Grownetics Report:
Operational and Efficiency Gains in Controlled Environment Agriculture

12/5/2016

by: Entrepreneurial Solutions

in Association with

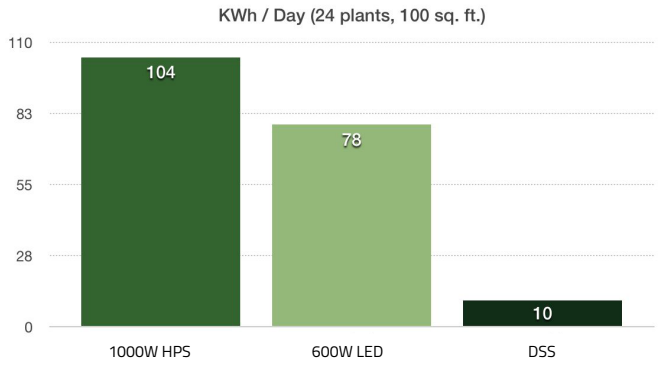
University of Colorado Boulder Leeds School of Business

Grownetics Operational and Efficiency Gains in CEA

Introduction

Grownetics combines software, hardware, and machine learning to offer the most complete solution for managing indoor agriculture. The philosophy that drives Grownetics is the desire to grow the best medicine and food sustainably, at scale and lead the world in advanced crop analytics and efficient indoor cultivation. Grownetics is the world's first fully integrated, hardware agnostic, controlled-environment agriculture (CEA) optimization platform. While Grownetics is currently targeting the cannabis cultivation industry, their product has the potential to bring significant innovation to the commercial agriculture industry. Herein, Entrepreneurial Solutions examines the efficiencies and cost savings gained using the Grownetics system as compared to analog and traditional automated systems.

Grownetics is the only holistic, multi-zone solution to greenhouse agriculture that includes monitoring, analytics, and automated control. For a grower with the triple-bottom line in mind, Grownetics offers significant energy, water, and labor savings.



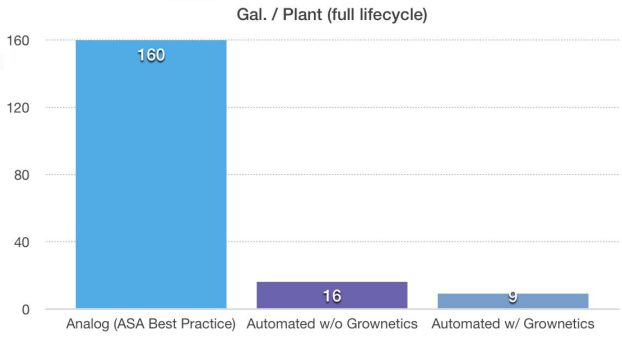
Lighting Energy Cost Savings

In a 100 square foot space with 24 plants, using the Grownetics enabled Dynamic Supplemental Sunlight (DSS) System drops lighting energy cost by 87%-90% when compared to traditional High Pressure Sodium (HPS) grow lights. This translates to a dollar amount savings of roughly $13.70 per day. An added benefit to lower lighting energy cost is that cooling costs will decrease as well. On average, energy costs account for 47% of total cannabis production costs.

Water Cost Savings

Grownetics enables water cost savings of 42%-94% when compared to an analog hand watered grow (using ASA Best Management Practices) and an automated grow without Grownetics. Furthermore, Grownetics is able to recapture and reuse 82% of the water in a typical hydroponic system.

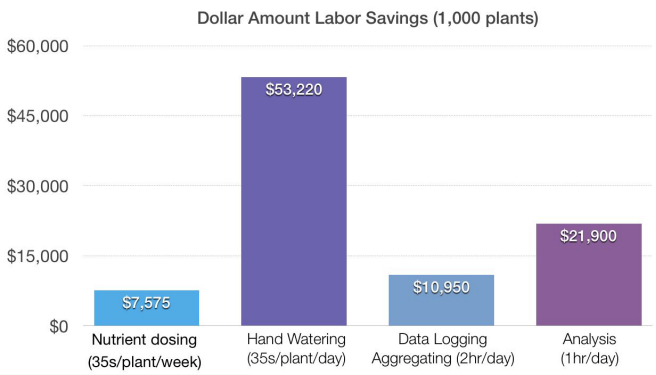
While water costs are very low compared to other inputs, water is an increasingly scarce resource. Growers should be aware of their environmental impacts and end-users will respond favorably to conscientious companies.



