VELCOURT

A perspective on the practical use of PCR testing to aid farm management

Nick Anderson
Velcourt

RESPONSIBLE FARMING FOR THE FUTURE

Velcourt and its approach to crop production

- Velcourt activities
- Evidence based approach
- Velcourt trials

Opportunities with PCR testing

Optimisation of fungicide inputs, within an IPM context

Political / environmental / social backdrop

Velcourt interest focussed on Septoria in winter wheat in the first instance:

‘Can we measure the level of latent Septoria in wheat and use this to optimise fungicide inputs?’

VELCOURT

Services

Microgenetics Swift Detect test

- Log genome scale
- Results categorised as undetected, low, medium or high

Bayer Crop Check

- 1-100 scale
- 1 represents the threshold for reliable detection
- Results categorised as ‘protectant’, ‘early stage infection’ and ‘curative scenario’

VELCOURT

Known unknowns

Accuracy and repeatability- sampling process as well as testing process

Spatial differences in disease pressure

False negative risk

Which leaf layer to test and when?

How to interpret results?

How do you factor this into decision making alongside other factors- variety, drilling date, weather etc

VELCOURT

Initial questions

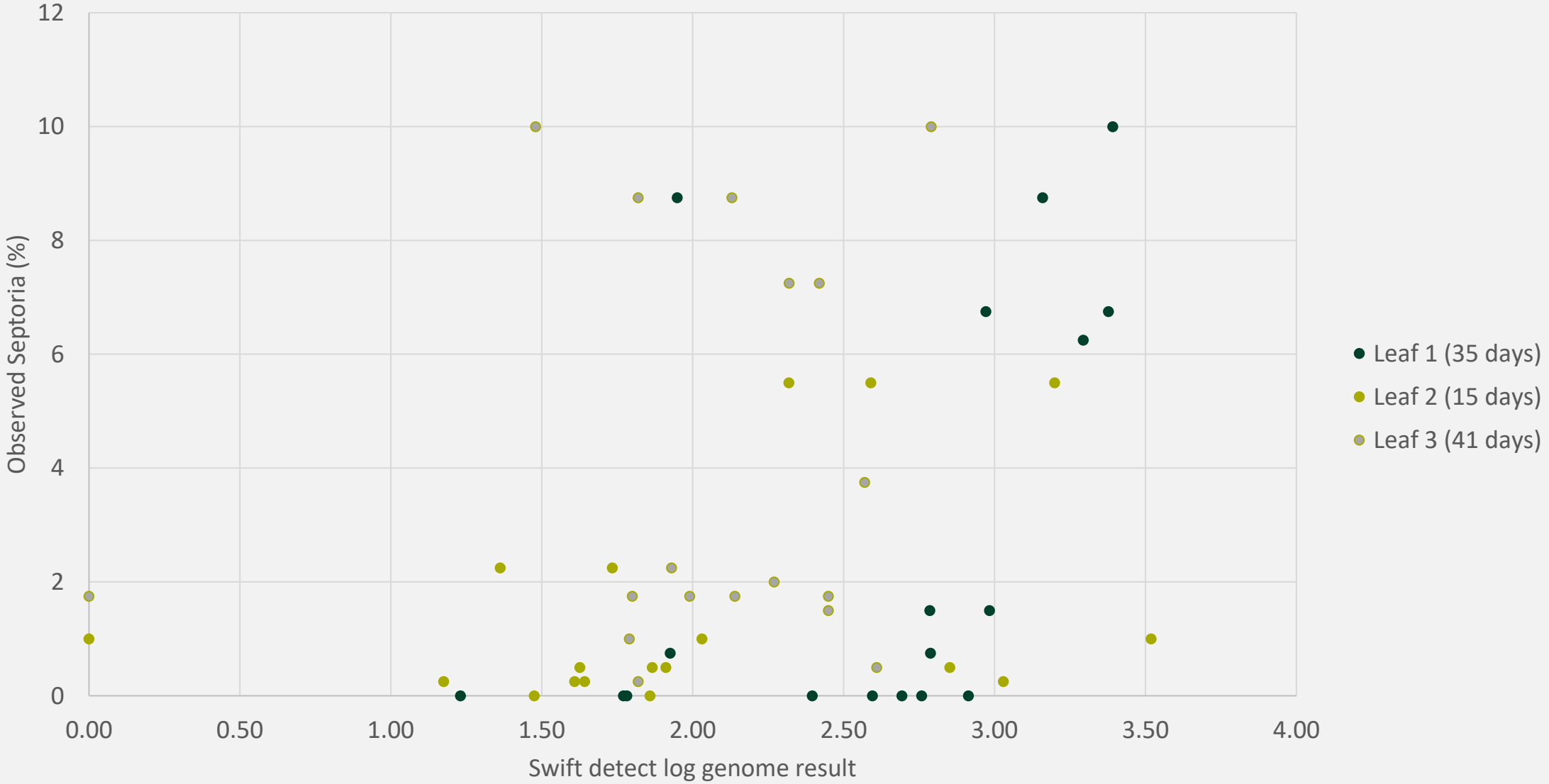
1. Does qPCR testing appear to accurately reflect what is expected, and then relate to observed Septoria?
2. How does spatial variation in Septoria pressure impact upon testing?
3. Do different tests give the same results?

