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Botrytis cinerea detection on blueberry in the Western Cape

J. Meitz-Hopkins, S. McIntyre, M. van der Merwe, C. Bowles, Cheryl Lennox

Photo by Stefan Els

BOTRYTIS IDENTIFICATION AND ASEXUAL LIFE CYCLE

Grey Mould

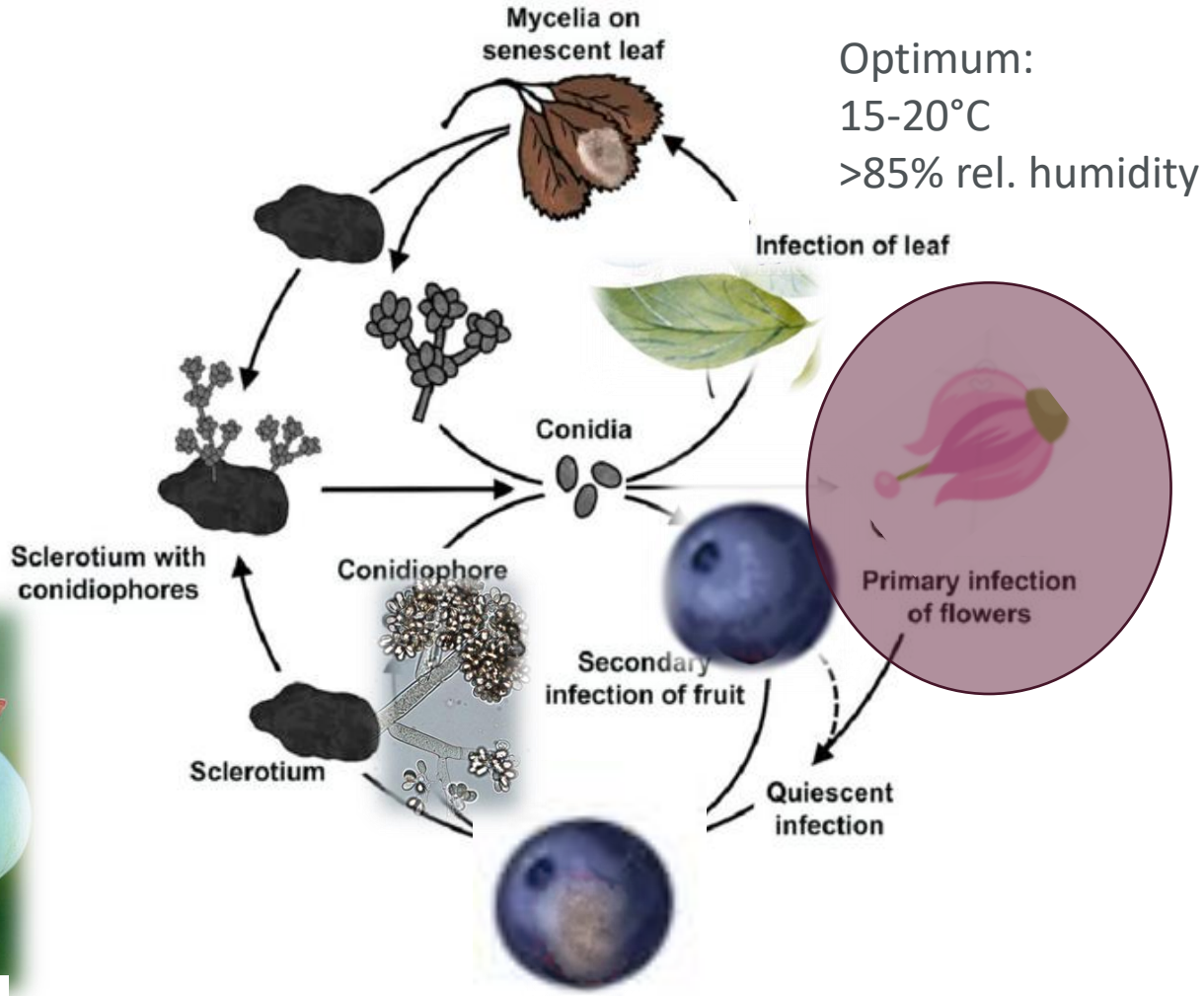
- Colonises all dead plant material
- Many alternative host plants including weeds
- Latent fruit infections
- Ubiquitous fungus

Shoot tip blight

Blossom blight

Stem/Cane Botrytis

Green fruit rot



Optimum:
15-20°C
>85% rel. humidity 8-12h

DISEASE RISK PREDICTION

MODELS

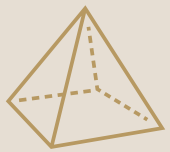
↓

COMPUTER SIMULATION

↓

MANAGEMENT

Prediction of occurrence and degree of disease, as well as disease development



Knowledge of pathogen-host-environment interactions (**epidemiology**) is important

RATIONALE & PROJECT OBJECTIVES

- 2020/2021 season: WC growers noticed increased postharvest decay of blueberry possibly due to grey mould

- Project initiated to **detect *B. cinerea* on blossoms and berries** of highly susceptible cv. 'Eureka' and to evaluate accuracy of **ileaf decision support system** predicting *B. cinerea* infection risk
- Monthly samples collected from two farms (Simondium and Franschhoek)

Botrytis cinerea

FACTORS ASSESSED FOR DISEASE RISK CALCULATION

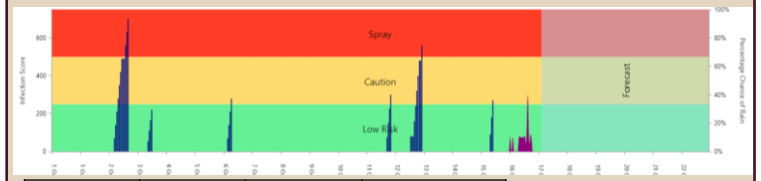
B. cinerea
(pathogen)

