

T.1.3 YIELD MAPPING

What is this?

Yield mapping or *yield monitoring* is a precision-agriculture tool that collects geo-related data on yield levels, combining speed, grain moisture, altitude, and other relevant information. The data is collected as a result of the operation of several *sensors*. The information of them is combined with location data. Based on the data, a map is generated that facilitates visualisation.

Some additional information...

Yield mapping began in the early 1990s when *yield monitoring* equipment was introduced. It uses a combination of GPS technology and physical *sensors*, such as speedometers, to track crop yields, grain elevator speed, and combine speed.

Based on collected field data, a yield map is generated that can be used to compare yield distribution within the field from year to year. This allows farmers to determine areas of the field with different needs for inputs like irrigation, fertilisers, etc. It also allows farmers to show the effects of a change in field-management techniques, to develop nutrient strategies for their fields, and as a record of crop yield to use in securing loans or renters.

Despite of possibility of varying because of the scale of the farm and the crop being monitored, usually, the grain *yield mapping* system includes the following components:

- Grain flow sensor - monitors the volume of harvested grain;
- Grain moisture sensor - monitors grain moisture variability;
- Clean grain elevator speed sensor - An optional sensor in some mapping systems to aid in the accuracy of grain flow measurements;
- GPS antenna - receives a satellite signal;
- *Yield monitoring* display with GPS receiver - combines yield quantity information with geographic location information;
- Header position sensor - provides data from measurements recorded during turns;
- Ground speed sensor - determines the distance the combine travels in a certain time interval (sometimes the ground speed is measured with a GPS receiver, radar, or ultrasonic sensor.)

Obtaining correct data requires proper calibration of the *sensors*, which must be performed by a qualified person and in accordance with the operator's manual. Calibration is the conversion



ITFARM

of the sensor signal into physical parameters. During harvesting, a proprietary binary log file is created in which the data from all *sensors* are recorded as a function of time. This file can be converted to text format or visualised as a map using the software.

Precision agriculture's essence lies in using technology and data to carry out agricultural operations. The aim is to determine the characteristics of the production system and the optimization by type, time, and place of the input resources. This enables cost reductions, productivity increases, and maximum efficiency to be achieved.

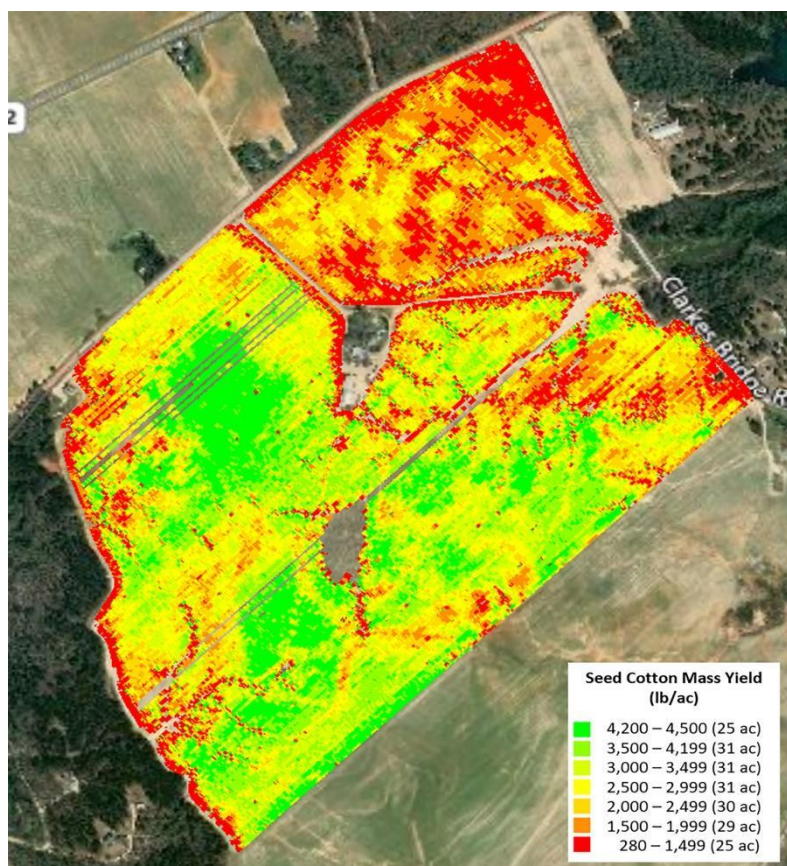
Yield monitoring is an essential element of precision agriculture. Through it, the quantities of harvested production and their variation by section in the growing crop system are identified, allowing refining decisions.

Yield monitoring provides variable data within a specific field. The data is generated as a result of the interaction between the main factors determining the parameters of the farm environment - management methods,

environmental factors, and climatic factors. Accumulating this data is crucial in implementing the concept of precision agriculture.

The use of *yield monitoring* data requires the provision of the following conditions:

- It is necessary to accumulate a more extended series of data - at least for five years- to make decisions for precision-farming interventions for another year;
- *Planning and scheduling of yield monitoring* or harvesting operations are required, as well as optimisation and correct calibration of hardware and software;



Source:

<https://newswire.caes.uga.edu/story/8214/yield-maps.html>



ITFARM

- Yield data, reflecting the variation of this indicator in different parts of the field, makes it possible to optimise farmers' decisions by combining them with the technical possibilities provided by precision agriculture.

Yield mapping visualises in detail the high and low-producing parts of the field. This allows farmers to analyse the situation and identify the factors and causes contributing to the observed yield level. The next step is to make decisions and plan measures regarding treatments, fertilisation, irrigation, crop rotation, etc., to overcome the low yield in the respective areas at optimized *costs*.

Along these lines, *yield mapping* brings some other *benefits* beyond the collection of yield data. The following can be mentioned as additional *benefits*:

- Financial *benefits*: Data on yields and their visualisation through mapping are accepted as reliable documentation for assessing the farm's production capabilities and their monetary expression, which is used when motivating solvency in front of financial institutions or when negotiating the amounts of rent, lease, etc. Crop yield maps and yield data are increasingly used as documentation to secure finance in the form of bank loans, leasing, etc.
- New product testing: Detailed yield data and resulting maps allow for precise analysis and informed decision-making on a new product or crop introduction approaches, and the resulting yield map provides an accurate answer to the results and potential of the culture.
- On-farm research: Accumulated datasets and their visualization allow for adequate statistical analysis when conducting experiments and testing hypotheses, facilitating research and leading to faster progress in the sector.

In conclusion: to summarize, farm *yield mapping* creates excellent opportunities in the decision-making process of farmers. The collected data allows informed and sound decisions to be made on many issues, contributing to increasing the farm's overall productivity, profitability, and sustainability.

Links

https://en.wikipedia.org/wiki/Yield_mapping

<https://cropwatch.unl.edu/ssm/mapping>

<https://geopard.tech/blog/yield-monitoring-in-precision-agriculture-importance-and-basic-components/#>





ITFARM

<https://datadragon.eu/2020/08/03/the-benefits-of-yield-monitoring-and-mapping/>

<https://www.aspexit.com/yield-maps-in-precision-agriculture/>

<https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/yield-mapping>

Video

<https://www.youtube.com/watch?v=Ll6XQc-oCe8>

<https://www.youtube.com/watch?v=5PRY7kCp6nM>

Keywords

Yield monitoring

Yield mapping

Sensors

Benefits

Costs