Remote sensing of plant physiology – an intersection of machine learning, remote sensing and photosynthesis

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30 years from now science will solve most of our pressing issues

www.smartcitiesworld.net


Except one: we are looking at
10 billion people at 2050 (+130%)

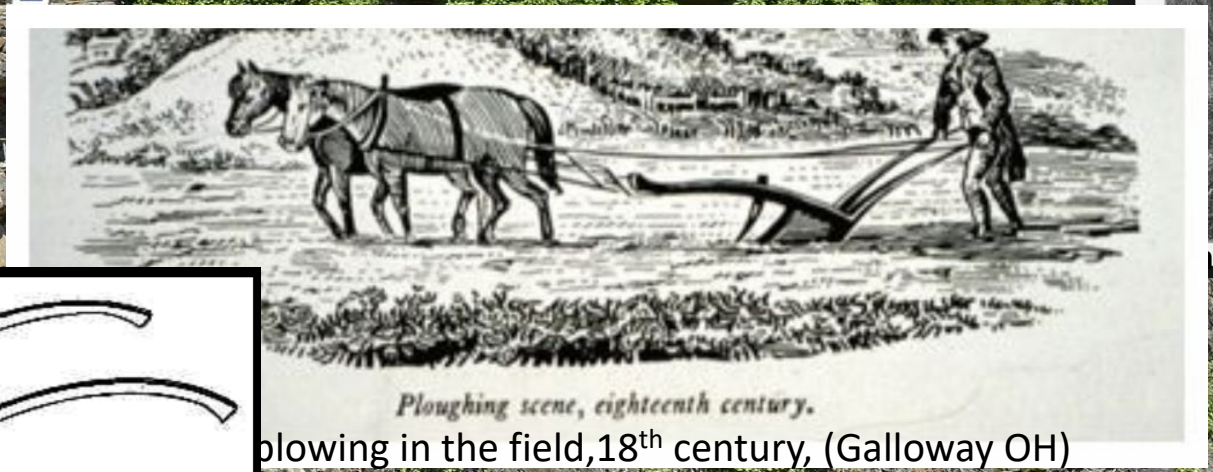
In order to survive we will need to increase agriculture produce per hectare

A promising approach to reach this goal is Precision Agriculture

www.openaccessgoverment.org

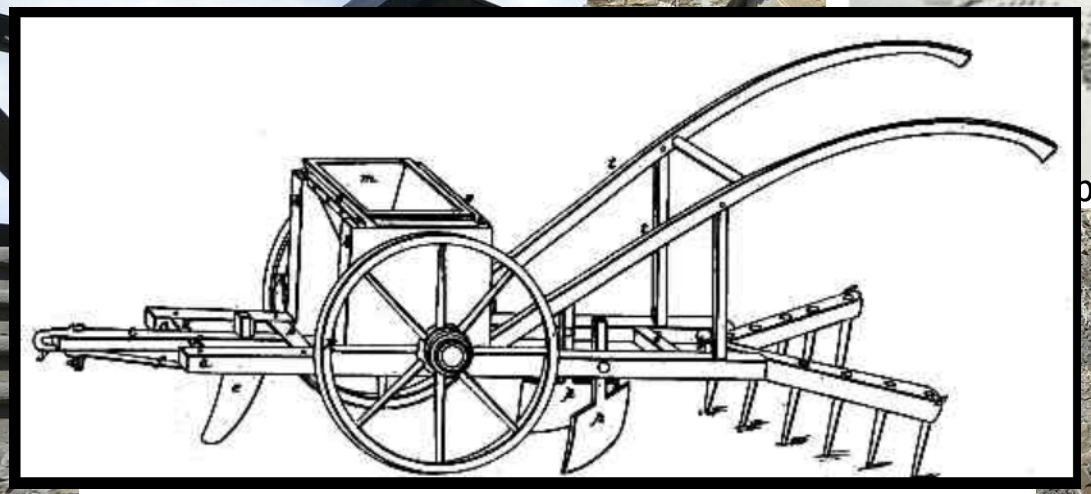
If we think about it, farmers were always interested in Precision Agriculture

yte (19th century) Netherlands)



