PULSES: Botrytis grey mould in lentil and chocolate spot in faba bean

AUSTRALIAN FUNGICIDE RESISTANCE EXTENSION NETWORK

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

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Wednesday 16 August 2023

Australian Fungicide Resistance Extension Network

AUSTRALIAN FUNGICIDE RESISTANCE EXTENSION NETWORK

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Regionally specific resources and training to help growers and advisors understand the status, risks and management of fungicide resistance in Australian grains.

Develop and deliver:

- Fungicide resistance management guide
- Workshops, info sessions & webinars
- Factsheets, updates & email alerts

afren.com.au
afren@curtin.edu.au
@theGRDC
#AFREN

Housekeeping

AUSTRALIAN FUNGICIDE RESISTANCE EXTENSION NETWORK

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- To ask a question:
  - Go to the Q&A window in the bottom of your screen.
  - Click on Q&A, open the window and enter your question.
  - Your question will then be posted ready to be answered. You can also tick “send anonymously” if you don’t want your name attached to your question.

Integrated Disease Management for pulses

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- **3-4 year break between crops of the same type**
- Avoid susceptible varieties & review disease ratings (NVT).

- Sow clean seed
- Seed treatment protects emerging seedling & offers 4-6 weeks protection
- Avoid sowing near previous year's pulse crop (including your neighbour's stubble)

- Monitor crops early for signs of disease
- Plan your foliar fungicide strategy
  - Mix and rotate fungicide groups
  - Apply ahead of rain fronts, if disease present
  - Pre-canopy closure spray critical to protect base of plant before canopy closes over
  - Apply podding spray(s) to protect developing grain
- Consider economics of continued disease management and crop end use (WHP, MRLs)

- Report disease symptoms to your state pathologist

2022 season recap

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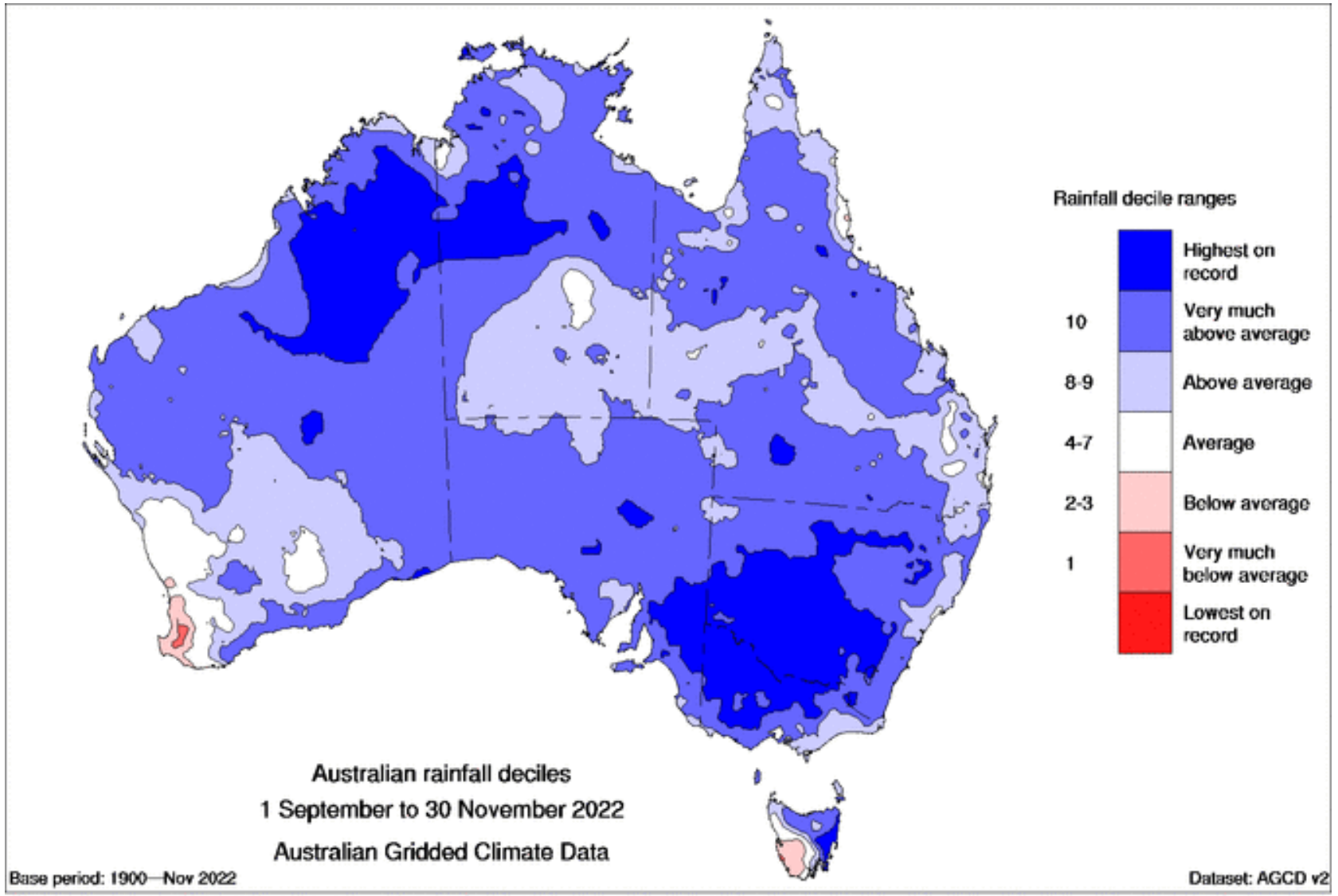

