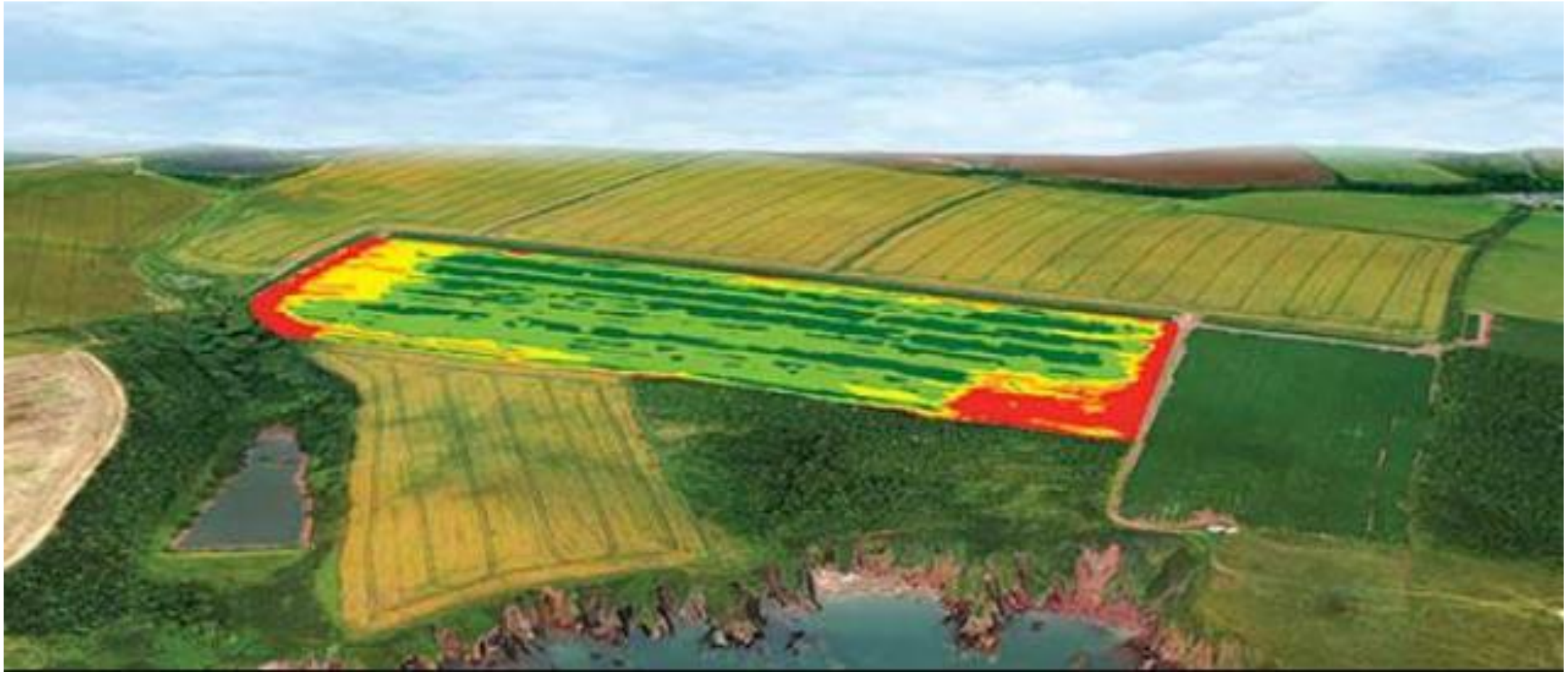
9. LESSON

OTHER POSSIBILITIES HOW TO ESTIMATE THE YIELD



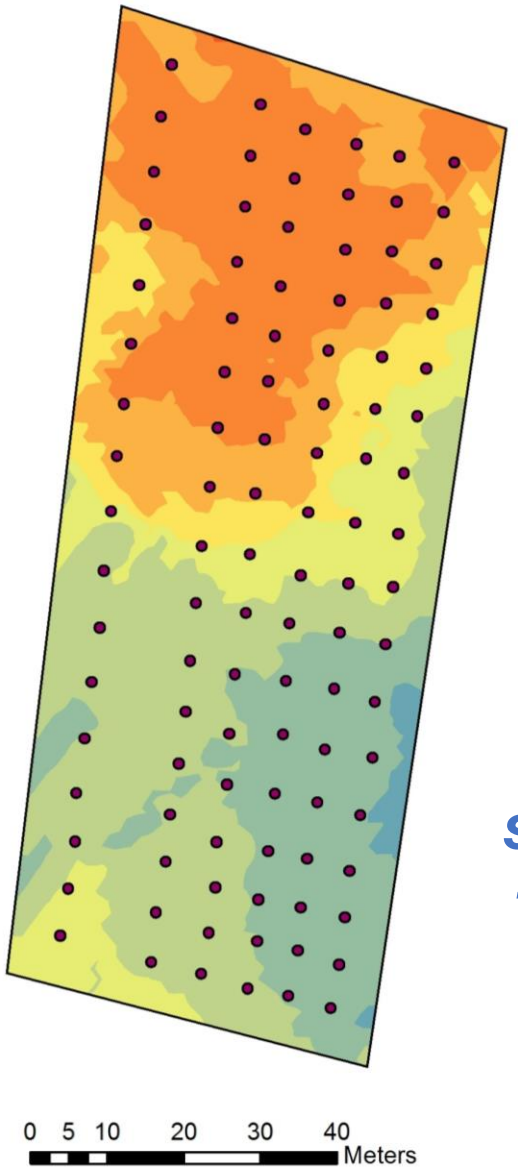
Hand measurement

Of course, it is also possible to take samples manually to determine yields. Yield samples are usually taken from an area of 0.25 m^2 of vegetation. Subsequently, they are converted to 1 m^2 and 1 hectare.

