



Teagasc Aphid Monitoring Network Update

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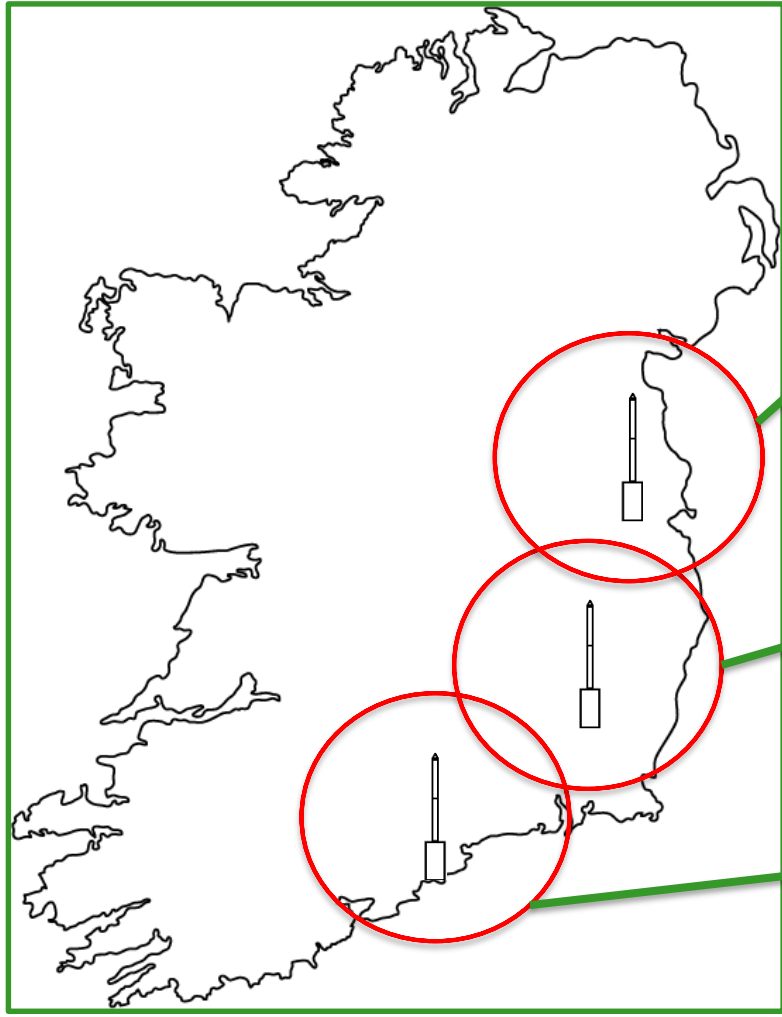
Teagasc, CELUP, Oak Park Crops Research

Introduction

- Grain and Bird Cherry Oat Aphids are major vectors of Barley Yellow Dwarf Viruses.
- BYDV can cause yield losses up to 80%
- Partial resistance in a Grain Aphid clonal lineage (SA3) can cause control issues
- Can we quantify incidence of BYDV and insecticide resistance?
- How does this help inform farmers decision making?



What is required to monitor aphid flight?



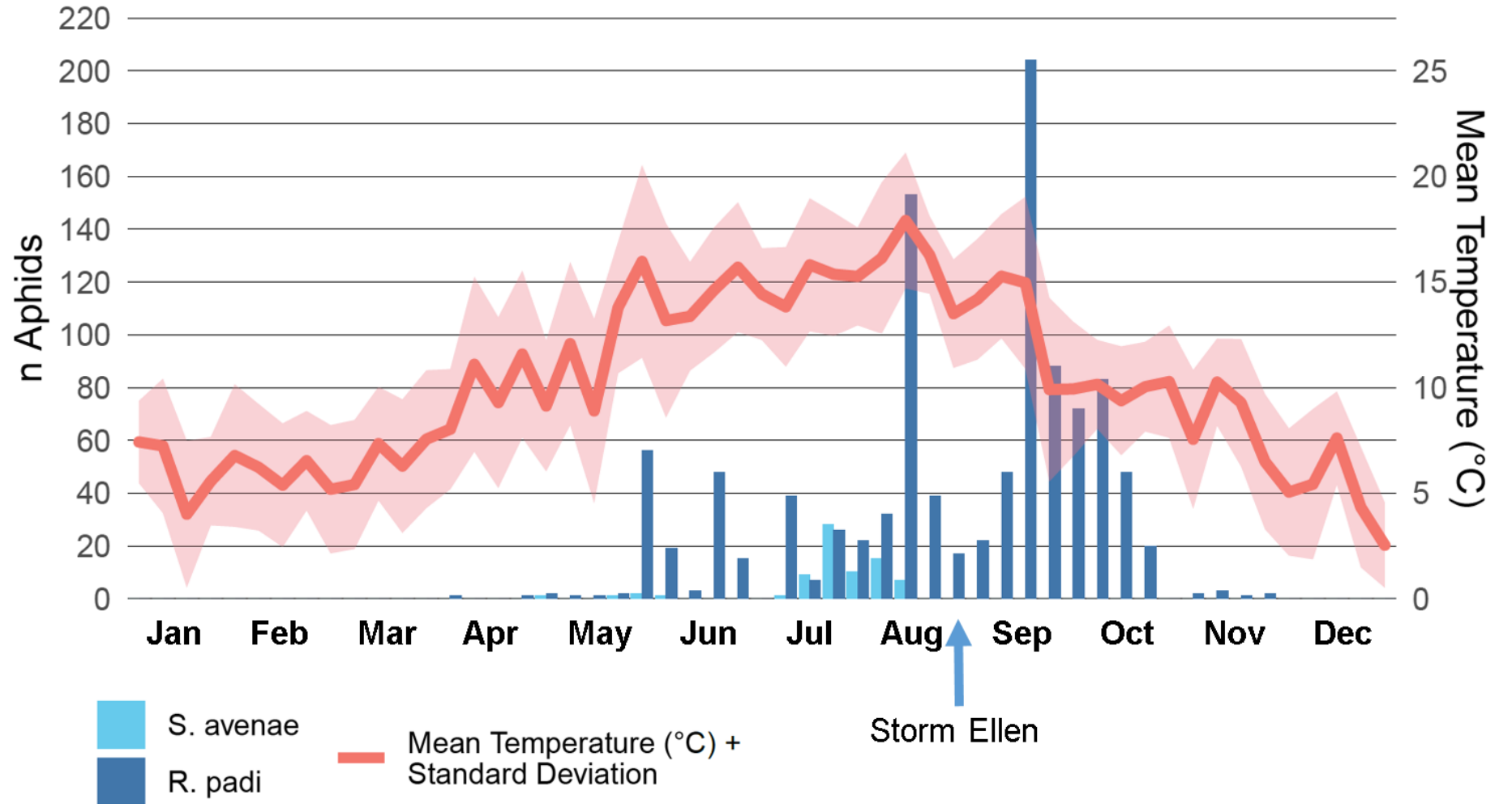
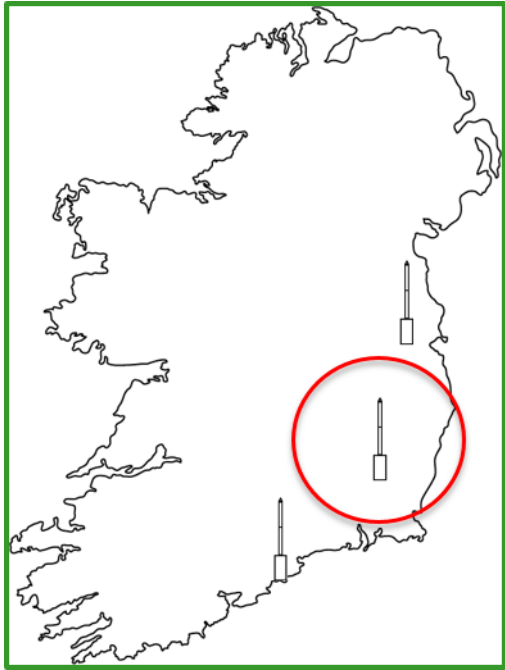
12.2 m suction tower network



