Smart IPM – Data driven decisions

Ant Surrage

Fargro

Technical development specialist


20.1 °C
49.3 %
20.8 °C
9.8 °C
1.1 kPa
8.8 g/m3
7.9 g/m3

Why IPM?

- Resistance to synthetic chemistry

- Legislation and societal pressure: e.g. SUD, Neonicotinoid restrictions, etc.

- Increased investment in development of alternative tech: biopesticides

- Loss of synthetic chemistry

Barriers to IPM adoption.

- Efficacy

Components tend not to be as effective as traditional chemistry.

- Predictability

Many controls require specific conditions therefore can be inconsistent in their performance.

- Complexity

IPM programmes are often more complex than previous programmes.

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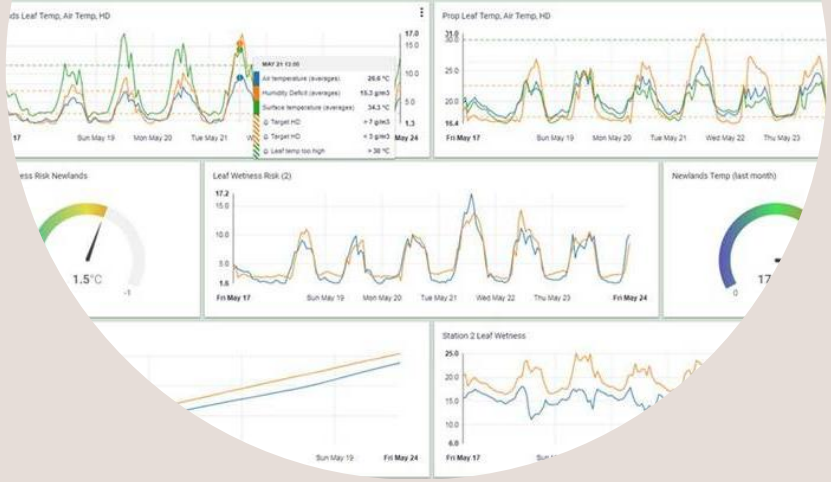

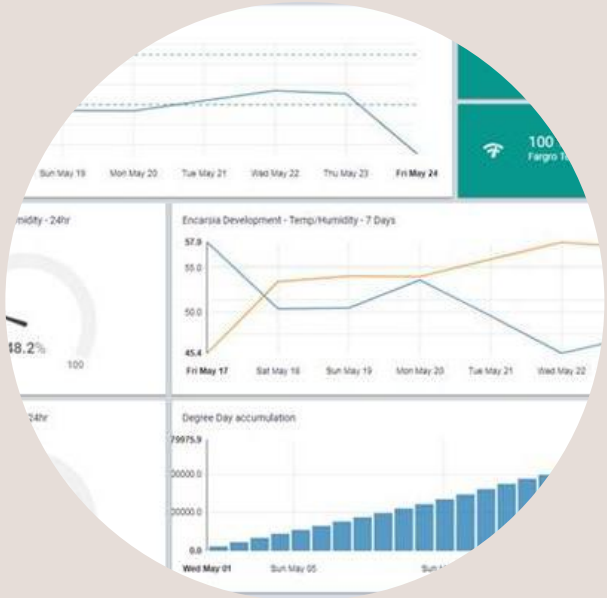

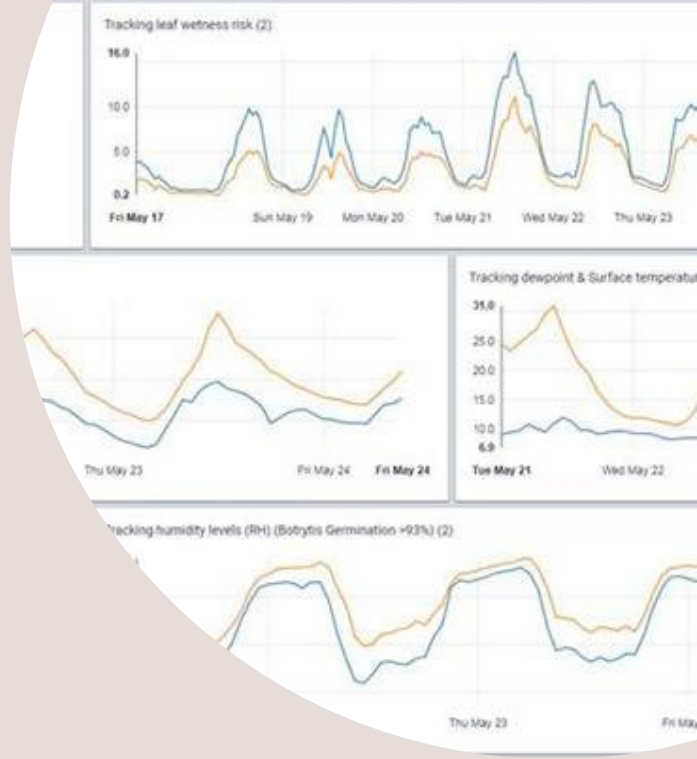

How can data help us get the best from an IPM programme?

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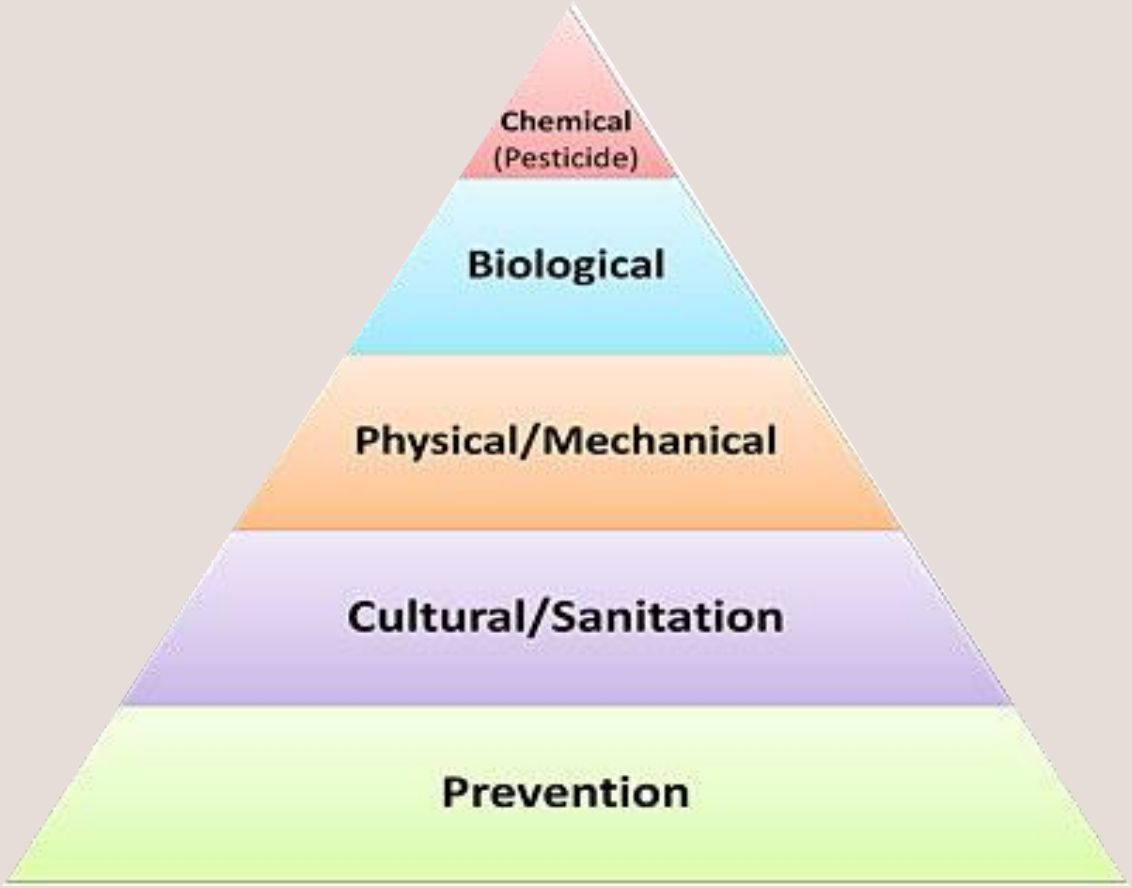
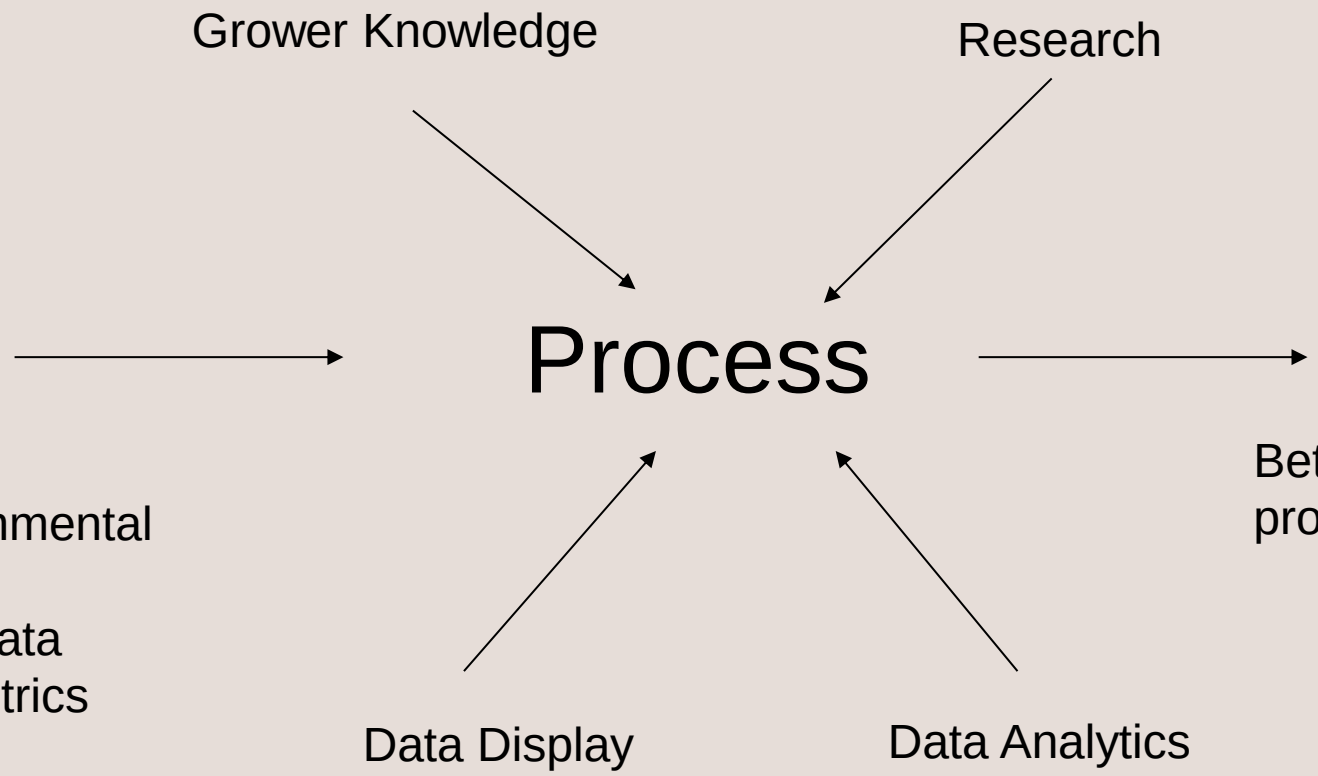
Components of a Programme