Weather forecast
(environment)

- Assess two farms
  - Franschhoek (A)
  - Simondium (B)
- Moisture chamber incubation of 100 blossoms/orch.
- qPCR of RNA from 20 blossoms per orchard block
- Ileaf weather stations next to orchards

MATERIALS AND METHODS

- Weather data



Avg Temp	Wet Hours	Infection Score	Risk
14.10	7	490	Caution
11.37	7	385	Caution
16.20	1	80	Low Risk
13.85	5	325	Caution
12.10	3	180	Low Risk
12.03	**14**	**840**	**Spray Needed**
11.98	4	220	Low Risk
15.60	2	150	Low Risk
12.26	**12**	**720**	**Spray Needed**
9.66	**14**	**630**	**Spray Needed**
11.77	**23**	**1265**	**Spray Needed**
10.83	9.00	450	Caution
9.77	6.00	270	Caution
12.97	**12.00**	**720**	**Spray Needed**
12.40	1.00	60	Low Risk

CAUTION

SPRAY

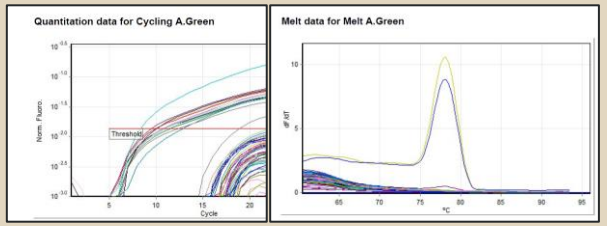
- ‘Eureka’ samples:
  June- Sept: blossoms
  Oct-Nov: berries

- Two orchards (under nets):
  - <u>Dense</u> planting
    Farm **A**

  - <u>Spaced</u> pots
    Farm **B**

- RT-qPCR from blossoms

  Ren *et al.* 2017 primers



- Moisture chamber incubation

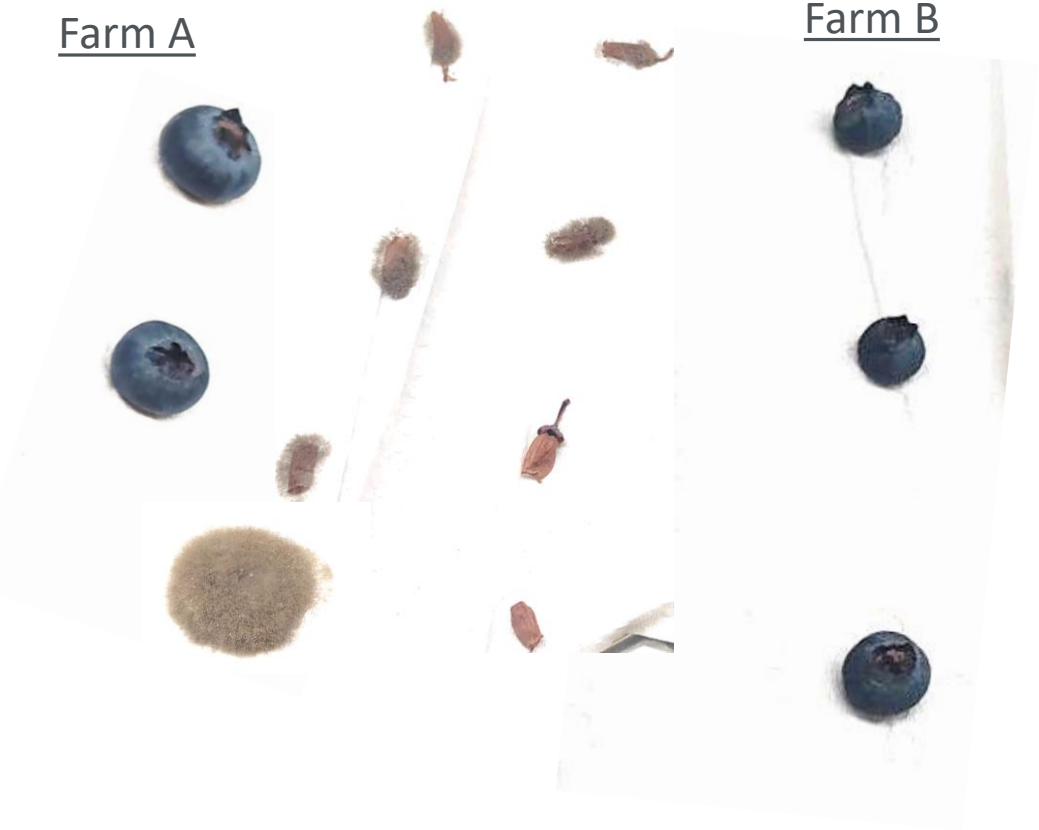
Ren et al. 2017. Journal of Microbiology Methods 142:71–75.