Grownetics Operational and Efficiency Gains in CEA

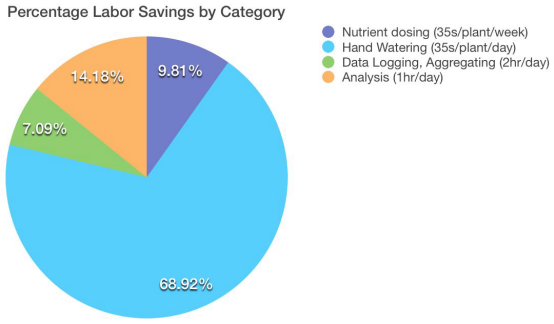
Labor Cost Savings

With proper integration of the Grownetics system, growers could see significant labor cost savings regardless of the size of their operation. Assuming a harvest size of .75 lbs per plant and 5 harvests per year, the labor cost savings that Grownetics systems enable could account for a margin increase of 1.25%. Comparing labor cost savings to overall cost of production, Grownetics has the potential to deliver a 27.75% decrease in cost of production. These calculations reflect an average $900 cost of production.



Data Logging

Cannabis growers spend approximately 30 hours per week logging and aggregating data. This amounts to roughly 4.5 hours per day. Growers could save almost 50% of the labor time and cost spent logging and aggregating data by using Grownetics (and data logging and aggregating only accounts for 7.1% of the labor cost savings that Grownetics enables).



Total Savings per Year Using Grownetics

Grownetics can be easily implemented with grow operations of any size. The chart and table below show the possible savings that Grownetics enables for grow operations between 10,000-500,000 square feet.

These savings range from $444,239.33-$22,211,955.25

Inputs	Input Savings 10,000 sq. ft.	10,000 sq.ft.	20,000 sq. ft.	50,000 sq. ft.	100,000 sq. ft.	250,000 sq. ft.	500,000 sq. ft.
Nutrient dosing	758 (hours)	$11,362.50	$22,725.00	$56,812.50	$113,625.00	$284,062.50	$568,125.00
Hand Watering	5,322 (hours)	$79,830.00	$159,660.00	$399,150.00	$798,300.00	$1,995,750.00	$3,991,500.00
Data Logging	548 (hours)	$16,425.00	$32,850.00	$82,125.00	$164,250.00	$410,625.00	$821,250.00
Analysis	1,095 (hours)	$32,850.00	$65,700.00	$164,250.00	$328,500.00	$821,250.00	$1,642,500.00
Water	781,950 (gallons)	$5,864.63	$11,729.25	$29,323.13	$58,646.25	$146,615.63	$293,231.25
Energy	372,384 (kWh)	$297,907.20	$595,814.40	$1,489,536.00	$2,979,072.00	$7,447,680.00	$14,895,360.00
Total		**$444,239.33**	**$888,478.65**	**$2,221,196.63**	**$4,442,393.25**	**$11,105,983.13**	**$22,211,966.25**

Sources include:
1. Hawkin, A., Ph.D., & Prieger, J., Ph.D. (2013, October 22). Economies of Scale in the Production of Cannabis.
2. Caulkins, J. P. (2010, July). Estimated Cost of Production for Legalized Cannabis.
3. O'Hare, M., Alstone, P., & Sanchez, D. L. (2013, September 7). Environmental Risks and Opportunities in Cannabis Cultivation.
4. Podorson, D. (2015, September 11). Harvesting Energy Savings in Cannabis Cultivation Facilities [E Source].

Data for this report was collected online and directly from Grownetics research projects. Entrepreneurial Solutions and the Leeds School of Business have not sought to further verify the accuracy of this data.