

e-Gro Yield Forecaster:

Insights In Our AI Driven Prediction Model



Part of the ROCKWOOL Group

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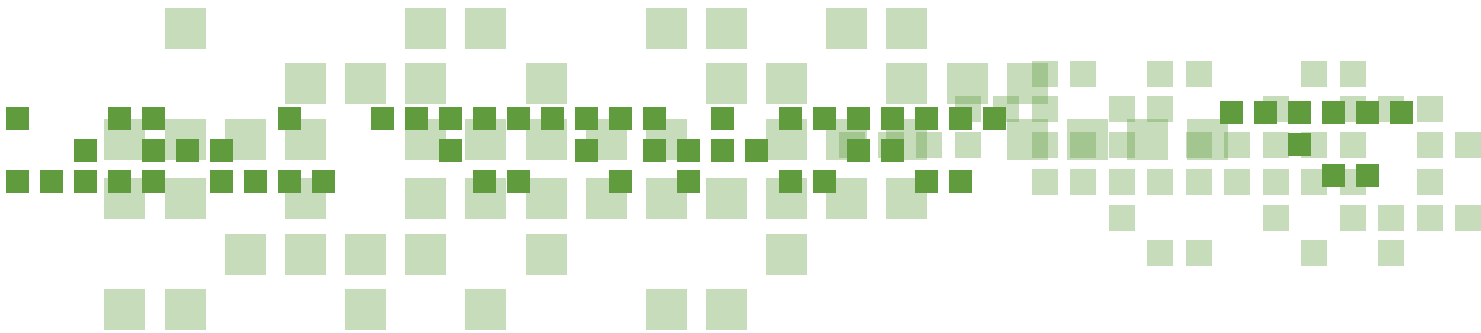
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Introduction

What if you could predict the future of your harvest based on data? What if you could plan ahead and make more data-driven decisions that saves time and takes away the guesswork? Due to a high demand for this type of technology, Grodan recently improved the Yield Forecaster in the e-Gro Essential Package in order to make this dream a reality. This module is driven by Artificial Intelligence (AI) and is uniquely tailored to your greenhouse. The power of AI allows us to correlate historical data with current situation, something that is impossible to do accurately without technology.



Chapter 1

e-Gro AI-Driven Yield Forecaster: Predicting the Future Without Guesswork



e-Gro's Yield Forecaster can add real value by predicting yield based on a combination of historical data. The innovative technology analyzes all the available data in your greenhouse, finds patterns and unlocks critical factors that influence yield. Simply put, it predicts your weekly harvest (kg/m²) into the future: 1, 2, 3 and 4 weeks out. And best of all? The module starts making predictions from the first moment you input data. Below I'll take you through all the benefits of this exceptional technology and we'll take a look at what the future holds.

Planning for success, anytime, anywhere

Making sure you have the right budget predictions, price calculations and labor planning is often challenging, time-consuming and difficult. Conditions in a greenhouse change constantly due to both indoor factors, such as climate, type of greenhouse and labor, and outdoor conditions, such as wind, sunlight and CO₂ levels. All of these factors affect the growth of your plants and, consequently, the quality and quantity of your harvested crops. These conditions change every day, so anticipating your next steps can be difficult. So how will the new Yield Forecaster module help you?

- 1 More accurate insights 4 weeks in advance**
With the Yield Forecaster you are able to calculate yield results four weeks in advance and compare the realized yield

- 2 Determine optimal product and price range**
You can aim for optimal product and price ranges based on yield forecast, making it easier to meet marketing and sales commitments. Additionally, the Yield Forecaster helps you gain a stronger position for price trading with third parties in the markets, such as trade organizations. Since the Yield Forecaster helps forecast how much harvest will be produced, the purchase of crops at inflated prices to cover shortages is reduced and therefore has a positive impact on your business.

- 3 Get more control**
With the Yield Forecaster you gain more control over labor

planning, packaging, storage and shipping thanks to predictions four weeks in advance, helping you to plan and control resources to save costs.

- 4 Optimize time and growth**
If you can predict your yield accurately using certain parameters like irrigation and CO₂ you can also determine how to adjust these to get more yield. In other words, you can optimize your growing.

- 5 Reduce food waste**
The better you can predict your harvest quantity, the better you can make decisions. Not only does this prevent extra costs because of bad market prices or warehouse costs, it ultimately saves food and lowers waste in order to become a more sustainable business.



Powered by data

Grodan's new Yield Forecaster is the next step in data-driven precision growing. There is so much data available in the greenhouse and we are increasingly able to combine this data to determine the correct insights and decisions. Manually this is complex, overwhelming, time consuming and often inaccurate. You need to determine the precise factors in order to improve the overall yield of a greenhouse and reduce needed resources. New technology, like Artificial Intelligence (AI) and Machine Learning (ML) allows us to make significant steps towards utmost efficiency and ease.

The Future of AI & Yield Prediction

Based on the experiences, data, and feedback from the market we continually improve e-Gro and the Yield Forecaster module. We are making great progress and are continually able to make use of more data and more variables. Within just one year we realized an enormous improvement in the accuracy of the model, which is a significant achievement.