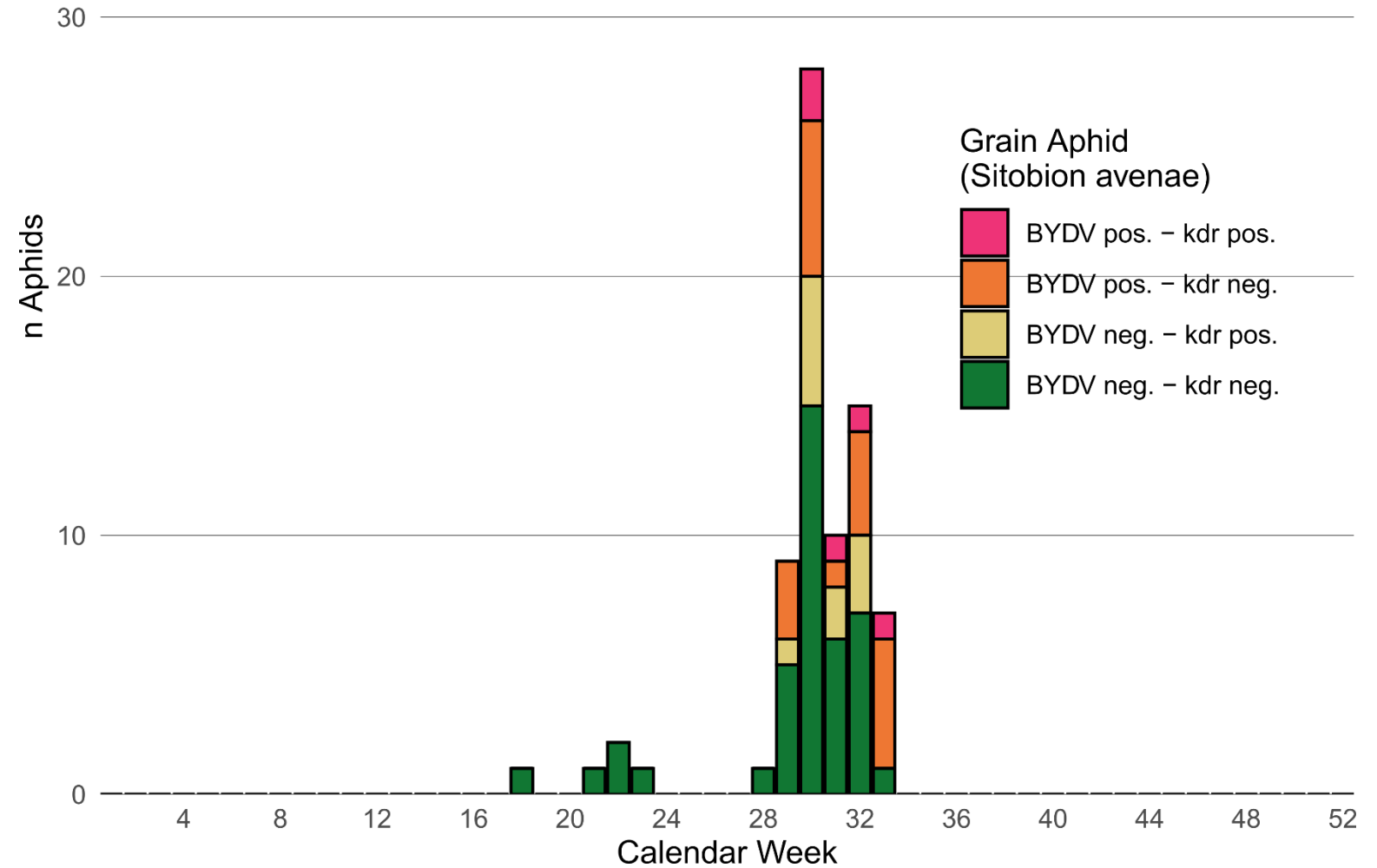
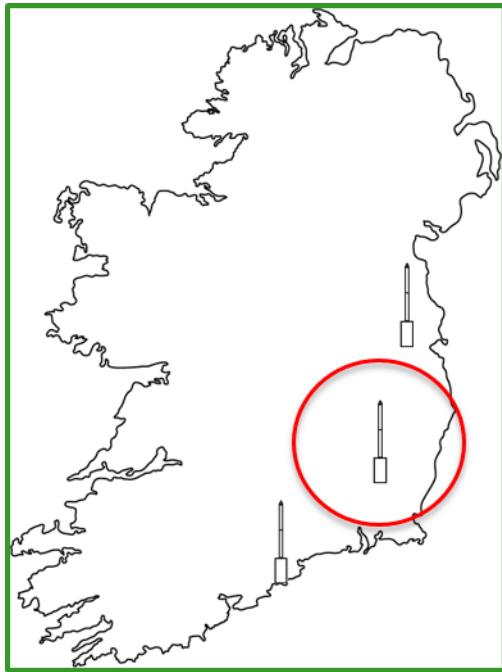
Crops
Environment
& Land Use
Programme



