

Promising no-veg-phase cannabis trials achieve significant increase in yield and quality while saving costs

**Rooted
in science**





“Through advanced irrigation management with real-time GroSens sensors, we’ve achieved a 10-20% reduction in water and nutrient usage while maintaining optimal plant health”

*– Frank Janssen,
Product Development
Manager at Grodan*

*No vegetative phase
4th week after
transplant (left)
and with vegetative
phase week 6 (=4+2)*

What if cannabis growers could significantly increase their annual yields per square meter, while also improving flower quality and saving costs? Grodan has recently demonstrated that this could be possible in a ‘no-veg-phase’ cannabis research trial with Innexo. The promising initial results show that eliminating the vegetative phase enables growers to complete more crop cycles per year, reduce operational risks and make more efficient use of resources including labor, water and nutrients. Based on these exciting findings, the researchers believe that this new approach of shorter crop cycles has the potential to completely transform the cannabis industry in the next five years.

As part of its commitment to contributing to innovation in a range of high-tech crops for controlled environment agriculture (CEA), Grodan is involved in multiple research programs with respected partners. The company has already demonstrated that precision growing, in combination with stone wool growing media, can help cannabis growers achieve uniform, consistent, repeatable and therefore scalable results. Now taking this a step further, Grodan has recently investigated the possibilities for shortening the crop cycle as a way of helping cannabis growers to significantly increase their production and boost their profitability. The goal: to eliminate the vegetative phase.

“At Grodan, we are keen to use our knowledge and expertise to contribute value to our customers and to advance the market in general. The insights generated from research enable us to drive progress in horticulture by improving the propagation and cultivation advice we offer to growers,” comments Frank Janssen, Product Development Manager at Grodan.

“Much of our long-standing knowledge and experience in other high-tech crops can be applied to large-scale

cannabis cultivation. However, cannabis is such a unique crop that high-quality research requires dedicated staff with specialized knowledge and attention. That’s why we decided to work together with Innexo BV in Horst, the Netherlands, on this innovative ‘no-veg-phase’ cannabis research trial. It is the first research station fully focused on cannabis. We’ve been particularly pleased with Innexo’s highly skilled staff and premium service,” he adds.

Key findings

By skipping the vegetative phase, it is possible for cannabis growers to achieve:

- 6 crop cycles per year in a greenhouse
- 20-40% savings on energy costs
- 40% savings on labor costs
- 10-20% savings on nutrient costs
- A significant increase in annual yield per square meter



Overview of the training table at Innexo (week 2 to 6 of a 6 week cycle.)

Experimenting so that growers don't have to

"At Innexo, we prioritize standardization and energy efficiency to develop the cannabis cultivation systems of the future. We share a similar vision with Grodan, in that we believe knowledge exchange is key to accelerating innovation in the industry," says Dominique van Gruisen, Managing Director of Innexo.

"Cannabis is a relatively new industry with old 'roots'. There is a lack of specialized testing stations worldwide, so most growers do their own experimentation," he continues. "This results in unique but often overcomplicated processes and methods. At Innexo, we work with industry-leading voices to conduct experiments under scientific conditions – both in climate chambers and in greenhouses – so that growers don't have to jeopardize their commercial operations. We use our findings to develop and share simplified approaches that help growers to achieve uniform and repeatable results and therefore to scale up profitably."

"The combination of faster growth cycles and optimized irrigation has led to a significant increase in crop yields and a higher quality grade"

– Dominique van Gruisen, Managing Director of Innexo BV

The aim: to boost the grower's profitability

How did the idea for a no-veg-phase trial come about? "Nearly all cannabis growers include a vegetative phase in the crop cycle, usually because that's the 'traditional' way of doing things. But if you think about it objectively, keeping plants vegetative to produce biomass – i.e. foliage – that is later removed is counterproductive," explains Van Gruisen.

"After all, the plants require roughly 50% more hours of light in the vegetative phase than in the flowering phase, which has a big impact on a grower's energy costs for not only lighting, but also for heating, ventilation and air conditioning (HVAC). Moreover, the vegetative phase adds several weeks to the crop cycle, increases the risk profile for pests and diseases, and takes up valuable space in the greenhouse. So we decided to investigate whether it would be possible to skip the vegetative phase and boost the grower's profitability without compromising on quality," he adds.

Innexo had previously collaborated with Grodan on a cannabis irrigation project utilizing the GroSens sensors for substrate monitoring. "Therefore, we were keen to use Grodan's stone wool growing media and leverage the company's irrigation expertise in this project to explore the possibilities for growing cannabis without a long-day vegetative period," states Van Gruisen.

| Per m ² (ft ²) | 2 Week Veg | No-veg-phase | |
|--|------------|--------------|------|
| Yield (g/lb) | 712 / 157 | 622 / 137 | -13% |
| Annualized Yield* (g/year) / (lb/year) | 4111 / 906 | 4621 / 1019 | +12% |
| % Grade A (top flowers) | 20% | 35% | +75% |
| % Grade B (mids) | 55% | 60% | +9% |
| % Grade C (larf) | 25% | 5% | -80% |
| Cultivation labour** (minutes) | 414,80 | 262,50 | -37% |
| Light Energy (kWh) | 533,40 | 373,38 | -30% |
| Irrigation (l) | 494,40 | 440,40 | -12% |

* Annualized yield takes into account the number of crop cycles per year with veg in the same room as flowering.
** Cultivation labour is plant manipulations such as pruning, topping, deleafing, scouting etc. but excluding harvest.