- Raw environmental data
- Crop walk data
- Growing metrics

Better results from an IPM programme

One platform for horticulture data

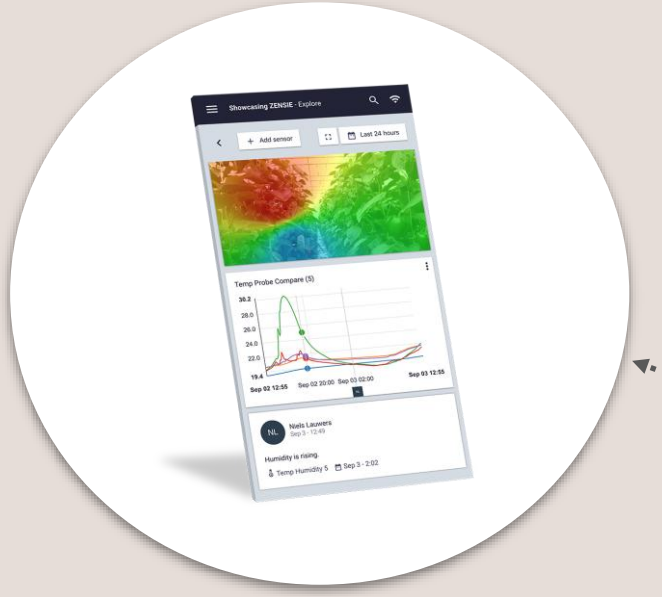
Easy to use, deployable in minutes and scalable

Wireless sensors

Any combination

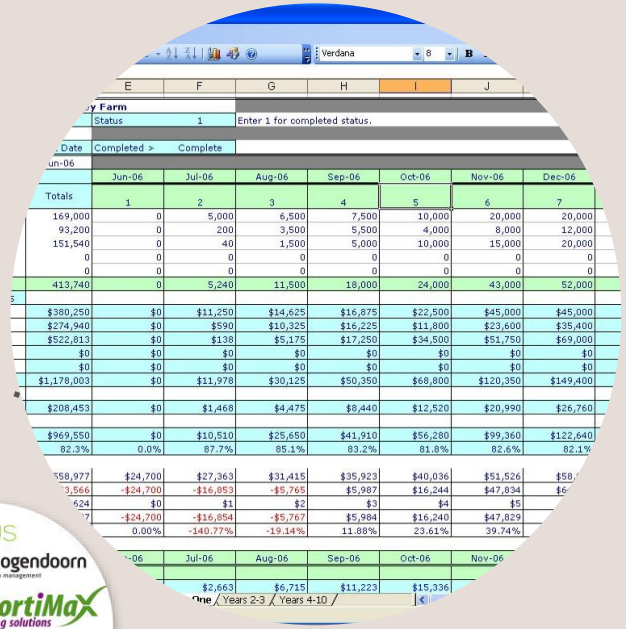
Gateway

Collects & connects data to our cloud



ZENSIE Dashboard

Cloud based dashboard enables analytics anywhere, anytime on **any device.**



3rd party & manual data

Climate computer, weather stations, crop walks, pest pressure, manual input

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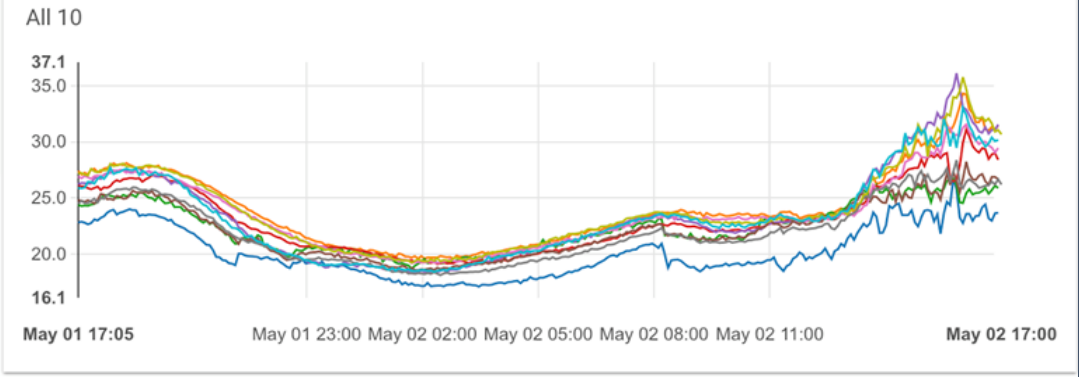
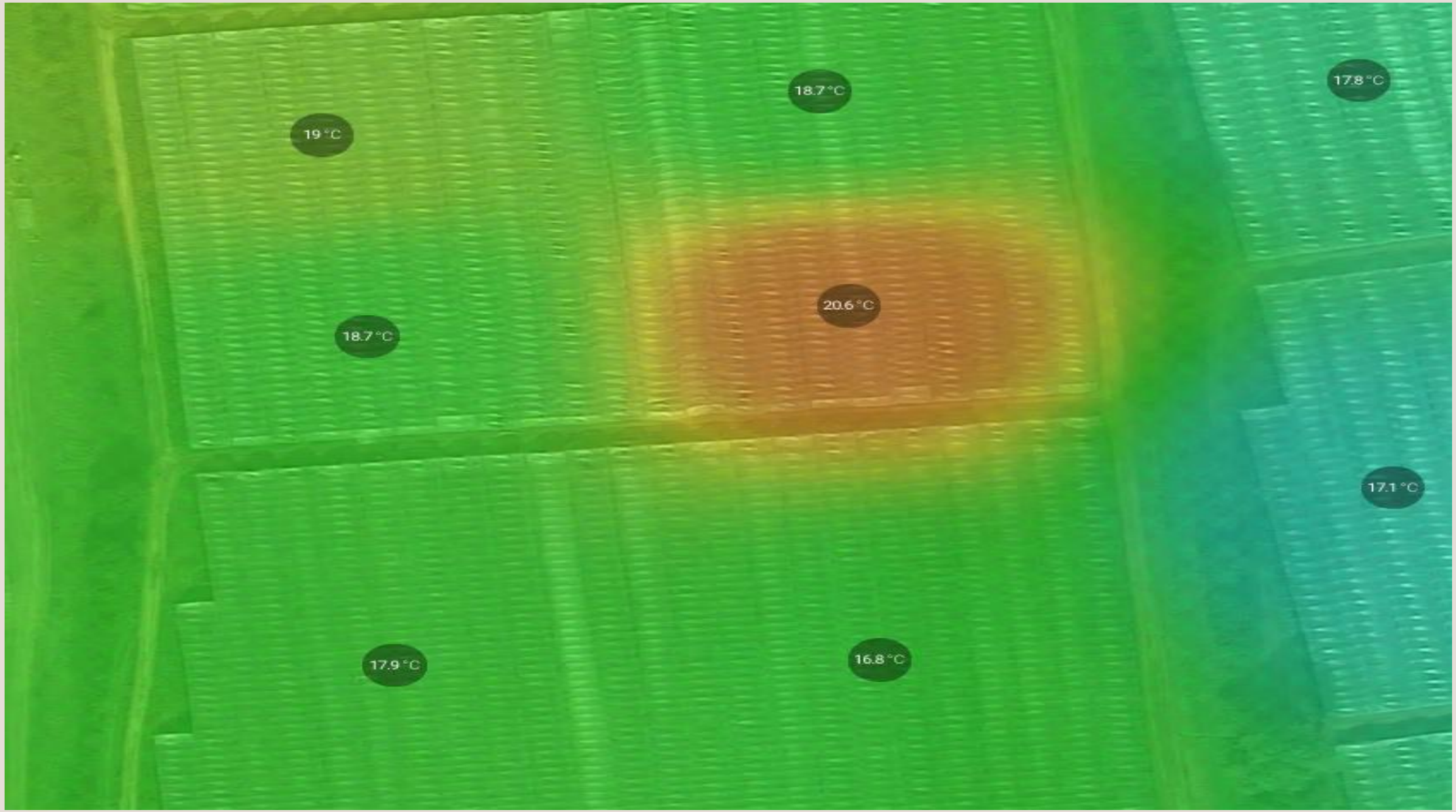
26.9 °C 3000 onder 2	**31.5** °C sensor 0013A2004153B46F	**27.8** °C 3033 boven	**30.7** °C sensor 0013A2004153B49B
29.5 °C sensor 0013A2004153B490	**25.7** °C 3000 onder	**30** °C 2033	**23.4** °C 3033 boven
31.8 °C Sensor 0013A2004153B47A	**26.2** °C 3033 boven		