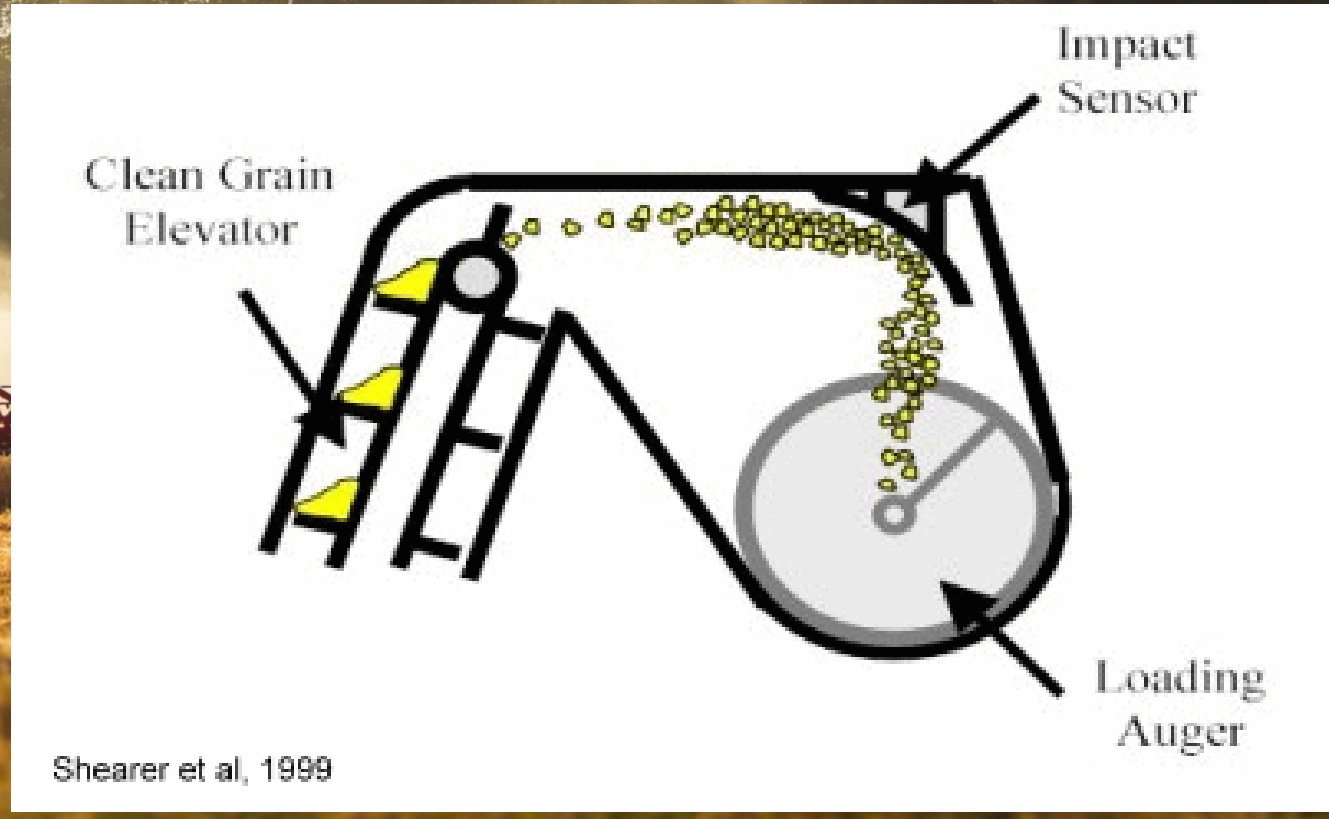
Ploughing scene, eighteenth century.

plowing in the field,18th century, (Galloway OH)



(Cotton Planter -Blair H, 1834- US Patent)

Precision Agriculture has seen explosion in techniques during the 70's of the previous century

