

From ploughs to platforms

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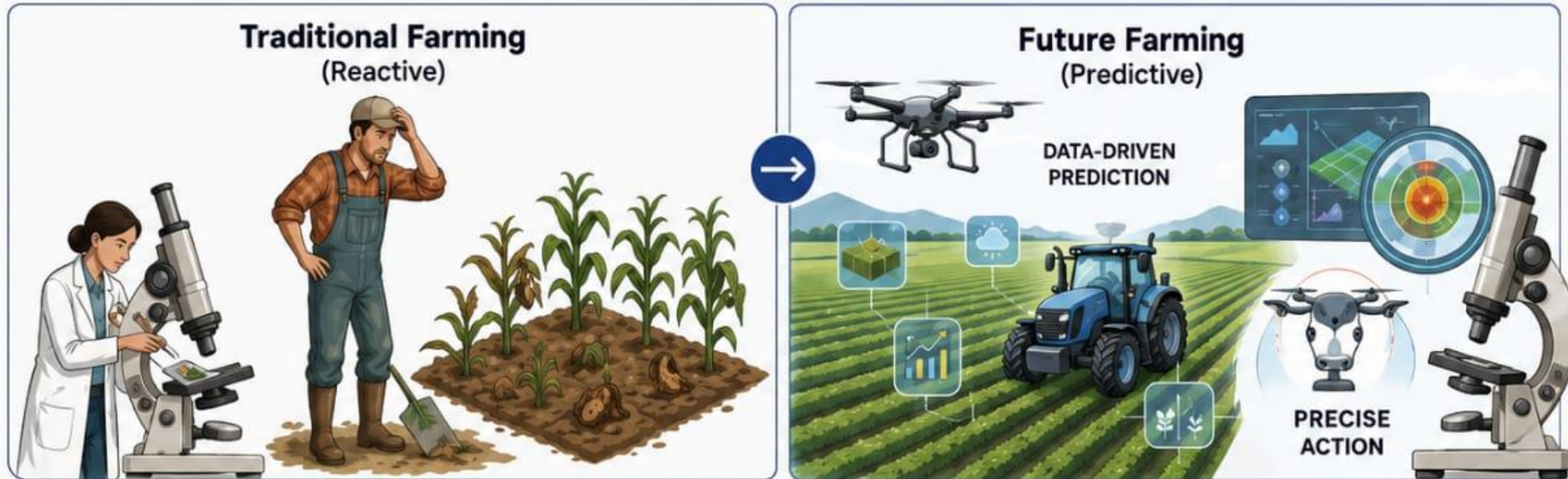




Prediction Changes Farming

For thousands of years farming worked like this: **Problem happens → farmer reacts**

- AI changes that.
📈 Prediction → 🛡️ prevention → 🎯 precise action
- Farmers can now spot problems before they spread.



Farming is moving from reactive to predictive.

What the industry needs from tech



MORE EFFECTIVE TIME IN
THE FIELD



CONTINUITY



TECHNICAL TEAMS THAT
WORK TOGETHER



SYSTEMS THAT CONVERT
DATA TO ACTION

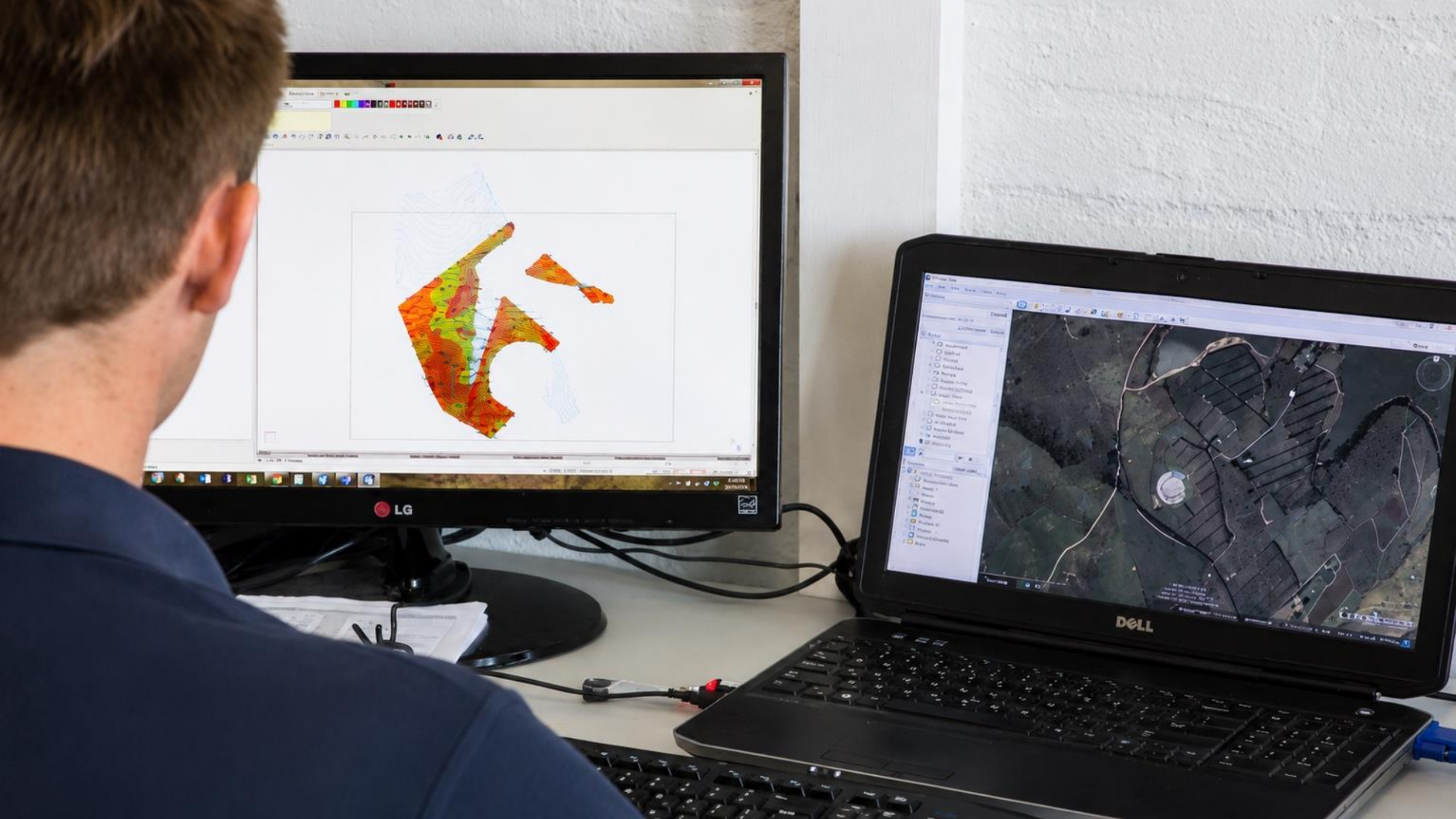
It seems that talk about data is everywhere these days. But data is only useful when it is converted into information that supports decision-making. The Smart Orchard project shows how the data deluge can be channelled into supporting better productivity and profitability for tree-fruit growers.

“When you adopt something into your operations, it comes down to thinking about how the data lead to a decision that improves fruit quality and productivity long-term,” said Kalcsits.