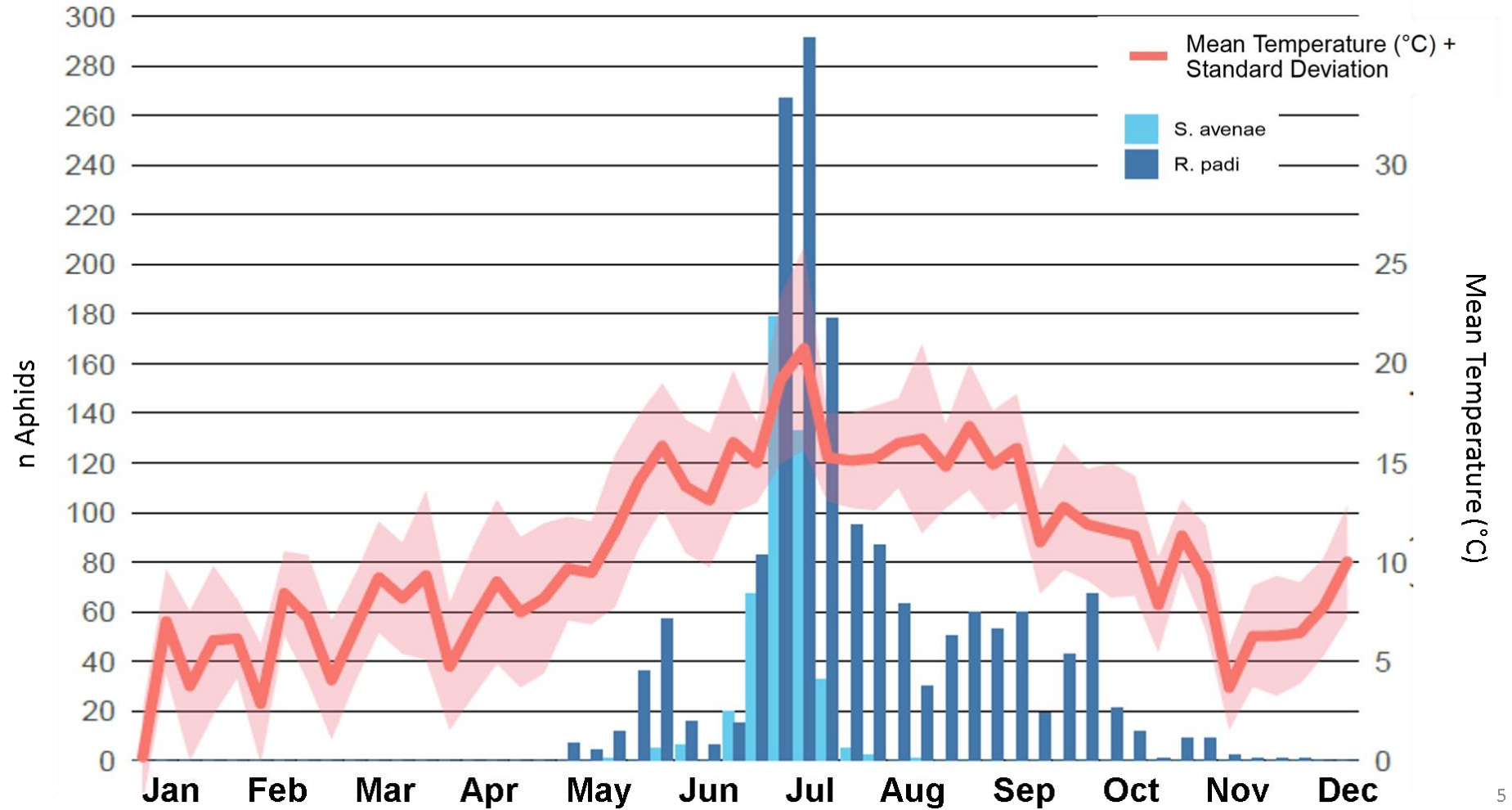
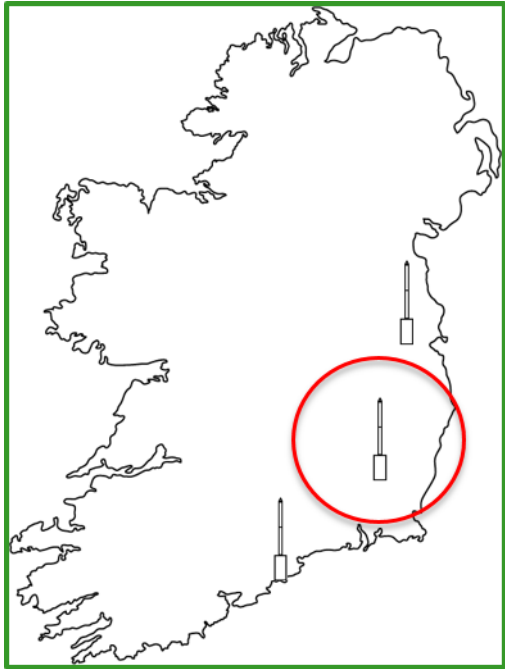
Oakpark Suction Tower 2020 Aphids – Temperature



