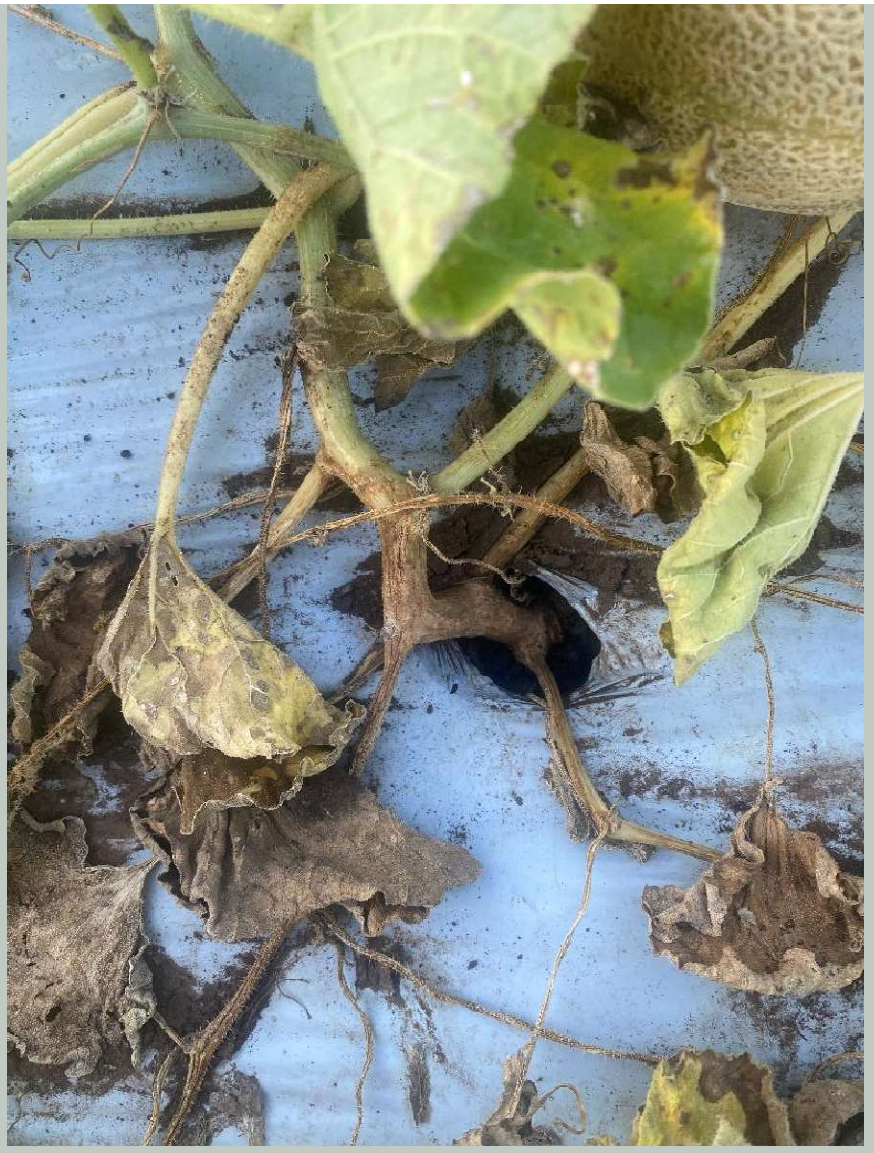
IDENTIFICATION AND MANAGEMENT OF FUNGAL DISEASE COMPLEXS IN MELONS

Agreco Australia

April 2023



Project Overview

- Aim - is to improve productivity through better management
- How?
  - Improved knowledge of the diseases
  - Risk factors for disease outbreaks
  - Holistic approach to management
- What are the diseases?
  - Gummy stem blight (GSB)
  - Fusarium wilt
  - Charcoal rot
  - Vine decline