Technology Testbed & Demo Site

WSU Smart Apple Orchard

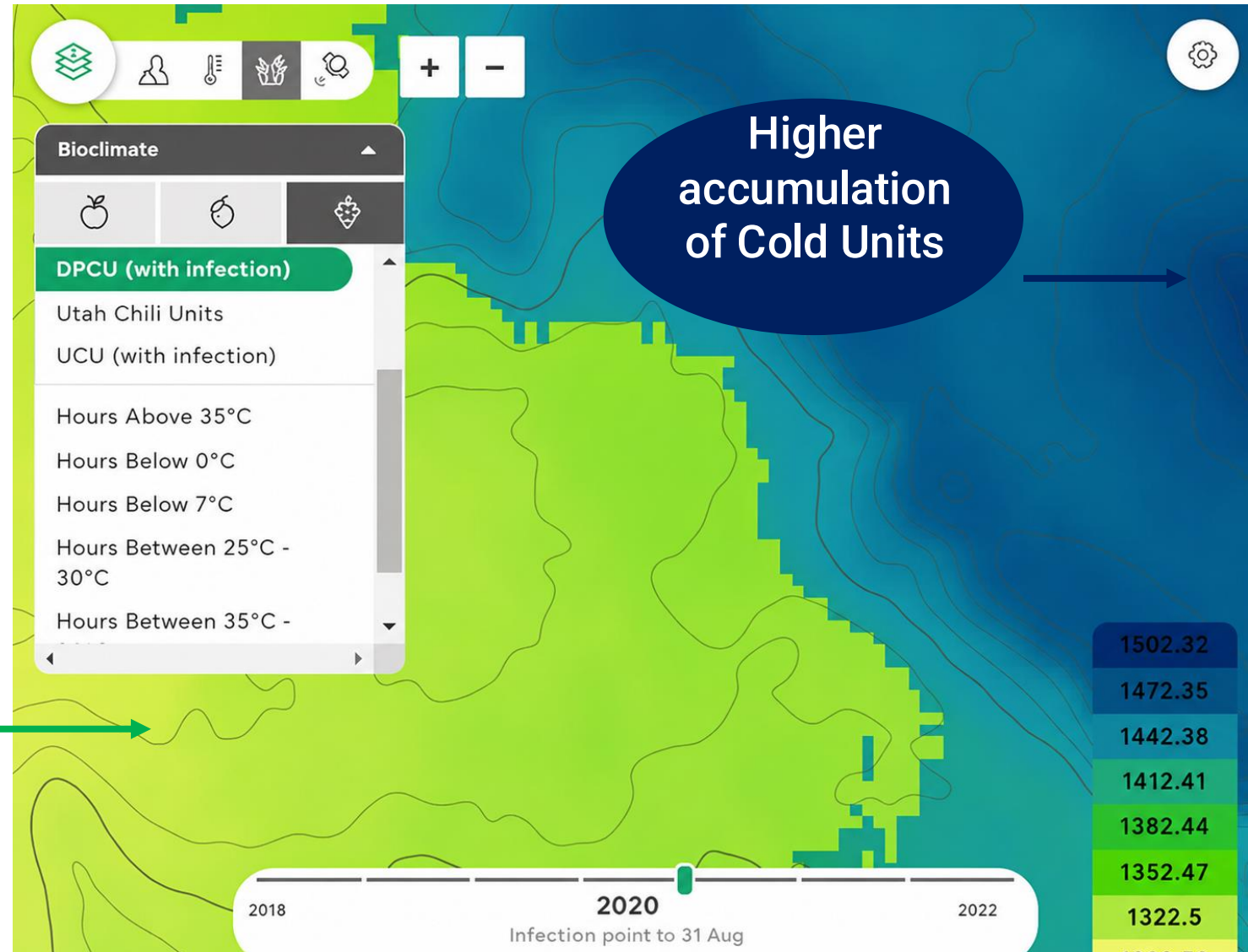


Variation of cold units on a farm



Less accumulation of Cold Units

Higher accumulation of Cold Units



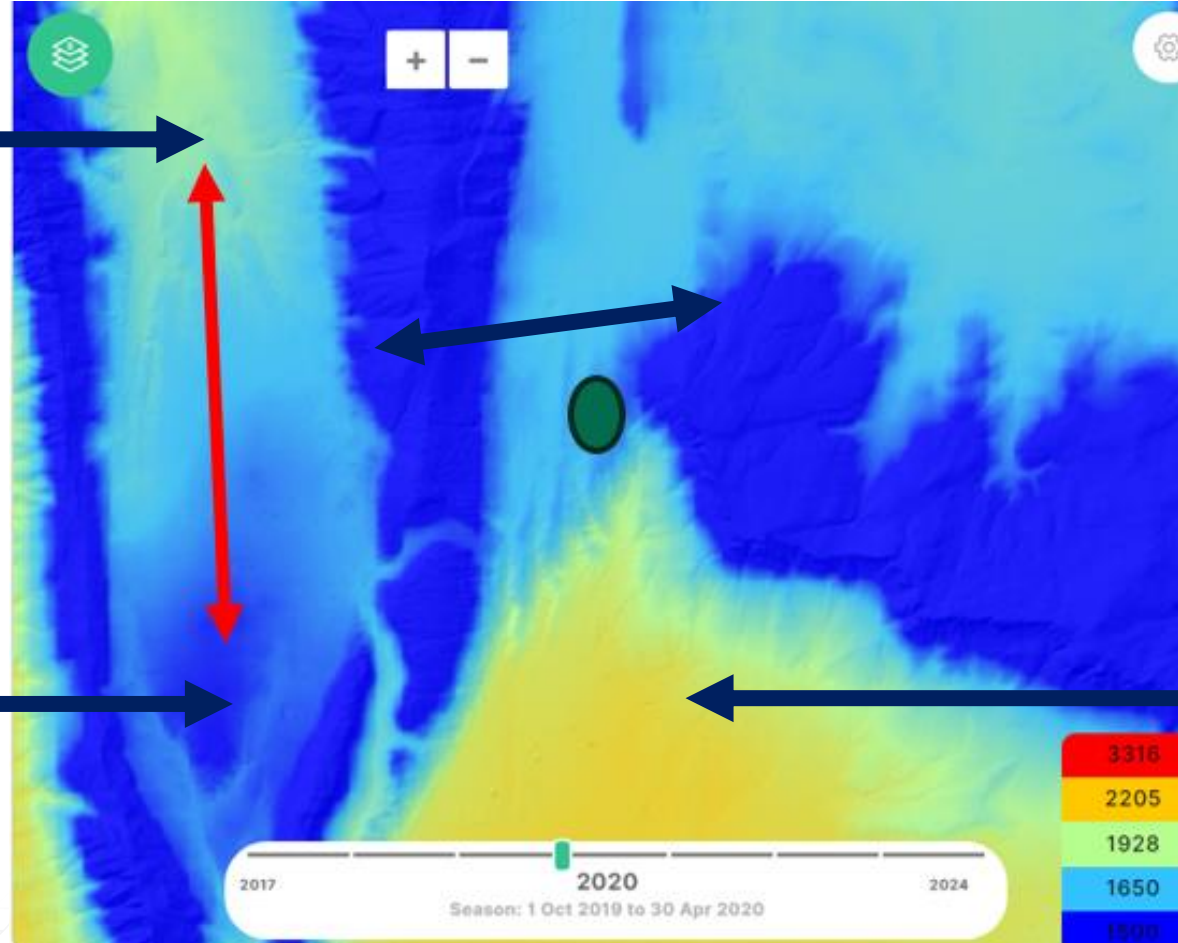
Compare sites to determine the right micro climate for a variety – Heat Units

More heat units
in the North of
the valley

Comparable sites

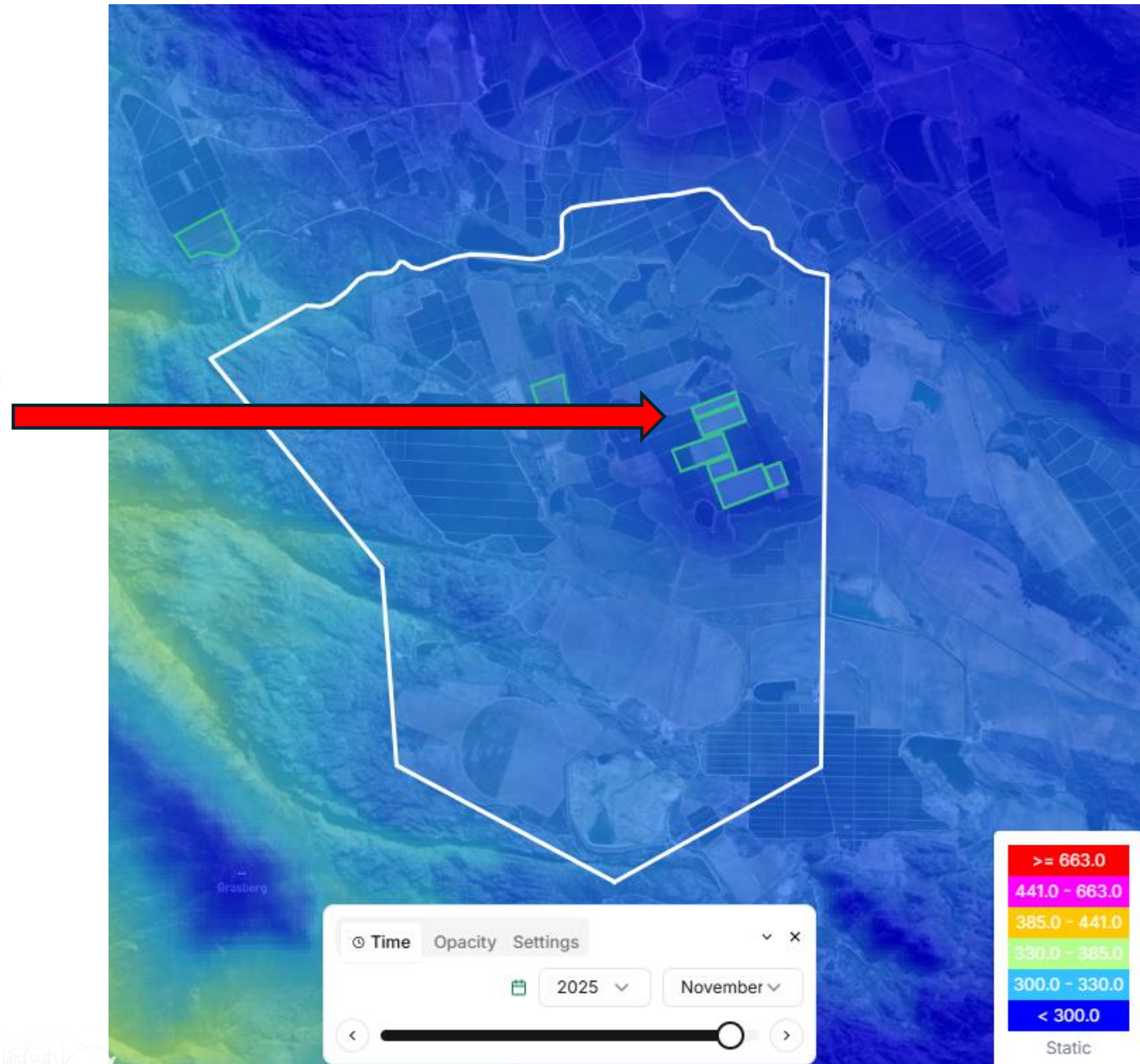
Less heat units in
the South of the
valley