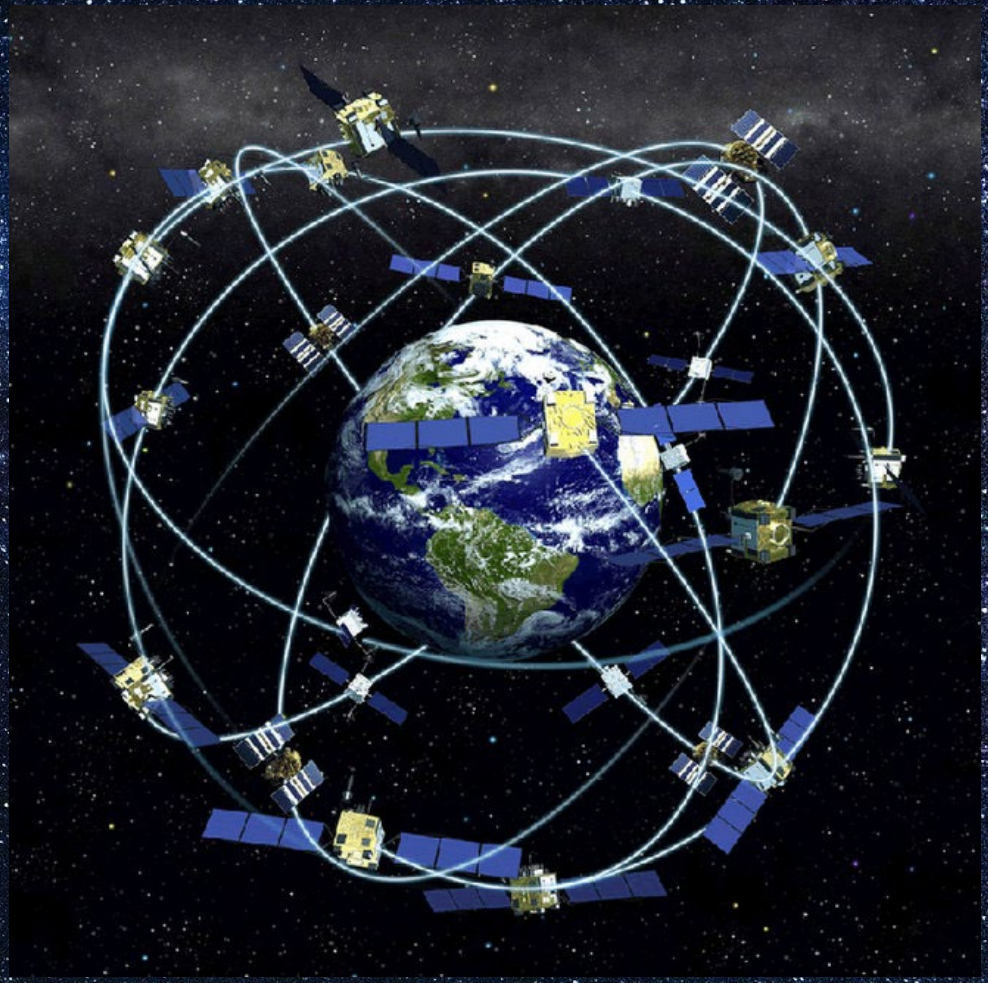


Shearer et al, 1999

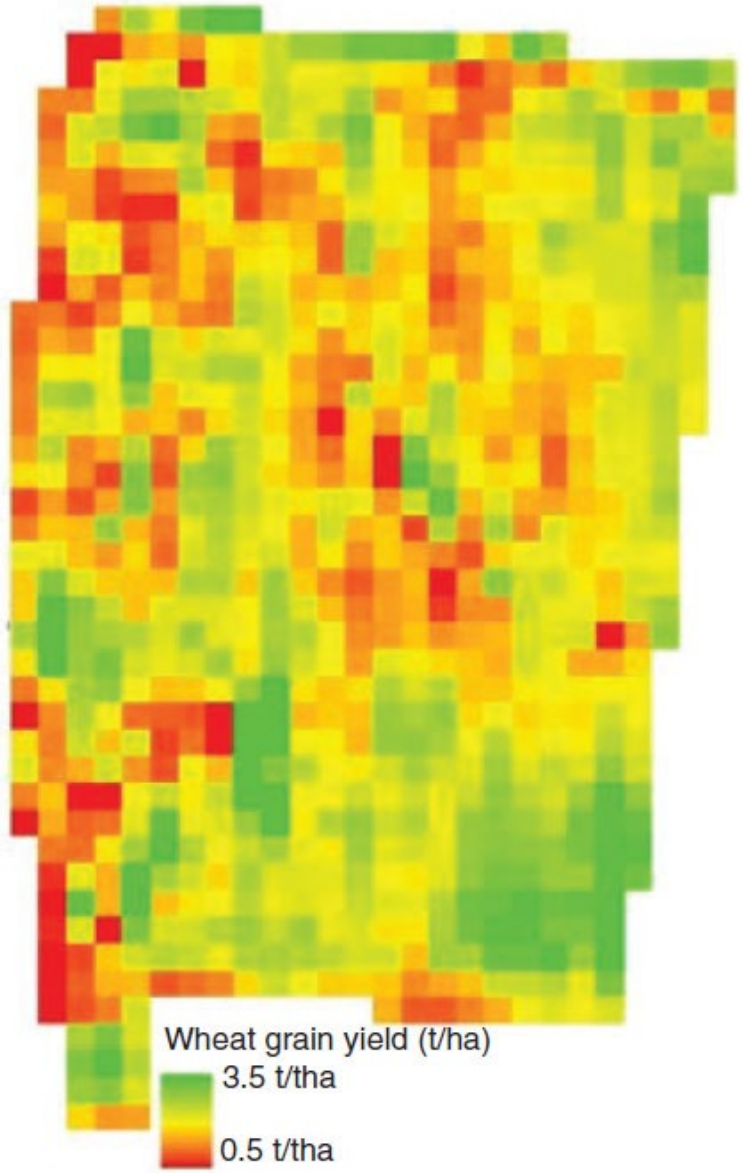
However, one invention, in a completely different area was going to change Precision Agriculture forever

Global Position System

NAVSTAR

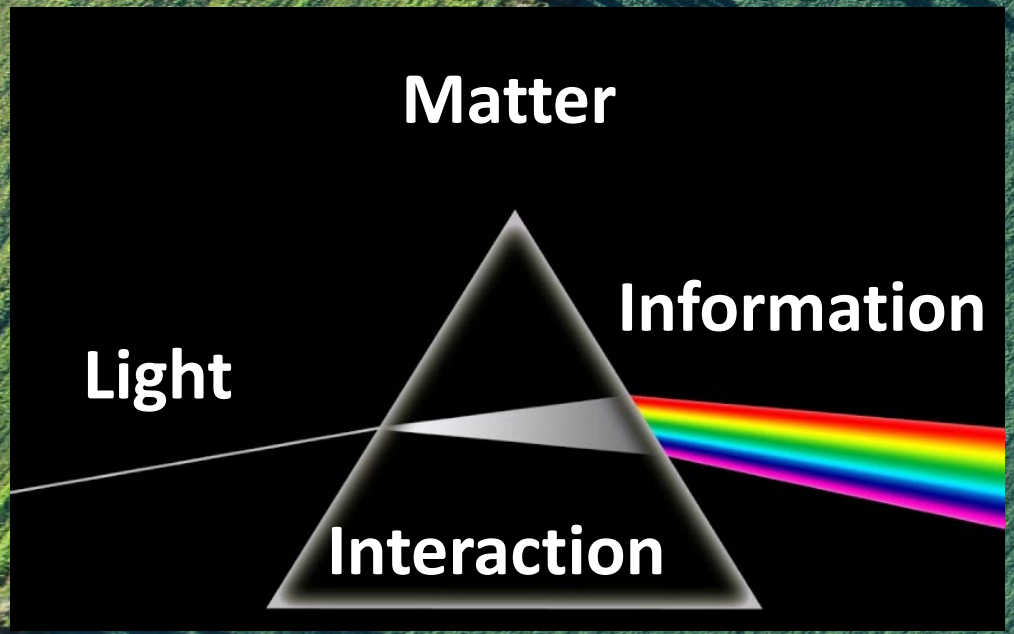


Impact sensor + GPS results in a yield map and ability to plan from one season to the next