Table 1. Summarized results comparing plants grown with a vegetative phase and without.

Results of the comparison: 2-week veg phase vs no-veg-phase

To find out how eliminating the entire vegetative phase would affect plant growth, production levels and flower quality, the research team compared a no-veg-phase approach against a cannabis crop cycle including a two-week vegetative phase. The results in the no-veg-phase crop were more than satisfactory, opening up interesting opportunities for growers to enjoy tangible benefits (Table 1):

Higher yield

Eliminating the vegetative phase shortens the overall crop cycle, which means that growers can fit in more cycles per year. "By eliminating just two weeks from each cycle, growers can take their annual number of cycles from four to six, which of course means a sizable increase in yield," comments Janssen. "And if the greenhouse has a separate compartment for the vegetative phase, the grower can reallocate this room to flowering, thus further increasing the production area."

Better quality

Buds formed sooner, resulting in earlier flowering. The overall flower quality was better too, with more consistency and an increased harvest index of 60-80%, resulting in more marketable flowers that command higher prices "This was a result of precision irrigation and a hands-off approach to crop maintenance, which caused less stress to the plants as a result of pruning, defoliating and topping," says Van Gruisen.

Less risk

Shorter cycles reduce the operational risks for growers. "The likelihood of crop failure increases toward the end of each cycle; the longer a cycle is, the more chance there is of infection or other issues that could potentially harm the crop. In the worst-case scenario, the crop fails and all the efforts in the previous weeks have been for nothing," explains Van Gruisen. "In the no-veg-phase approach, any issues can be detected early on, enabling growers to abandon the crop if necessary and restart quickly, without wasting valuable time or inputs."

Energy savings

The no-veg-phase approach achieves energy savings of 20-40% compared to a crop cycle with a two-week veg phase. "Finishing each cycle sooner can make a big difference for growers in terms of their input use – not only water and nutrients, but also energy inputs such as lighting, cooling and dehumidification," says Janssen.

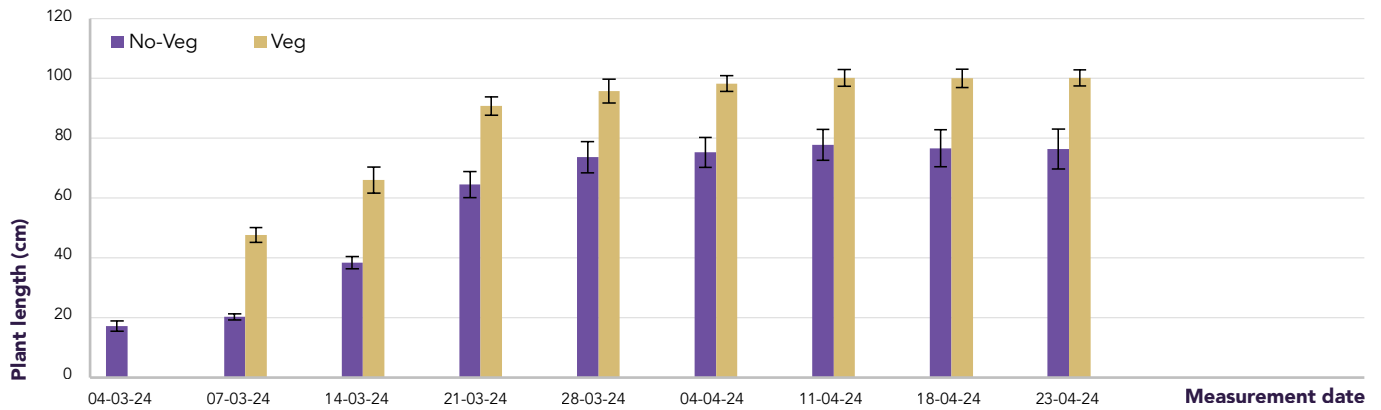
Less need for water and nutrients

The no-veg-phase plants grew to around 80cm (Graph 1) in height and remained more compact, with an approximately 40% smaller canopy and a higher flower-to-leaf ratio than the plants with a two-week veg phase. "Smaller plants support precise irrigation better than larger ones because they react faster to changes. This gives you better overall control over the crop steering. so it's easier to hit the target drain values, especially when working with our highly steerable stone wool growing media and GroSens sensors," explains Janssen. "In this trial, we have shown it is possible to significantly reduce the drain by eliminating the two-week vegetative phase from an eight-week cycle. As a result, growers can save 10-20% on water and nutrient use," he continues.