Highest
accumulation of
heat units

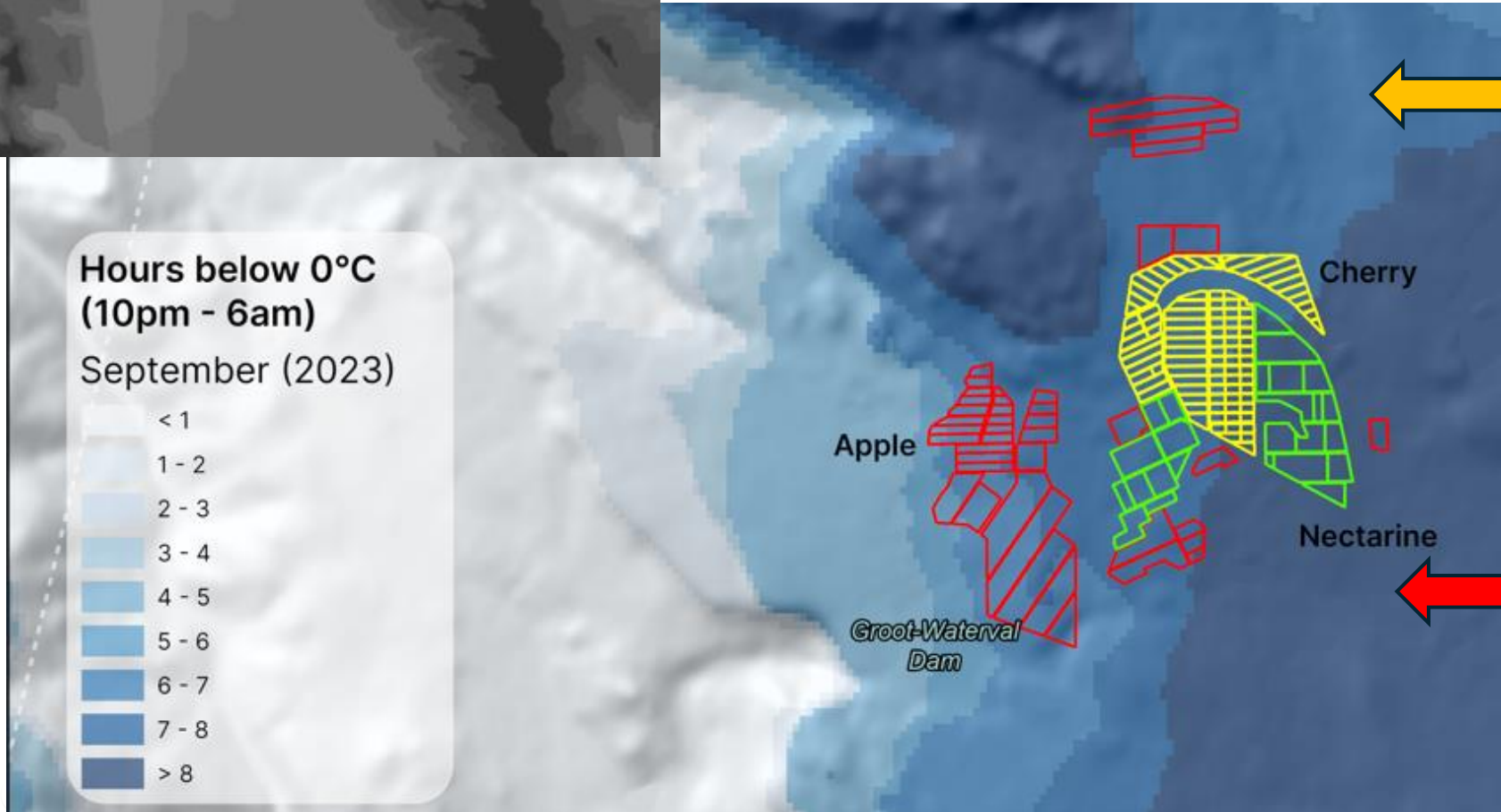
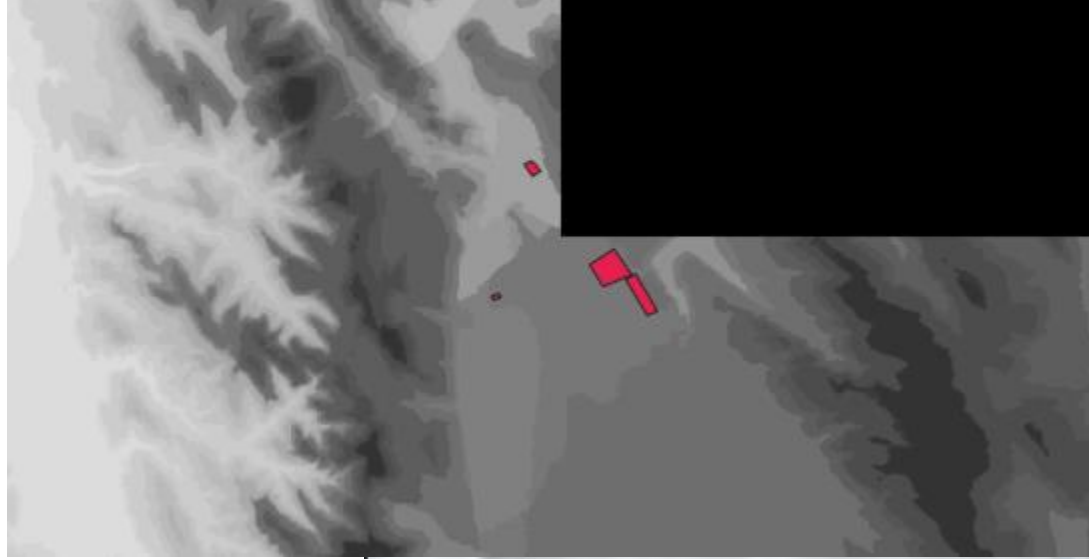


Heat Units

- Early cherry varieties planted at some of the coldest areas for chilling
- Different sites have different growing lengths.



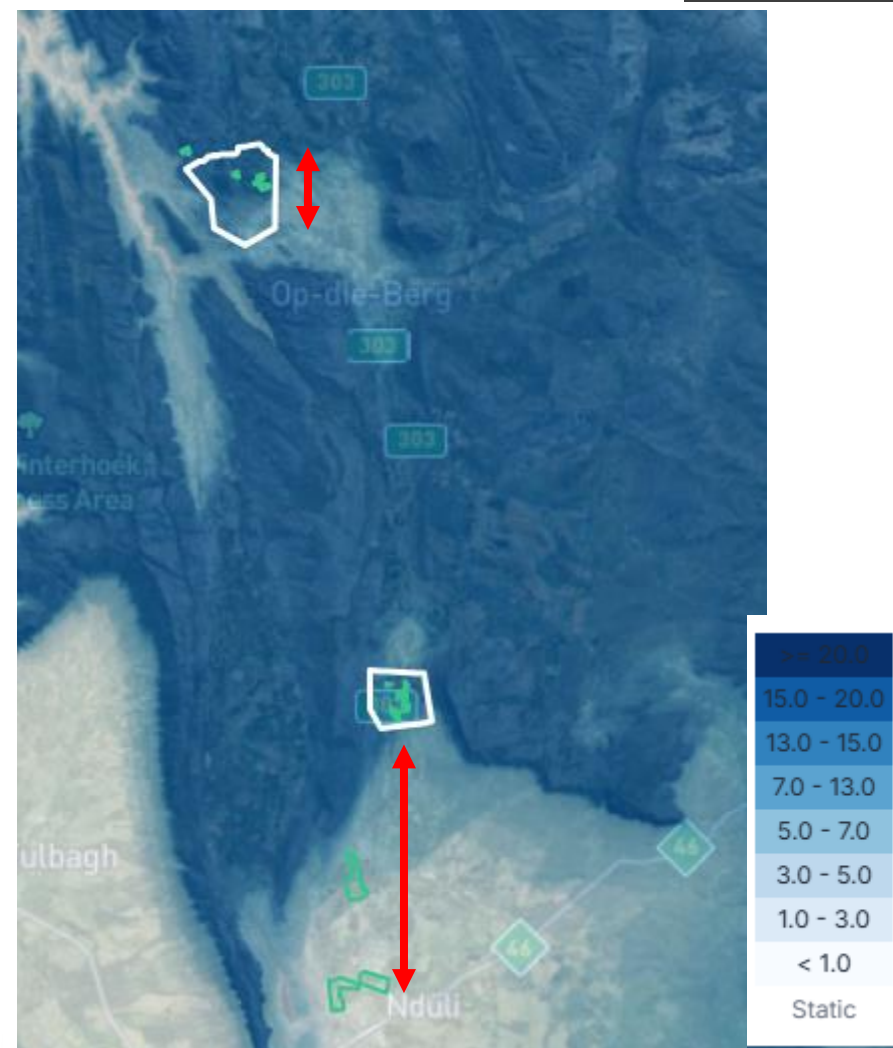
Frost Index and risk



Hours below 10°C for March 2026



- Difference between areas for colour development
- Difference on the farm
- Difference between location



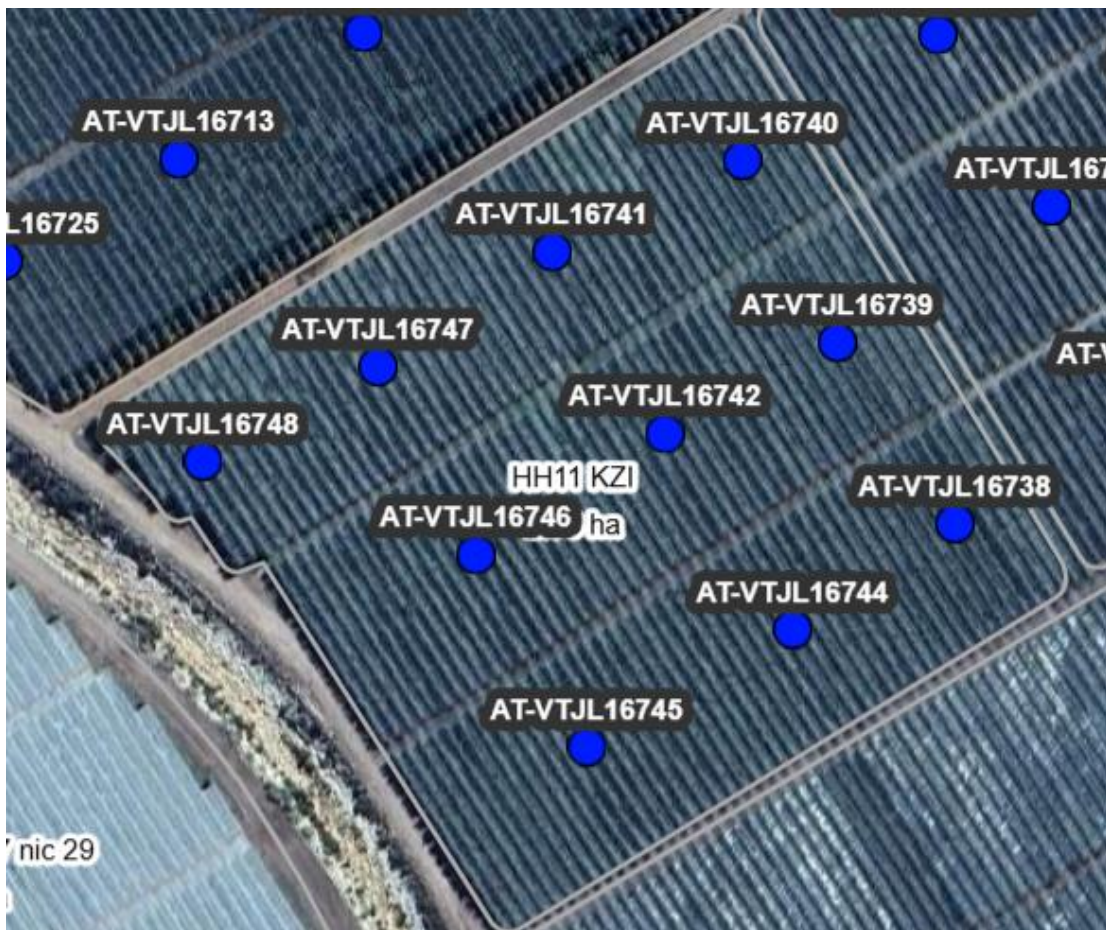
- In this orchard, the soil samples were taken from different areas.
- From the colour, its clear that there are differences.
- Its also clear from the picture that vigour differs.
- BUT, without the GPS point, it becomes useless.