We are making great progress and are continually able to make use of more data and more variables.



Chapter 2

How to improve your business with e-Gro's Yield Forecaster



In the previous chapter we explained Yield Forecaster and its user benefits. In this chapter we will go more in depth on how the latest version of the module works and, most importantly, how to get the most out of it.

Extensive set of data

e-Gro's Yield Forecaster makes use of an algorithm that examines an extensive set of climate, crop and rootzone parameters that can have an impact on yield. While this data would usually require a lot of time and effort for growers to gather and interpret, e-Gro's Yield Forecaster provides our users with fast, accurate and detailed insights into yield and greenhouse data.

How the module works

To put it in the most simple way possible, input data and output predictions. But of course the technology behind Yield Forecaster is far more complicated than this. The module takes certain variables such as climate (temperature, humidity, CO₂, etc.), crop specifications (type of crop & recently recorded crop parameters), greenhouse type (lit or non-lit, geolocation, etc.) and relates it to current and past harvest data. Using a machine

learning model (a model that was trained on historical data) it produces the corresponding predictions for the coming 4 weeks.

Starting with the Yield Forecaster in e-Gro

e-Gro is built with the user in mind and the Yield Forecaster is easy to find under the 'Production' tab. On this tab you will find:

- Clear KPIs with last week's and next week's harvest.
- Bar chart of the 1, 2, 3 and 4 week out yield forecaster and be able to compare actual and predicted yield.
- Harvest divided into Quality A (premium) and Quality B.
- The actual and predicted yield, which can be exported to a CSV file and be opened in Excel and shared with (external) crop advisors, as well as authorise (external) crop advisors or your colleague to access the production module.

Just getting started?

When you enter your first harvest data and other data connections made (with GroSens and your climate computer) then you can already see predictions. Current weeks harvest is required as a minimum, but over time it becomes more stable and more accurate. The model uses parameters from all possible sources. The parameters for 1 week out and 4 weeks out are usually slightly different; moreover, even if the inputs were the same for all week-outs, the Machine Learning (ML) model assigns different weights for different inputs in each week-out model. For example, last week's harvest could be very important for the 1 week out model, whereas it might be of no big importance for the 4 week out model.



Essential tips for your yield prediction

We would like to share with you the tips on how to get the most out of your yield prediction in e-Gro:

Tip #1: Actively and consistently use the module

By actively using and feeding the Yield Forecaster with the quality data (data is the food for ML & AI) you will receive the best and most accurate predictions. It is recommended to input production and crop data on the same day, at the same time, every week. Data entry should be made as standard and regular as possible. For example, do not make a stem length measurement by ruler one day and guess the length the next. Always use a ruler, always be consistent. The model is quite robust, but inconsistent input can have a negative impact in terms of expected accuracy.

Tip #2: Feed the model with accurate, quality data

Wrong data is worse than no data at all. Record everything as correct as possible and make sure you have the right connections and readings from sensors. This directly determines the quality of the data, which is just as important as the quantity of it. Be sure to enter the right data and don't let the input reflect event-driven decisions (such as harvesting more or less due to the market situation). Enter the amount what should normally be harvested or be sure to note harvest versus harvestable. The model does not yet use any speculation related external variable like prices; however, since it takes previous weeks' fluctuations into consideration, speculative or even pest/disease related movements in the harvest are captured and compensated for, to a certain extent.

Tip #3: Gather as much data as possible

Besides quality of data, the amount of data is also important. Also historical yield data is important for the model. The data keeps accumulating and we are adding all this data into training of the model, as well as adding additional parameters like more climate and crop related variables to enhance the model.

Tip #4: Work with the right system(s) and the right people

Make sure the right connections and platforms are used. Look for products that offer good and reliable data connections that collect and read the right data. Work with people that have a focus on quality, continuous improvement and accuracy. For example, the Customer Success Managers and Green Experts at e-Gro are always ready to help, advise and explain how to use the platform for utmost success. e-Gro is compatible with a variety of systems and climate computers. We are constantly working to add more systems and optimizing these connections.

Yield Forecaster, your partner in efficient growing

We are continuing in the direction of more autonomous and efficient growing where we can use less resources while achieving more yield. e-Gro and the improved Yield Forecaster is your partner and extra check in the growing process. The automated predictions by the Yield Forecaster will save the growers a lot of time, allowing them to focus on what they do best: growing.

Be sure to look out for our next big release in the first half of this year (2021), where the model will be improved even further with more data parameters included. Stay tuned for more.



Grodan supplies innovative, sustainable stone wool media solutions for the professional horticulture sector, based on Precision Growing principles. These solutions are applied for the cultivation of vegetables and flowers, such as tomatoes, cucumbers, sweet peppers, aubergines, roses and gerberas. Grodan offers stone wool substrates together with tailor-made advice and innovative tools to support Precision Growing and therefore facilitate the sustainable production of healthy and safe and tasty fresh food and products for consumers.

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