Source: BOM

2022 season recap

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Exceptional year for foliar disease across all pulse growing regions

Botrytis grey mould (BGM) on lentil

Chocolate spot (CS) on faba bean

Botrytis diseases of lentil & faba bean

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Caused by necrotrophic fungal pathogens: *Botrytis cinerea* and *Botrytis fabae*

Optimal conditions for disease:

- mild temperatures (15-25^{o}C) BUT can develop slowly in cool conditions
- high relative humidity: rain, mist, fog, dew, high soil moisture

Botrytis grey mould on lentil

Chocolate spot on faba and broad bean

Pathogen life cycle

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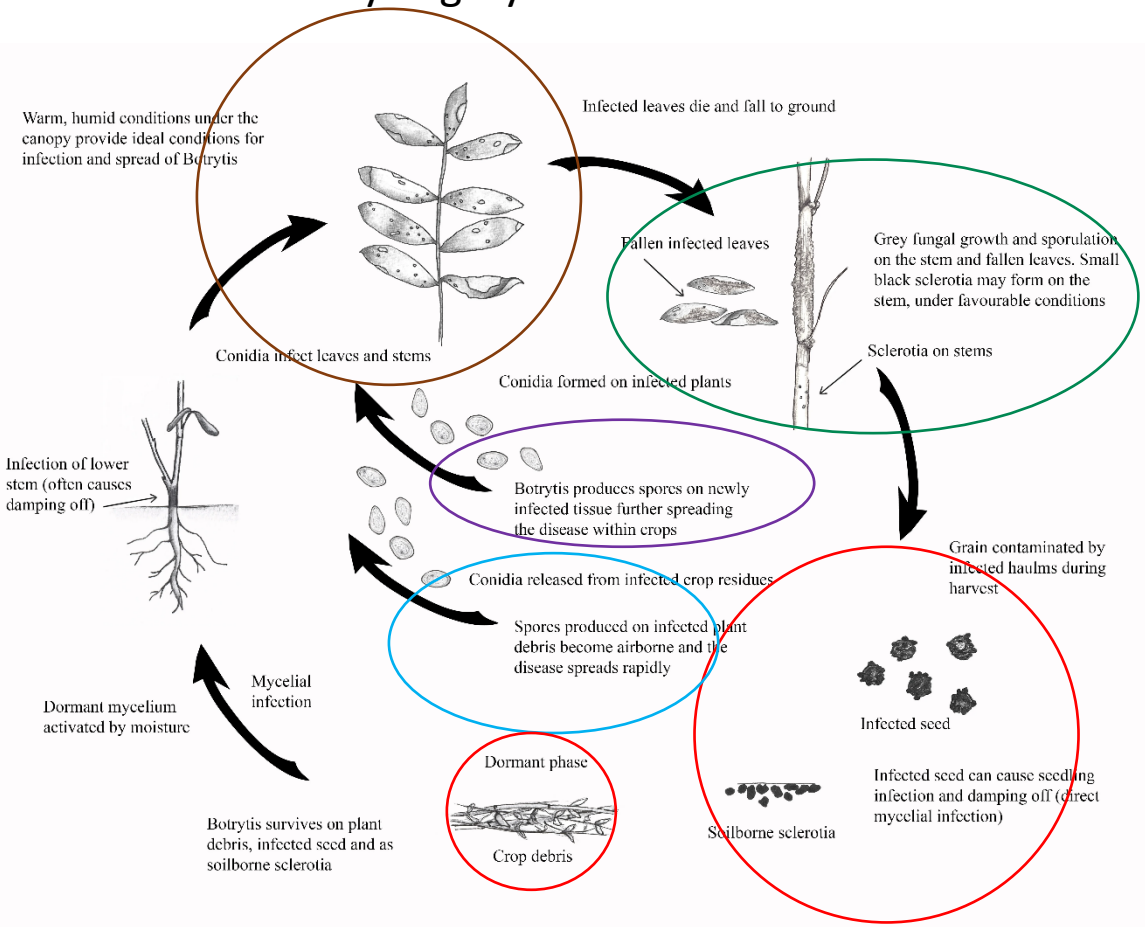
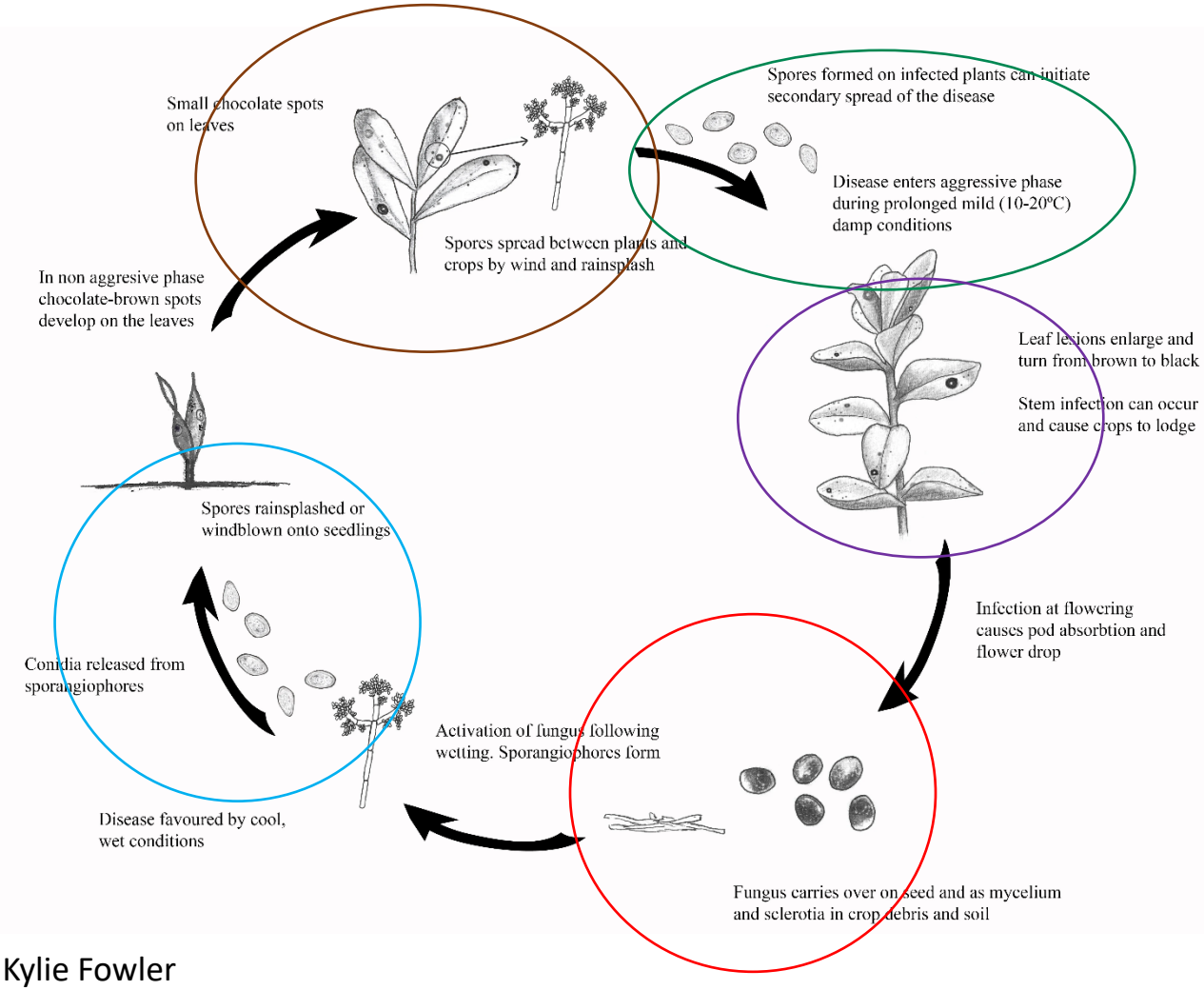
Botrytis grey mould of lentil



