Identification of fungicide tolerance isolates

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Australian Government Grains Research and Development Corporation
GRDC Grains Research & Development Corporation

Industry is heavily dependant on use of fungicides

- Currently seed treatments, amended fertilizers and foliar fungicides are used to minimise blackleg disease
- All available fungicides from the one active group – Triazoles (DMIs, Group 3)
  - Strong selection pressure for fungicide resistance to evolve
- Do fungicide tolerant/resistant isolates exist in the population?

- Septoria (Ascomycete) from Barley has recently been identified with triazole tolerance.
  - Considered to be a step based tolerance as it doesn't completely overcome the fungicide but reduces efficacy

Ascospore shower technique was used to identify potential fungicide tolerant isolates

Stubble from trials that had fungicide applications

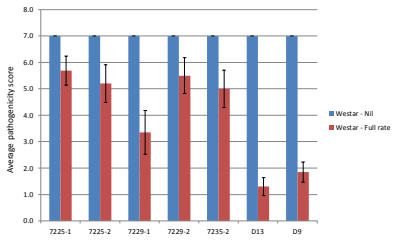
Jockey treated seedlings

Looked for lesion development and cultured isolates from them

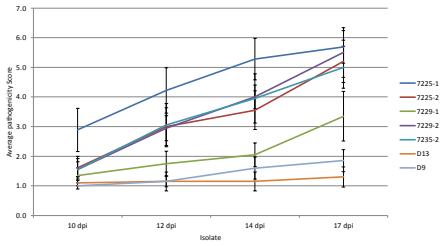
x3

Location	Region	Cultivar	Fungicide treatments
		Hyola444T	Jockey
		45Y86CL	Jockey
		45Y86CL	Prosaro
		45Y86CL	Untreated
		45Y86CL	Jockey + Prosaro
		CB Atomic	Impact-In-Furrow
		CB Atomic	Jockey
		CB Atomic	Prosaro
		Mixed cultivars	Untreated

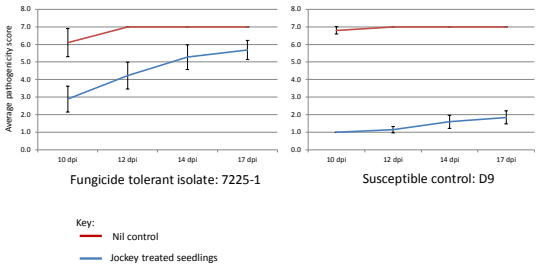
Identified five isolates with increased tolerance to fluqinconazole



Rates of infection development vary for the fungicide tolerant isolates



Lesion development is slower in the presence of the fungicide



Fungicide tolerant isolate: 7225-1

Susceptible control: D9

Key:

Nil control

Jockey treated seedlings

Isolates have increased tolerance but not resistance

- Isolates appear to have increased tolerance rather than resistance
  - Lesions develop slower on jockey treated plants compared to nil control
- Septoria (Ascomycete) from Barley has recently been identified with triazole tolerance.
  - Considered to be a step based tolerance as it doesn't completely overcome the fungicide but reduces efficacy

Future work

- Need to
  - Do *in vitro* assays to determine tolerance levels (discussing with Fran Lopez, Curtin University).
  - Survey incidence of fungicide tolerant isolates in different canola-growing regions.
  - Ability of isolates to cause stem canker and yield loss.
  - Look at different growth stages of the plant to see if this impacts on virulence.
  - Determine molecular mechanisms.
  - Determine specificity to different azole molecules.
  - Determine specificity to other mechanisms of action.
  - Identify risky practices such as multiple fungicide applications??
  - Determine fitness eg do they decrease in frequency if no fungicide applied.

The current plan is to inform industry that:

1. Jockey tolerant isolates have been found.
2. Further work will be undertaken during 2015 to determine the distribution of these fungicide tolerant isolates.
3. We will not tell anyone where these isolates were found (our 2014 survey is too small to be useful).
4. Further work will be undertaken to determine the reduction in fungicide efficacy against these isolates.
5. We will recommend that in 2015 fluquinconazole still be used to treat canola seed (business as usual).