



Resilience of *Colletotrichum gloesporioides* strains infecting yams to dry period and elevated temperature stresses



Background

Climate change: impacts?

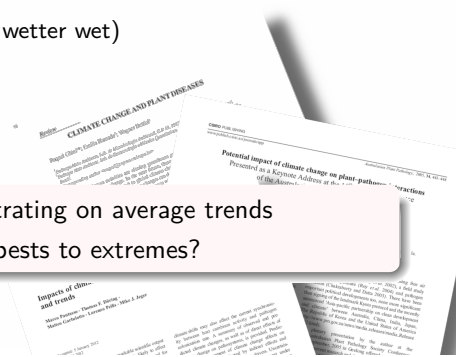
- The climate change is expected to have several effects in the Caribbean:
 - increase in temperatures (0.5 to 2°C)
 - increase in rainfall
 - increase in extremes (drier dry, wetter wet)
- This can be beneficial for yield
- But what about crop pests?

Background

Climate change: impacts?

- The climate change is expected to have several effects in the Caribbean:
 - increase in temperatures (0.5 to 2°C)
 - increase in rainfall
 - increase in extremes (drier dry, wetter wet)
- This can be beneficial for yield
- But what about crop pests?

- Mostly modelling studies, concentrating on average trends
- But what about the resilience of pests to extremes?



Background

Yam & anthracnose

- Yam (*Dioscorea* sp.) is an important tropical root crop
- Serves as staple food
- Has high market value
- Main constraints: weeds, pests



Background

Yam & anthracnose

- Yam (*Dioscorea* sp.) is an important tropical root crop
- Serves as staple food
- Has high market value
- Main constraints: weeds, pests



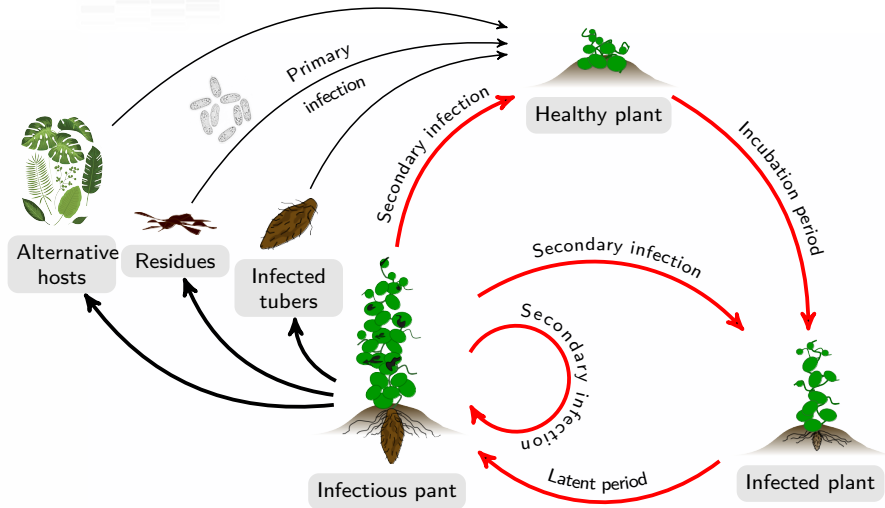
Anthracnose : caused by *Colletotrichum gloeosporioides*