Soil samples

- Even without complex maps, different management is possible if you see it spatially.





Leaf Nitrogen levels



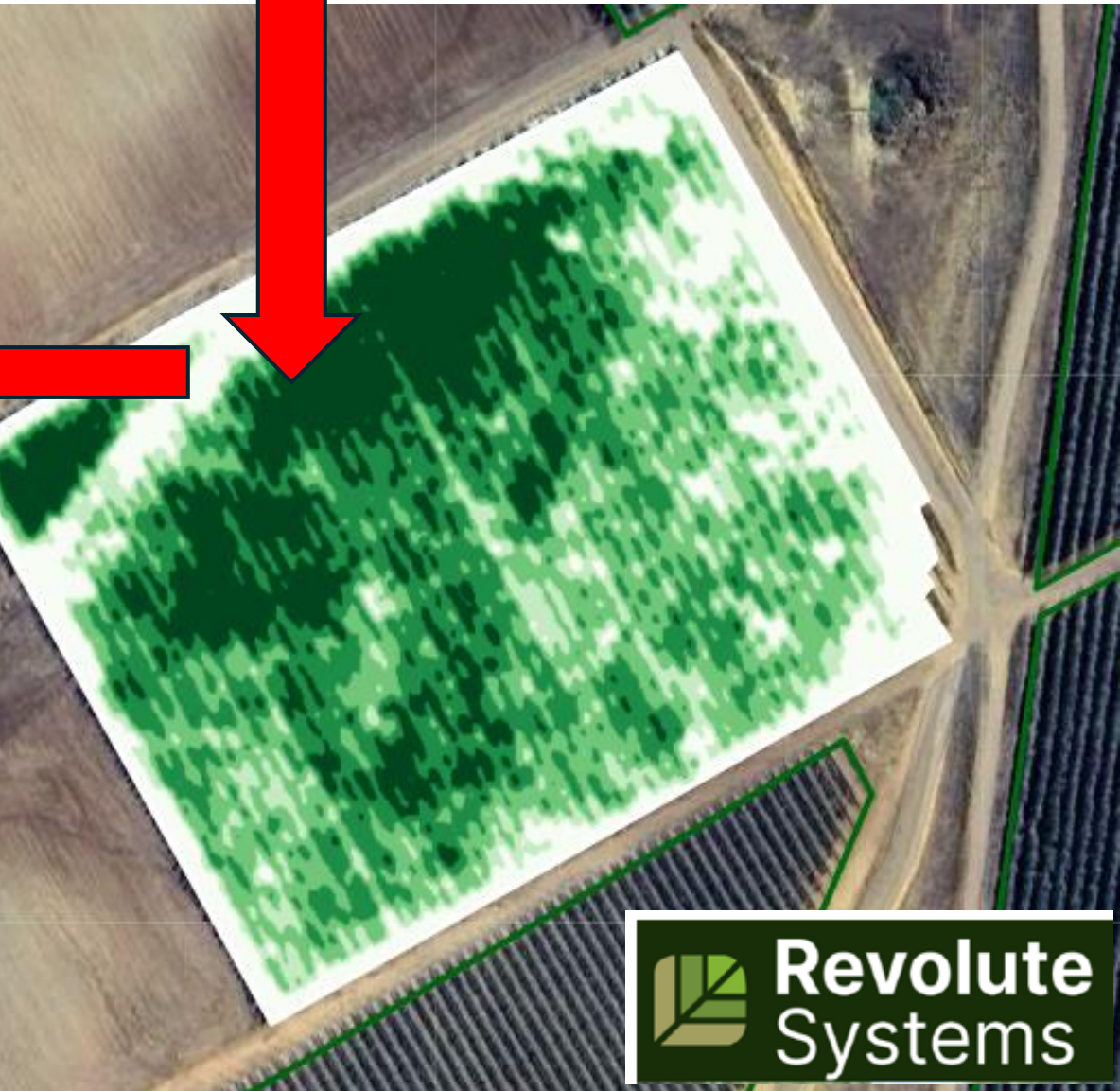
- Effect on green fruit colour in storage
 - This is critical for storage allocation.
- You have to stop at 3 different spot in this big block for chemical thinning

Yield map

Low production

High vigour

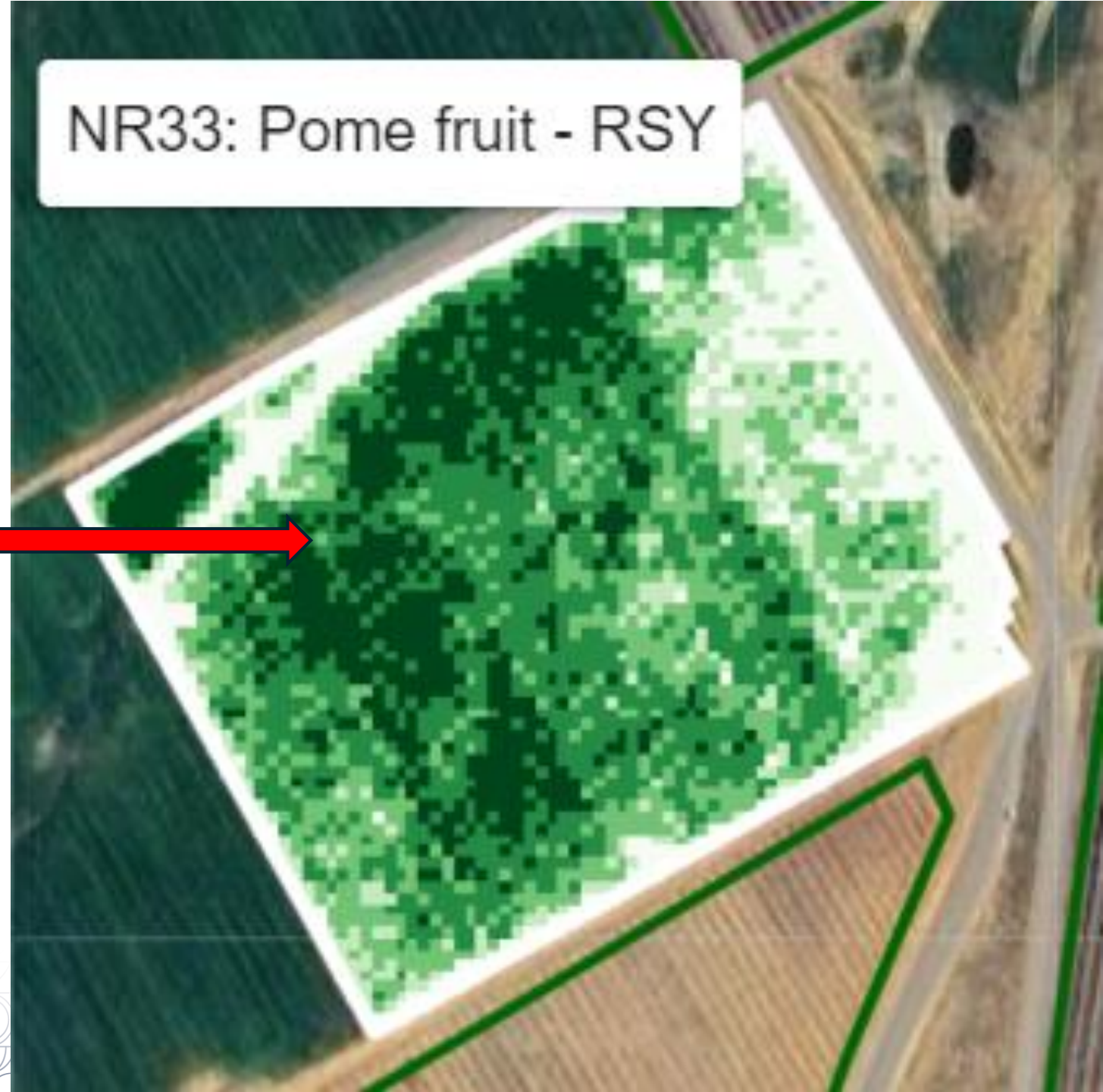
NDVI



High Resolution
NDVI for variable
rate Nitrogen
fertilizer

Zones hide vital
detail.

NR33: Pome fruit - RSY



Canopy volume size reduce from 2023 to 2026 with differential management. More uniform!