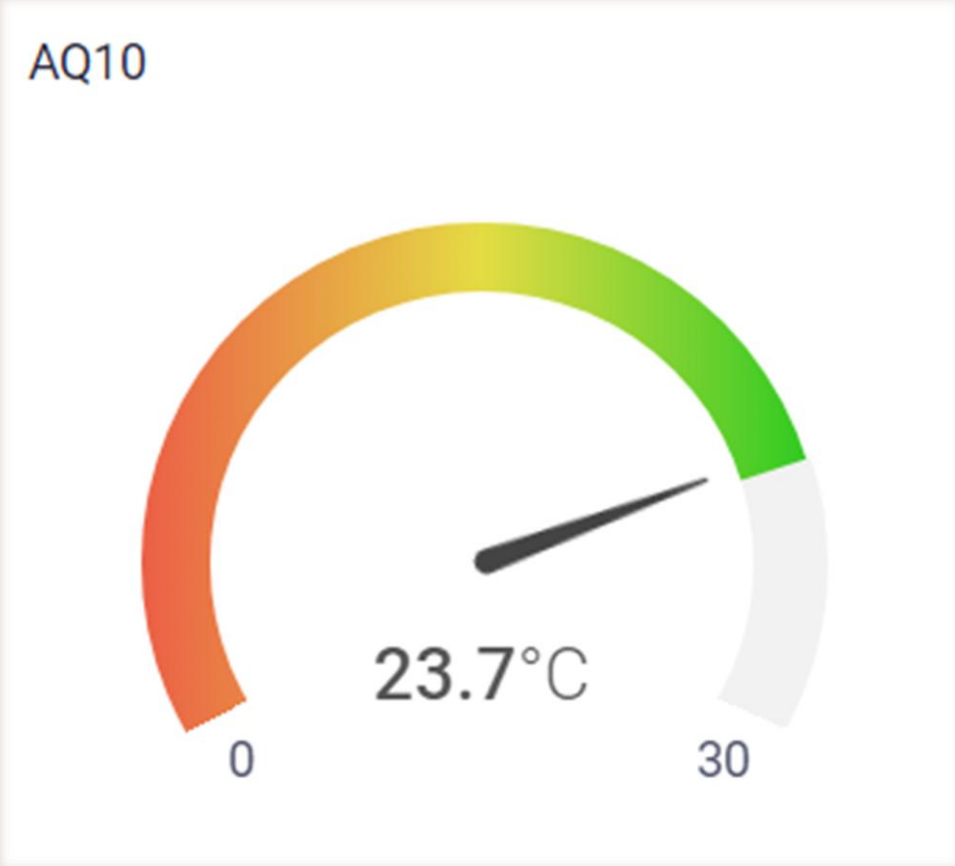


+

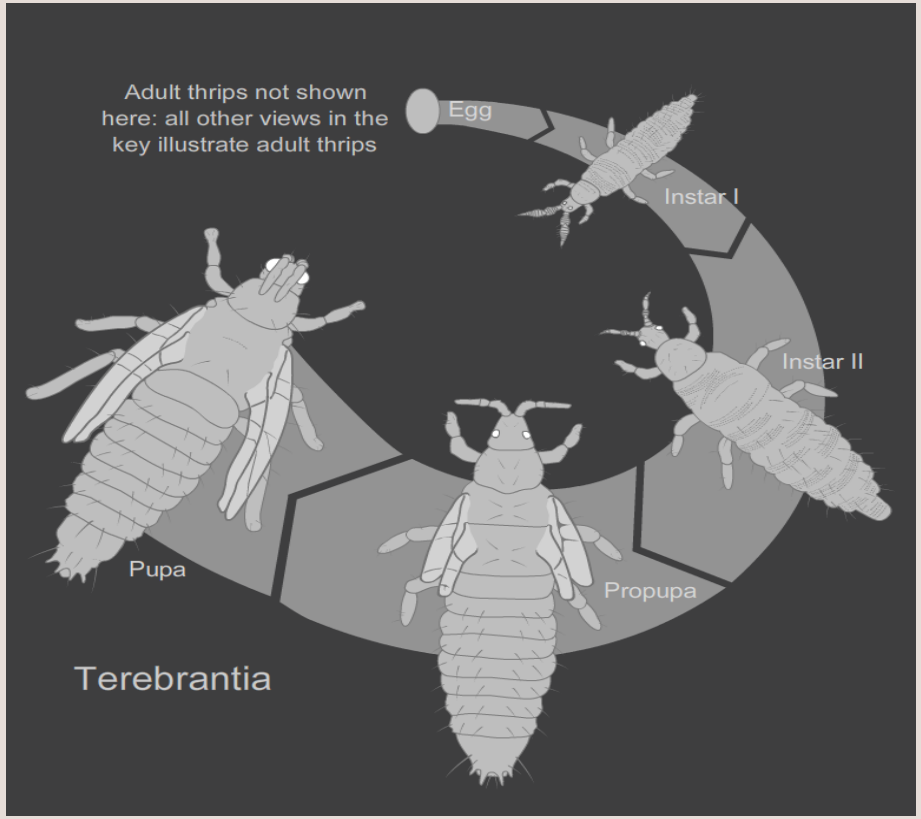

18.7 °C
17.8 °C
19 °C
20.6 °C
18.7 °C
17.1 °C
17.9 °C
16.8 °C

Timing

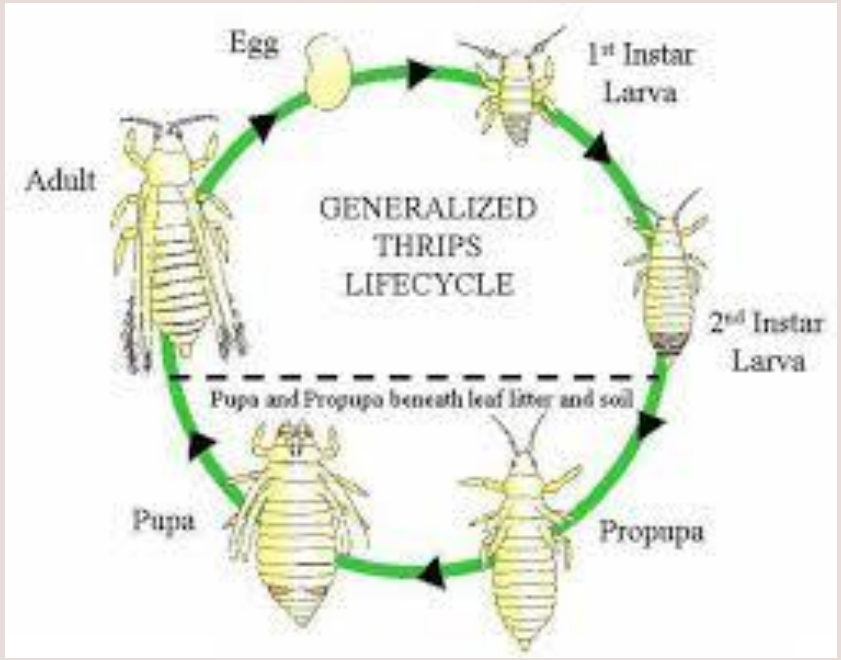
- Many IPM controls have a preventative MoA
- How can we use data to predict when to apply a control to get the best result?



Pest specific/Crop architecture

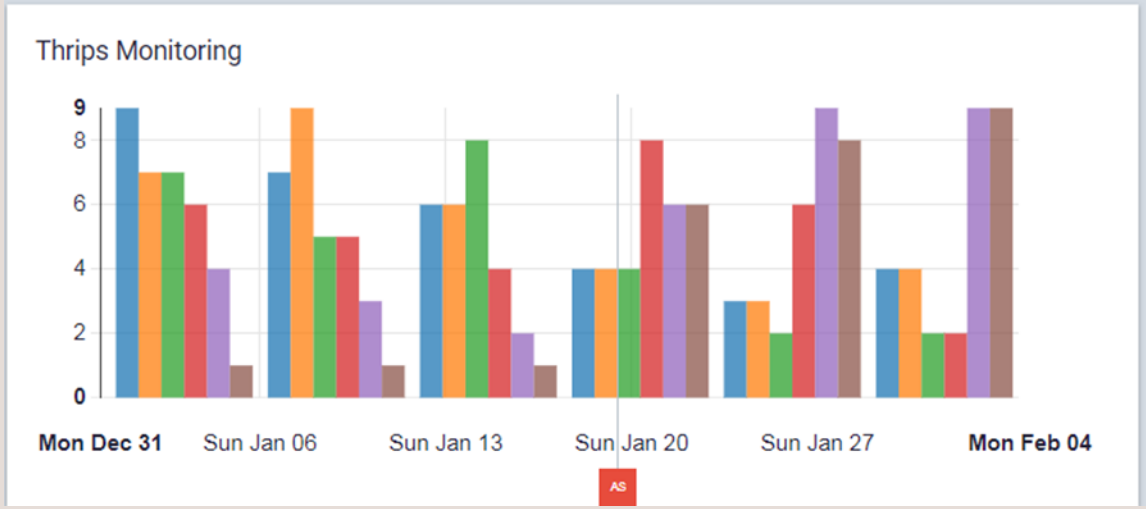


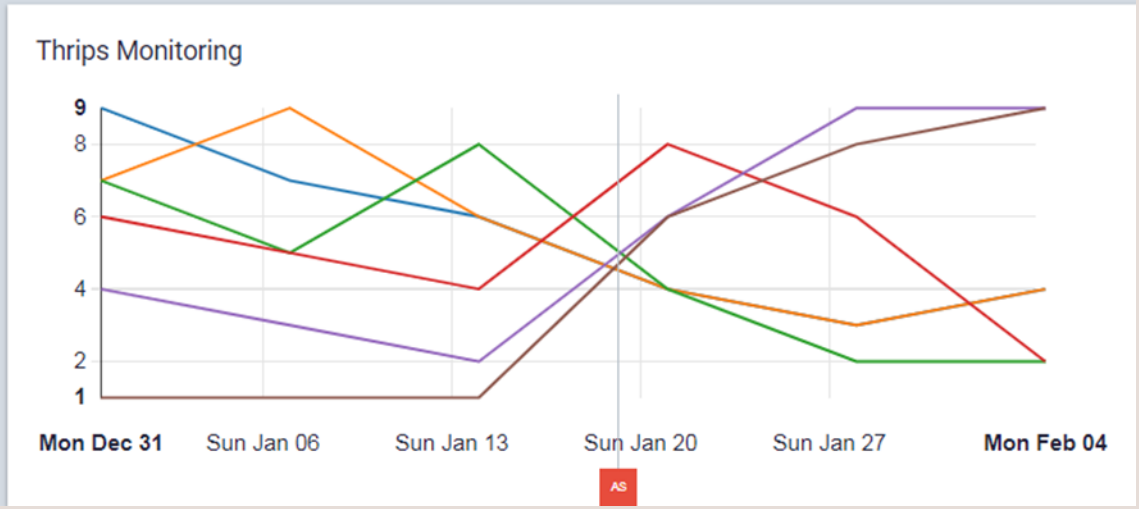
- Understand the pest lifecycle
- Understand where in the crop the pest will be
- Take into account the structure of the crop and how that can influence your application