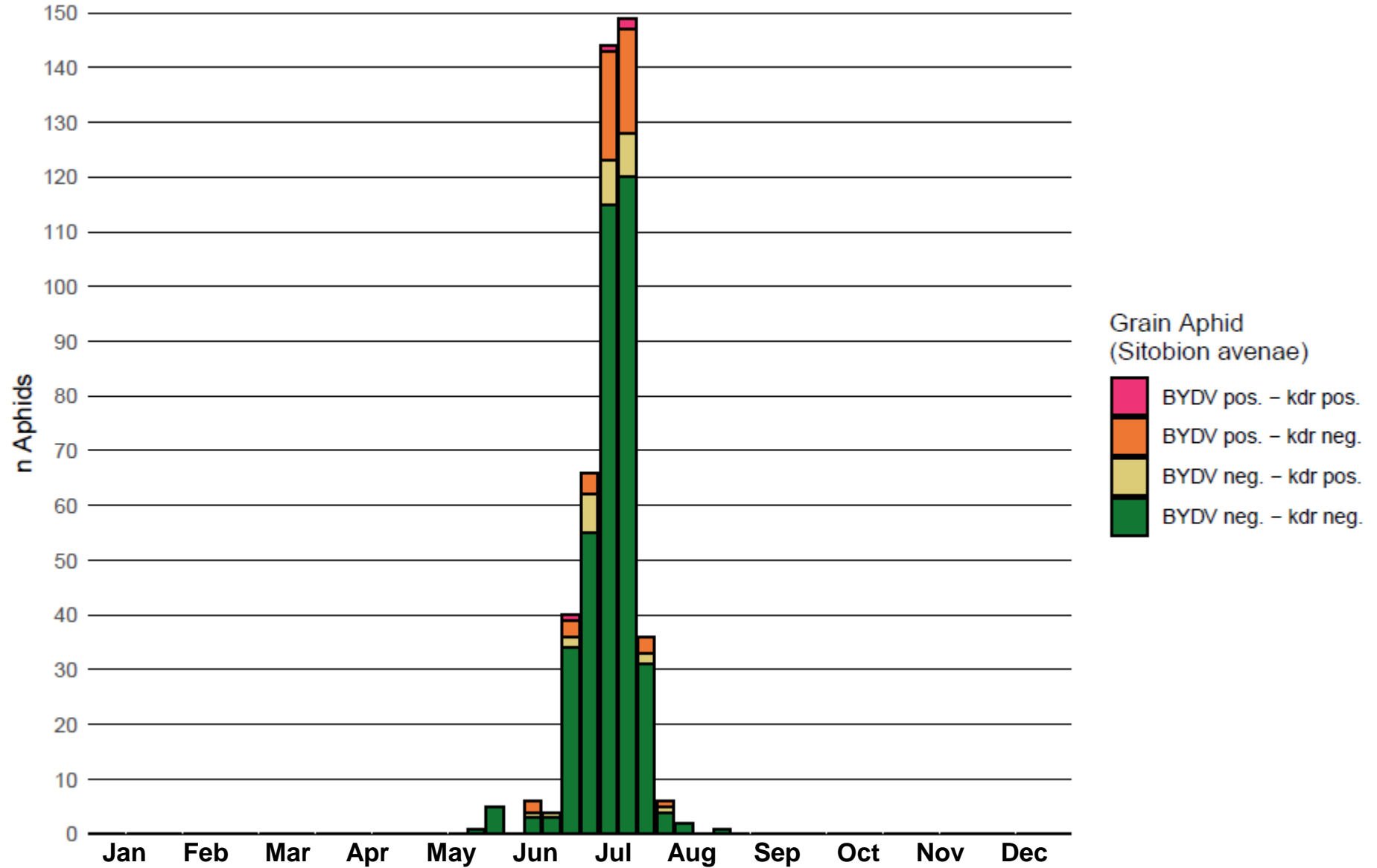
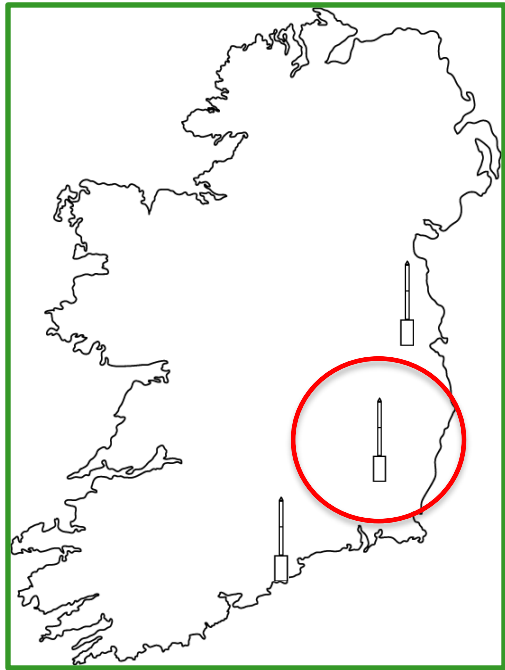
Incidence of kdr/BYDV Oak Park 2020



