower amount of lighting optimizes natural light from the sun and decreases financial operating costs. As a result, greenhouses become a more energy efficient growing environment. Greenhouses represent the best of both growing worlds – indoor and outdoor.

Greenhouse equipment components including light deprivation systems and lighting need to operate within the parameters of an environmental control system. With computerized automation controls, sensors monitor internal environmental conditions and trigger mechanical systems to align the conditions with targeted set points. These systems improve plant quality results and reduce overall utility costs.

## **Greenhouse Implementation**

As a greenhouse manufacturer and designer of customized greenhouses, Nexus integrates light deprivation systems into the engineered greenhouse design for each client by working with qualified vendors. This effort ensures the client that the light deprivation system will integrate with other greenhouse structural components. Construction implementation of components and equipment is completed by licensed general contractors. In the cannabis market, Nexus has over 80 quoted projects to clients in 15 states with over 500,000 sq. ft. of structures built since 2013.

## **About Nexus**

Nexus Corporation has served the greenhouse industry as a top US manufacturer since 1967. With a corporate office and production facility in Northglenn, CO along with an advanced manufacturing plant in Pana, IL, the company brings innovative designs, high quality products, and exceptional customer service to its [System 420™](#) hybrid greenhouse systems.

Nexus has a team of engineers (licensed in 49 states), sales, project management, customer service, and operations professionals dedicated to managing a greenhouse development project from start to finish. The team has expertise regarding the customized design components, efficiency features, and cost management strategies necessary to maximize crop yields and return-on-investment.

**For more information on greenhouses from Nexus Corporation, [click here.](#)**

## **Sources**

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