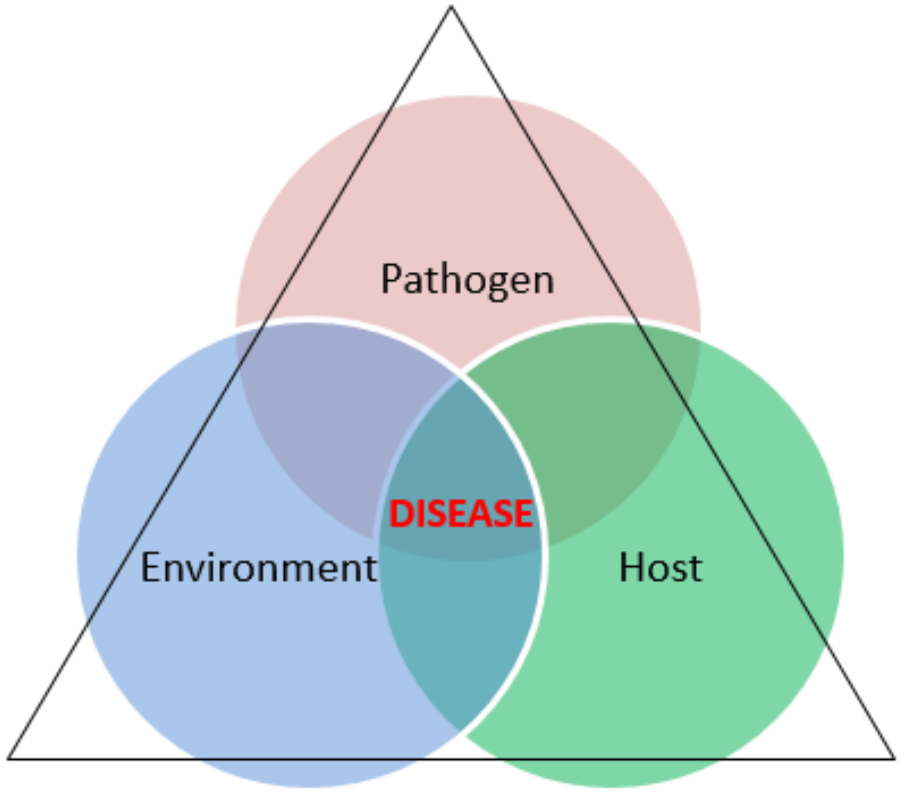
Chocolate spot of faba bean



Illustrations by Kylie Fowler

Risk factors

Inoculum on seed, stubble, infested plant debris, in soil



mild (15-25^{o}C) temperature & high relative humidity

Bulky canopy from early sowing, high seeding rate; long growing season

Susceptible variety

Varietal resistance

nvt.grdc.com.au/nvt-disease-ratings

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2023 NVT lentil BGM rating	
GIA Leader	MRMS^{P}
GIA Lightning	MS
GIA Metro	MRMS
GIA Sire	MS
GIA Thunder	MRMS
Nipper	MRMS^{P}
PBA Ace	MS
PBA Blitz	MS^{P}
PBA Bolt	S
PBA Hallmark XT	MRMS^{P}
PBA Highland XT	MS
PBA Hurricane XT	MS