1. Does PCR testing reflect observed Septoria

- Variety – fungicide interaction trial at Kings Lynn
- Matrix of disease pressure:
  - 3 varieties; Firefly, Extase and Skyscraper
  - 2 levels of fungicide; tebuconazole only and fully treated
- Testing on 3 leaf levels with Swift Detect only
- Comparison with observed Septoria levels 3-6 weeks later

VELCOURT

Swift detect log genome score compared with observed Septoria 15-41 days later



Averages		11th May Pre T1 Leaf 3	3rd June Pre T2 Leaf 2	18th June Post T2 leaf 1	8th July Post T3 Leaf 1
Teb programme	Firefly	2.29	1.58	3.21	4.76
	Extase	1.90	1.65	2.50	3.62
	Skyscraper	2.39	2.94	2.70	4.74
Full Programme	Firefly	1.97	2.27	2.34	1.86
	Extase	1.36	1.65	2.16	2.55
	Skyscraper	2.35	1.85	2.68	2.37

VELCOURT

2. Does spatial variation in Septoria pressure render testing ineffective?

- Is this a risk?
- Need to consider the human factor!

- Two simple trials with the managers to look at this.

VELCOURT

‘Trial’ 1

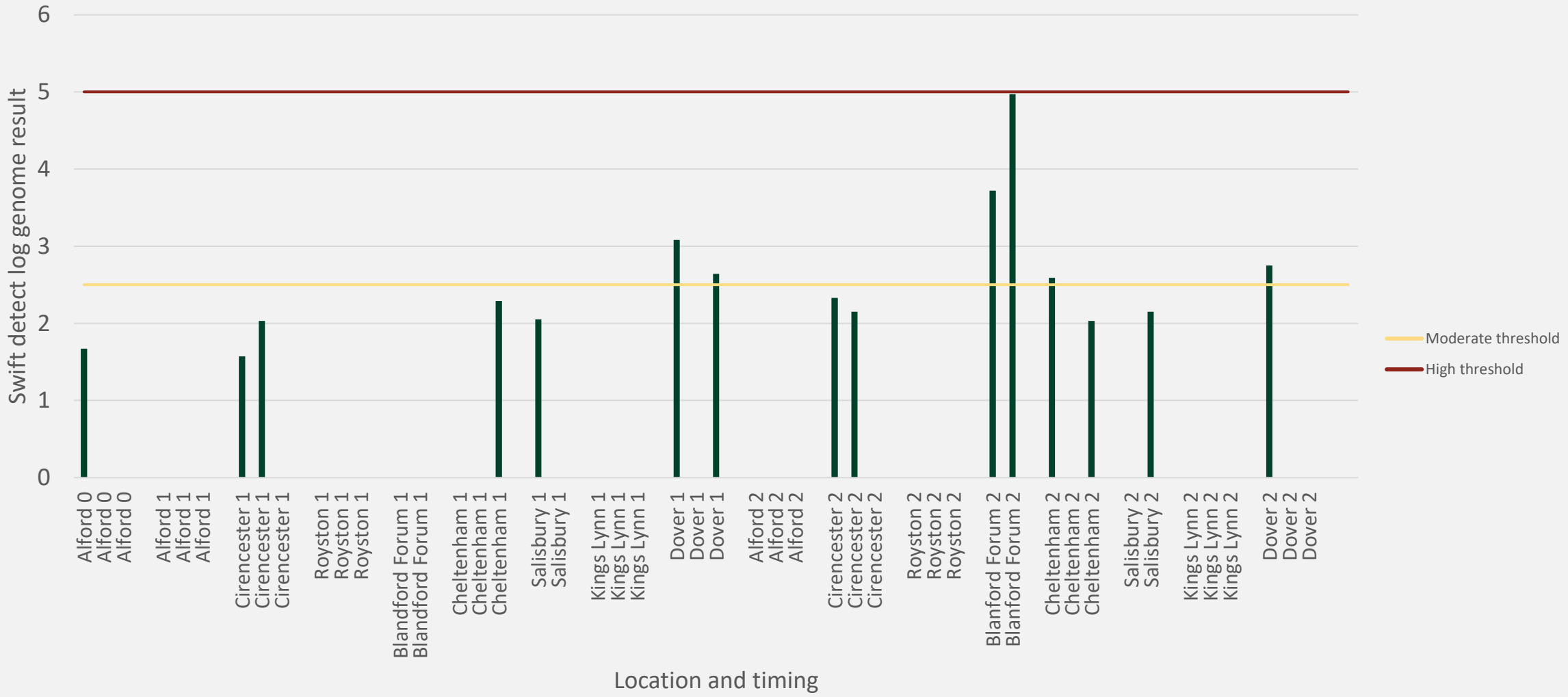
Manager trial undertaken on farm. It was not replicated and there were no Septoria assessments.

Three points were marked in a field. A sample was taken from around this point, allowing comparison.

No composite sample.

VELCOURT

Comparison of qPCR results from samples taken from different points in fields across the country