Project Activity Progress

- Monitoring of commercial crops in Bundaberg
- Disease surveys
  - Watermelon crops surveyed in Burdekin, Chinchilla & Griffith
  - Rockmelon crops surveyed in Burdekin, Mildura
- Pathogen identification
  - Crop monitoring: mostly fusarium, GSB and charcoal rot
  - Disease surveys: fusarium, GSB, charcoal rot, pythium, Alternaria, Diaporthe
- Fusarium race testing
- In vitro fungicide screening – GSB
- Seed to production pathway – in vitro testing of seed and seedlings has started

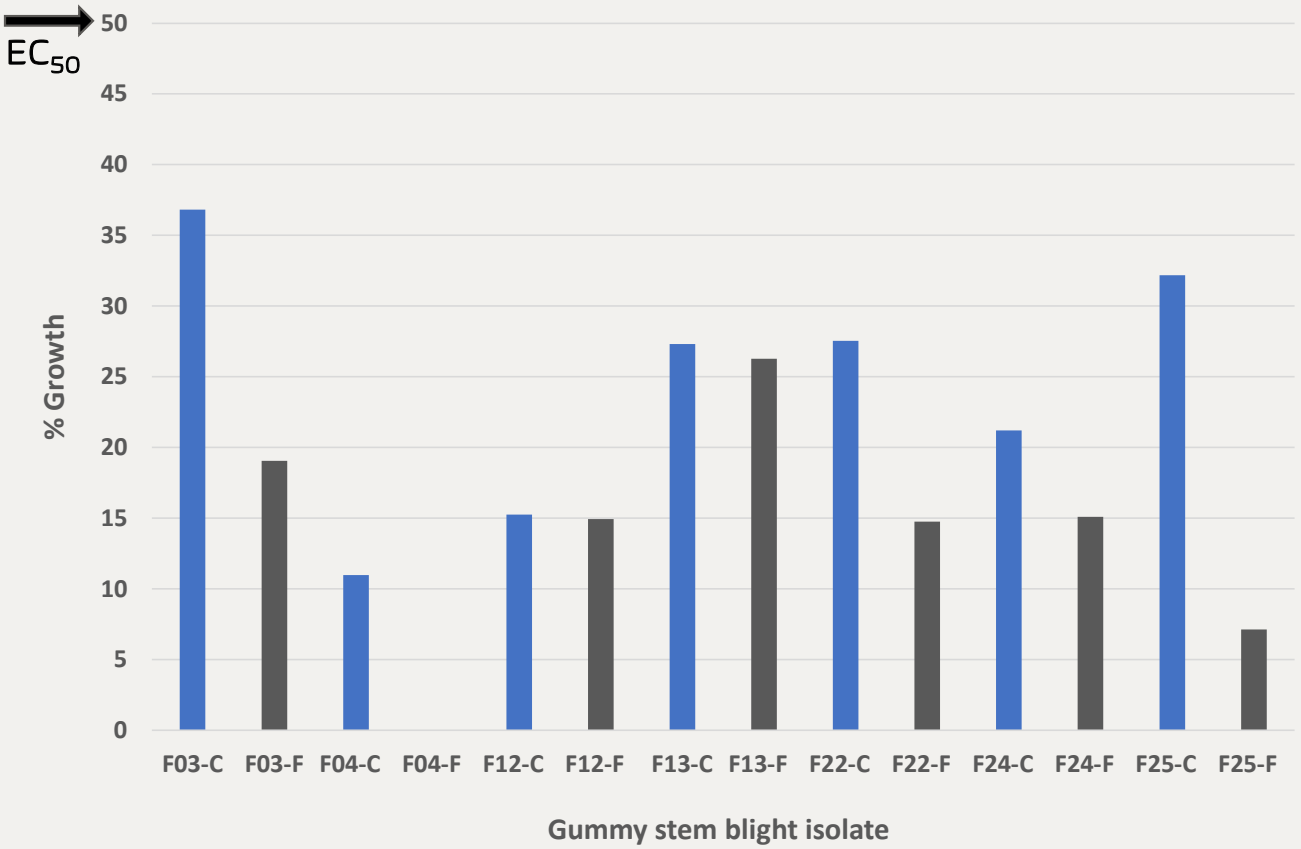
Summary of monitoring results

- Main disease is site specific
- High incidence of GSB doesn't always mean big losses
- Weather influenced disease severity for GSB - plants can recover
- Plants didn't recover from fusarium infections
- Nov 2023 watermelon losses due to charcoal rot