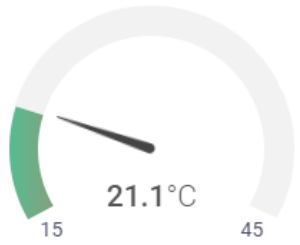
	A	B	C	D
1		Fargro Technical 1 Temp/Humidity - Humidity (%) - averages	Fargro Technical 1 Temp/Humidity - Temperature (Â°C) - averages	
2	24/08/2019 15:00	62.8	22.8	
3	24/08/2019 16:00	63.2	23.1	
4	24/08/2019 17:00	63.5	23.3	
5	24/08/2019 18:00	63.5	23.2	
6	24/08/2019 19:00	63.3	23.2	
7	24/08/2019 20:00	63.7	23.1	
8	24/08/2019 21:00	62.5	22.8	
9	24/08/2019 22:00	61.3	22.5	
10	24/08/2019 23:00	60.2	22.2	
11	25/08/2019 00:00	60.1	22	
12	25/08/2019 01:00	59.7	21.8	
13	25/08/2019 02:00	59.2	21.8	
14	25/08/2019 03:00	58.7	21.7	
15	25/08/2019 04:00	58.2	21.5	
16	25/08/2019 05:00	57.9	21.3	
17	25/08/2019 06:00	57.6	21.1	
18	25/08/2019 07:00	57.7	21.1	
19	25/08/2019 08:00	58.2	21.4	
20	25/08/2019 09:00	58.5	21.6	
21	25/08/2019 10:00	59.2	21.8	
22	25/08/2019 11:00	60.2	22.1	
23	25/08/2019 12:00	61.2	22.5	
24	25/08/2019 13:00	62.4	23	
25	25/08/2019 14:00	63.3	23.4	

Tunnel A	Egg	1st Instar Larva	2nd Instar Larva	Propupa	Pupa	Adult
Week 1	9	7	7	6	4	1
Week 2	7	9	5	5	3	1
Week 3	6	6	8	4	2	1
Week 4	4	4	4	8	6	6
Week 5	3	3	2	6	9	8
Week 6	4	4	2	2	9	9