RESPONSIBLE FARMING FOR THE FUTURE

VELCOURT

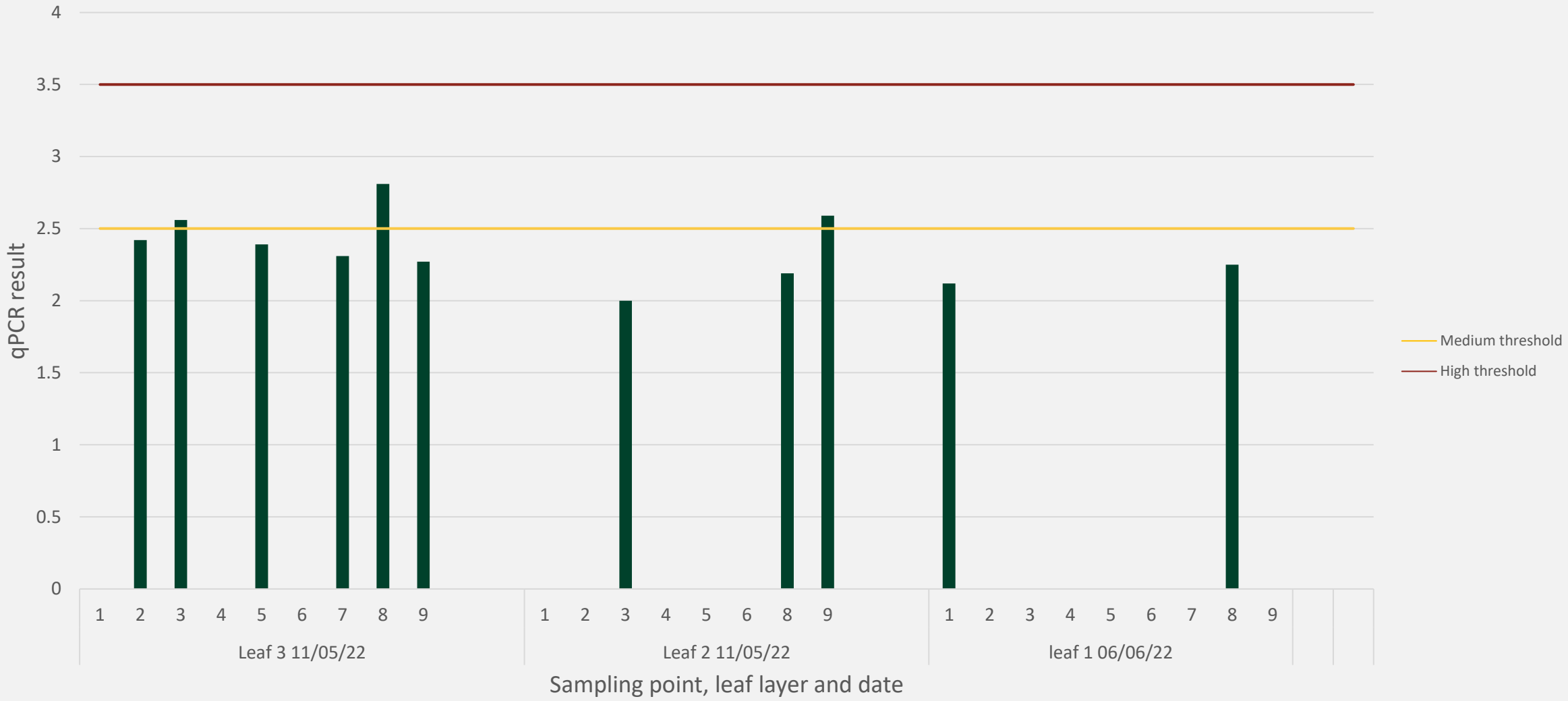
Trial 2

- One field was sampled at nine different points at two timings.
- Nine leaves were collected and sent for qPCR analysis from each point in the field.
- Leaf 3 and leaf 2 were sampled @ GS 37
- Leaf 1 was sampled at GS 69