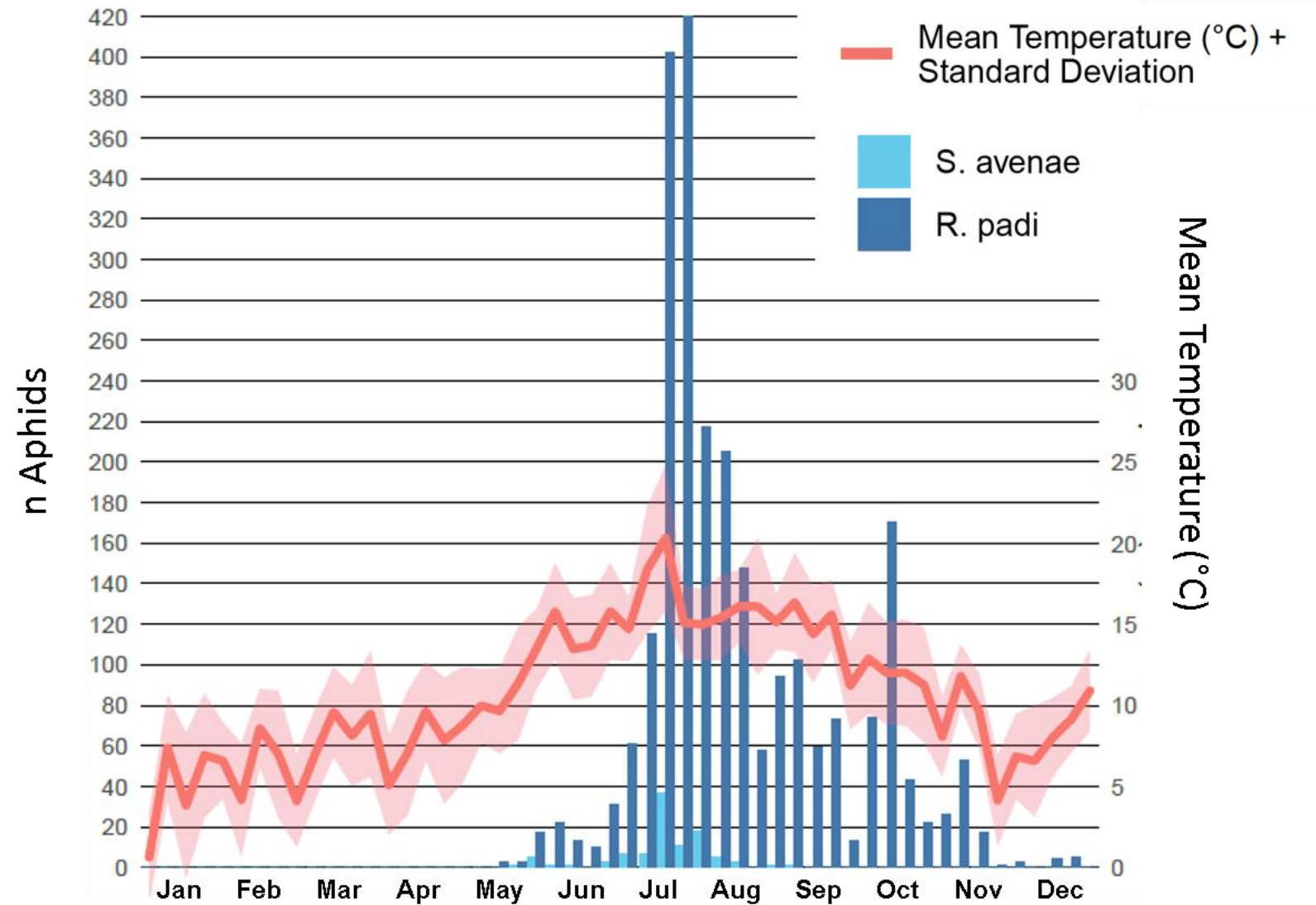
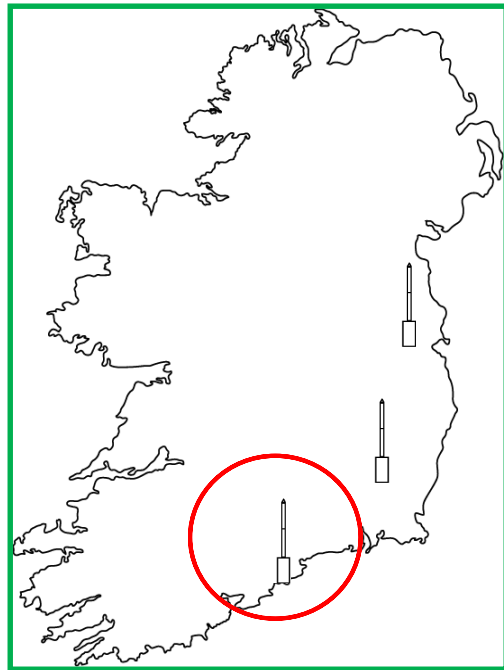
Carlow Suction Tower 2021 Aphids – Temperature



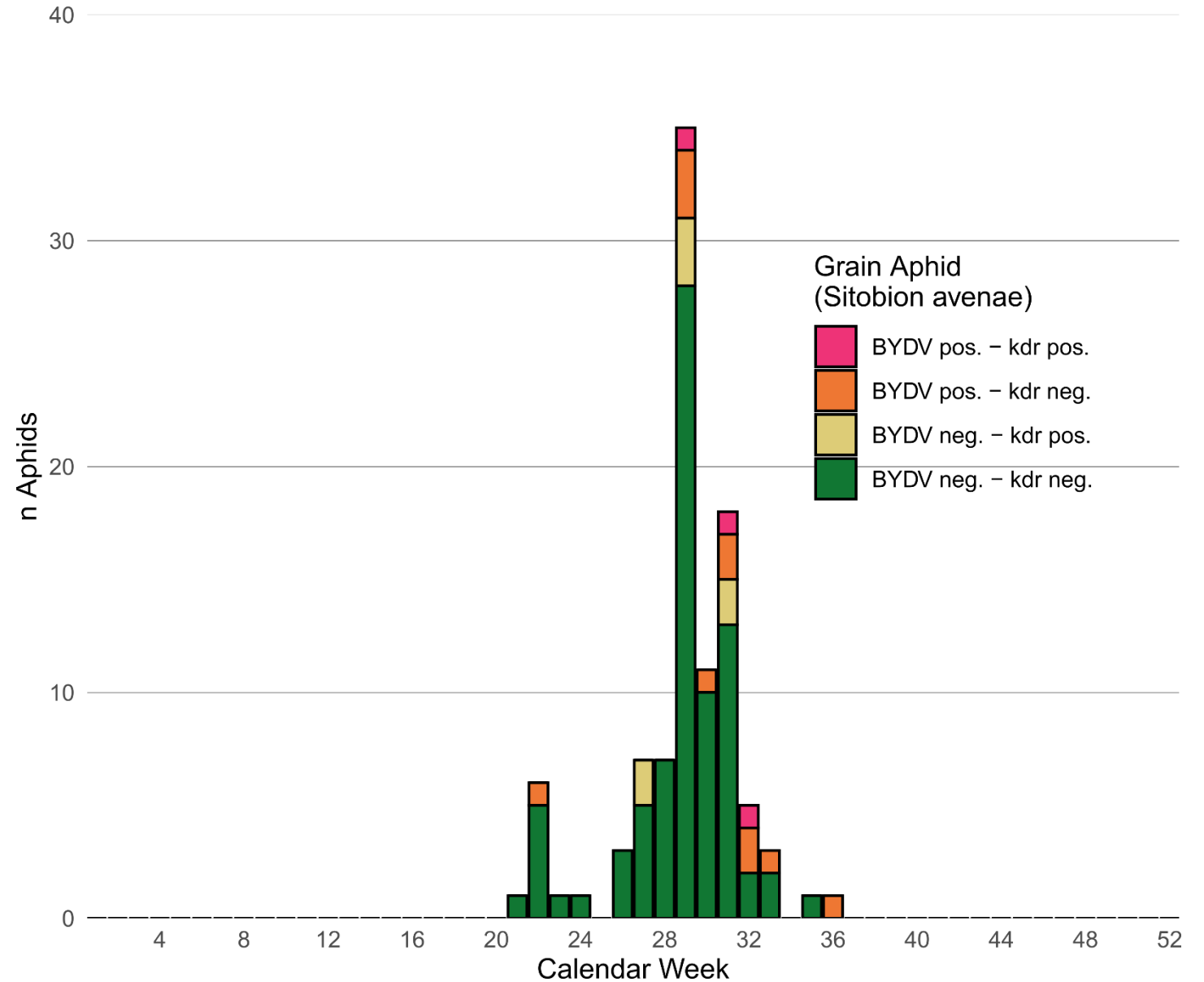
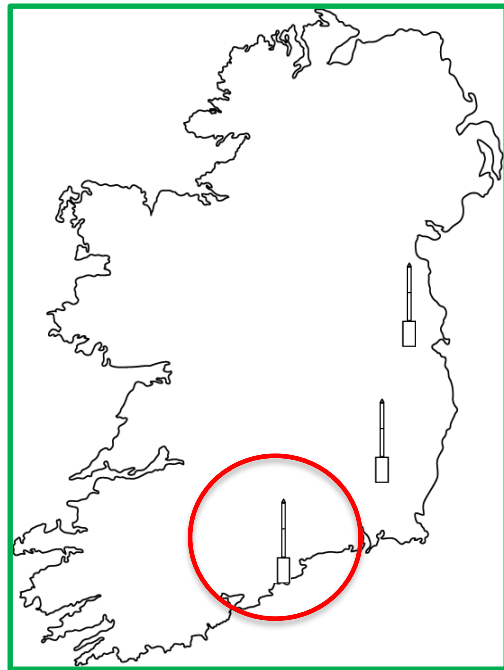
Incidence of kdr/BYDV Oak Park 2021