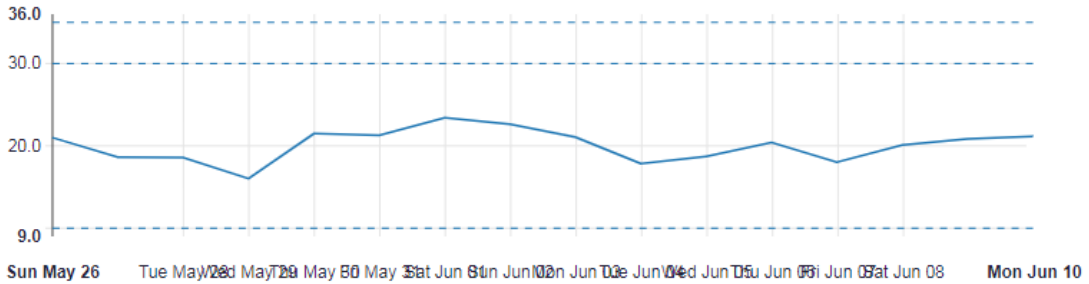




Thrips life cycle speed



F. occidentalis Development (Egg-Adult, 9 days at 30, 40 days at 15)

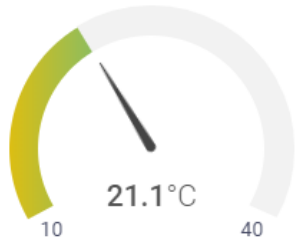


21.2 °C 52.5 %
Temp/Humidity

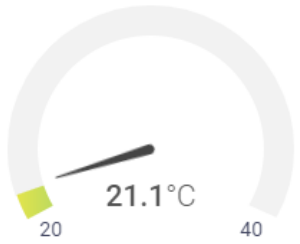
100 %
Fargro Technical 1

last 7 days

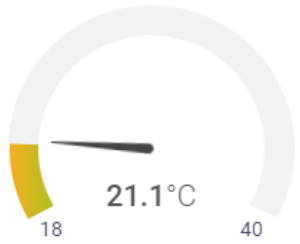
O. laevigatus development



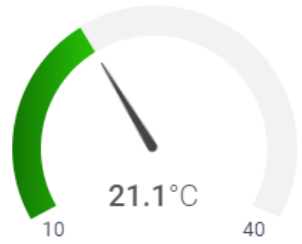
A. montdorensis development



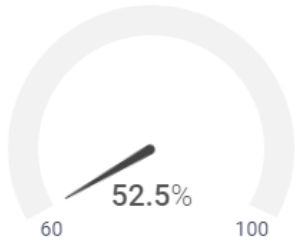
Swirskii development



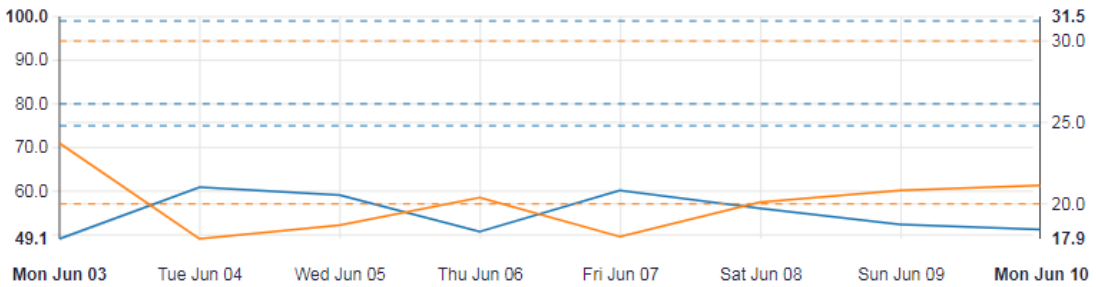
N.Cucumeris Development



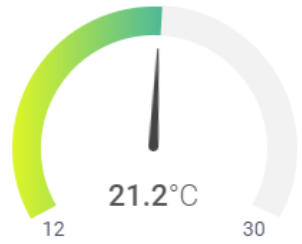
Naturlais-L optimum humidity

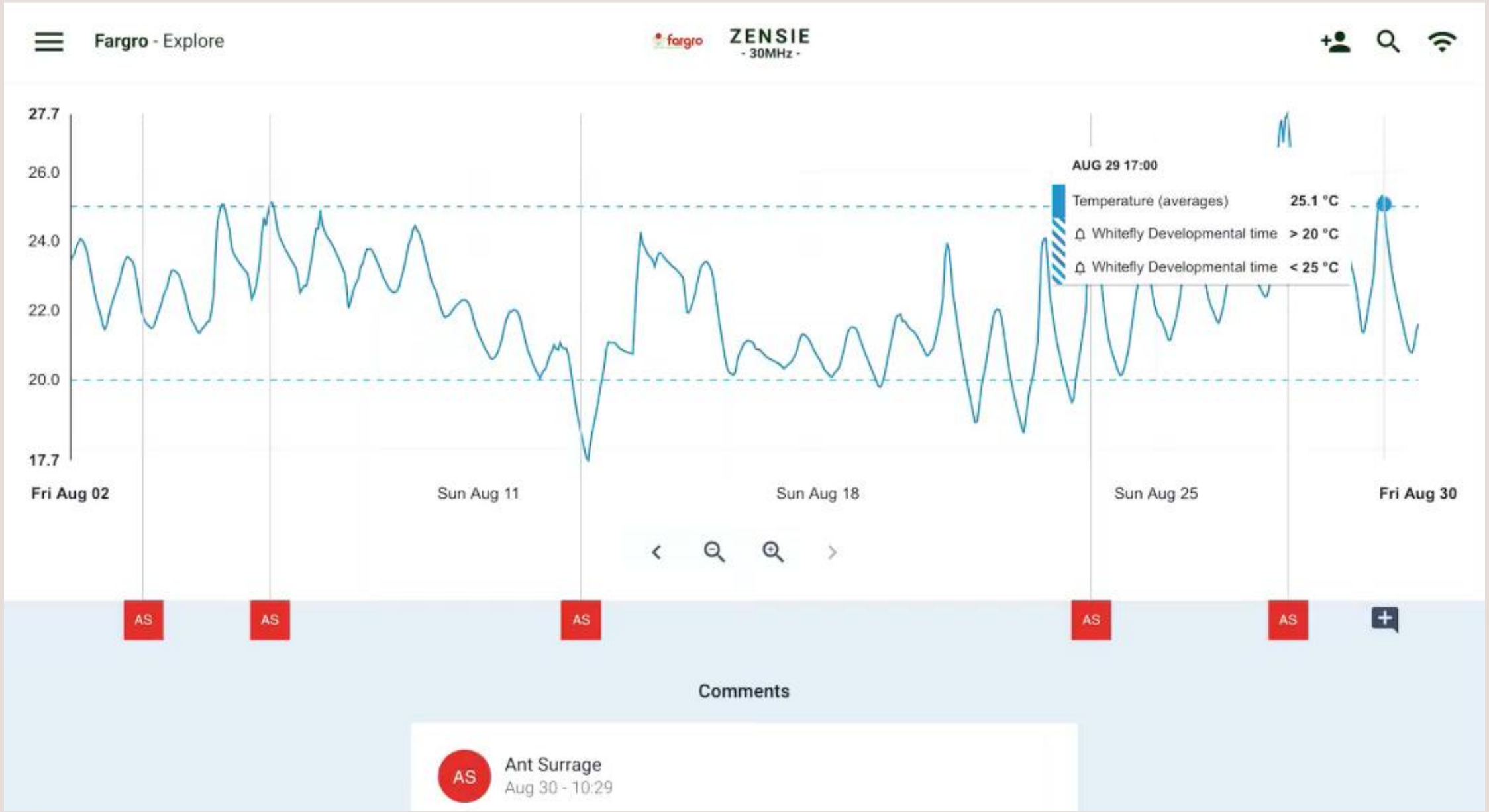


Naturalis-L Development



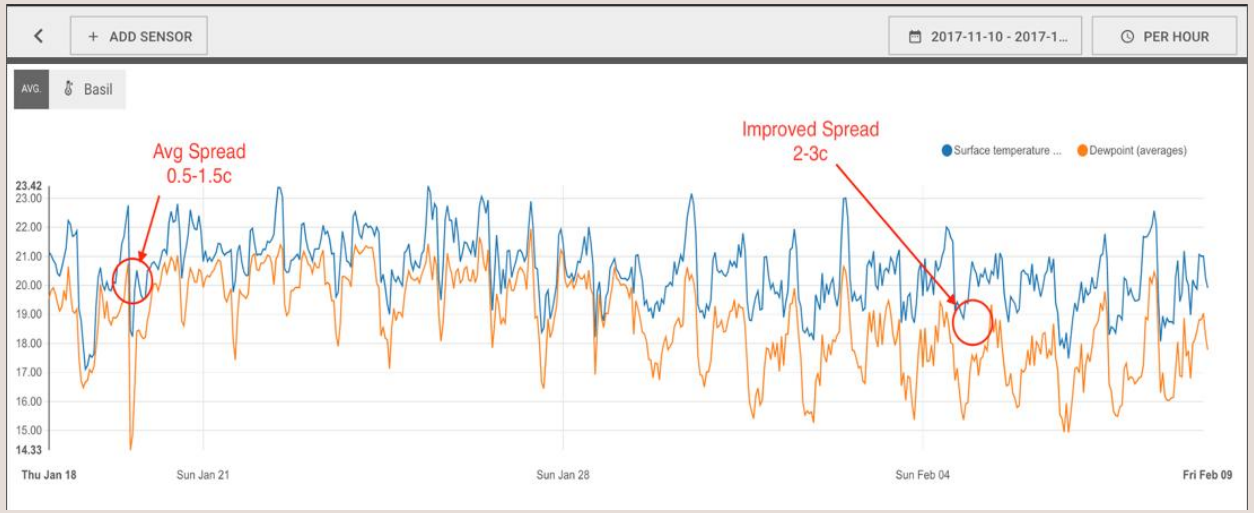
Naturalis - L optimum temperautre




Fargro - Explore
fargro
ZENSIE
- 30MHz -
27.7
26.0
24.0
22.0
20.0
17.7
AUG 29 17:00
Temperature (averages) 25.1 °C
Whitefly Developmental time > 20 °C
Whitefly Developmental time < 25 °C
Fri Aug 02
Sun Aug 11
Sun Aug 18
Sun Aug 25
Fri Aug 30
AS
AS
AS
AS
AS
Comments
AS
Ant Surrage
Aug 30 - 10:29

Timing for disease control.

- Early detection of leaf wetness.
- Improve spread and reduce the cumulative hours at risk.
- Monitor plant stress
- Reduce unnecessary stress, or even increase low level stress.



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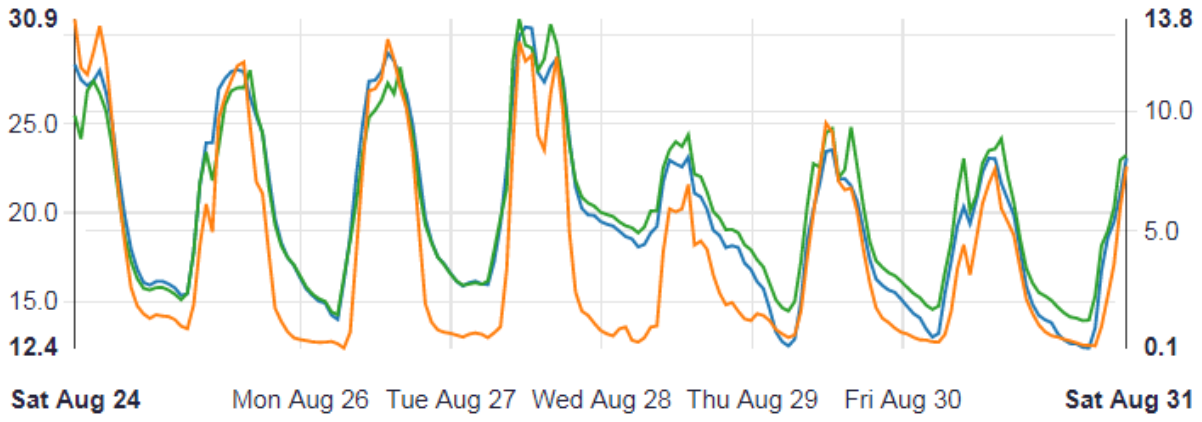
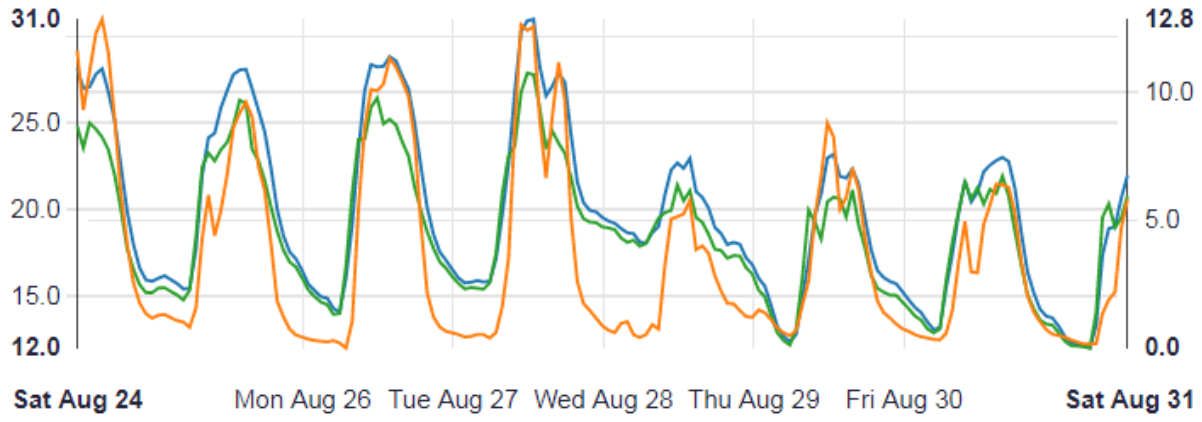
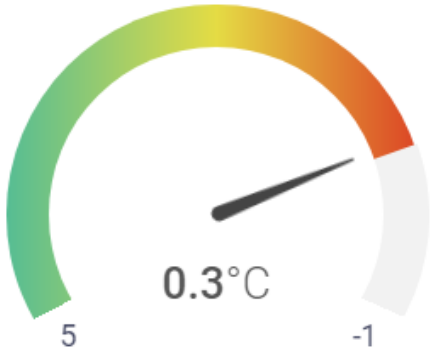
Leaf Temp, Air Temp, HD



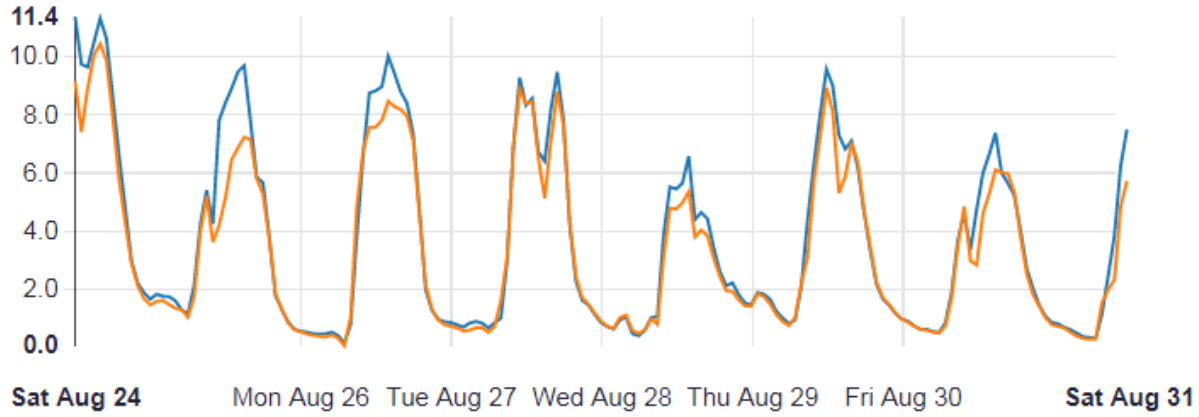
Prop Leaf Temp, Air Temp, HD



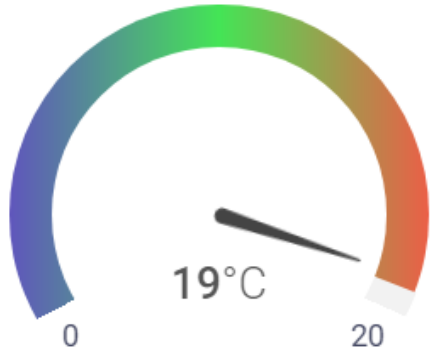
Leaf Wetness Risk



Leaf Wetness Risk (2)



Temp (last month)



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AQ10

- *Ampelomyces quisqualis* is a hyper parasite
- Research last year by ADAS showed that if powdery mildew is not present AQ10s presences will be fleeting
- AQ10 should be applied at 5% Powdery Mildew
- However, if powdery mildew gets too advanced it can be equally difficult to control.
- Can we use predictive models to tell us level of risk/likelihood that 5% powdery mildew is present.