Yang D, 2010

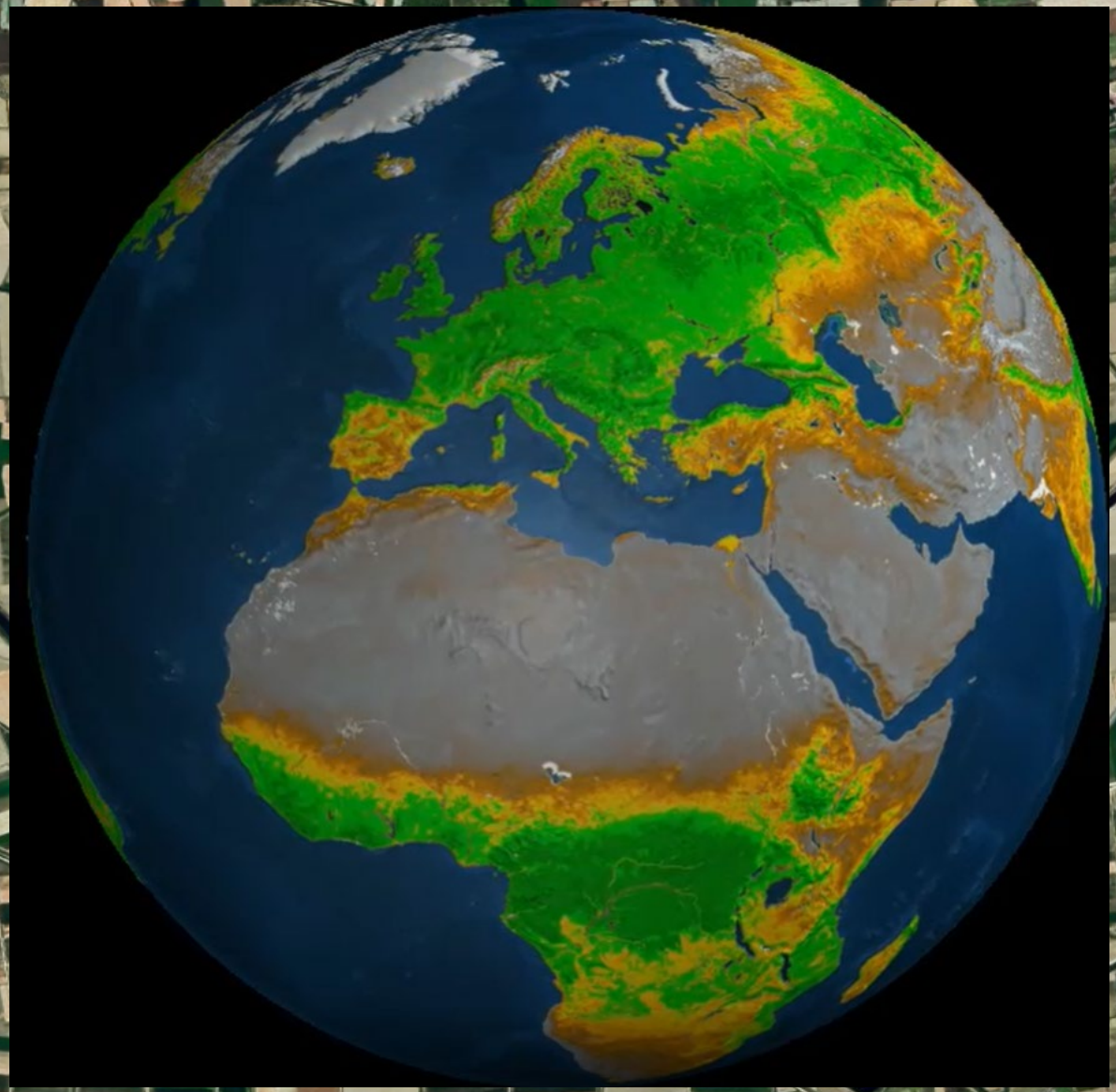
Precision Agriculture continues to evolve since.
Remote Sensing – A scientific field which studies crops' optical properties…



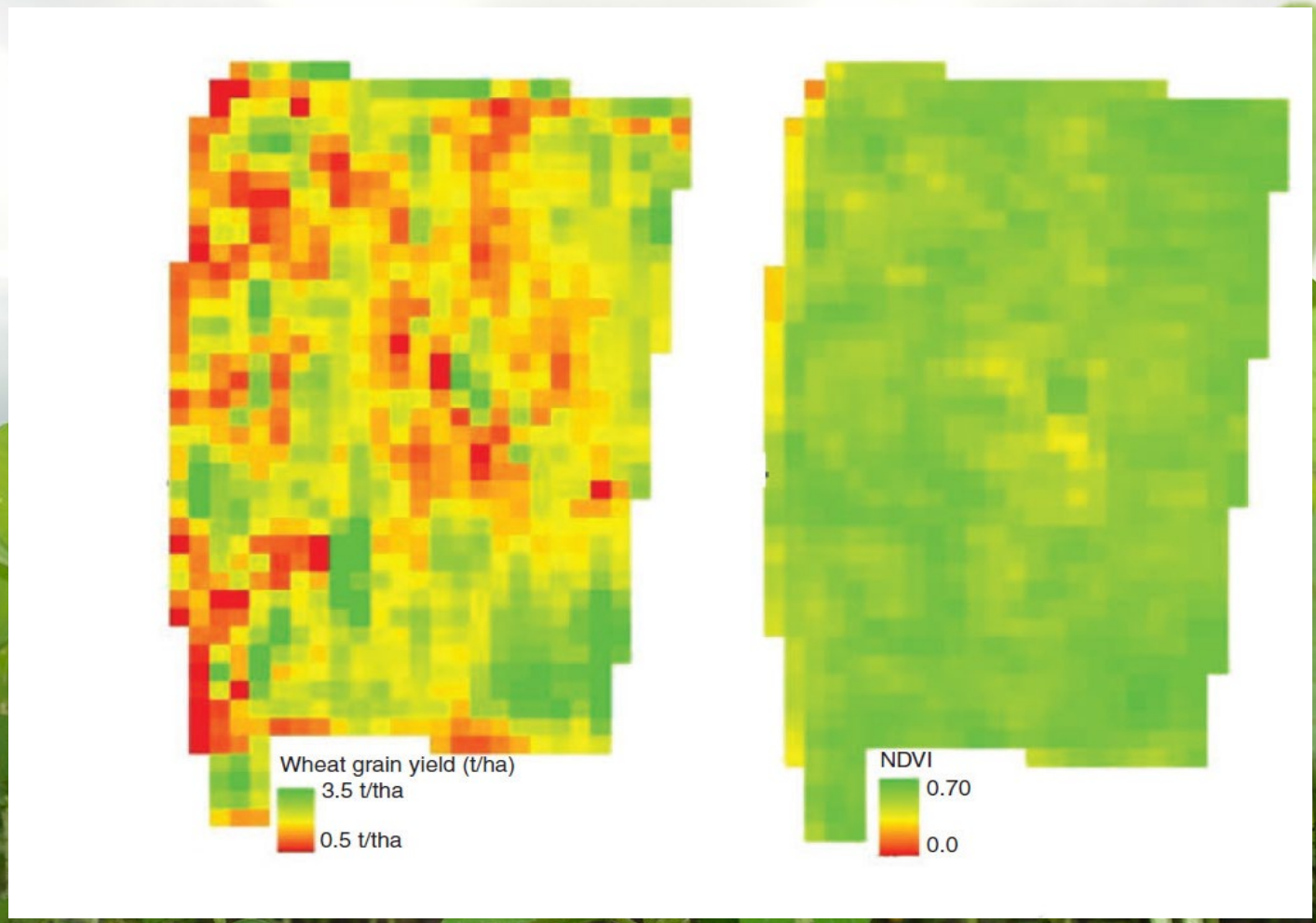
… intends to shorten the recommendation time to the same season