Moisture chamber and RTqPCR detection

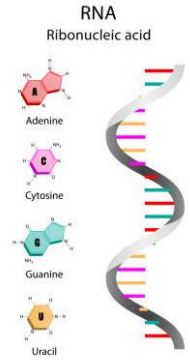
Sampling 8.9.2022

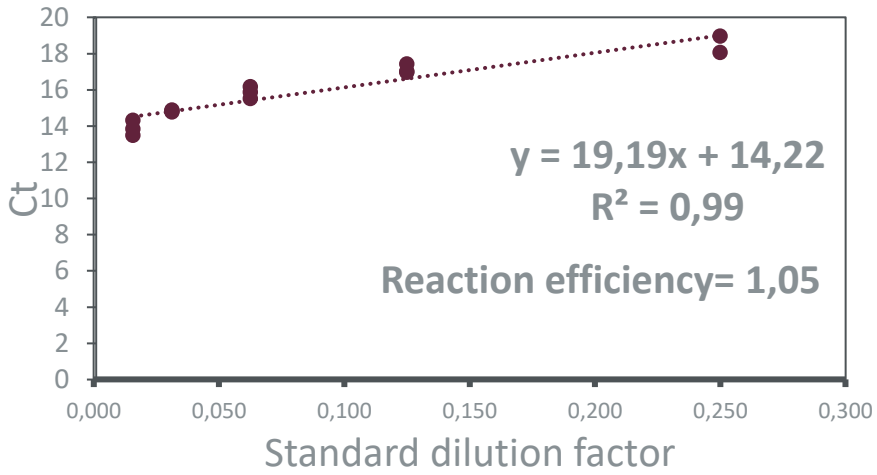
Farm A

Farm B



15 d incubation at 25°C, 90% RH



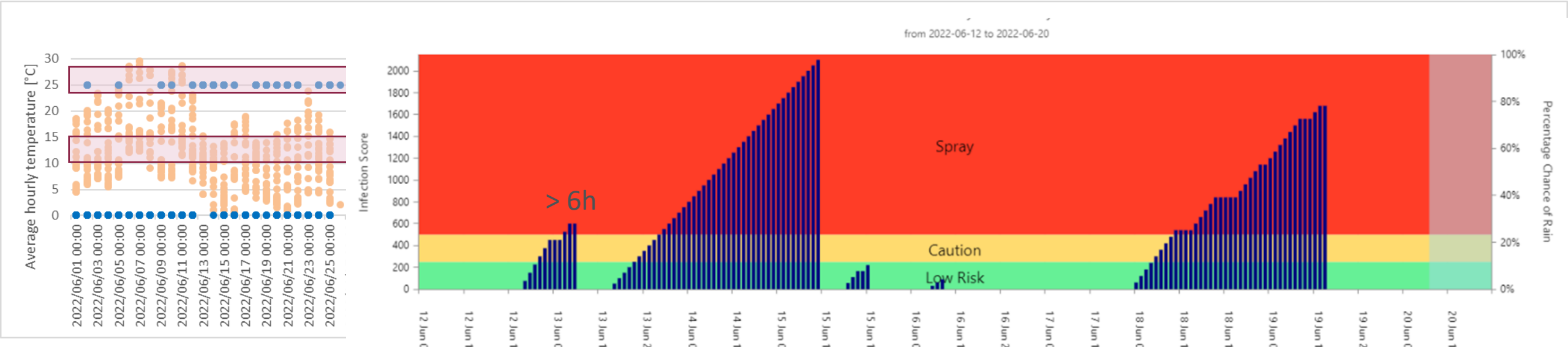


PREDICTED INFECTION PERIODS (WEATHER)

- Conidia (from overwintering mycelia or sclerotia in orchard debris) carried by wind or water infect young blueberry plant tissue
- Optimum spore germination: 20-25 °C
- Optimum infection: 10-15 °C
- Min. 6 hours of leaf wetness
- Infection between 0-30 °C

Orchard A:

16 x high risk infection periods



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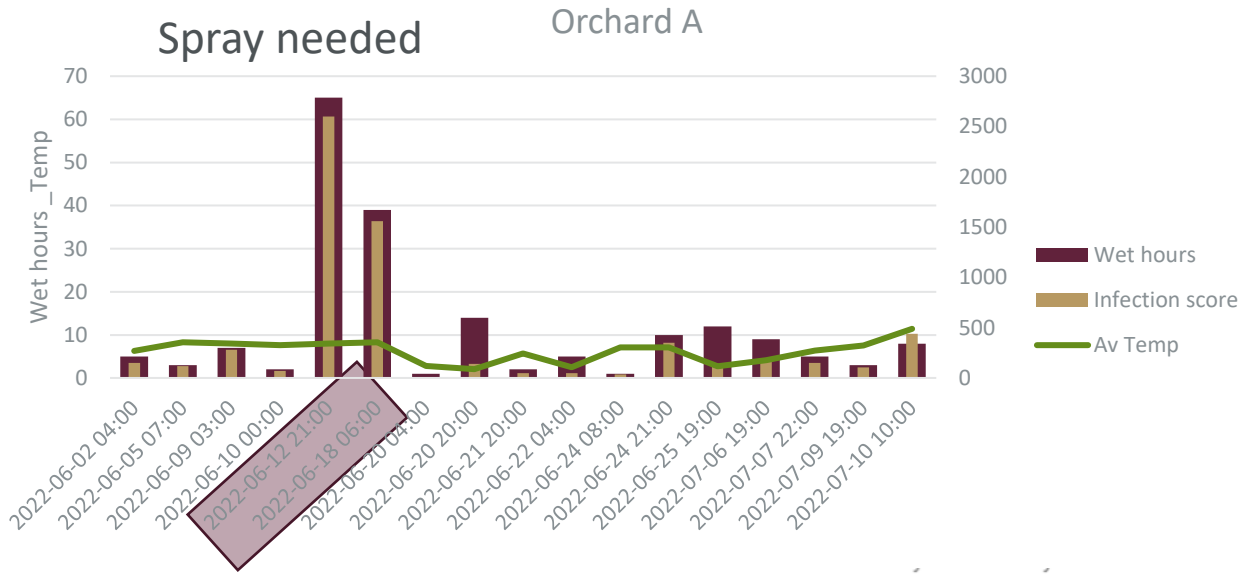
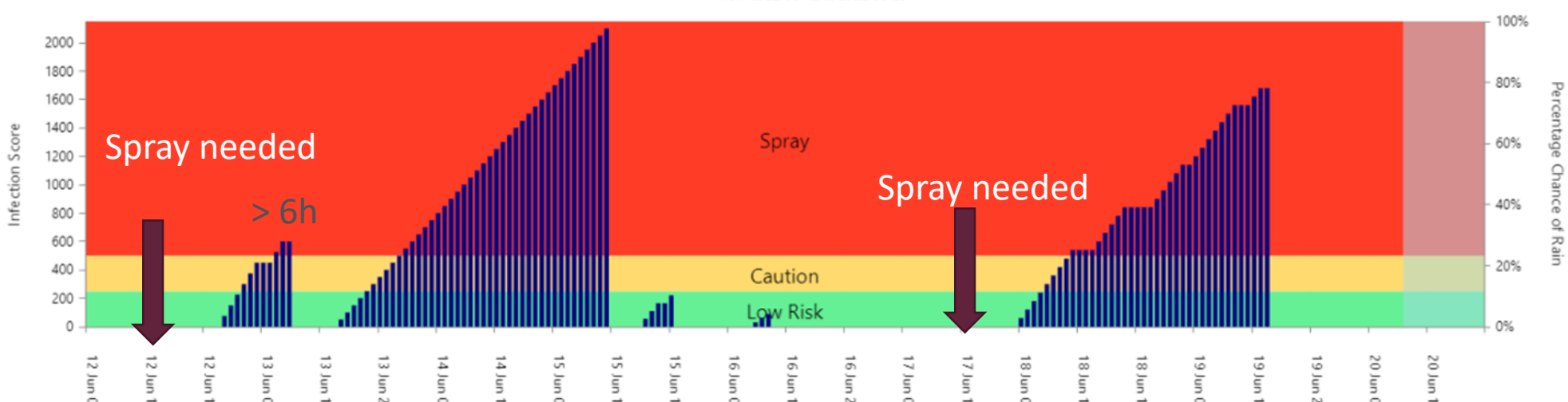
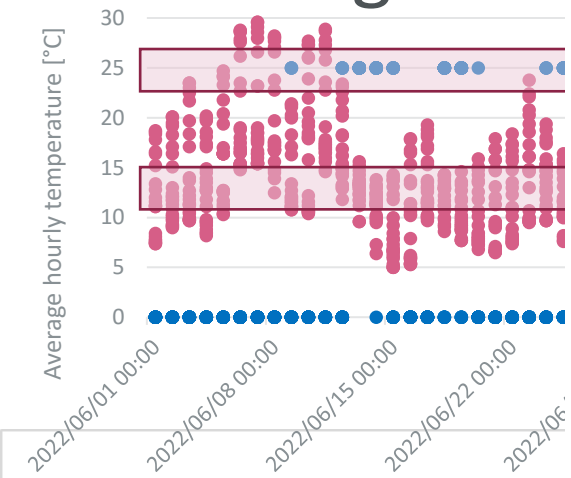