PBA Jumbo2	MR^{P}
PBA Kelpie XT	MS^{P}

2023 NVT faba bean CS rating	
Farah	S
Fiesta VF	S
Nura	MS
PBA Amberley	MRMS
PBA Bendoc	S
PBA Marne	MS^{P}
PBA Rana	MS
PBA Samira	MS
PBA Zahra	MS

R, resistant,
MR, moderately resistant
MRMS, moderately resistant moderately susceptible
MS, moderately susceptible
S, susceptible

^{p} = provisional. Rating may change in a future NVT disease review once further data becomes available.

2023 season

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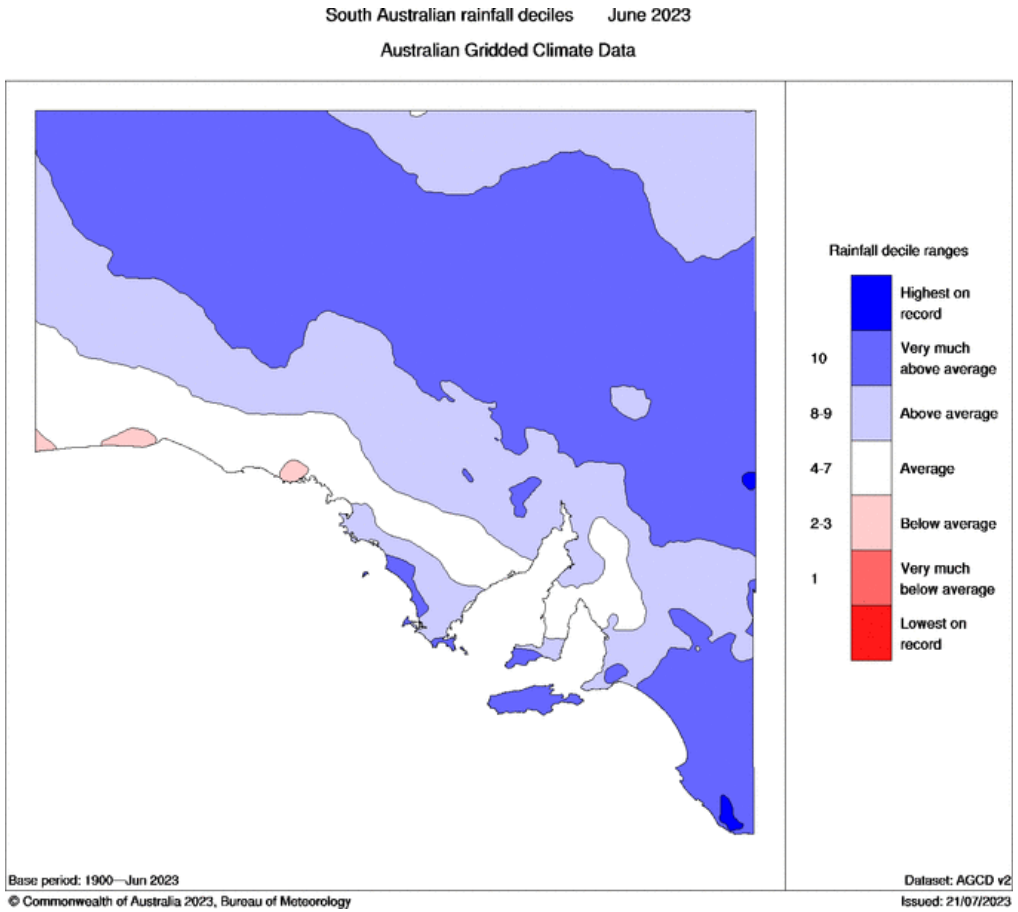
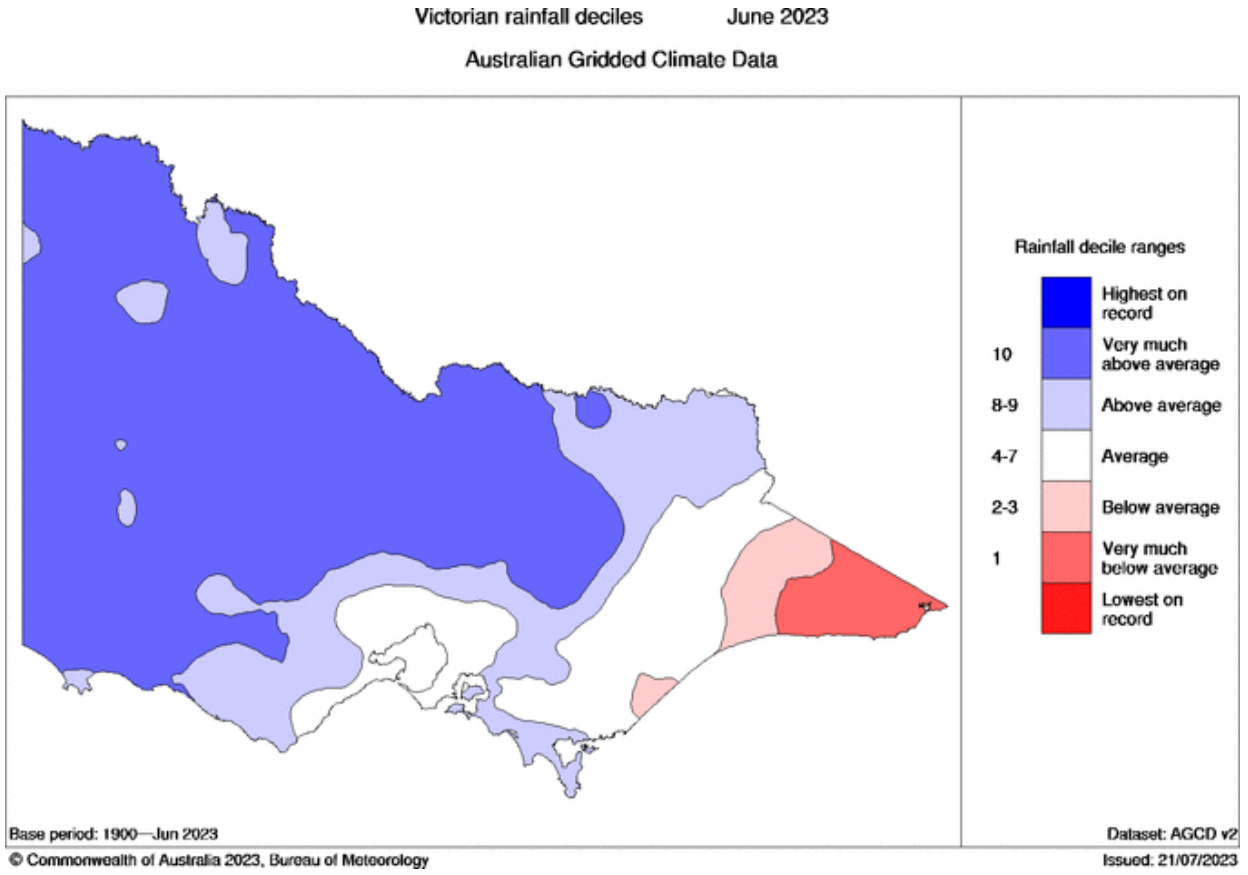
High inoculum load from 2022 + above average June rainfall
⇒ disease initiation and establishment