Farm management.pro

One such index, NDVI was originally invented to track seasonal changes in vegetation satellites images



The problem is …
Its not accurate when it comes to address agriculture challenges

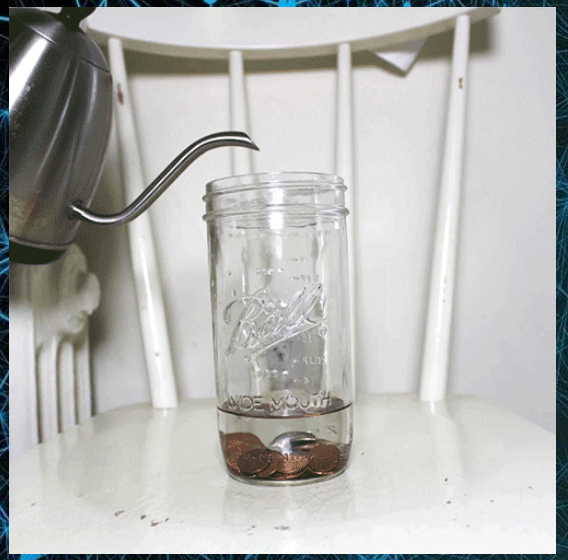


(Yang D, 2010)

We therefore need a shift in perception

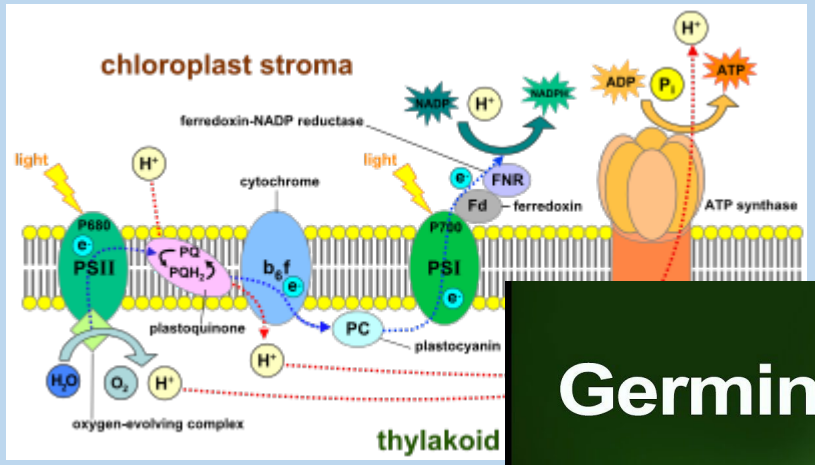
Quantity

Activity



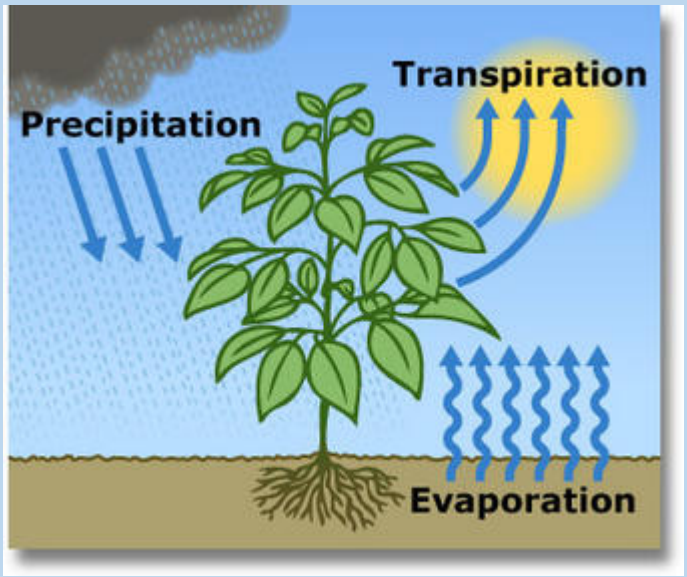
Plant physiology is concerned with chemical reactions that change with time

Photosynthesis



Ripening

Transpiration



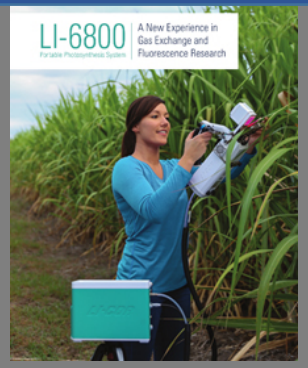
However, outside a controlled environment measurements are getting tricky