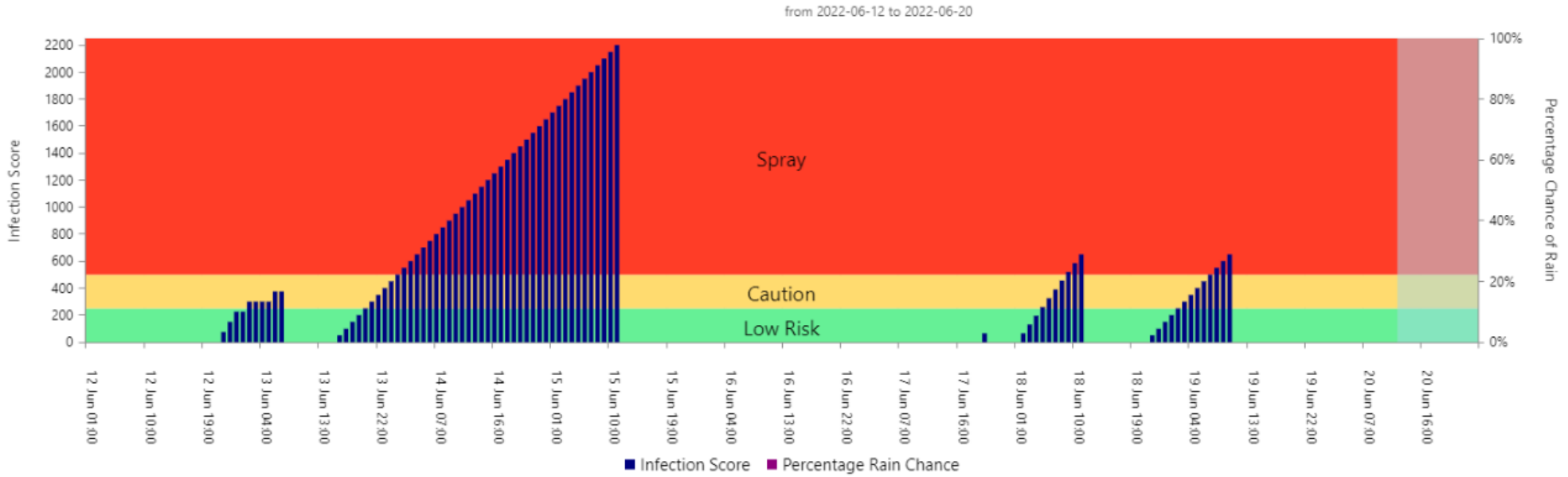


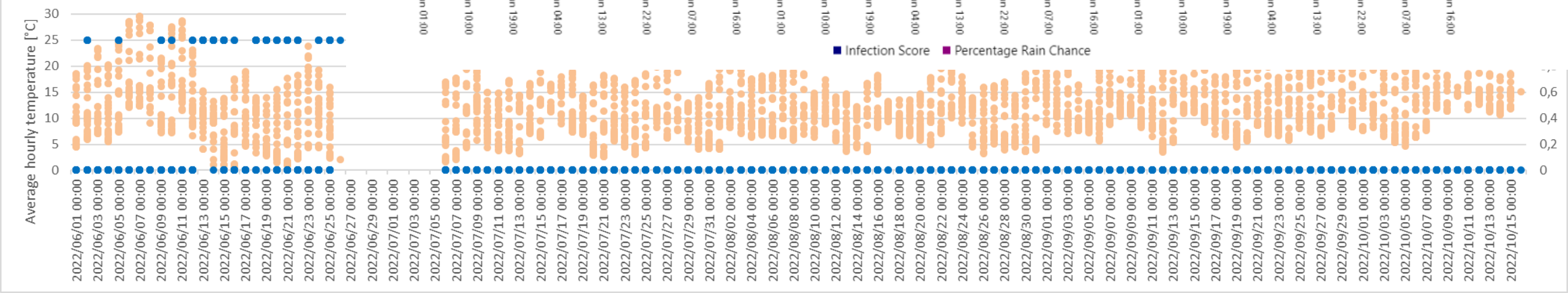
PREDICTED INFECTION PERIODS 2022

Orchard B:

20 x high risk infection periods Orchard B







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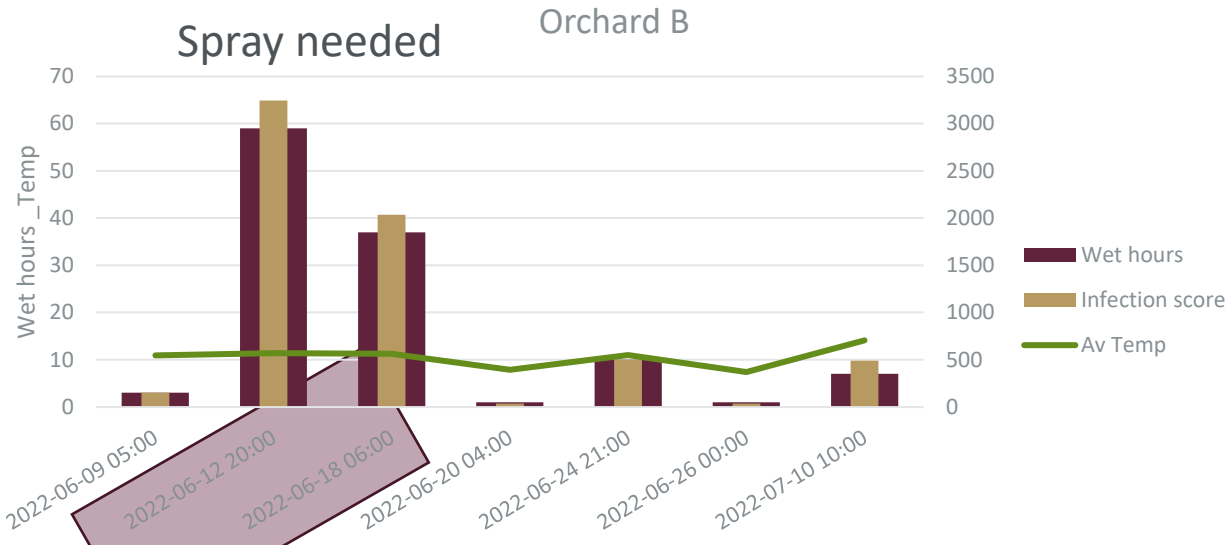
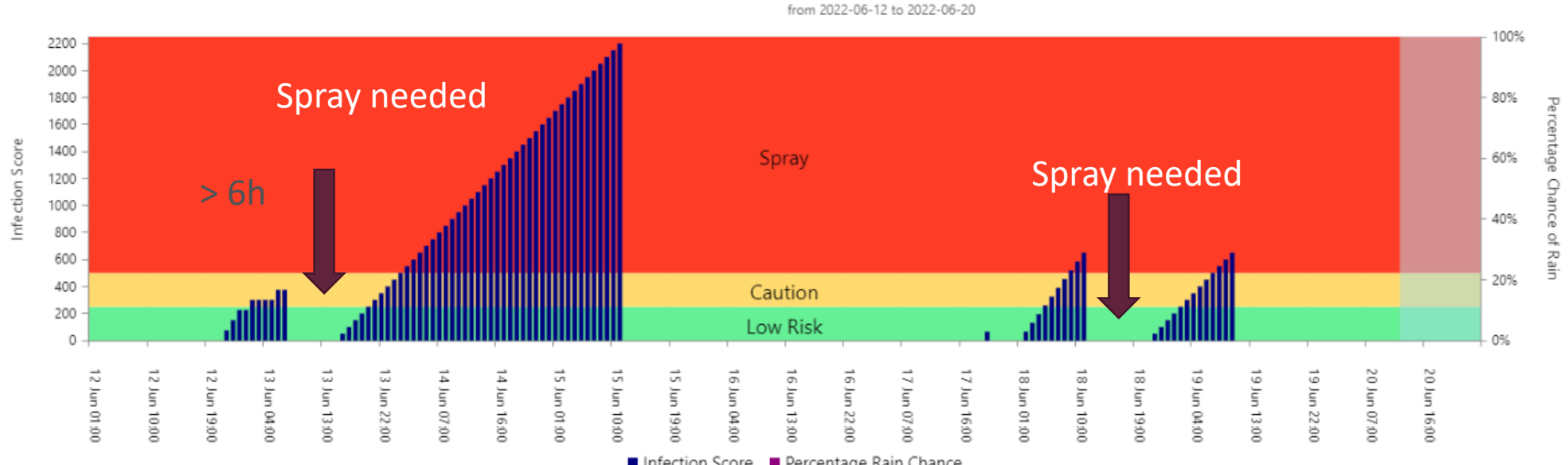
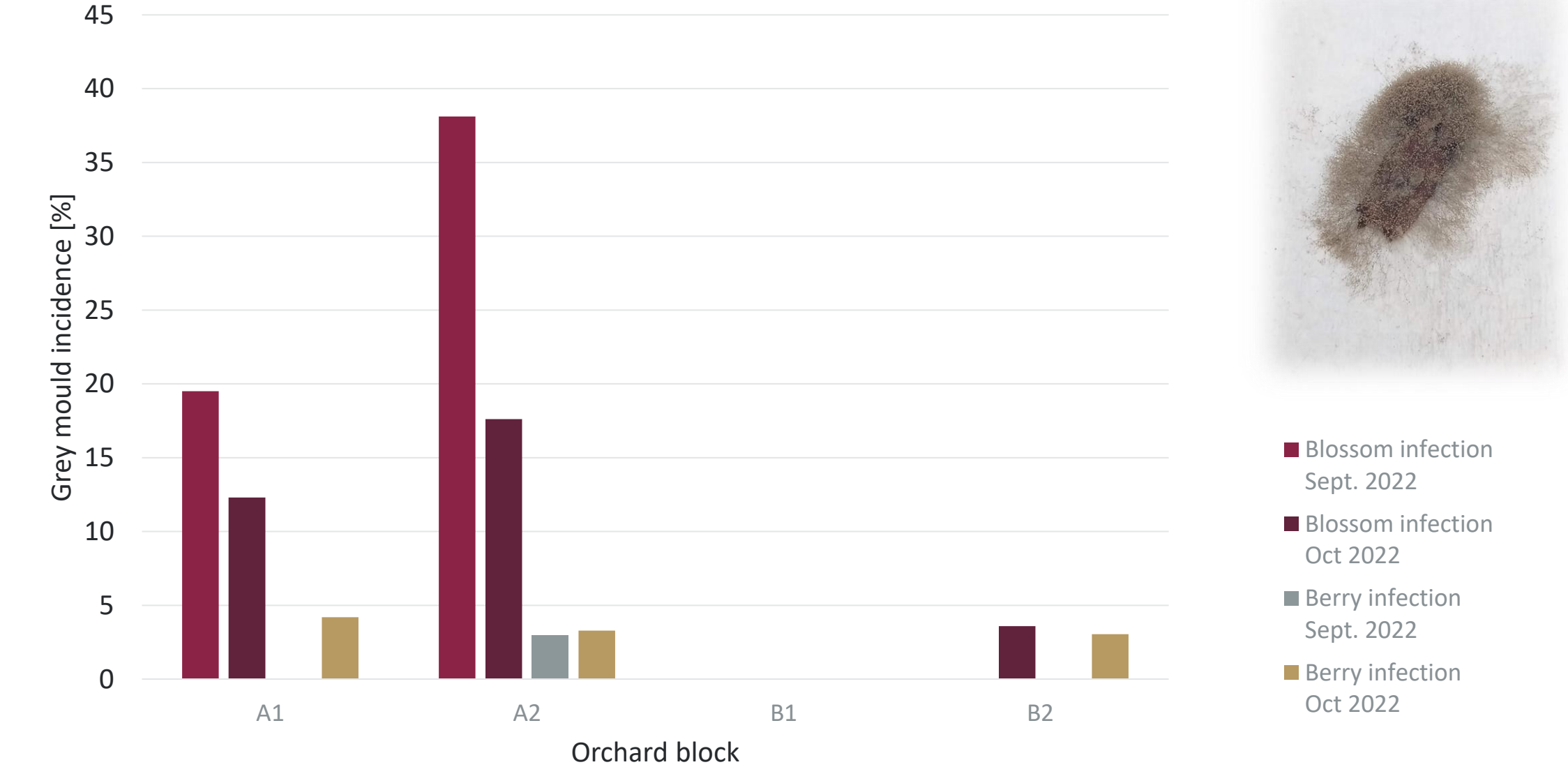