2023 season

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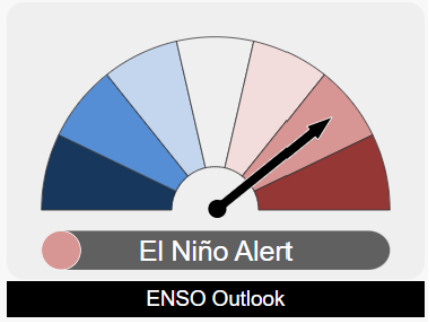
High inoculum load from 2022 + above average June rainfall
⇒ disease initiation and establishment

July:
cold temps & below average rainfall for SA and Vic – slow disease

El Nino forecast conditions to be warmer and drier than average, but not guaranteed…

Be alert, not alarmed



http://www.bom.gov.au/climate/enso/

Disease management in lentil & faba bean

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Late winter

Pre-canopy closure fungicide spray critical

- last chance to get a fungicide on lower plant parts

After canopy closure (or no canopy closure): WEATHER IS KEY.

If rain is delayed, can delay sprays. Control aimed at:

- Botrytis disease: spray ahead of rain events with forecast day temp >15C & night minimum >8C
  New GRDC investment DJP2304-004RTX (Ag Vic, SARDI, NSW DPI, FAR, Trengove Consulting) may refine this
- Ascochyta blight: if disease present & rain front approaching (stem lesions => lodging & yield loss)
- Sclerotinia: if risk present (= frequent rain, pulse/canola rotation, previous sclero disease in paddock)

Podding spray(s): May be required, especially in wet spring or susceptible variety

- To protect developing grain, prevent pod abortion (yield loss) and seed staining (quality impact)

Fungicides: one disease management tool

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Active (Product)	Group	Sprays/crop	Crops
Bixafen + prothioconazole (e.g., Aviator XPro)	7 SDHI + 3 DMI	2	CP (to late flower) Le, FB, FP (all to early flower)
Azoxystrobin + tebuconazole (e.g., Veritas Opti)	11 QoI + 3 DMI	2	CP, FB, Le, FP, V
Azoxystrobin + cyproconazole (e.g., Amistar Xtra)	11 QoI + 3 DMI	2	CP, FB, FP, Le (all to 50% pods reached final length)
Pydiflumetofen + fludioxonil (e.g., Miravis Star)	7 SDHI + 12 PP	2	CP, Le, FP, FB (all to end of flowering)
Carbendazim	1	2	CP, Le, FB, V
Procymidone	2	2	FB*, Le
Chlorothalonil	M5		CP, FB, Le, FP
Mancozeb	M3		CP, Le, FB, FP, V
Copper	M1		FB, FP
Tebuconazole	3 DMI		FB, FP (other crops in mixed products)
Thiram	M3	SD	CP
Thiram + Thiabendazole	M3 + 1	SD	CP, Le, FB, FP, V
Metalaxyl	4	SD	CP, FP

CP=chickpea, Le=lentil, FB=faba bean, FP=field pea, V=vetch

Registration information on APVMA https://portal.apvma.gov.au/pubcris

Permit information at http://www.pulseaus.com.au/growing-pulses/crop-protection-products

*Procymidone for faba bean under permit PER92791 (27 Oct 2022 to 31 Oct 2025). Now: max 2 sprays in a season, WHP 21 days.