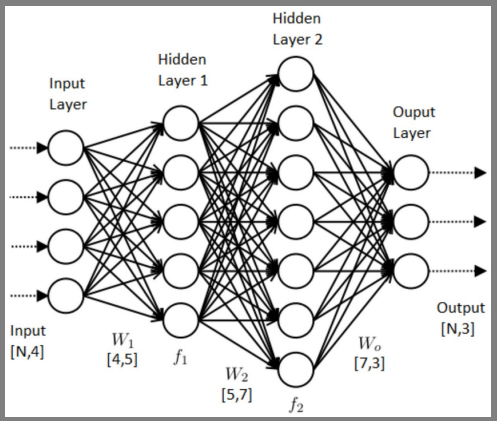
Atmosphere (Black Box)

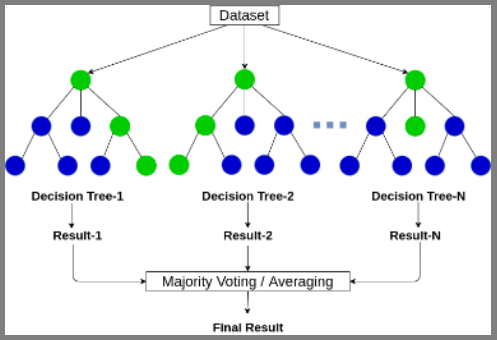
Plant (Black Box)

Soil (Black Box)

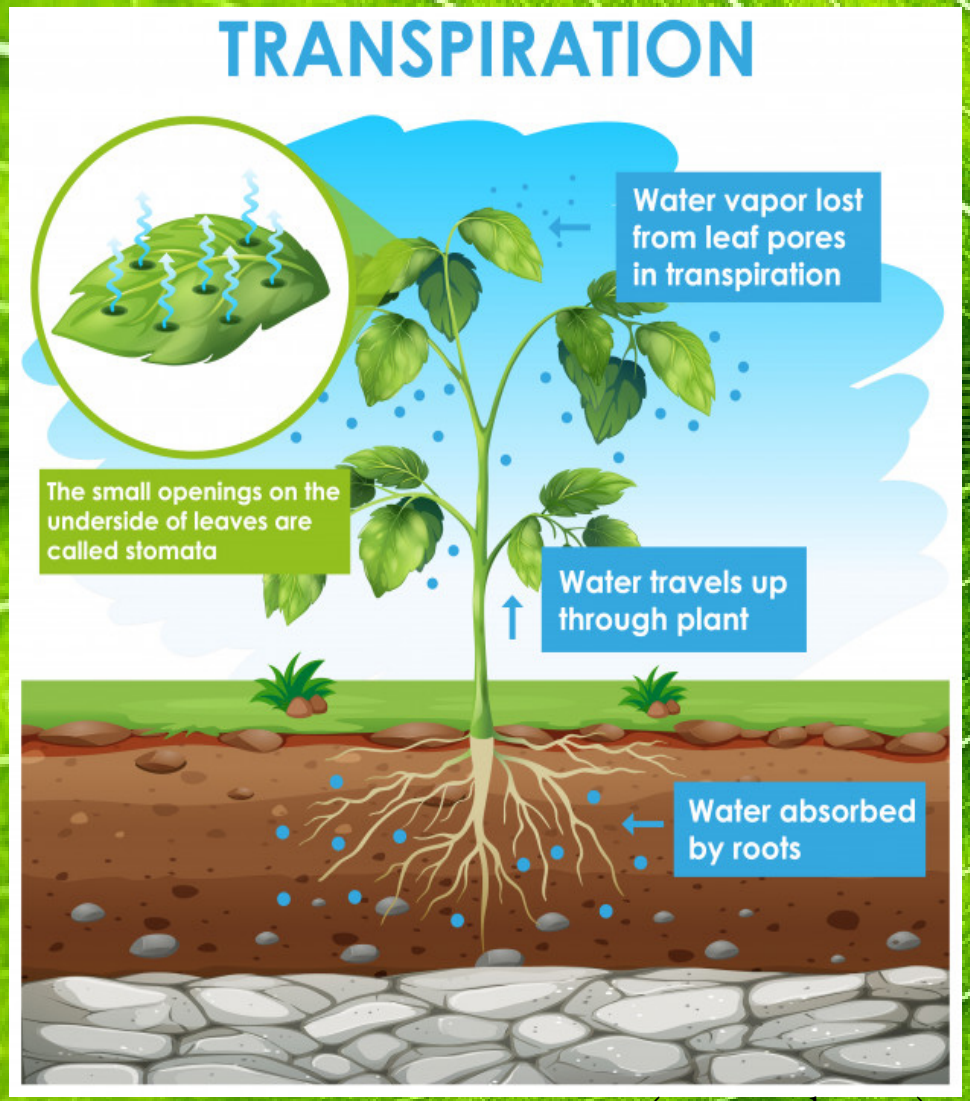
Therefore, it requires the establishment of an interdisciplinary group…