- Blind spots with fruit counts for yield estimation



To much info – just zoom out and it becomes clear

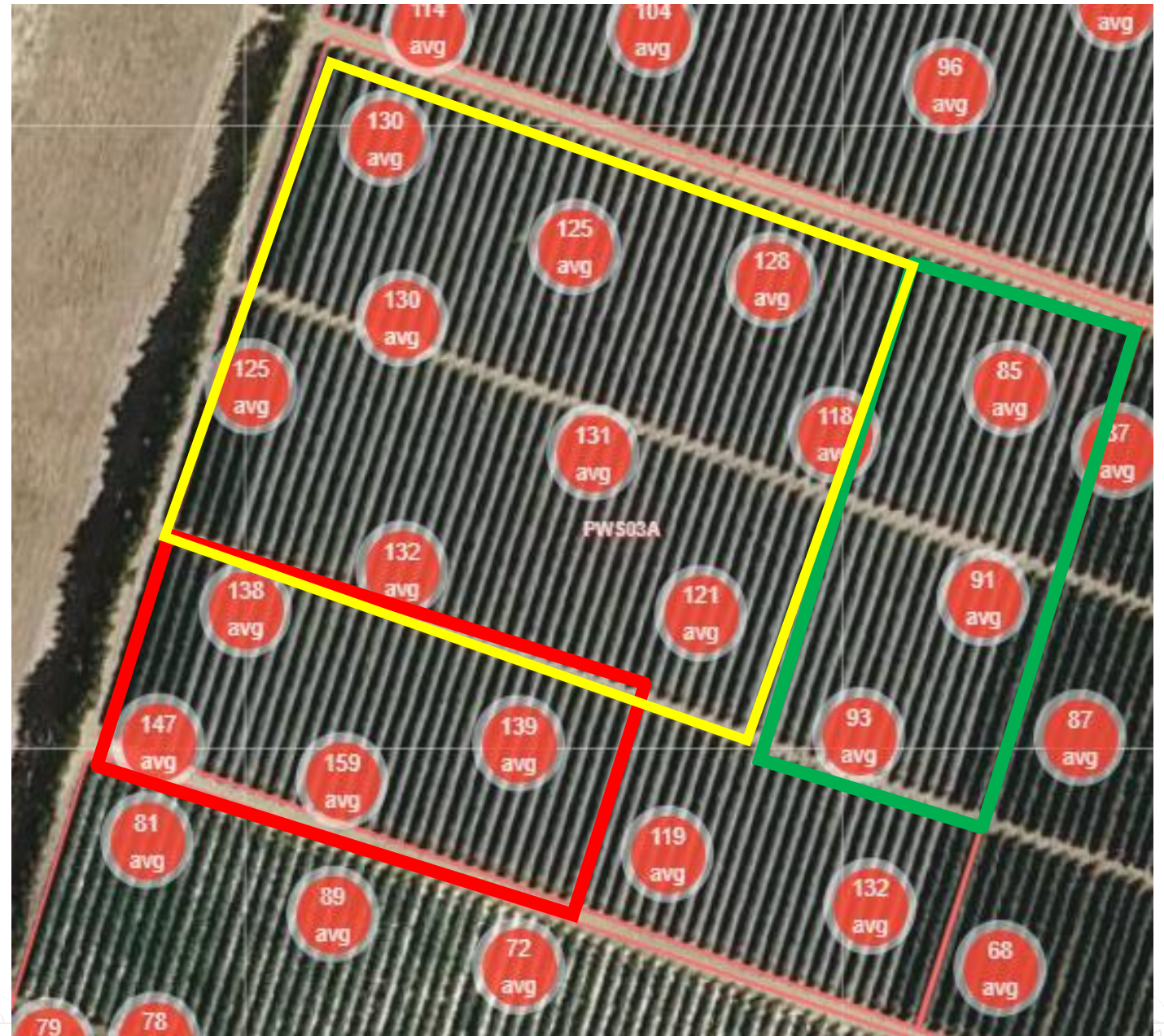


Live data allows timely adjustments to hand thinning instructions.

Easy transformation – Just zoom out

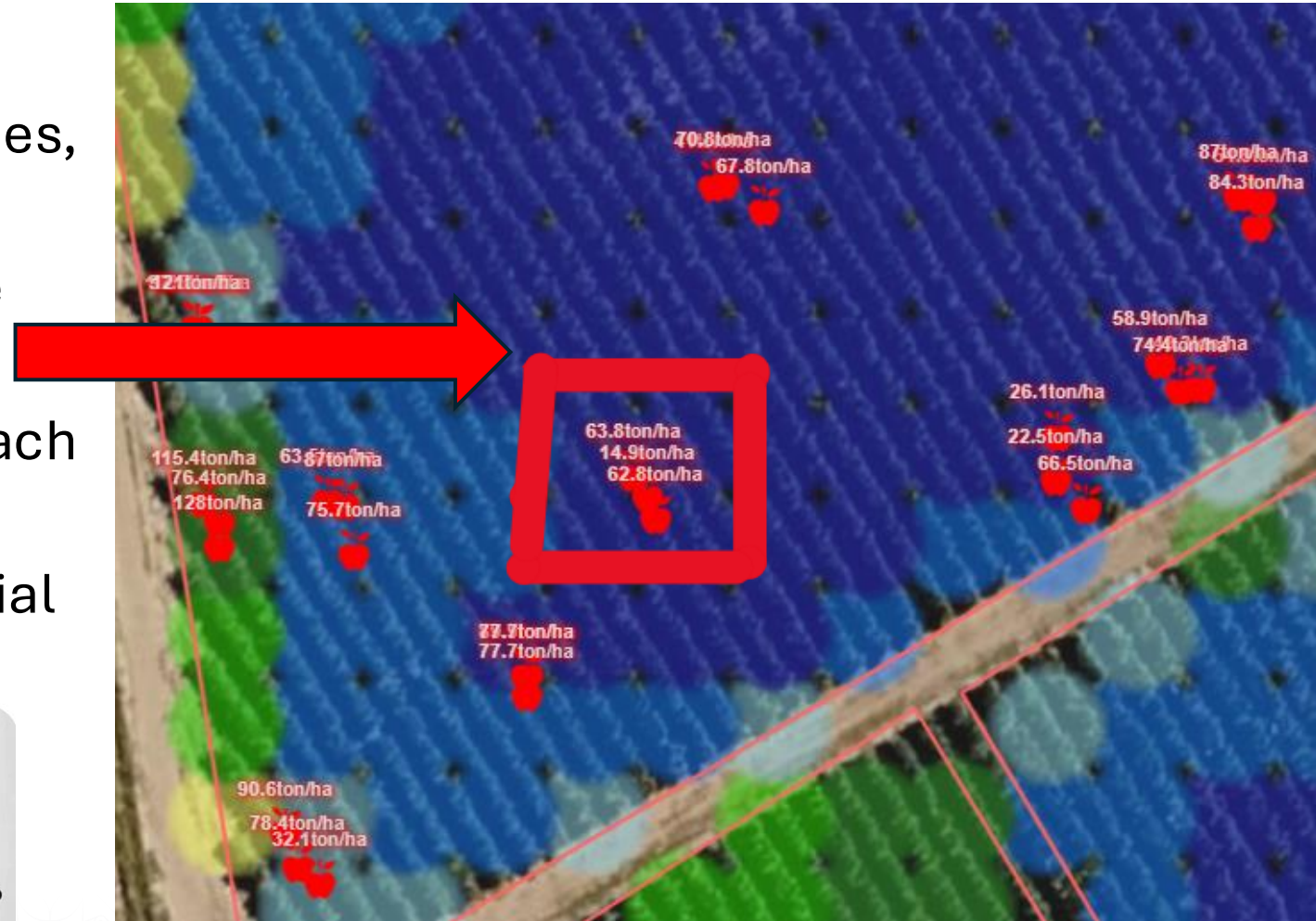


- Groom and thin more in some parts to get to the correct crop load



Which tree do we count – the representative one??

- When we count consecutive trees, the picture changes
- Which one is the representative one?
- What's the weighted effect of each one?
- This where cameras has potential



Fruit growth curve vs fruit size reference curve



Fruit size distribution chart



Fruit Size

Chart
Distribution

Season
2025/26

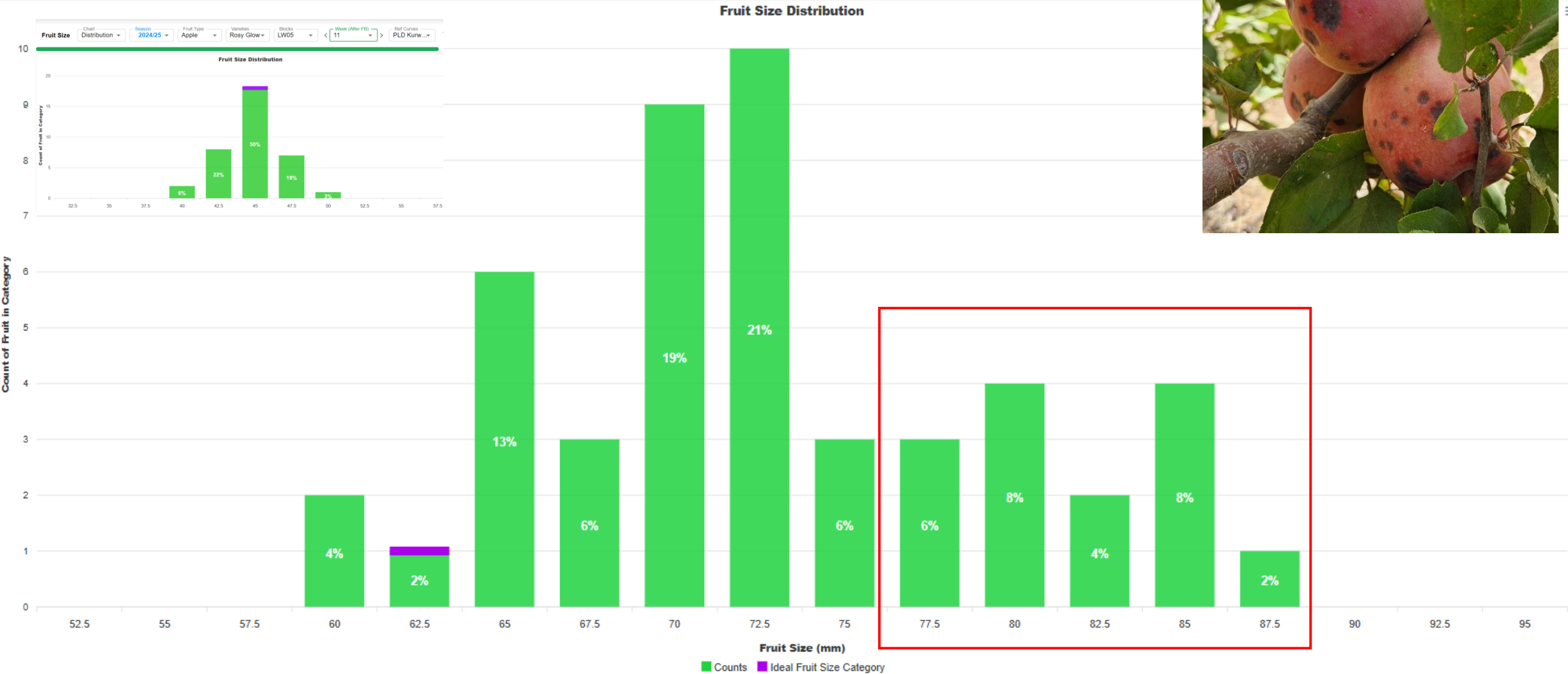
Fruit Type
Apple

Varieties
Big Chief

Blocks
NC08

< Week (After FB)
18 >

Ref Curves
ROOI Kurw...