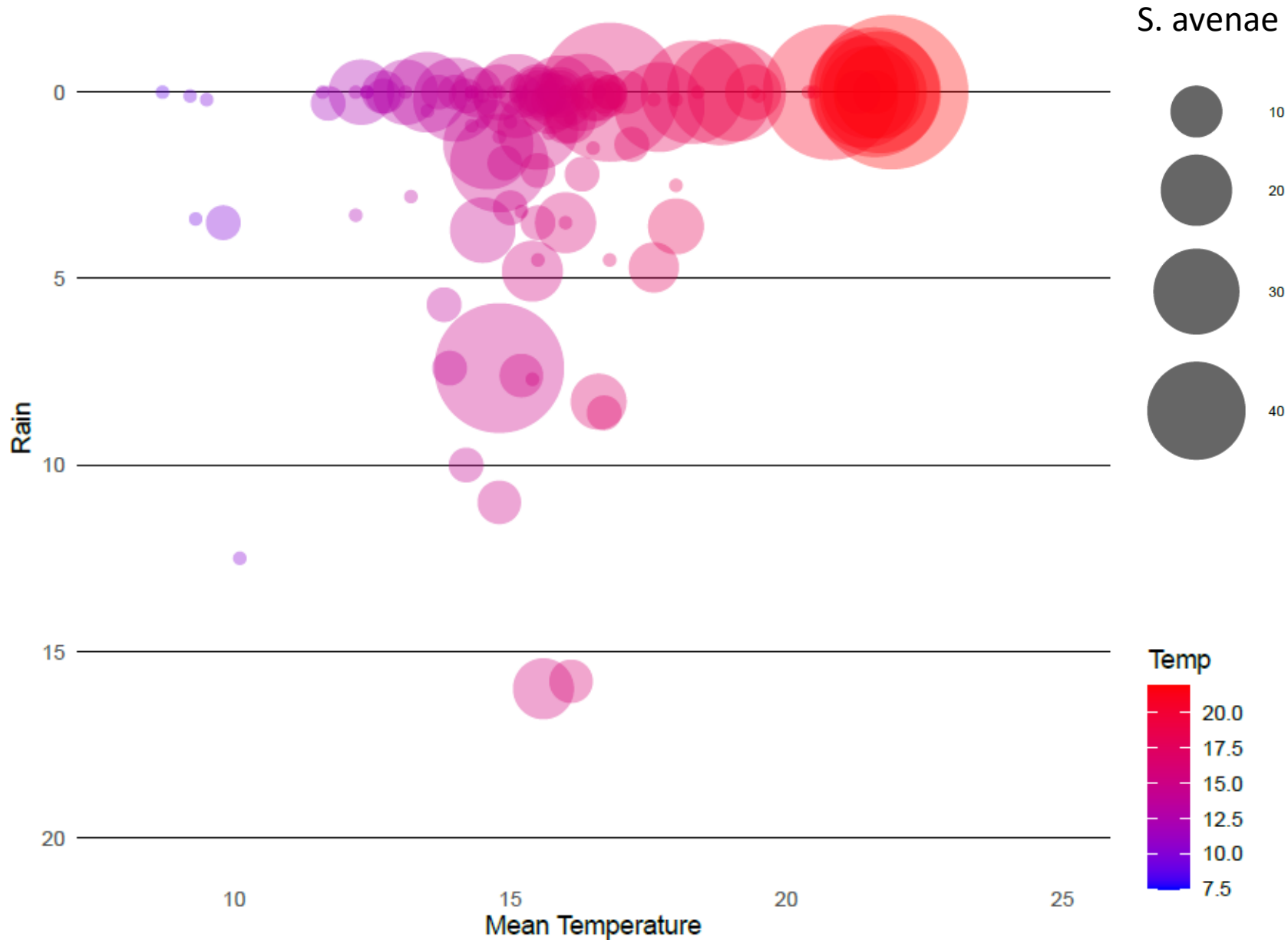
Cork Suction Tower 2021 Aphids – Temperature