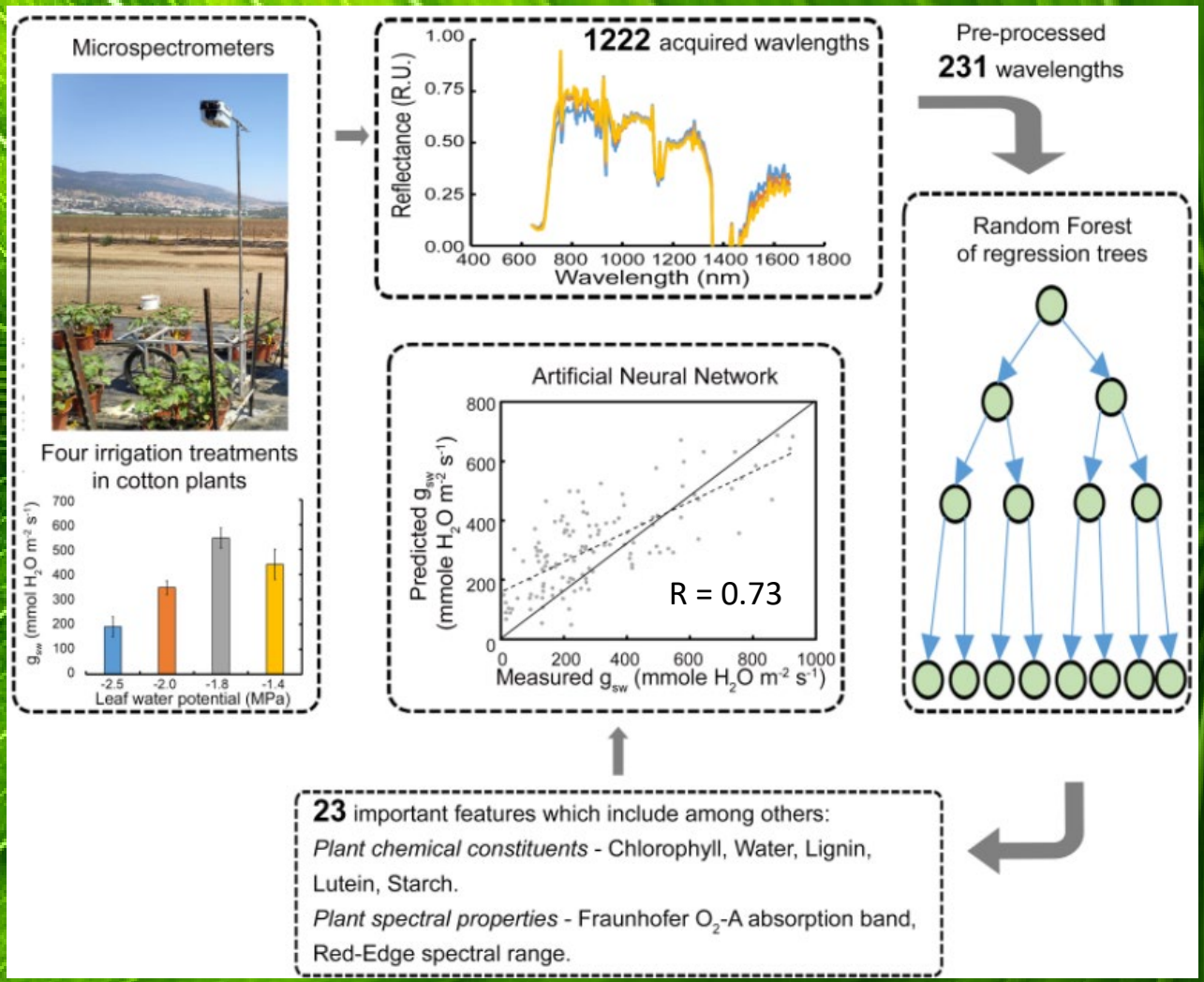




...In order to reach higher accomplishments



(www.nohat.cc)

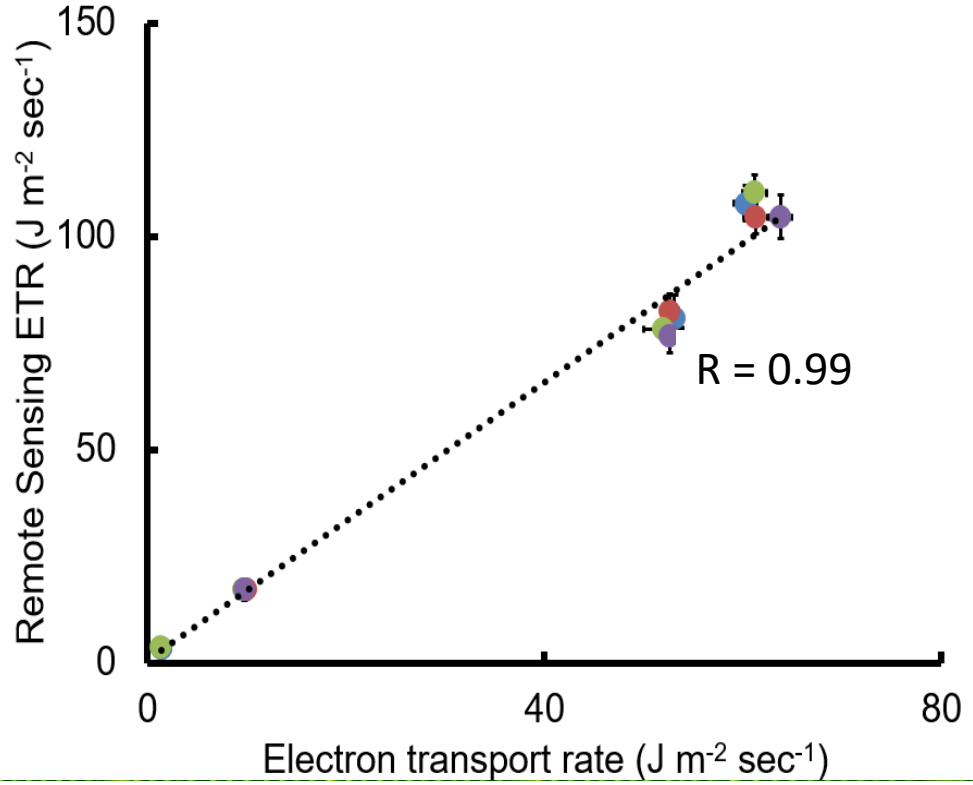


PCT Stage Patent

(Vitrack-Tamam et. al. 2020, *Remote Sensing*)