RESULTS BLOSSOM INFECTION SEPT./OCT. 2022



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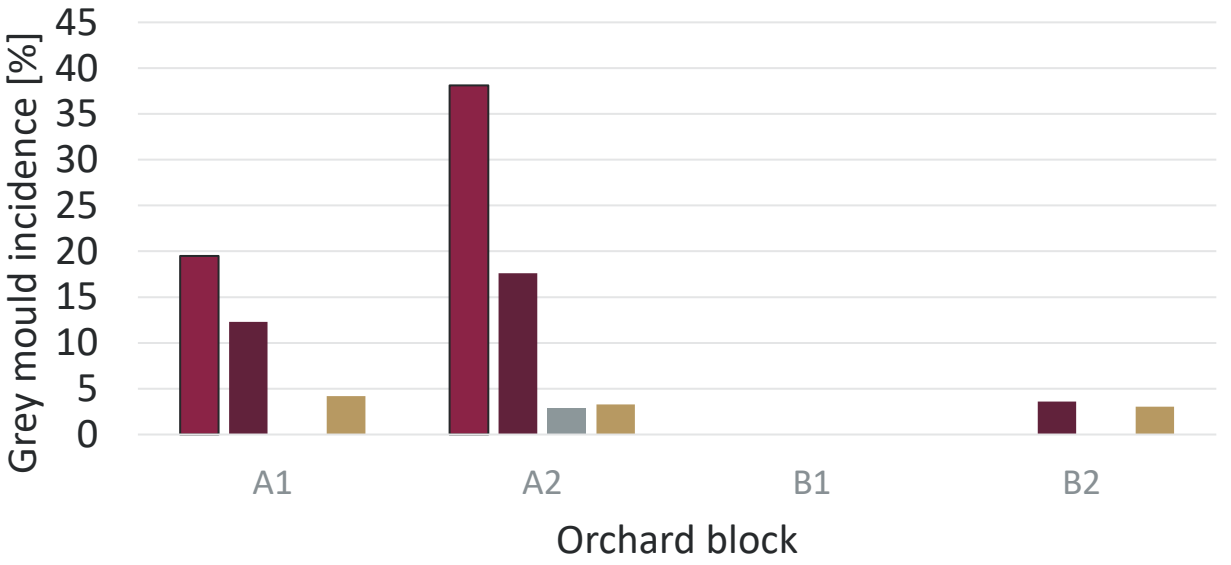
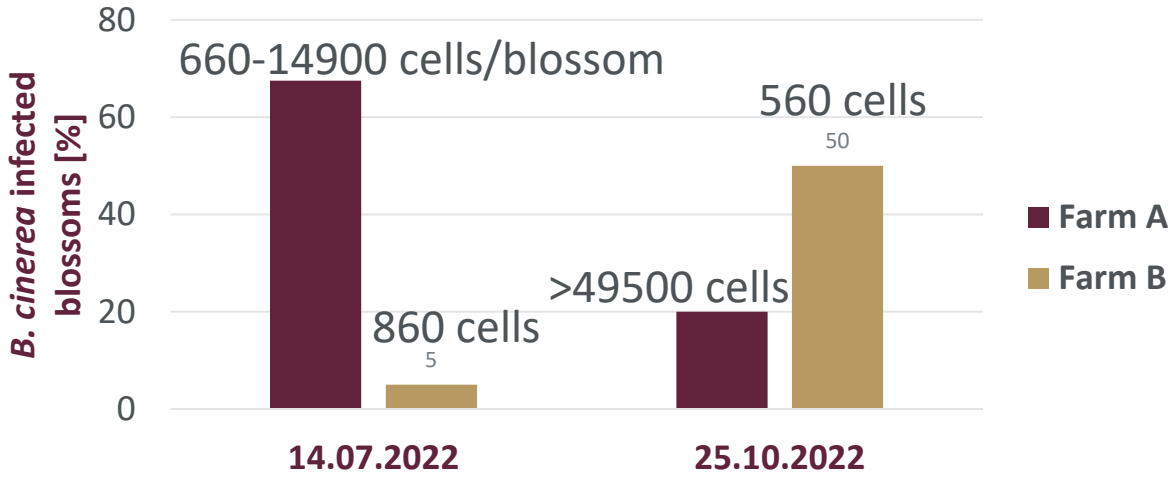


- Blossom infection Sept. 2022
- Blossom infection Oct 2022
- Berry infection Sept. 2022
- Berry infection Oct 2022



RESULTS BERRY INFECTION SEP./OCT. 2022

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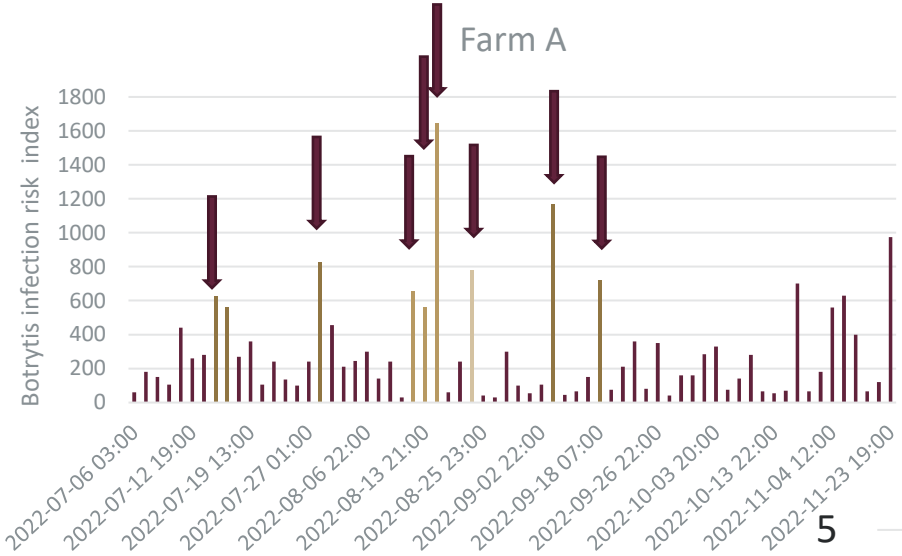