Large vs small fruit

Sample details		Lab.					
			N	K	Ca	Mg	K/Ca
		No.	mg/L	mg/L	mg/L	mg/L	
L6887 - KZI (MS15) M7 GROOT	Large	FAA-000-1184	344	1177	56	67	21
L6887 - KZI (MS15) M7 KLEIN	Small	FAA-000-1185	379	1146	72	98	16

Bitter pit related to fruit weight and yield in balanced and unbalanced canopies

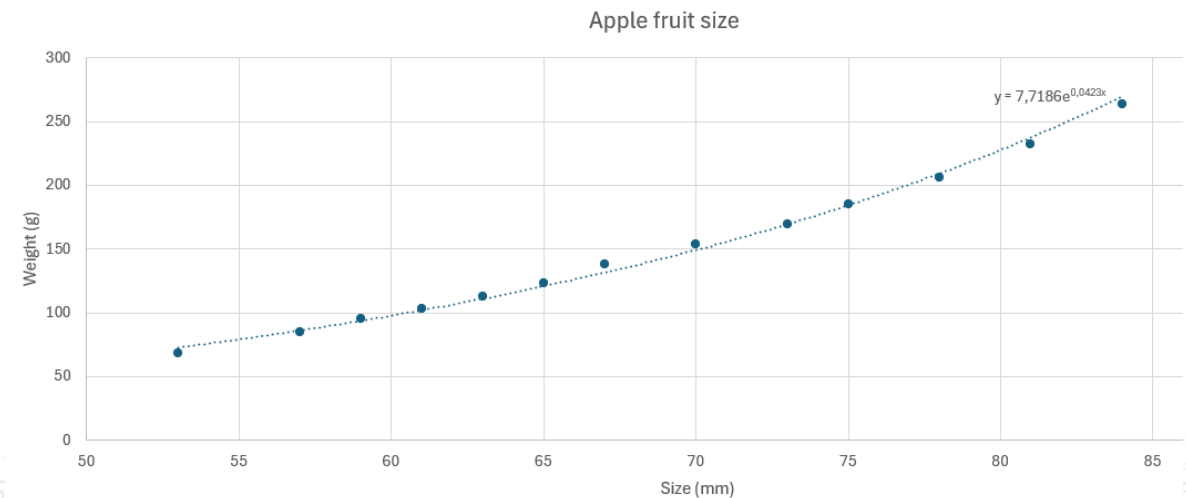


Goal		148	40%50%10%						
Orchard	Fruit wieght (g)	% Small <66mm	% Medium 66 - <76mm	% Large >76mm	T/ha	BP % in evaluation	# fruit per tree	# fruit per tree expected	# Difference
Block 1	196	31.6%	48.4%	20.0%	96	32%	293	396	-103
Block 2	142	54.4%	40.1%	5.4%	91	5%	385	376	9





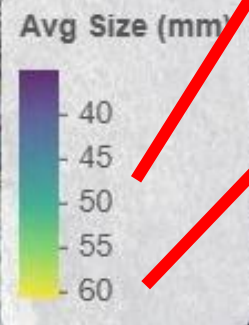
- Fruit size measurement at four spots within the orchard.
- Difference of 5mm between the highest and lowest measurements.
- This difference of 5mm is equal to 30g fruit weight per apple!
- 130g vs 160g
- Valuable info comes from spatial data!





Revolute
Systems

- New fruit sizing cameras can provide more accurate size distribution for the entire block.
- High risk areas can be identified for post harvest defects.

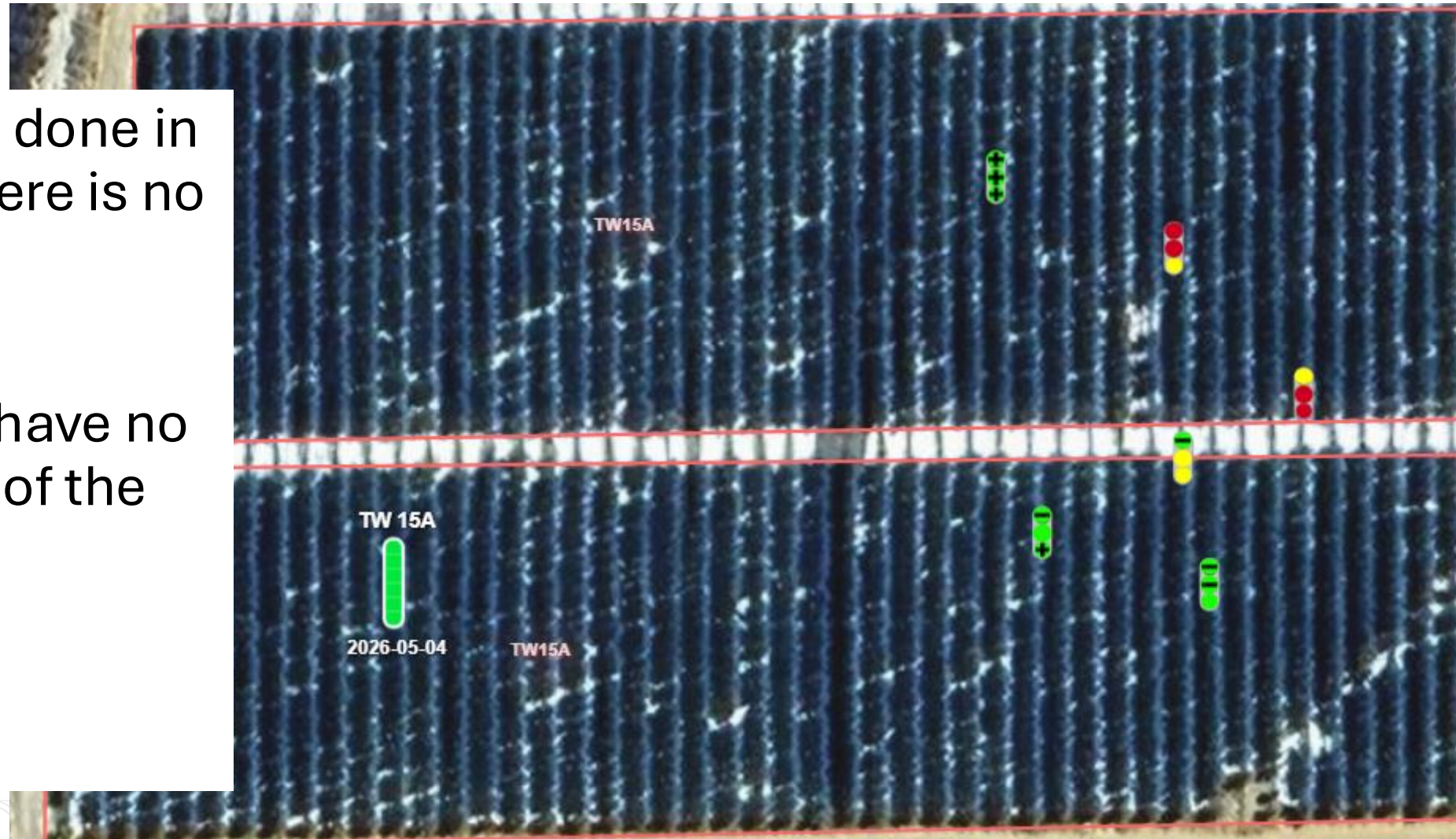


Size Distribution

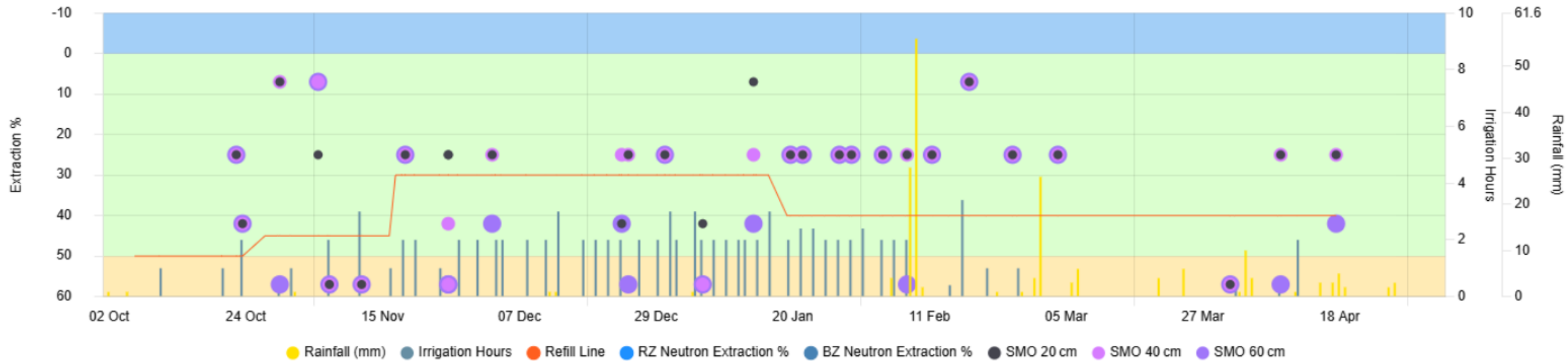


Irrigation probe in relation to field observations (seasonal).

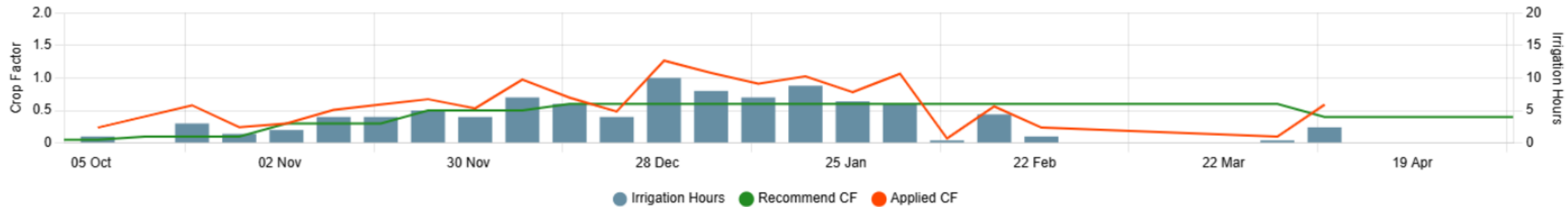
- Observations done in part where there is no probe.
- However, we have no “verification” of the probe!