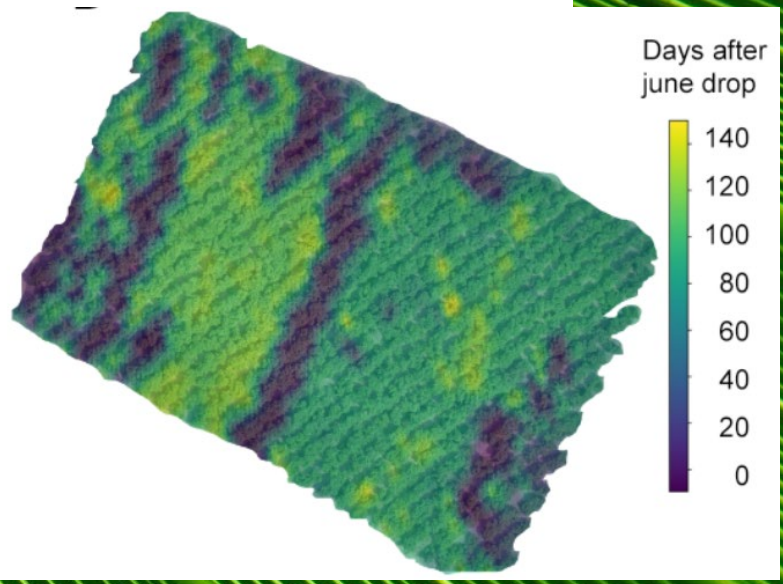
...and change current working paradigms

Remote sensing of biomass production

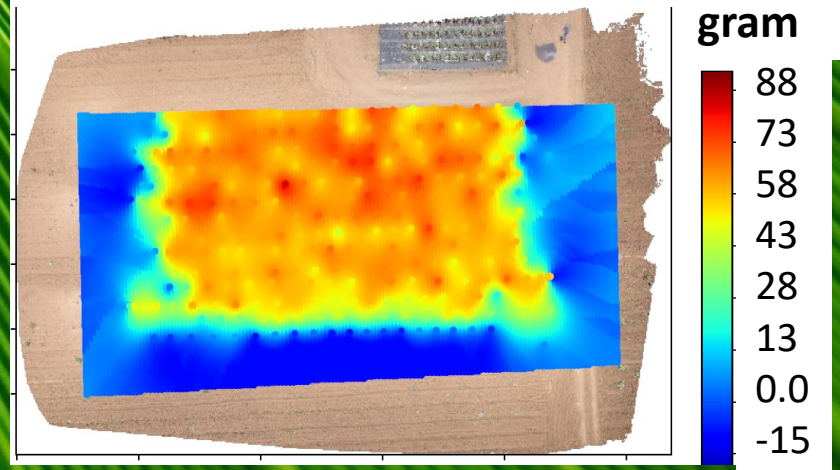


PCT stage patent (Liran et. al. 2020, *Remote Sensing*)

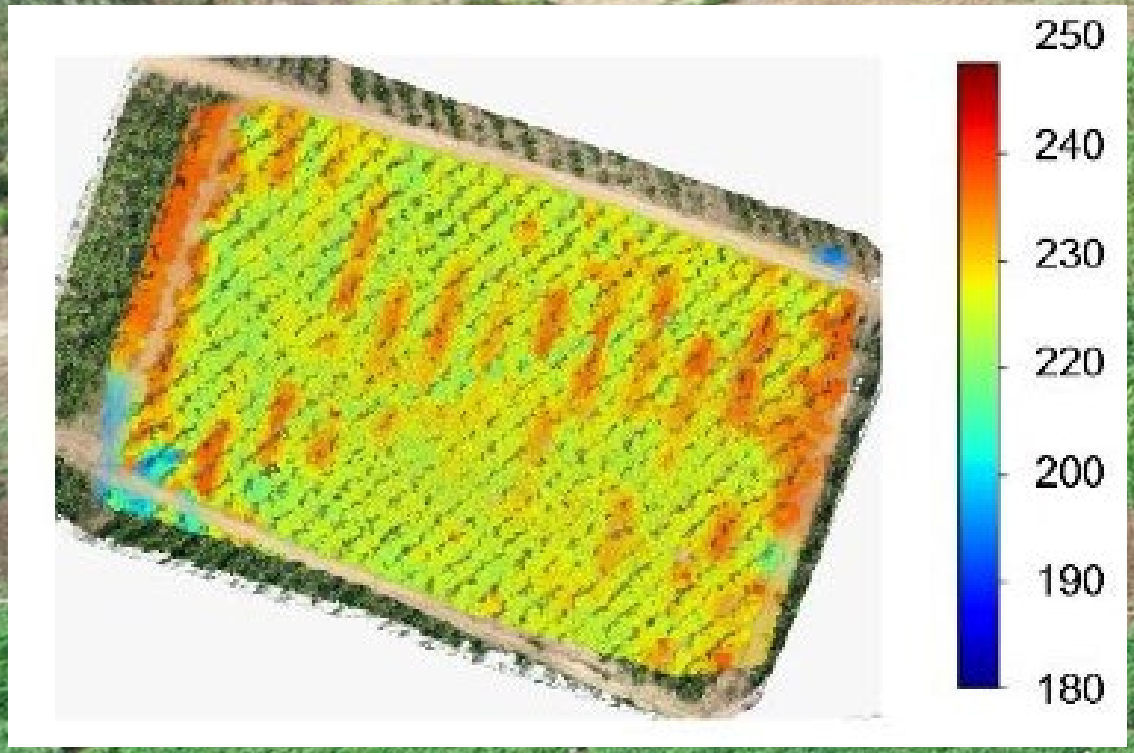
When to harvest?



Prediction of fruit size, two months before harvesting



In this way we increase out chances towards precise cultivation as we march towards 2050



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Current members

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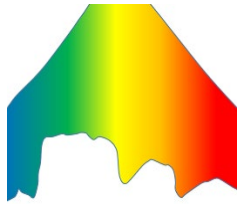

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Thank you for your attention

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