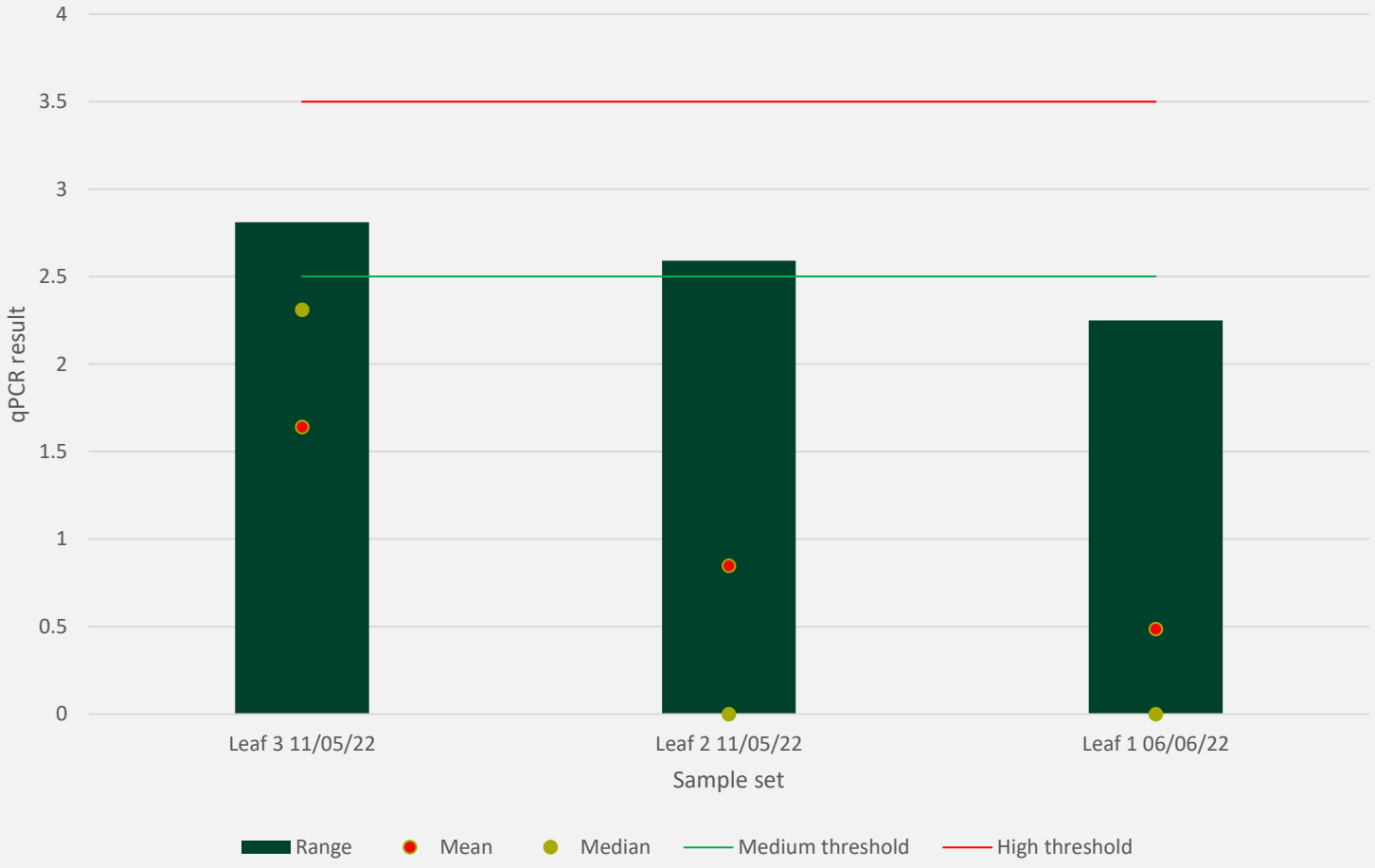
- Field of Gleam in Hertfordshire, very low rainfall.
- Very low levels of observed Septoria