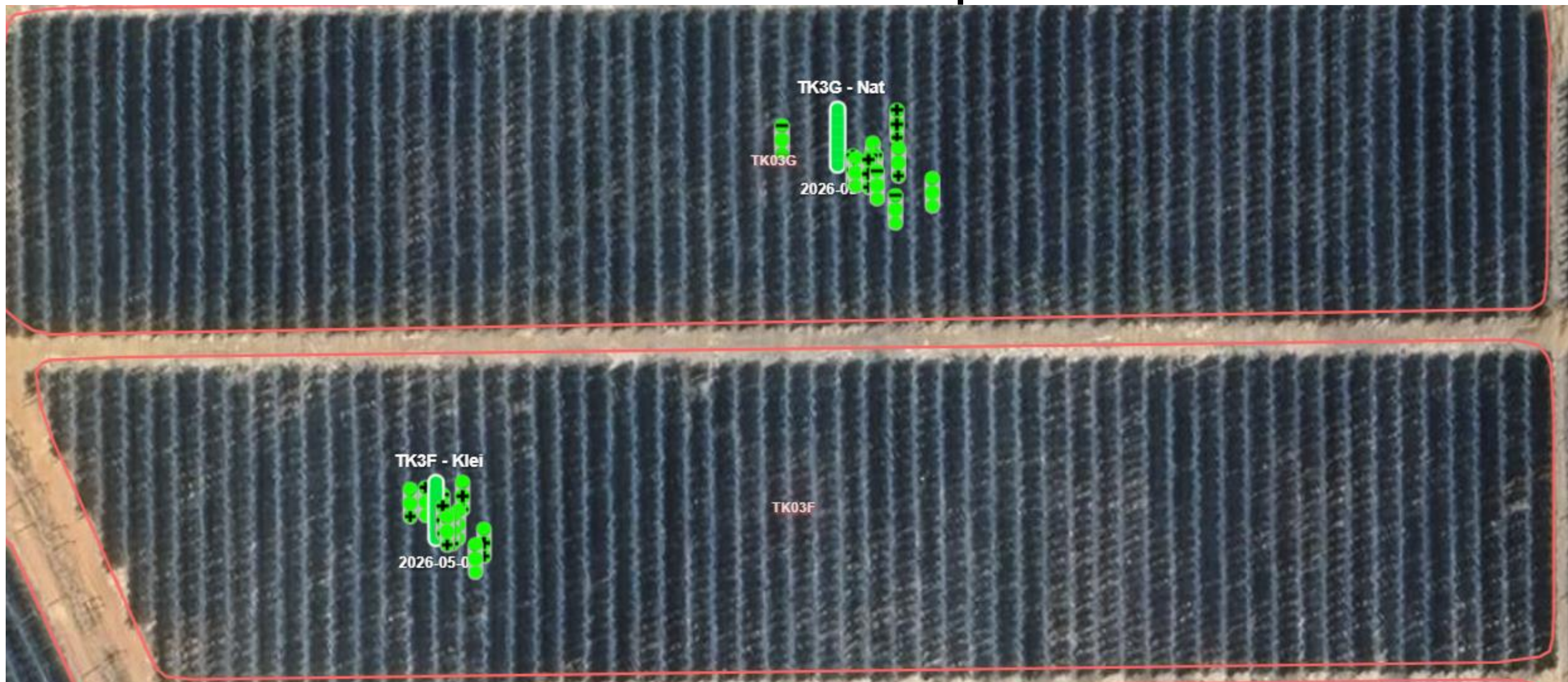
Combined Zone Summary



Crop Factor - Climate

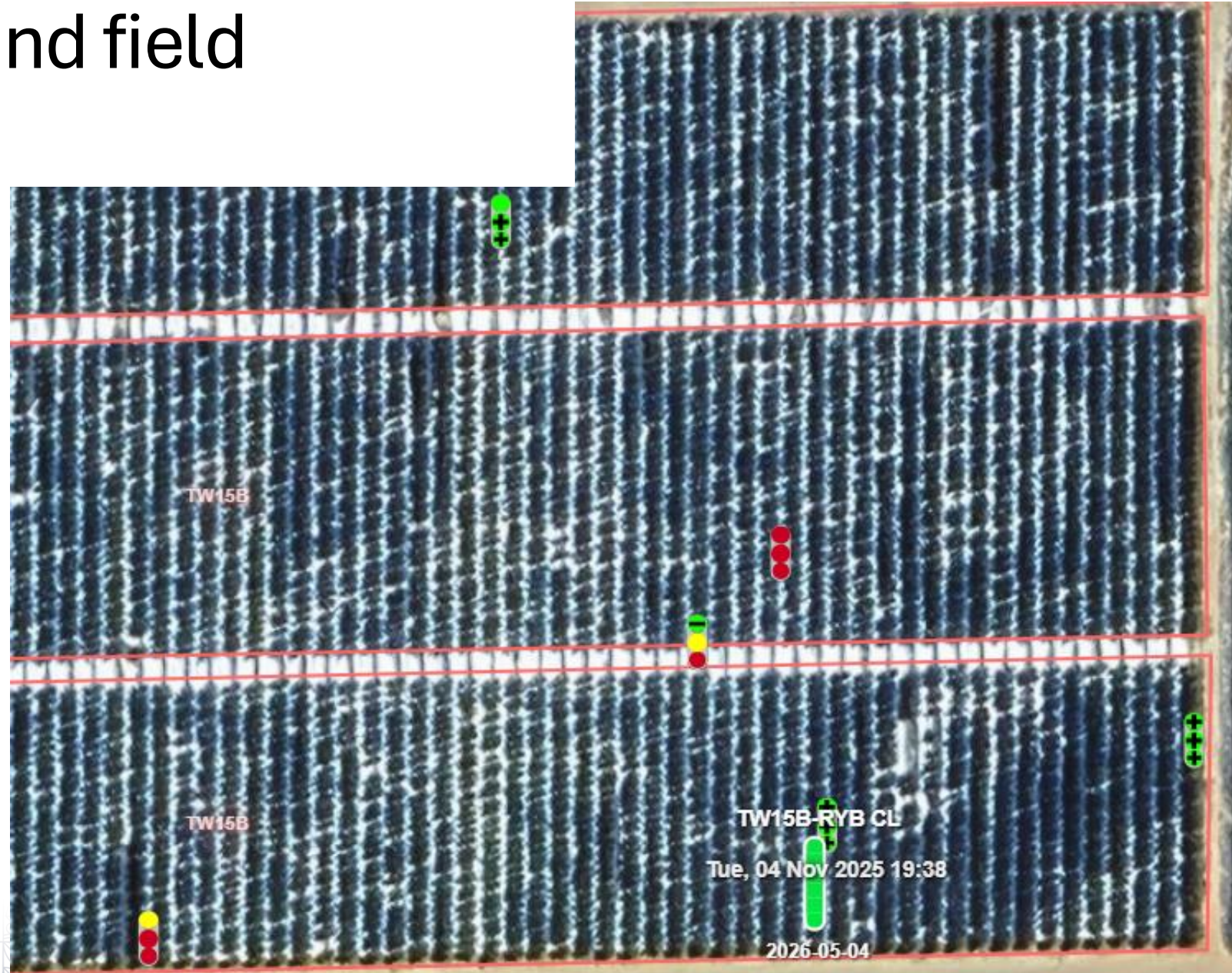


All the observations next to the probe?