Fungicides registered for control of botrytis disease in lentil or faba bean

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Carbendazim	1	2	CP, Le, FB, V
Procymidone	2	2	FB*, Le
Chlorothalonil	M5		CP, FB, Le, FP
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CP=chickpea, Le=lentil, FB=faba bean, FP=field pea, V=vetch

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Fungicide activity

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Protectant fungicide

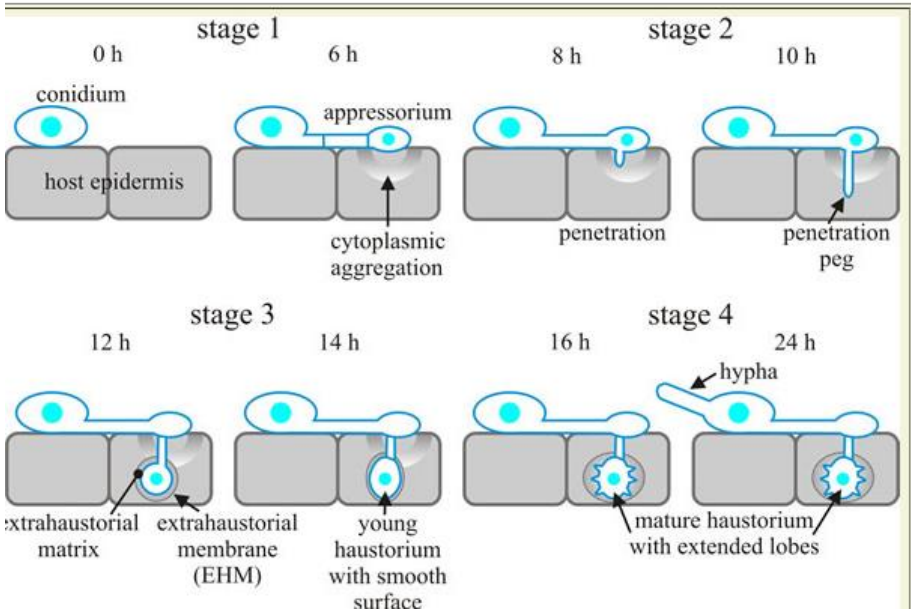
Acts on fungal pathogen on the leaf surface, preventing spore germination and/or infection.

- Group 7 SDHI, Group 11 strobilurin/QoI, Group 12
- Multi-sites M1-M5
- Limited activity by Group 3 DMI

Curative/systemic fungicide

Acts on fungal pathogen within plant tissue and stops early growth of pathogen and colonisation in the plant tissues.

- Group 1, Group 3 DMI, Group 7 SDHI.
- Limited activity by Group 11 strobilurin/QoI



Source: Moore, Robson, & Trinici (2021) 2nd Ed.