Symptoms are leaf blackening and shoot dieback
⇒ severe yield losses



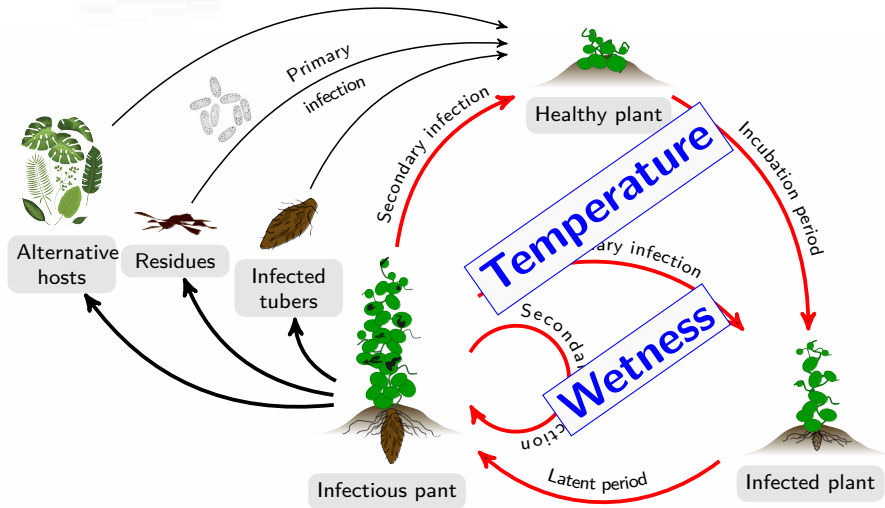
Background

The biology of *C. gloeosporioides*



Background

The biology of *C. gloeosporioides*



Background

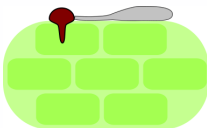
The biology of *C. gloeosporioides*

- Spores are dispersed through **rain splashing**
- **Leaf wetness** is necessary for spore germination
- Germinated spores produce an **appressorium**, allowing direct penetration of leaf tissues through cuticle

Background

The biology of *C. gloeosporioides*

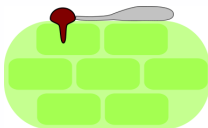
- Spores are dispersed through **rain splashing**
- **Leaf wetness** is necessary for spore germination
- Germinated spores produce an **appressorium**, allowing direct penetration of leaf tissues through cuticle



Background

The biology of *C. gloeosporioides*

- Spores are dispersed through **rain splashing**
- **Leaf wetness** is necessary for spore germination
- Germinated spores produce an **appressorium**, allowing direct penetration of leaf tissues through cuticle



Importance of weather variables

- **Rain** and **humidity** → spore germination → infection
- **Temperature** → fungus growth (infection and subsequent development)

Materials and Methods

Assessing the resilience of the fungus to longer dry and hot periods

- 1 Subject spores to dryness (6 to 48h)

Materials and Methods

Assessing the resilience of the fungus to longer dry and hot periods

- 1 Subject spores to dryness (6 to 48h)
- 2 Subject 1) spores and 2) mycelium to heat (36 to 40°C)

Materials and Methods

Assessing the resilience of the fungus to longer dry and hot periods

- 1 Subject spores to dryness (6 to 48h)
- 2 Subject 1) spores and 2) mycelium to heat (36 to 40°C)
- 3 Each time, put the fungus back to optimal conditions (wetness, temperature of 26°C)

Materials and Methods

Assessing the resilience of the fungus to longer dry and hot periods

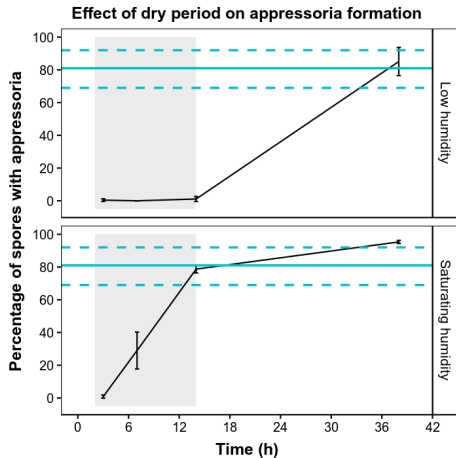
- 1 Subject spores to dryness (6 to 48h)
- 2 Subject 1) spores and 2) mycelium to heat (36 to 40°C)
- 3 Each time, put the fungus back to optimal conditions (wetness, temperature of 26°C)

What did we measure

- Percentage of spores with appressoria (capacity of infection)
- Growth rate (mycelium)
- Measurements taken both during and following stresses