Incidence of kdr/BYDV Cork 2021

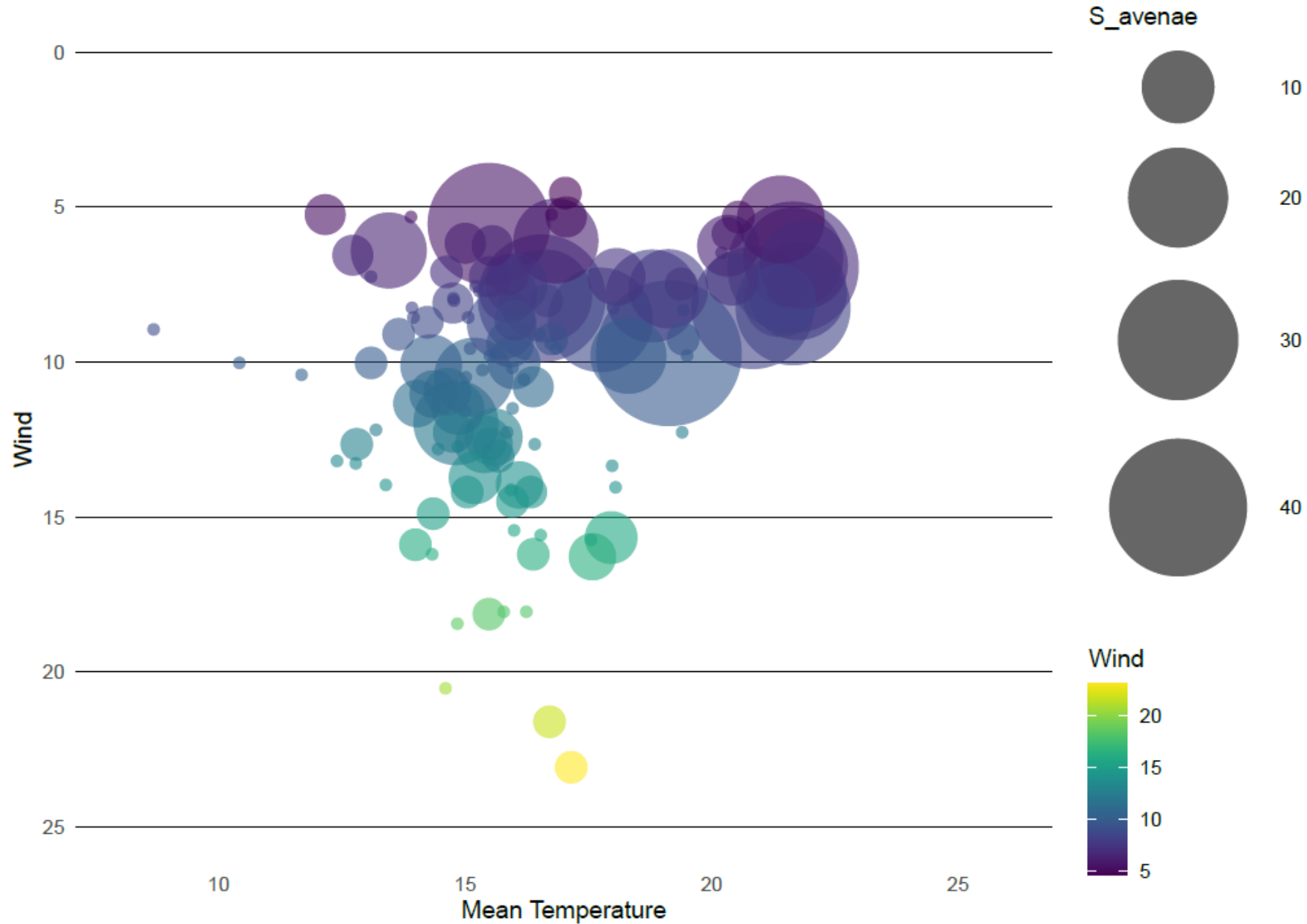


Suction Tower Grain Aphids – Rain



- **Combined data of daily catches from the Irish suction tower network in 2020 and 2021**
- **Total number of grain aphids caught: 647**

Suction Tower Grain Aphids – Wind



- **Combined data of daily catches from the Irish suction tower network in 2020 and 2021**
- **Total number of grain aphids caught: 647**

Results

- There was a 6 fold increase in Grain aphid numbers in OP in 2021 versus 2020.
- There was more than a 50% reduction in proportion of aphids carrying BYDV.
- Grain aphid flight is influenced by temperature, wind and rain
- Take home message: Aphid numbers alone does not give the full picture of what is happening, continuous monitoring is required. Next step is to connect monitoring data with in field disease pressure.

2020

- Insects from 1 x 12.2m suction tower
- Grain and bird cherry aphids taxonomically identified
- PCR to identify grain aphids with Kdr

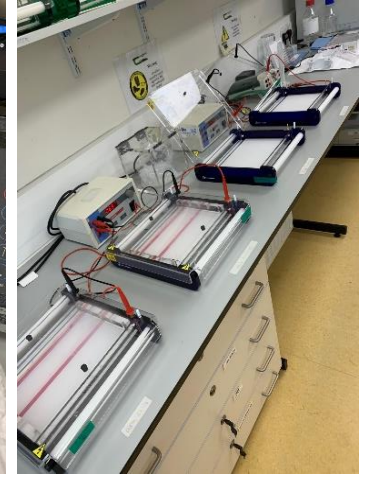
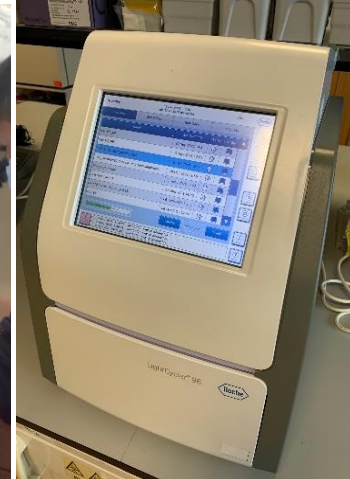
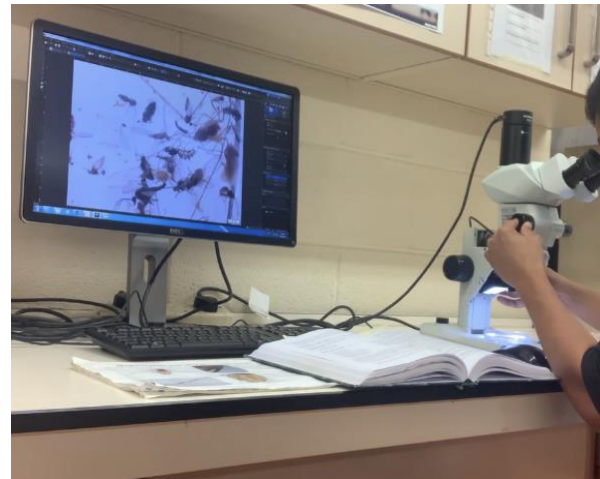
2021

- Insects from 2 x 12.2m suction towers
- Grain and bird cherry aphids taxonomically identified
- PCR to identify grain aphids with Kdr
- PCR to identify +/- BYDV