Infection can occur within 24 h or less of leaf wetness

Spray ahead of rain fronts

Any plant growth after fungicide is applied will be unprotected

Fungicide classification & MoA

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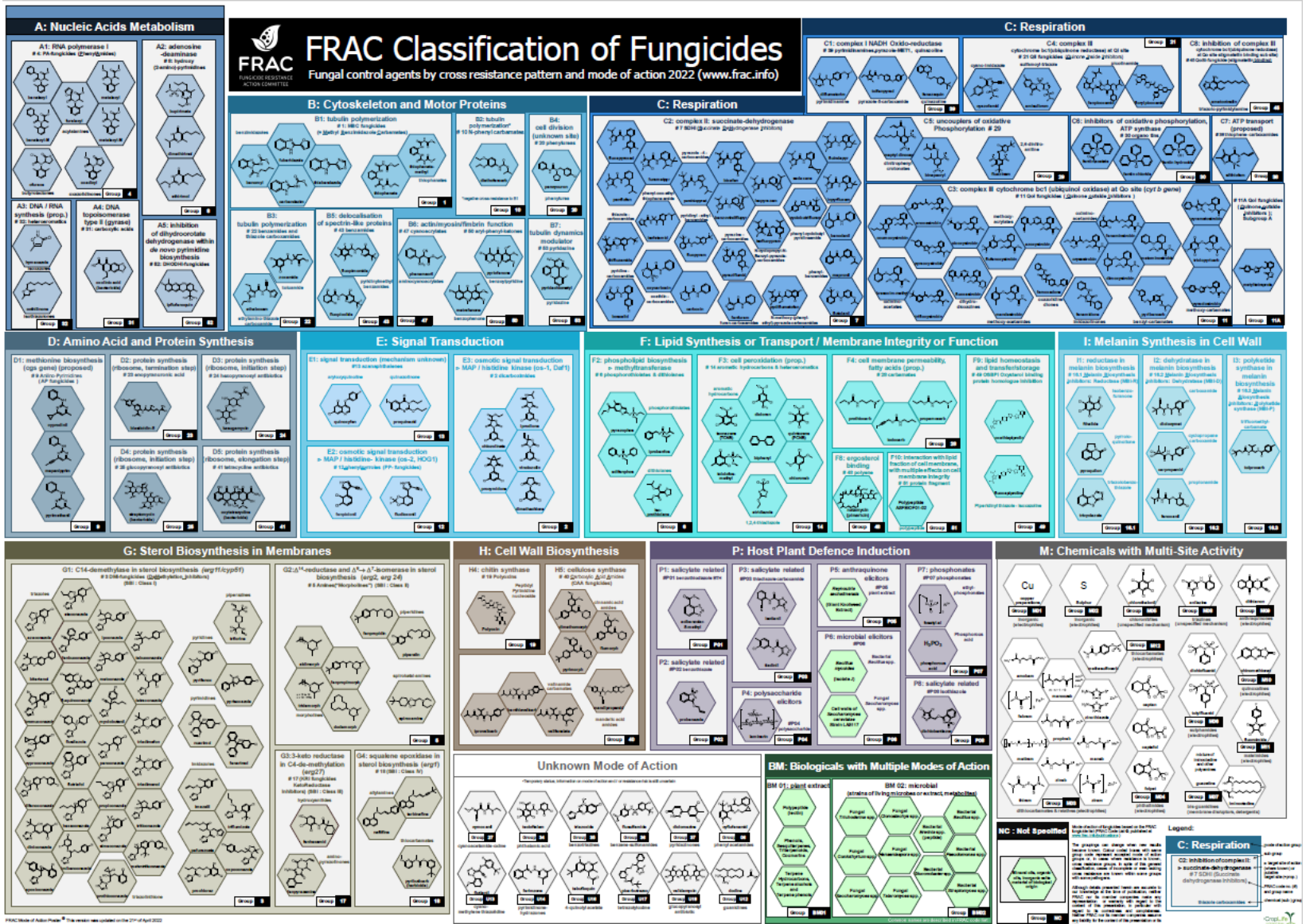

https://www.frac.info/docs/default-source/publications/frac-mode-of-action-poster/frac-moa-poster-2022.pdf

Future fungicides?

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Stewardship of fungicide use is critical to protect existing chemistries

New fungicide actives?

- takes time to identify, develop and gain registration
- Investment driven by market share: pulse production/value small compared to other broadacre crops or horticulture

What about horticultural products?

- not cost effective for use in pulses but permits are possible
- Tend to be very specific and targeted = > increased risk of fungicide resistance

How does fungicide resistance evolve?

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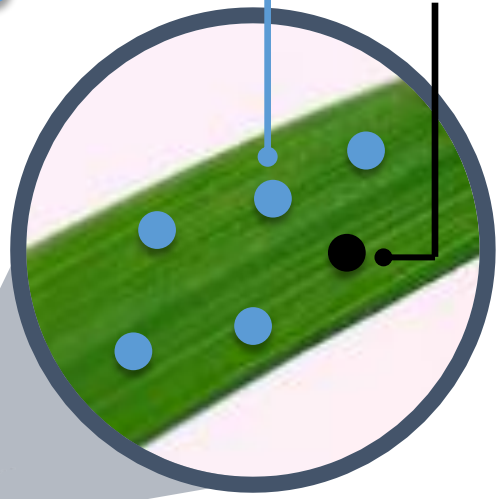
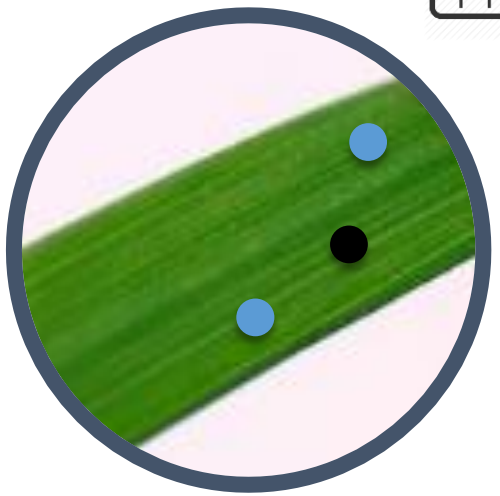
Fungicide applied

Sensitive fungus

Resistant fungus

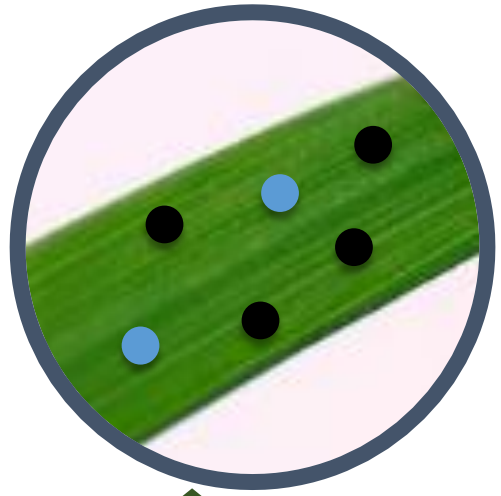


A few individuals in the fungal population are resistant to certain fungicide actives.



When the fungicide is used, it controls almost all of the fungal population.

Survivors reproduce over time



Survivors are naturally resistant to the action of the fungicide and can increase in frequency in the fungal population.