Reduced labor effort

Another benefit of compact plants is that they require less labor. "Think of less pruning, topping or defoliating, less scouting for pests, and less post-harvest work such as inspection and trimming. We've calculated that this adds up to labor savings of as much as 40%," comments Van Gruisen.

Plant length development, Hugo



Graph 1. Plant length development (cm) of plants grown with a vegetative phase and without.

The first two weeks are crucial

It is always essential to get a cannabis crop off to a good start by promoting strong root growth, but this trial illustrated that a shorter cycle makes the first couple of weeks even more critical than normal. “The most important lesson we learned in the trial is that there is zero margin for error in the first couple of weeks. Any issues that occur then will lead to problems in the rest of the cycle. Once growers have got past that stage, the subsequent weeks of the flowering phase are relatively easy to manage.”

So what should be the focus for the first couple of weeks? “It’s absolutely crucial to fine-tune the irrigation strategy to match the cultivar, growing media and climate requirements. Besides having good starting material, growers must create and maintain the optimal balance between the light, temperature and humidity, and the conditions in the root zone,” explains Janssen. “Strong and healthy roots need to be established at the start to lay the foundations for sufficient plant growth and flower production in the rest of the cycle. That’s why the irrigation strategy is so important.”

Finding the irrigation sweet spot

Grodan’s steerable stone wool growing media are ideal for this because they offer precise monitoring and control over the conditions in the root zone, including water content percentage (WC%), pH and electrical conductivity (EC). “The aim with the irrigation strategy is to cause controlled and uniform stress to the plant, because that promotes root growth. However, it can be difficult for growers to find the sweet spot between over-irrigating and allowing too much dry-back,” he continues.

In order to find that sweet spot, the research trial featured a lot of experimentation with different parameters, with all the irrigation and root-zone data monitored using GroSens sensors. “In terms of the initial irrigation setup, in some cases we started irrigating on day three, and in others we didn’t irrigate at all for the first week. We also explored how to manage dry-back, and the influence on stretch and flower formation,” states Janssen. “Not all strategies were successful, but that’s the point of a research trial – we wanted to push the boundaries. Even the outliers taught us something valuable.”



On the left no-veg-phase after transplant and on the right veg phase already 2 weeks after transplant.



On track to become the industry standard

“Even though we’re still at the research stage and further optimization is still possible, our annualized yields per square meter are already on track to significantly increase the industry average, while using fewer inputs. Provided everything is executed precisely, this streamlined and standardized method for faster cycle completion supports scalability and has a positive impact on a grower’s bottom line,” comments Van Gruisen.

“Around 2,000 industry professionals and thought leaders have visited our demo center over the past year, and everyone who has seen this approach in action leaves convinced that this is the way forward. So this method is already gaining traction in the industry, and we expect it to continue. In fact, in the next five years, I think it’s likely to become the industry standard for all growers who aren’t limited by plant count,” he adds.

“We believe that the no-veg-phase approach can provide considerable added value, both for our customers and for the industry overall,” agrees Janssen. “That’s why we will be conducting further research to validate these initial findings, and we will also incorporate the no-veg-phase method into Grodan’s future cannabis trials. All of this will allow us to fine-tune our advice for cannabis growers, such as through our five-phase model and other guidelines, so that we can continue to help growers save on inputs while optimizing their output,” he concludes.

Follow us

Get in touch with the technical experts from Grodan and Innexo for advice on your individual situation: **Frank Janssen, Product Development Manager at Grodan** frank.janssen@grodan.com
Dominique van Gruisen, Managing Director of Innexo BV dominique.vangruisen@innexo.nl
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Grodan is the global leader in supplying [soilless rootzone management solutions](#) for Controlled Environment Agriculture. These solutions are applied to the cultivation of vegetables, medicinal crops and flowers such as tomatoes, cucumbers, sweet peppers, eggplants, roses, gerberas and cannabis.

At Grodan, we aim to help feed and treat the world's growing population by innovating solutions from our stone wool growing media to enable 'more-with-less' growing. Through the method known as out-of-soil, our [stone wool substrates](#), [sensor systems](#), [software](#) and expertise support the reliable, informed growing of healthy, fresh, high-quality produce. Our material is 100% recyclable and supports growing methods that use up to 50% less water, 20% less chemical plant protection products and 75% less land. Sustainability plays a prominent role within Grodan, from manufacturing stone wool substrates to [recycling solutions and services](#).

Grodan has more than 50 years of cultivation experience. We pioneered the development of hydroponic growing methods in the 1960s, and today, our soilless rootzone management solutions are used in large-scale commercial greenhouses and indoor facilities in over 70 countries across the globe. The North America head office is located in Milton, Canada.

ROCKWOOL BV / Grodan

North America Head Office

8024 Esquesing Line

Milton, ON L9T 6W3

Canada

T +1-800-872-2476 (toll free)

T +1-905-636-0611

F +1-905-636-1901

info@grodan101.com (contact sales)

www.grodan101.com



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