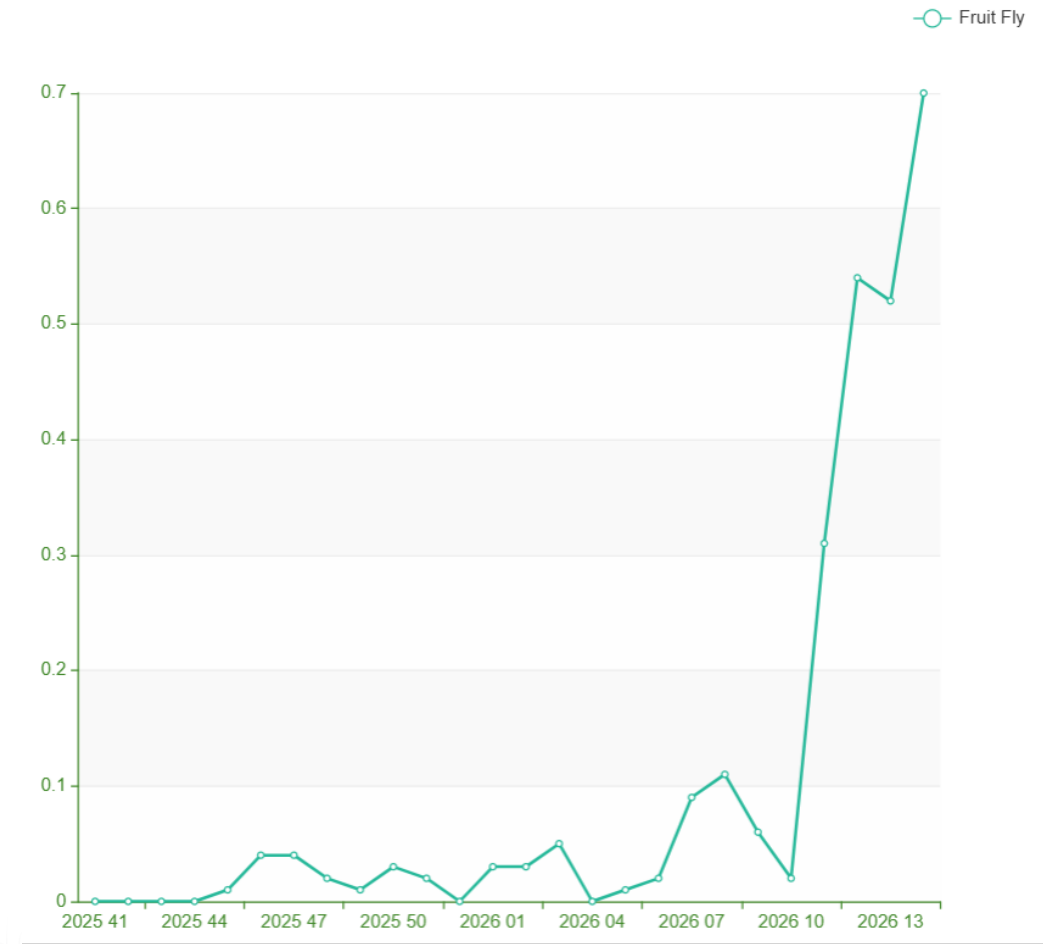
Irrigation probe and field observations

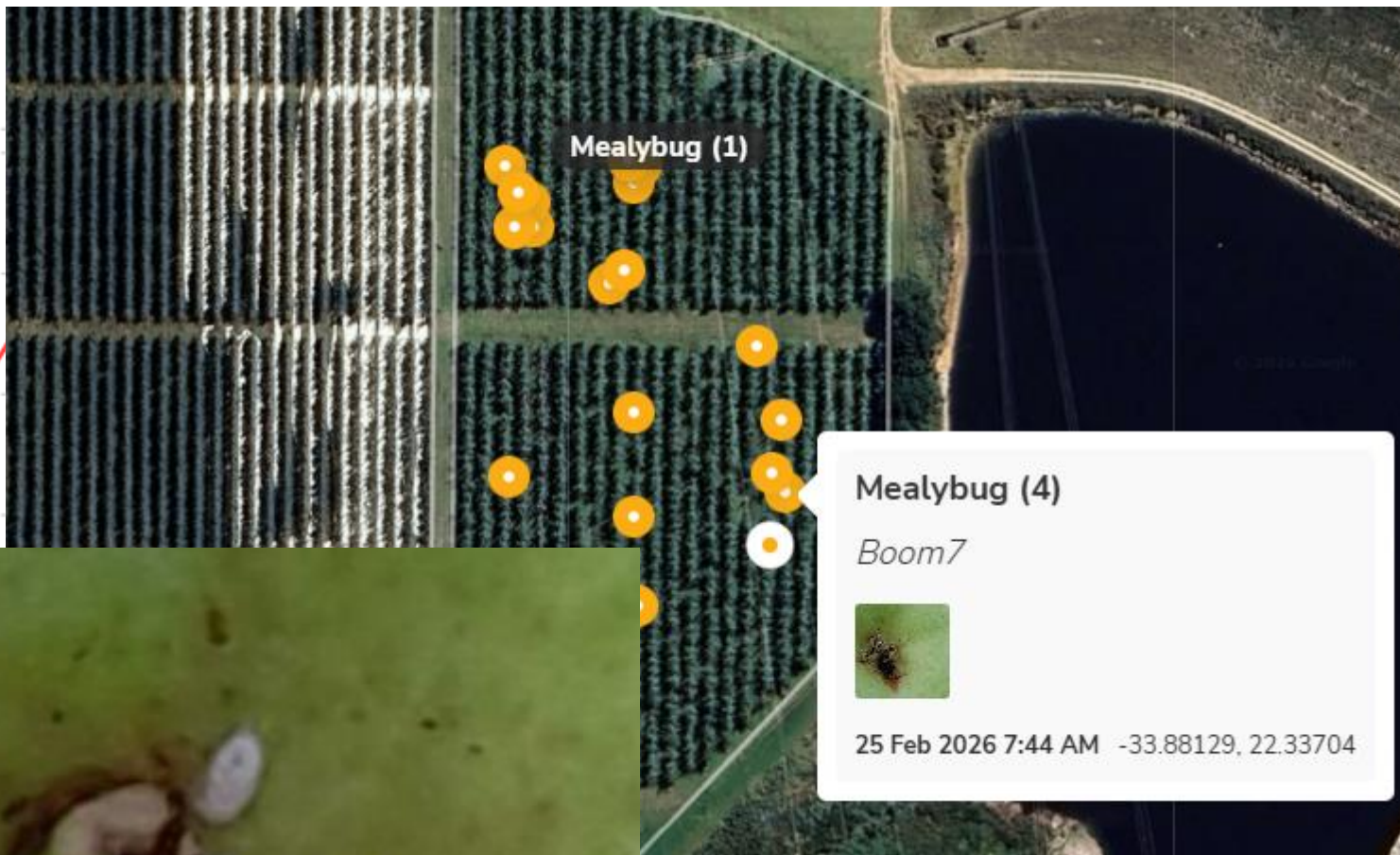
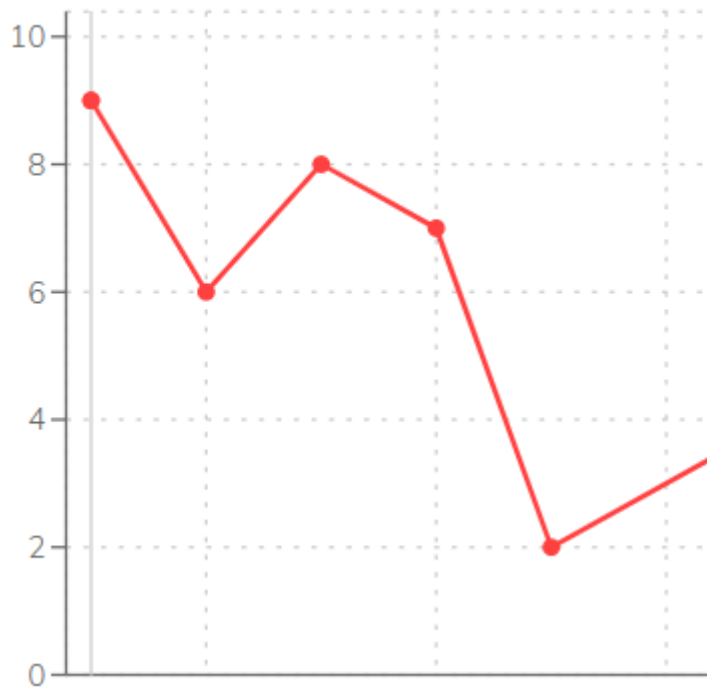
- Close to the probe for calibration
- Good spread over the rest of the block with field observations.





Pest monitoring and trend analysis.







- When you do visit the orchard:
- Make your observation electronically!
 - You do not remember as good as you think!
 - And everybody has access to the info.
 - You can even go back to last season chemical thinning and the exact location
 - Or the person doing the nutrition can see where you spotted the yellow leaves.
 - Make sure that you are not always stopping at the same point!
 - Red note: action has not been completed!



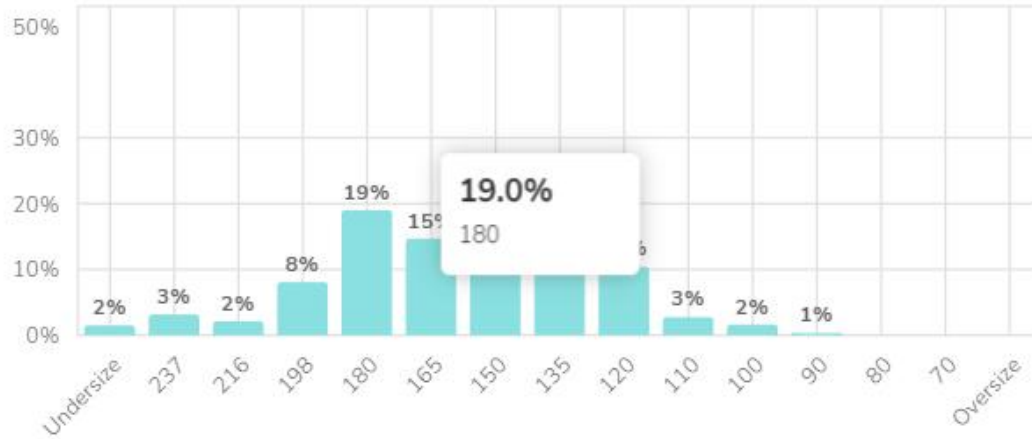
Aerobotics - Fruit annotation for apples





Size structure

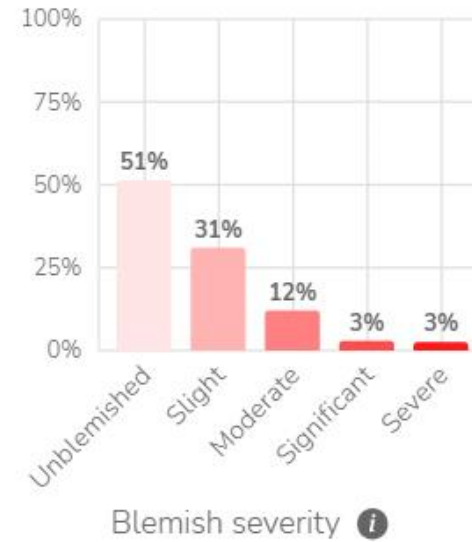
Average fruit size: 63.0 mm



Harvest size categories (by weight) ⚙️

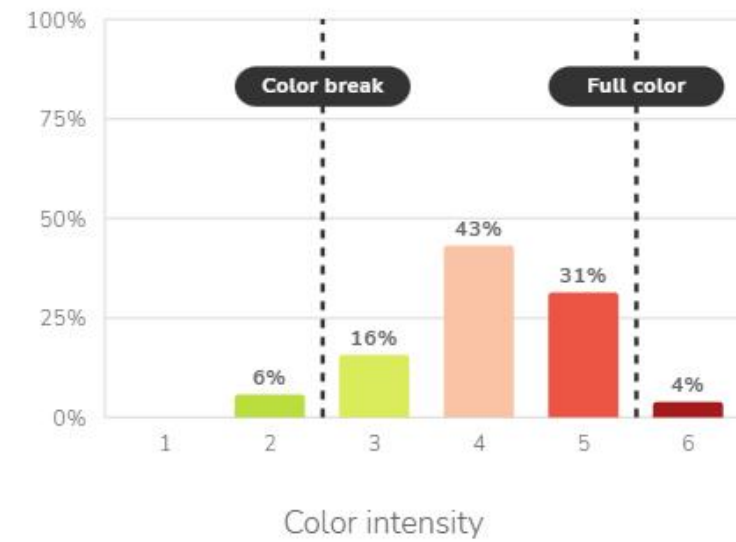
Blemishes

Beta



Blemish severity ⓘ

Color



Images

Fruit in bins

Blemishes

Color





*Start where you are,
Use what you have,
Do what you can.*

Arthur Ashe





THANK YOU

Hortgro
Technical Symposium
2026