VELCOURT

qPCR results from 9 different sampling points in one field



RESPONSIBLE FARMING FOR THE FUTURE

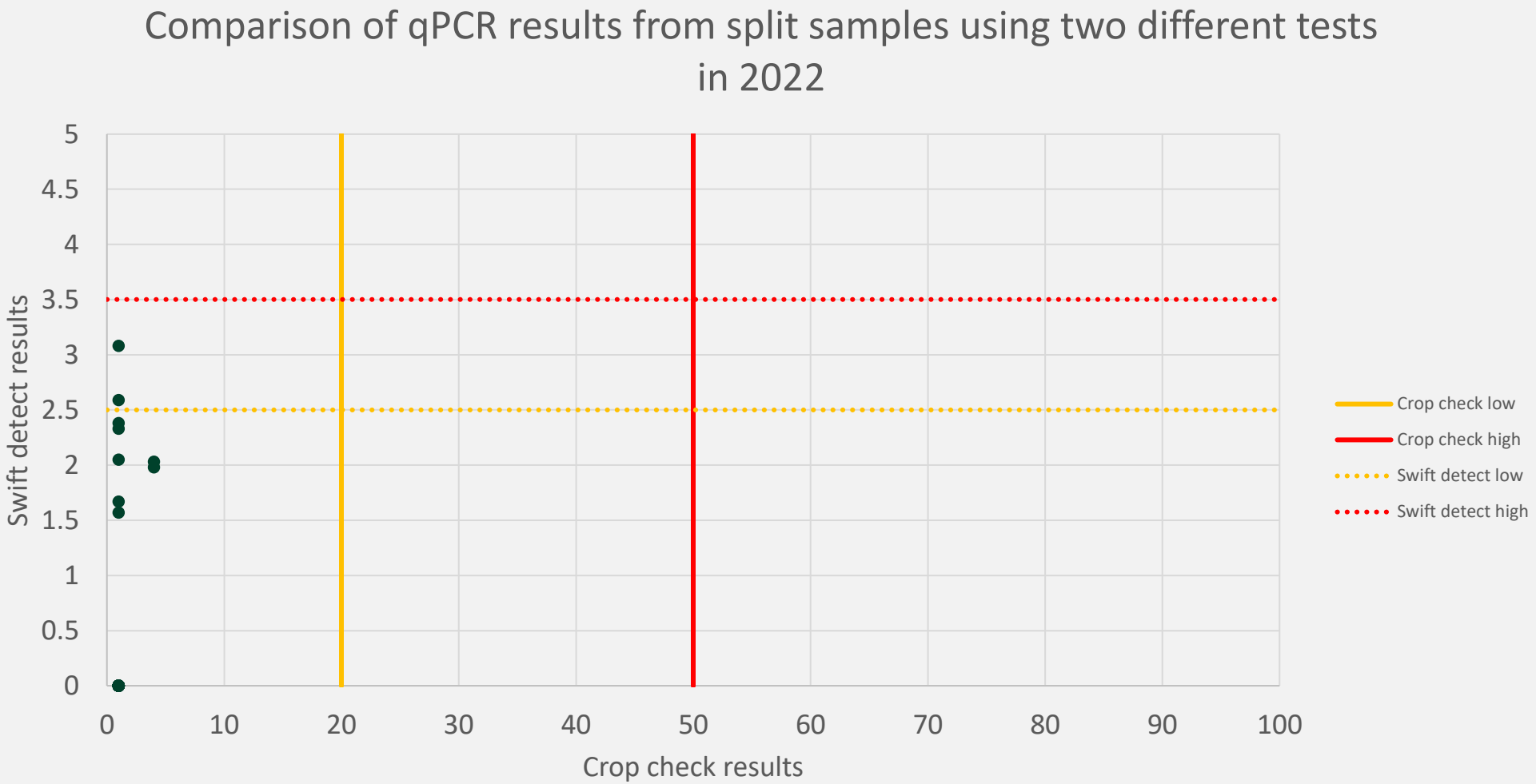

4
3.5
3
2.5
2
1.5
1
0.5
0
qPCR result
Leaf 3 11/05/22
Leaf 2 11/05/22
Leaf 1 06/06/22
Sample set
Range
Mean
Median
Medium threshold
High threshold

VELCOURT

3. Are there differences between commercially available tests?

- Two tests commercially available.
- If technically comparable, then it becomes a commercial decision.
- Composite samples were split and sent for testing under the two different systems available.

VELCOURT


Comparison of qPCR results from split samples using two different tests in 2022
Swift detect results
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Crop check results
Crop check low
Crop check high
Swift detect low
Swift detect high

VELCOURT

Service

In both cases the quality of the service was high, with results back within 48 hours and often 24.

Reliability issues seem to be associated with the postal service, rather than the test providers, with some samples delayed, and some never delivered.

Comments from Velcourt managers and agronomists

“Both tests were simple to use” Tom Taylor, AFM, Mawthorpe Farms

“It will add the most value when there is not obvious disease pressure, but the level of latent disease is unknown” Mike Dewar, Stowell Park

“It is something I could imagine building into my crop walking routine” Mike Dewar

“As yet, I do not have the confidence in the approach to build it into my decision making” Kieran Walsh, Agronomist

VELCOURT

What is required?

- Clarity around how to best use the tests and how to interpret them.
- Common scale?
- Ring testing?

- Confidence- the false negative risk is significant.
- Independent appraisal and guidance?

- An exciting technology, but much work yet to be done.