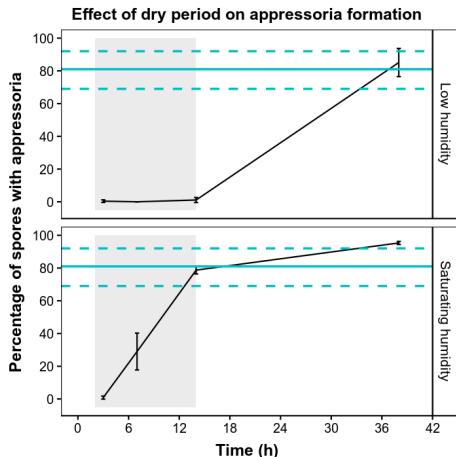
Results

Resilience to dryness



Results

Resilience to dryness

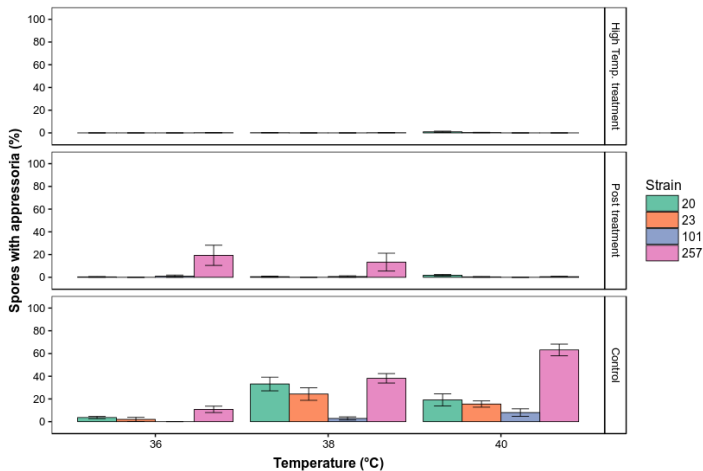


Main results

- Spores can withstand dry conditions for up to 48h
- Spores are "dormant" while undergoing dryness
- Saturating humidity \approx wetness

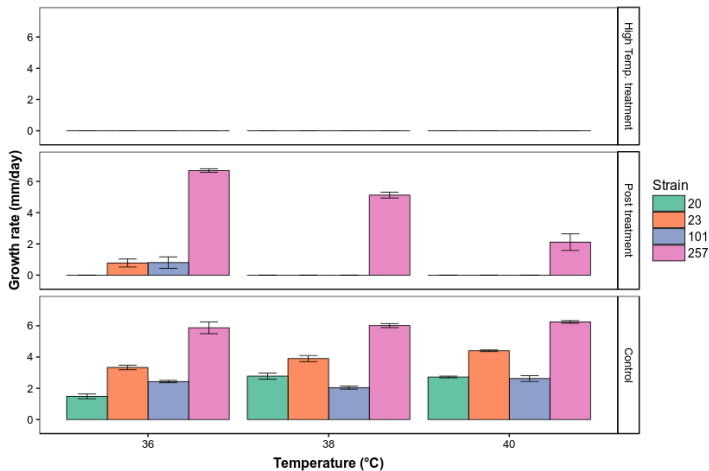
Results

Resilience to temperature: formation of appressoria



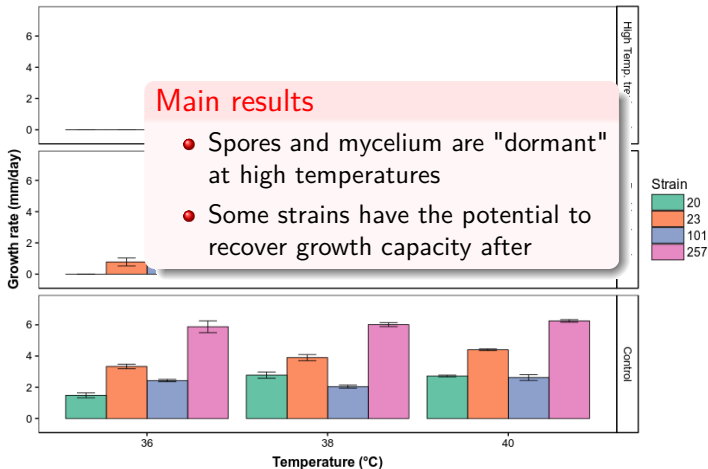
Results

Resilience to temperature: mycelium growth rate



Results

Resilience to temperature: mycelium growth rate



Discussion

What do we get from that?

- It is important to investigate the **effect of "extreme" weather variables**, as the future weather conditions are uncertain, but will probably be more erratic
- In pests populations, some strains/races have a **better resilience** than others → we have to **pay attention to the genetic diversity**
- Pests have the potential to adapt
- It's **hard to predict** what will happen with regards to the effects of climate change