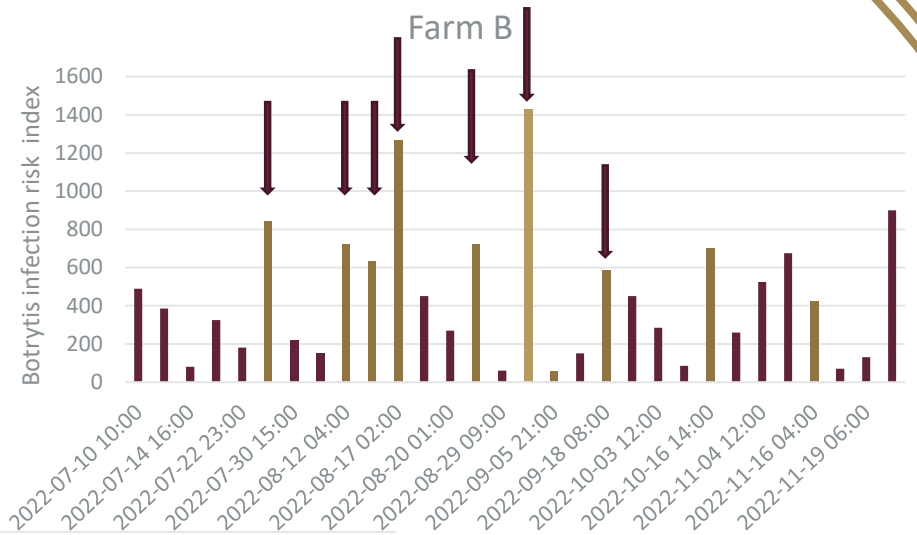

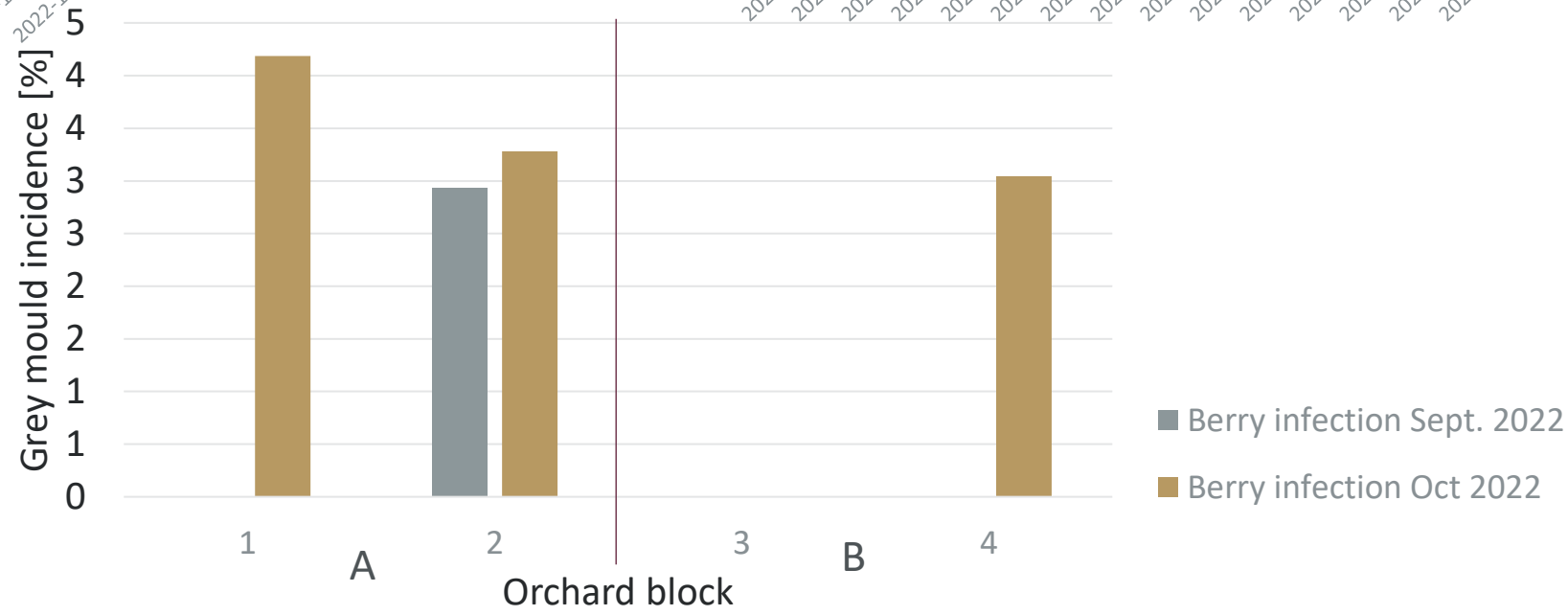

BLUEBERRY DISEASE MANAGEMENT

- Practice sanitation in the orchard and the pack house, to **minimize spore load** in the air and on the fruit
- Avoid overhead irrigation and **prune to allow air-flow**

- Handle fruit carefully to cause as **few injuries** as possible
- Prompt **cooling** of harvested fruit
- Chemical control: **pre-harvest sprays** with registered fungicides (contact or systemic formulations) according to **predicted infection risk**

SUMMARY

DETECTION OF BLUEBERRY DECAY

- *Botrytis cinerea* primarily infects dead or dying tissue and blossoms

- In spring: Optimal temperatures and relative humidity for primary **blossom infection**

- **Orchard sanitation, cultural practices and monitoring of infection risk** as part of integrated control

thank you | enkosi | dankie

ECONOMIC IMPACT OF GREY MOULD

PRE-HARVEST LOSSES:

Shoot tip or blossom blight, cane Botrytis a.o.

POSTHARVEST FRUIT DECAY impact (after harvest):

Estimated **20% crop losses** due to postharvest decay pathogens (Bell *et al.* 2021), depending on cv. susceptibility

R40 000 - R203 000/t = up to R40 656 loss

Botrytis cinerea

Bell et al 2021. LWT- Food Science and Technology 149:112046.