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Powdery Mildew Development

- The latent and developmental periods are well defined for a range of powdery mildews.

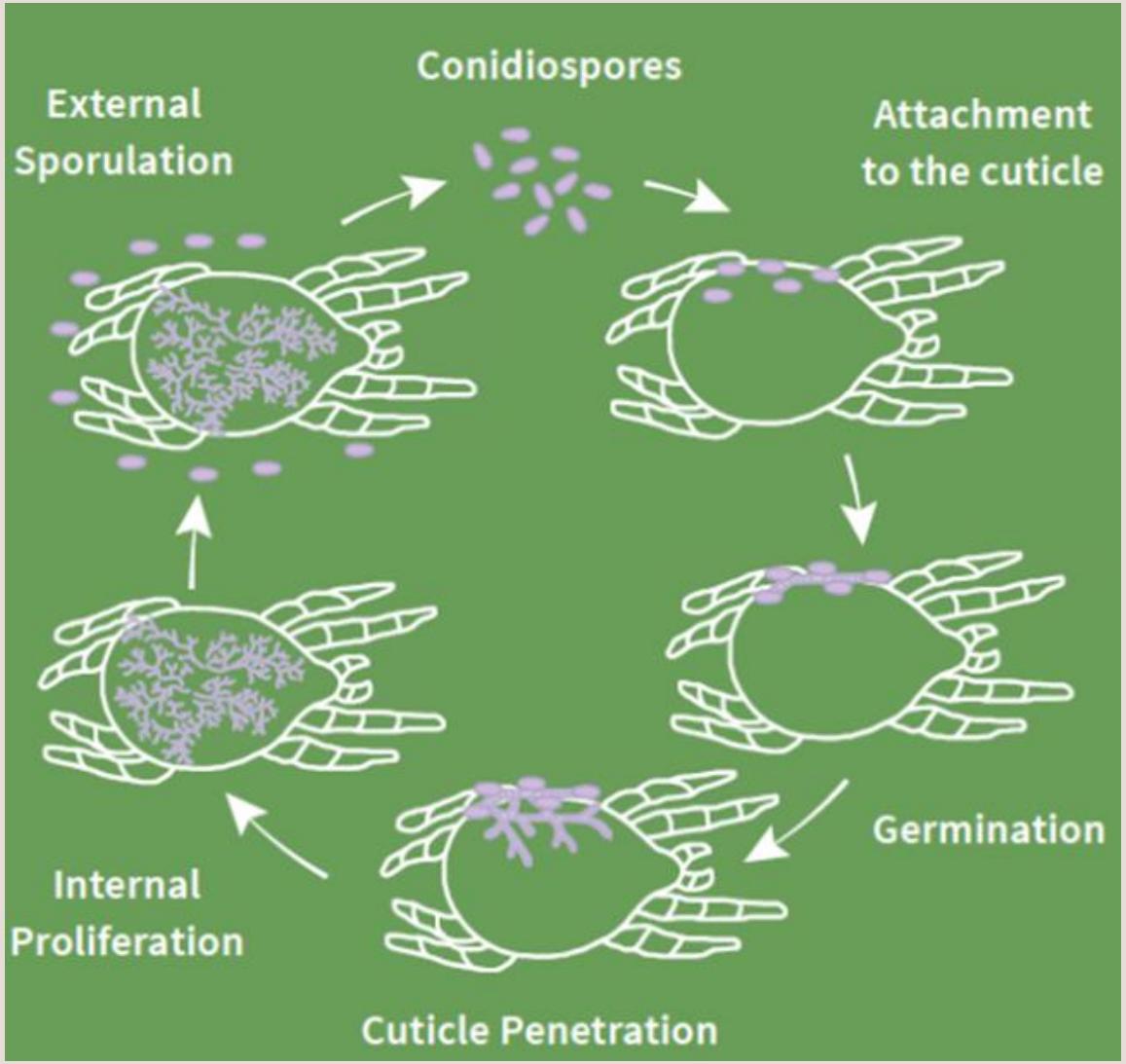
- Triggers for the onset are less well defined

- However, it is widely thought that fluctuations in relation with low VWC can causes significant stress in spring and autumn that lead to onset.

Application

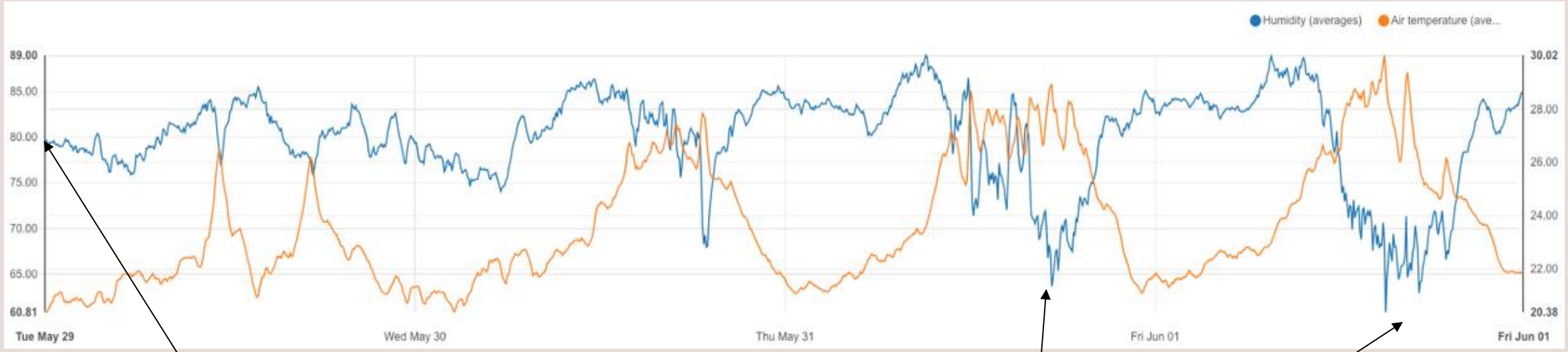
Naturalis – L
Beauveria bassiana

- Above 60% RH
- Above 80% RH for sporulation
- 20^0C – 25^0C
- UV sensitive



Naturalis - L

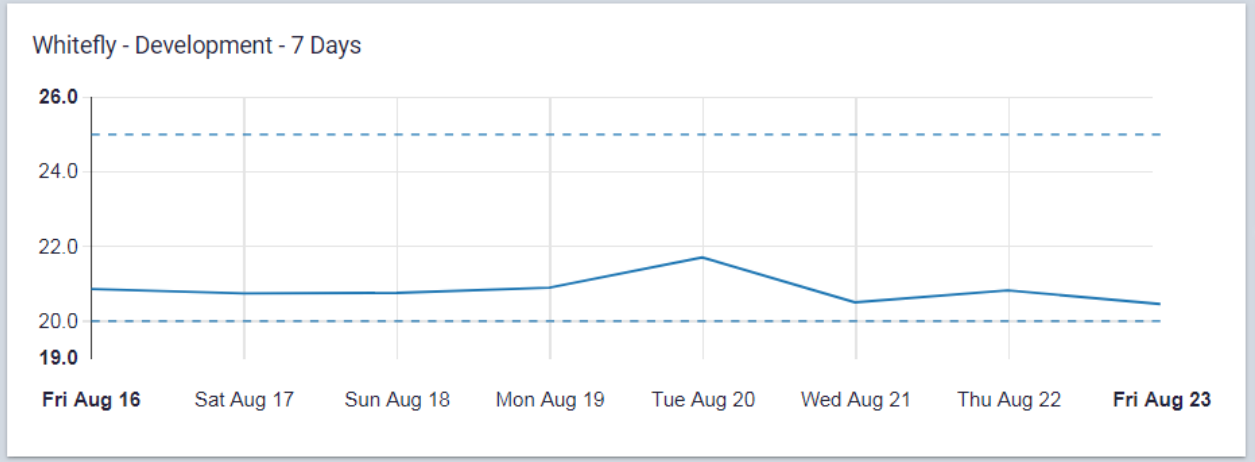
Temperatures are consistently good for *B.bassiana*

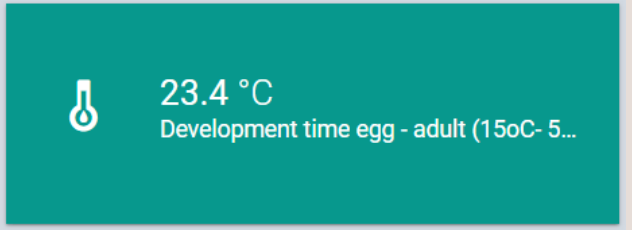


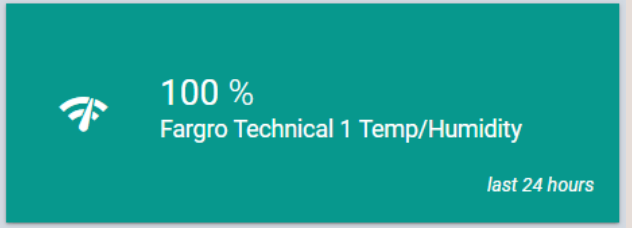
Good example of humidity being regularly over the 80% threshold