In vitro fungicide resistance testing

- Keinath 2015 - Plant Disease 99:815–822
  - Known resistance to G1, G7 and G11
  - Cyprodinil (G9) & fludioxonil (G12) registered in the USA – not in Australia
- Fungicides registered in Australia for GSB
  - Groups 3, 11, 40, M1, M3 and M5 as single actives
  - Actives with two groups: 11 + 49, 7 + 3, 11 + 7, M3 + 4, M3 + 40, M2 + M3,
- Some isolates showed tolerance (?) - more isolates and chemicals to be tested
- Still optimizing methods for this testing

Summary of in vitro testing



- Screened 7 isolates of GSB
  - Pumpkin x 2
  - Rockmelon x 2
  - Watermelon x 3
- No resistance:
  - Growth at 0.1 mg/ml > 50% (EC_{50})
  - Growth at 0.1 mg/ml > 0%
- Blue is cyprodinil
- Grey is fludioxinol

Fusarium race testing

- Fusarium oxysporum forma specialis (f.sp.) niveum (Fon) = watermelon isolates
  - Four races: 0, 1, 2 & 3
  - Races 2 & 3 confirmed in Australia (Puno, V.I. 2018, PhD Thesis, University of Sydney)
- F. oxysporum f.sp. melonis (Fom) = rockmelon isolates
  - Four races: 0, 1, 2 & 1,2
- Isolates collected in 2023 and tested so far:
  - Watermelon – 7, most from Bundaberg, one from Chinchilla
  - Rockmelon – 2, both from Griffith NSW
- No melon lines available to determine if Fom 1,2 is a single race or multiple races

Preliminary results of race testing

Isolate	Host	Location	Presumptive race
F81	Watermelon	Bundaberg, Qld	Fon R3
F72	Watermelon	Bundaberg, Qld	Fon R2
F83	Watermelon	Bundaberg, Qld	Fon R2
23/21-1	Watermelon	Bundaberg, Qld	Fon R1?
F74	Watermelon	Bundaberg, Qld	Fon R1?
23/14	Watermelon	Chinchilla, Qld	Fon R2?
23/21-8	Watermelon	Bundaberg, Qld	Fon R1?
9	Rockmelon var Infinite Gold	Griffith, NSW	Fom 1,2
11	Rockmelon var Infinite Gold	Griffith, NSW	Fom 1,2

Seed pathway testing

- Preliminary experiment using field collected pumpkin seeds
  - Field trial with high gummy stem blight disease pressure in 2023
  - Pumpkin fruit harvested – symptomatic and asymptomatic
  - Seed harvested from fruit and bulked
- Random seeds selected for testing
  - Tested in vitro – incubated on moist filter paper or on ¼ PDA media
  - Grow out of seeds and evaluation of disease in seedlings
- Results:
  - Fruiting bodies of GSB obvious on seed coats from 2/50 seeds evaluated using filter paper
  - GSB isolated from 4/50 seeds evaluated using ¼ PDA media
  - GSB developed in seedlings from 3/55 germinated seeds – GSB reisolated from seedlings
- Results support previous findings from overseas studies

Next steps

- Continue all previous activities
- Trial management strategies including
    1. different combinations of pre- and post-plant strategies
    2. varietal susceptibility screen
    3. irrigation stress and fruit load

Team

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Hort Innovation
Strategic levy investment

MELON FUND