2022 +

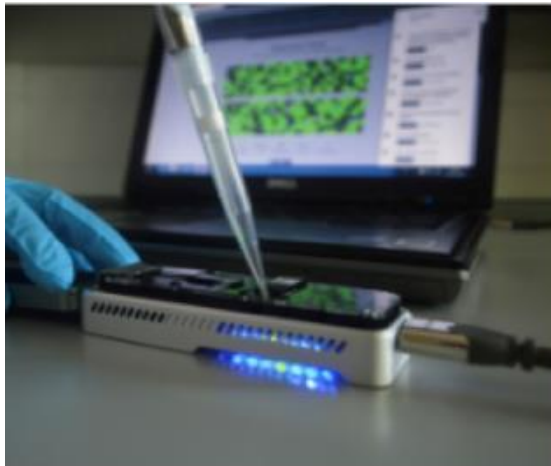
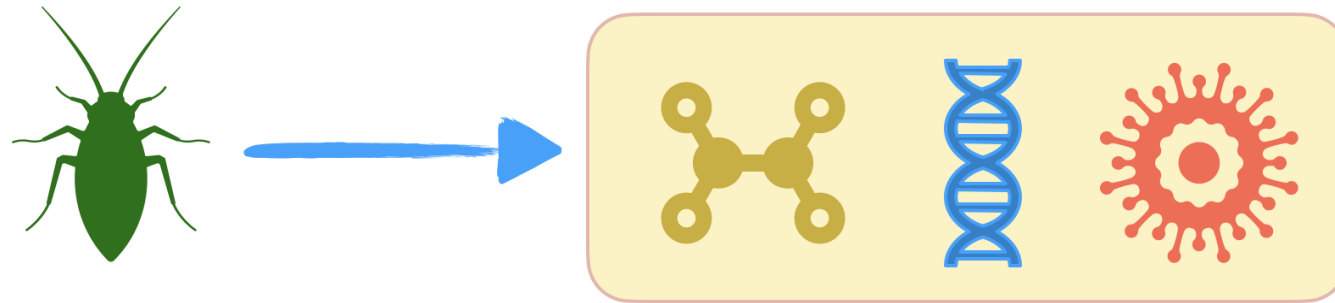
- Insects from 3 x 12.2 m suction towers
- 3 x 6 m mobile towers, plus many in-field traps
- Grain and bird cherry aphids taxonomically identified
- PCR to identify grain aphids Kdr
- PCR to identify +/- BYDV
- Monitor aphid & BYDV diversity via sequencing

Sample Numbers Increasing and ambitions to collect more data



Next Steps: Advanced Diagnostics

- Overall Goal: High throughput and inexpensive diagnostics platform to support routine monitoring



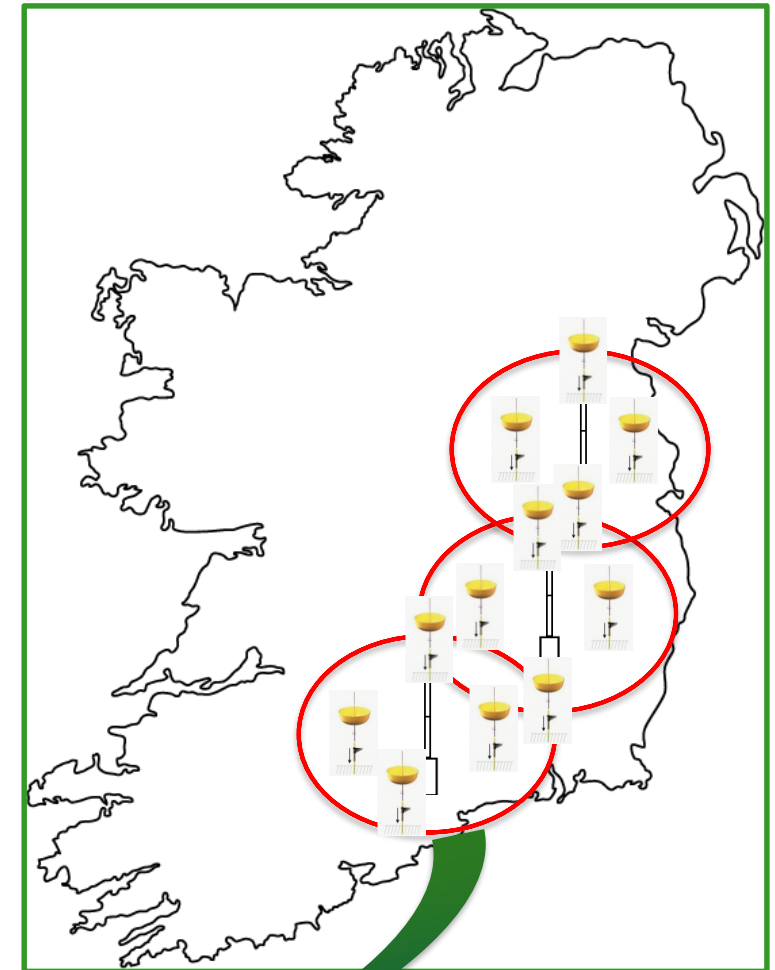
- A single assay enabling us to:
 - » Generate DNA profiles to monitor aphid diversity
 - » Identify if the aphid is carrying Kdr resistance
 - » Identify if the aphid is carrying BYDV
 - » Identify the strain of BYDV

Next Steps : BYDV control

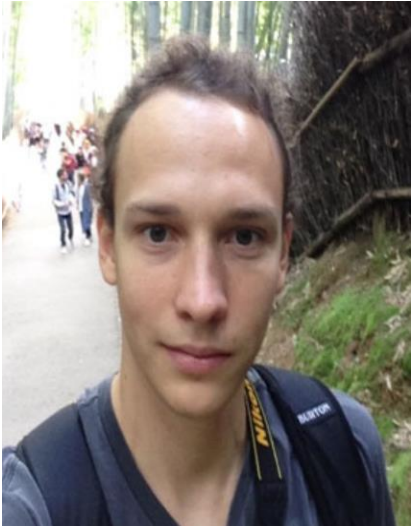
- **Overall Goal: IPM program for BYDV control in Ireland**
 - » Local and long distance migration monitoring
 - » Pairing monitoring network with IPM trials
 - » Validating the most robust DSS for Ireland
 - » We would like to develop a DSS for Spring barley
 - » Incorporating tolerant varieties into an IPM program for Ireland

Next Steps: BYDV control

- Overall Goal: IPM program for BYDV control in Ireland
 - » Local and long distance migration monitoring



Acknowledgements



Maximilian Schughart



Alison George



Helena Meally



Leona Murphy



Ciaran Collins



Michael Gaffney



Liam Sheppard



Virgile Ballandras