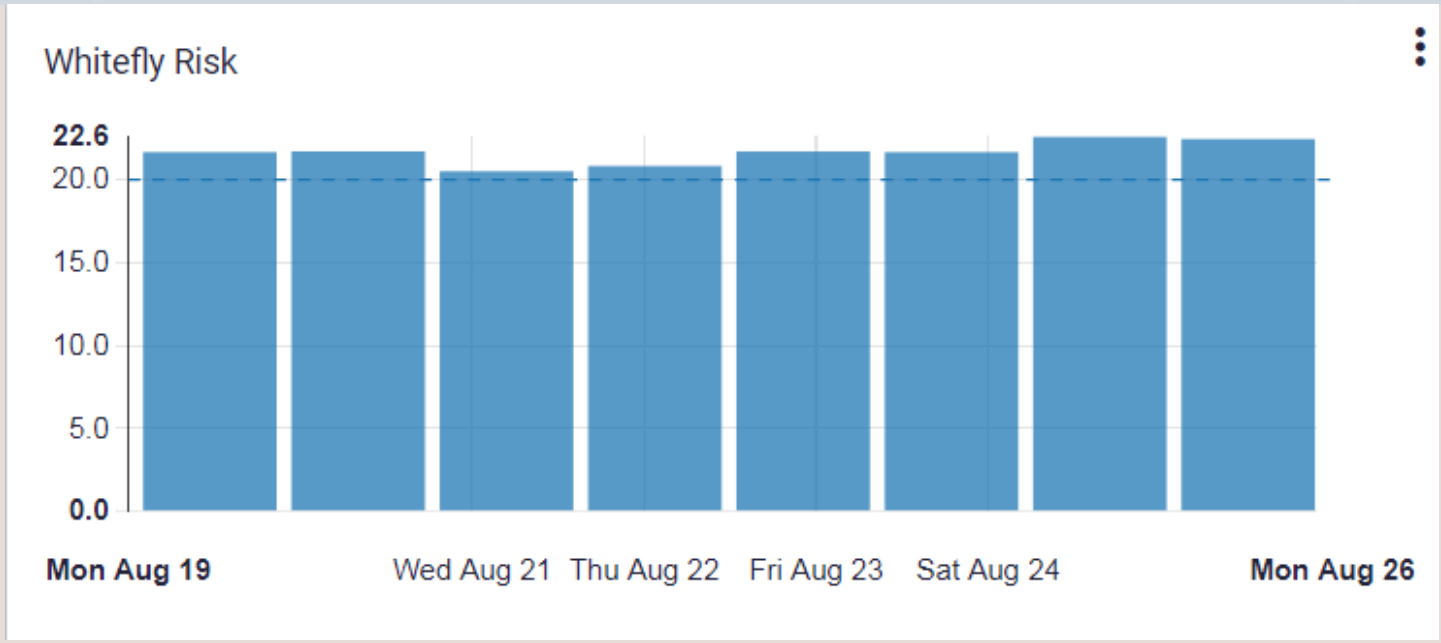
Reoccurring periods of low humidity

Forecasting









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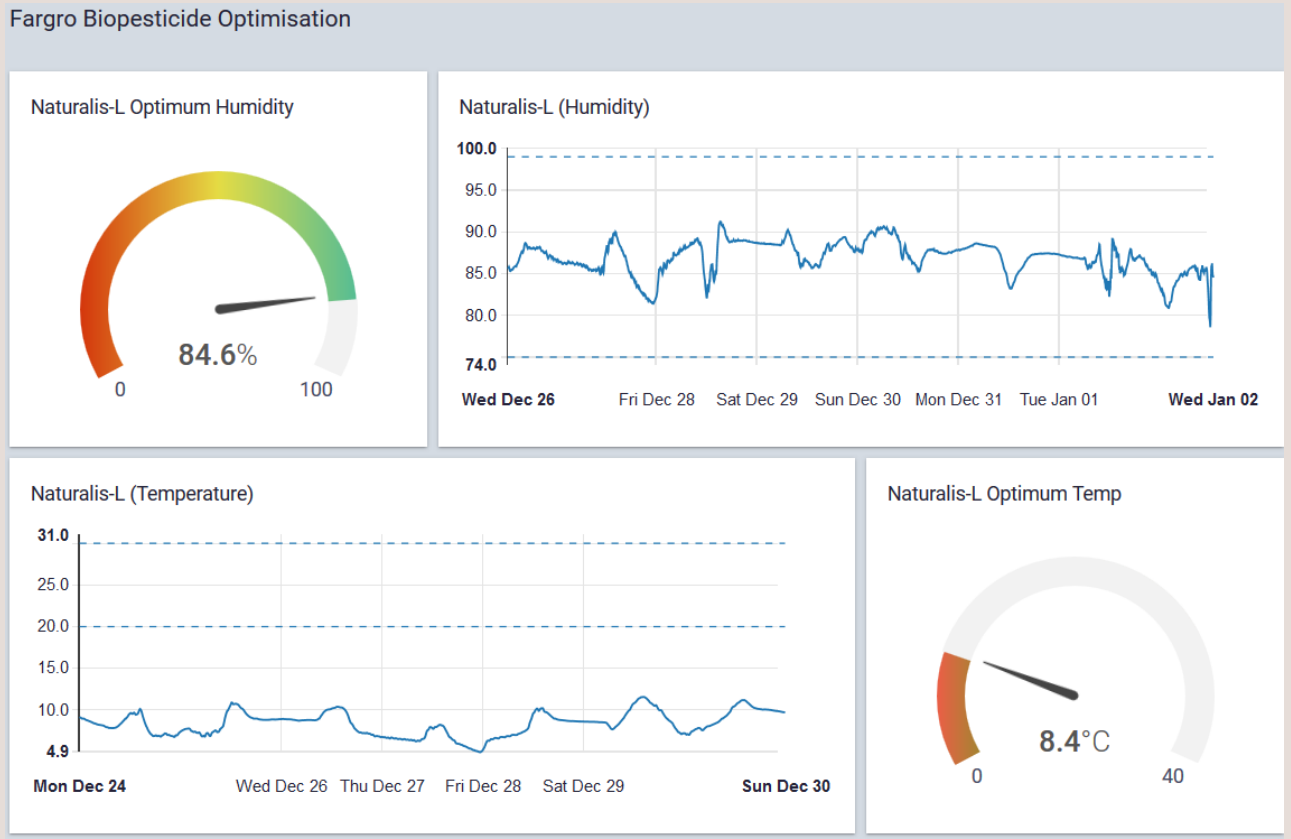
Naturalis - L

- Simple dashboard to inform growers
- Temperature/Humidity gauge to indicate best time for application
- Graphs to show conditions post application to inform the grower of the likelihood of *Beauveria bassiana* being present in the environment.

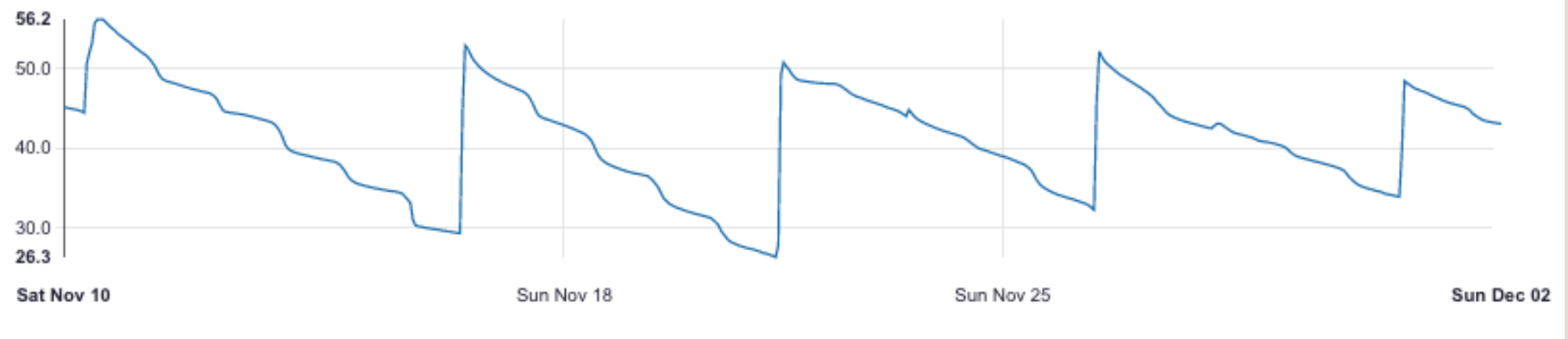


New Metrics, new insight

“No Robots here” just data driven humans

Old strategy

New strategy using real-time charts & alerts



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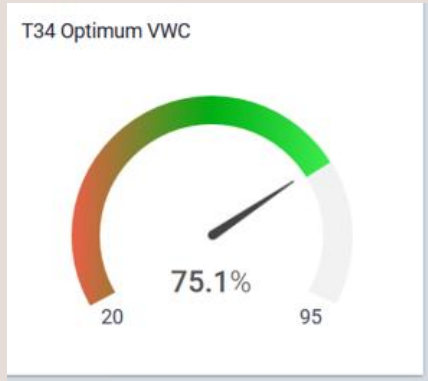
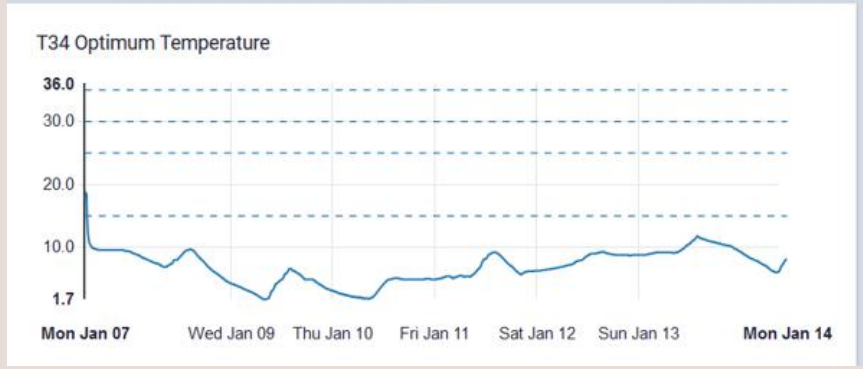
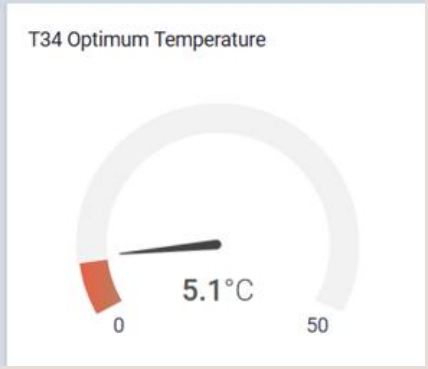
Predicting damping off disease & preventing