Sample of winter wheat from area of 0,25 m^2 for yield determination

All statistical and/or geostatistical principles must be respected when taking yield samples.

- It is still necessary to keep in mind the number of repetitions (usually at least 3 from the area of interest).
- To create a yield map using kriging or IDW, a minimum of 100 samples must be taken, but preferably 150. Otherwise geostatistical methods make mistakes.



Design of a sampling network for taking yield samples in order to create a yield map

The collected samples are then stored in well-marked bags and transported to the laboratory for further processing.
Yield samples must first be treshed.
A laboratory thresher is used for threshing.

Laboratory threshing machine. Above detail of a spike-tooth threshing unit.

Threshed yield sample must then be processed to separate the grain.

- First, larger straw particles need to be mechanically separated.
- Then the grain must be cleaned of lighter impurities.
- For this, a laboratory cleaning machine working on the principle of air flow is usually used.
- The cleaned grain is then weighed and its moisture is measured (usually using the oved drying method).
- The determined grain weight is re-calculated to standard moisture (usually 14%) and then to the required area (usually 1 hectare).

Yield sample after threshing

Example of a laboratory cleaning machine using the air stream principle of cleaning

Estimation of yield by remote sensing

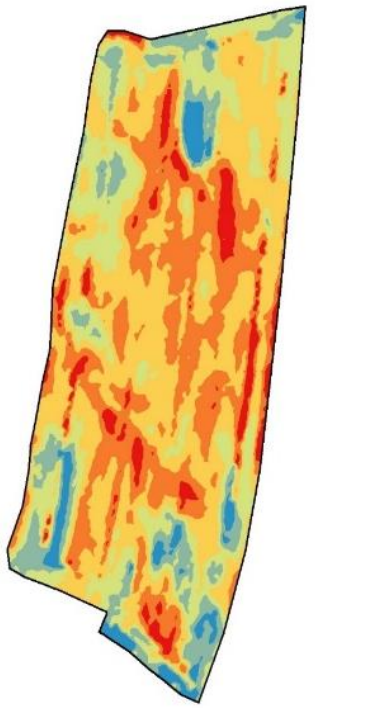
The eyes are watching. Satellite-based information gathering has been around since the early 1970s, but the information newer satellites can gather offers quick access to useful images throughout the growing season.

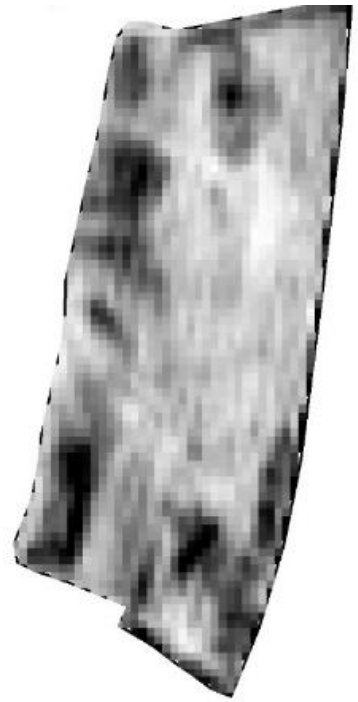
Pilot-controlled. Airplane-based information-gathering systems have existed for some time, and new tools like crop temperature measurement will add value to these services.

Remote-control monitoring. Unmanned aerial vehicles are growing in popularity and offer on-demand access to capturing field information; however, data processing can be a challenge for some. It's a technology in its infancy, with new software tools being developed.

Normalized Difference Vegetation Index (NDVI) can be derived from visible spectrum images, acquired from a satellite, aircraft or UAV.

- NDVI is a measure of healthy, green vegetation. The combination of its normalized difference formulation and use of the highest absorption and reflectance regions of chlorophyll make it robust over a wide range of conditions.
- The increasing value of NDVI points to higher density of the vegetation cover (higher leaf area index). Values approaching 1 indicate good growth in the later growth phase. NDVI can be used for differences in yield estimating.
- The absolute value of the yield cannot be determined in this way, but the relative differences in the yield are. This is still very interesting information from the point of view of precision agriculture.





Comparison of the yield map from 2018 and NDVI calculated from a satellite image taken on June 17, 2018

- Both maps correlate well with each other.
- Red spots on the yield map (higher yield) correspond to brighter places (higher NDVI value).
- Blue spots on the yield map (lower yield) correspond to darker places (lower NDVI value).
- A coefficient of determination of 52% was calculated between the two maps.

Thank you very much for your attention!

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