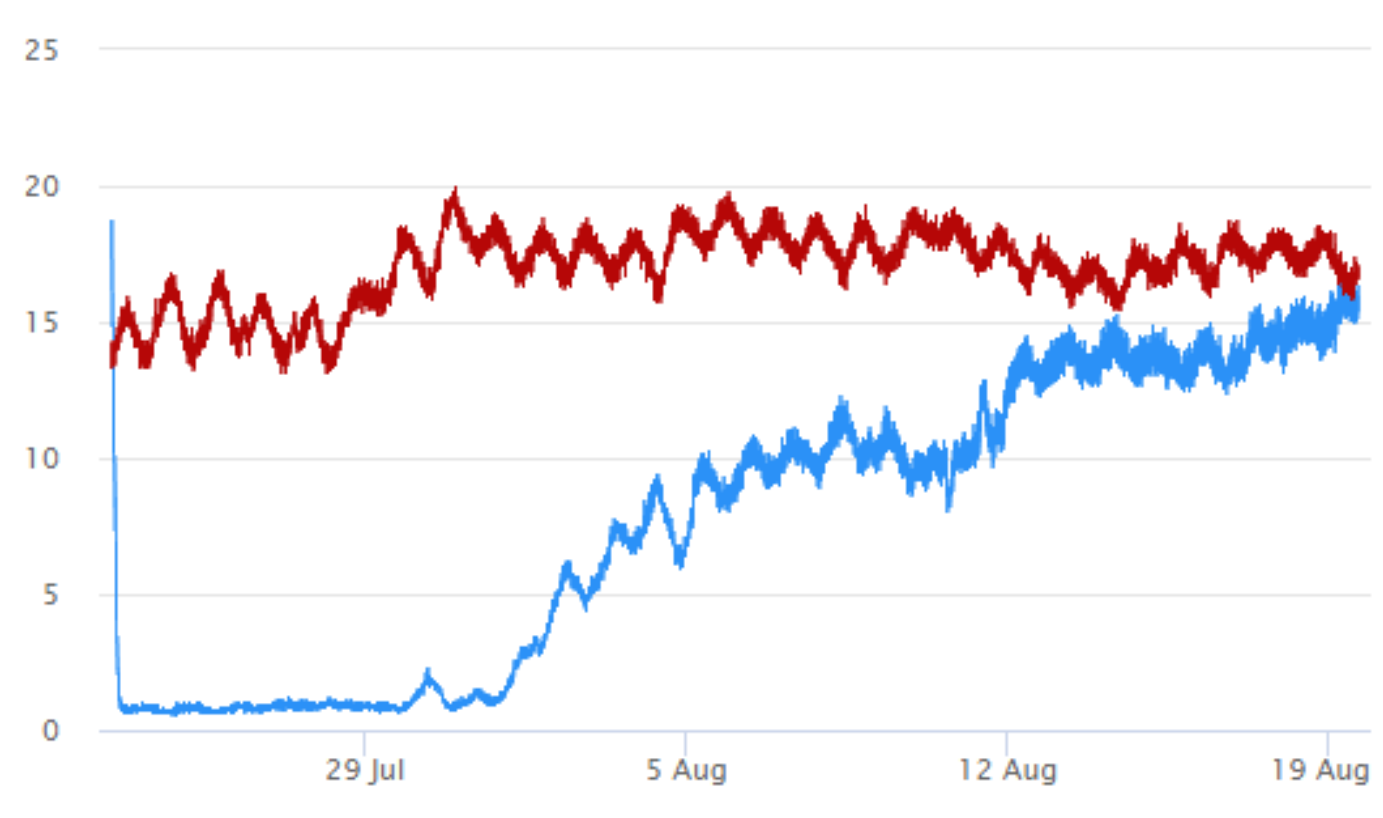
- T34 is active between 15ºC – 35ºC
- Above 36ºC mycelium will die
- Trichoderma's tend to work 20ºC – 30ºC
- Requires “normal” VWC
- Not Anaerobic/or too dry



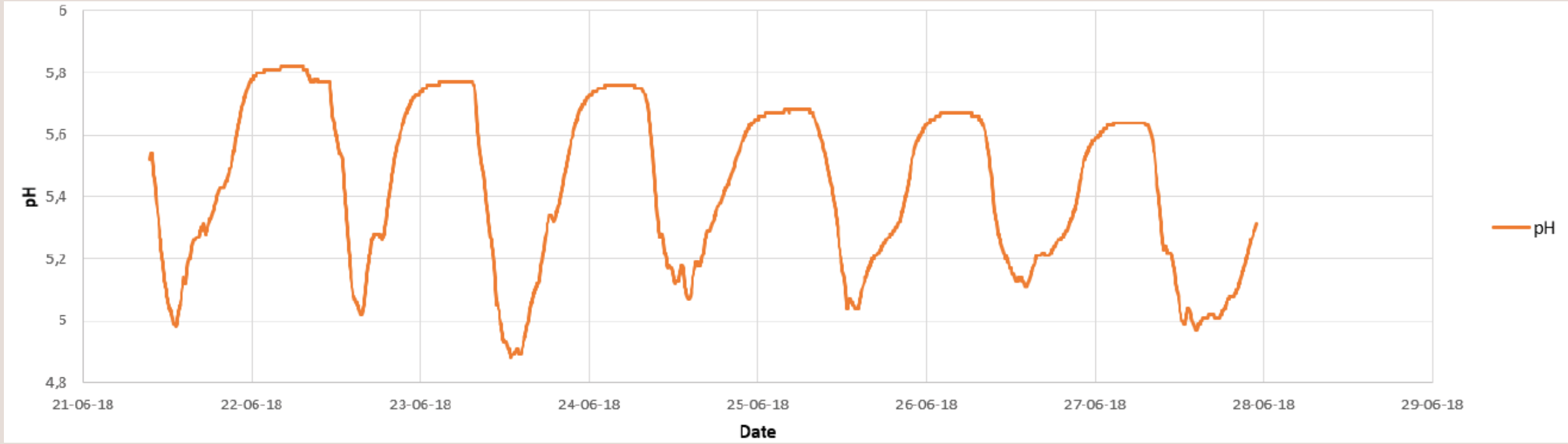




Oxygen in the root zone



pH


6
5,8
5,6
5,4
5,2
5
4,8
pH
21-06-18
22-06-18
23-06-18
24-06-18
25-06-18
26-06-18
27-06-18
28-06-18
29-06-18
Date
pH

Try calculating this 1,440 times a day

no more painful excel and data collection time

VPD = VPsat - VPAIR

Plant Temperature

Air Temperature

Relative Humidity

$$VPsat = \frac{610.7 \bullet 10^{(7.5T)/(237.3+T)}}{1000} - \frac{610.7 \bullet 10^{(7.5T)/(237.3+T)}}{1000} \bullet \frac{RH}{100}$$

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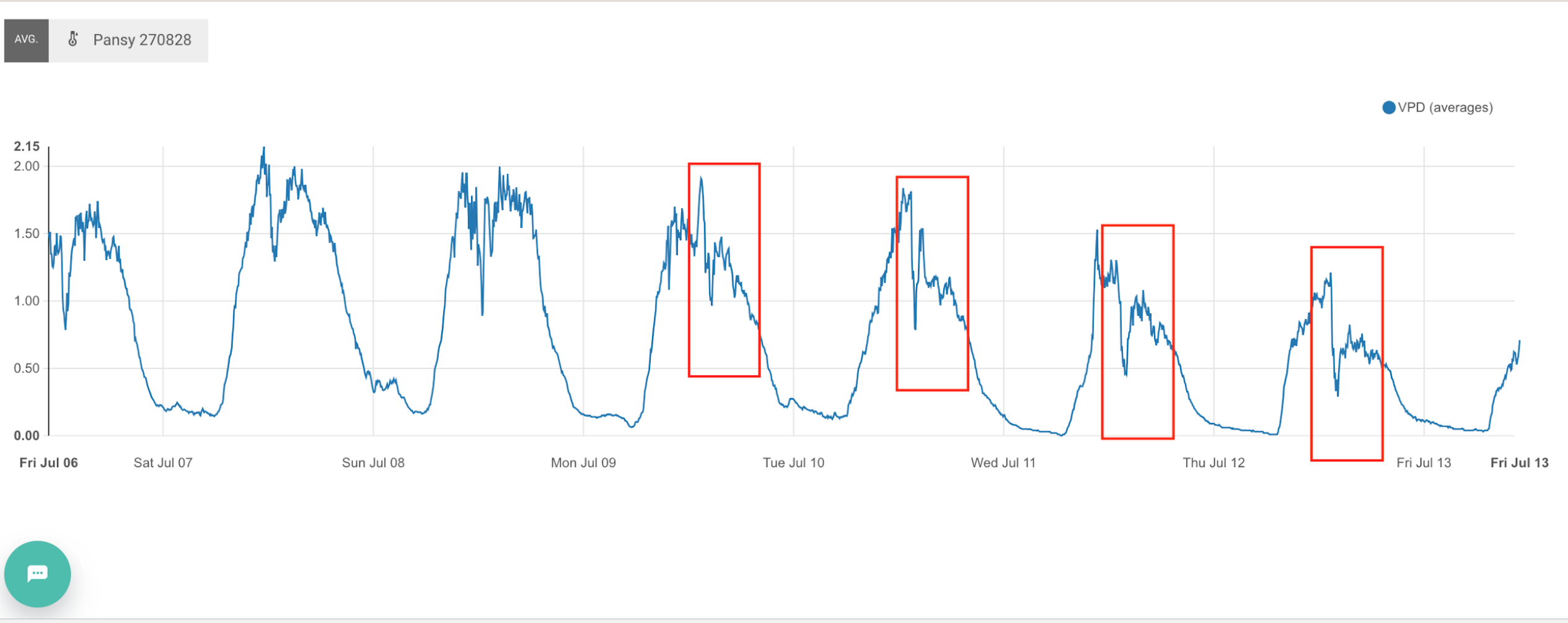
Actively reducing plant stress



Thank you for your time

Ant Surrage

Technical development specialist

Fargro