Applying the same fungicide with the same mode of action repeatedly enables the resistant population to multiply.

Modified from CropLife Australia Fungicide Resistance Management Fact Sheet - https://www.croplife.org.au/resources/programs/resistance-management/fact-sheet-fungicide-resistance/

Fungicide resistance – what's the risk?

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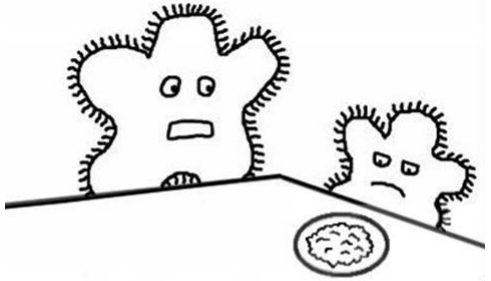
- Higher disease pressure = higher chance of fungicide resistance
- Risk of fungicide resistance greatest when:
  - Pathogen = short latent period, polycyclic, high spore production, high virulence
  - Fungicide = single mode of action (Group) used repeatedly
  - Host = susceptible variety, close rotation



Fungicide group resistance risk

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Active	Group	
Bixafen + prothioconazole	7 SDHI + 3 DMI	moderate to high risk moderate risk
Azoxystrobin + tebuconazole	11 QoI + 3 DMI	high risk moderate risk
Azoxystrobin + cyproconazole	11 QoI + 3 DMI	high risk moderate risk
Pydiflumetofen + fludioxonil	7 SDHI + 12 PP	moderate to high risk
Carbendazim	1	moderate to high risk
Procymidone	2	moderate risk
Chlorothalonil	M5	low risk
Mancozeb	M3	low risk

Fungicide Resistance Management

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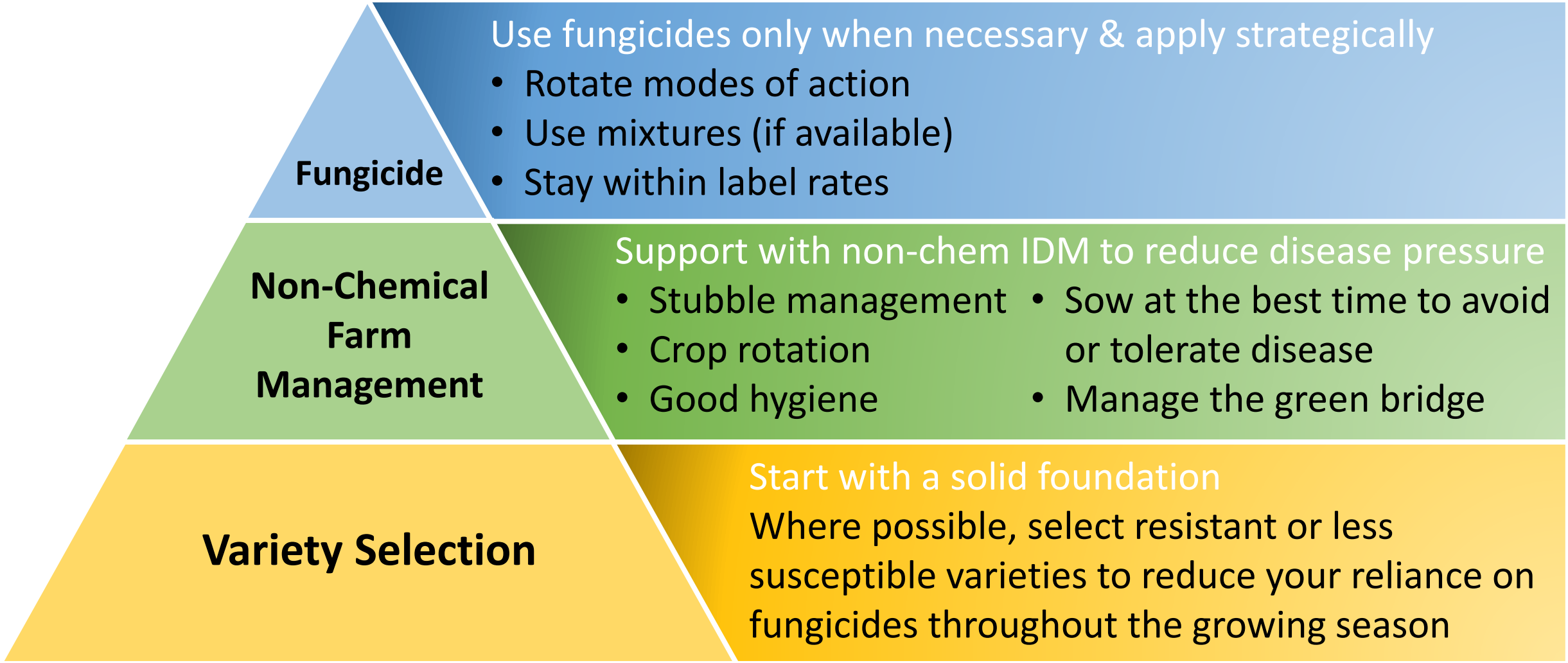

The Fungicide Resistance Five

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1. Avoid susceptible crop varieties
2. Rotate crops – use time and distance to reduce disease carry-over
3. Use non-chemical control methods to reduce disease pressure
4. Spray only if necessary and apply strategically
5. Rotate & mix fungicides / MoA groups

Resources

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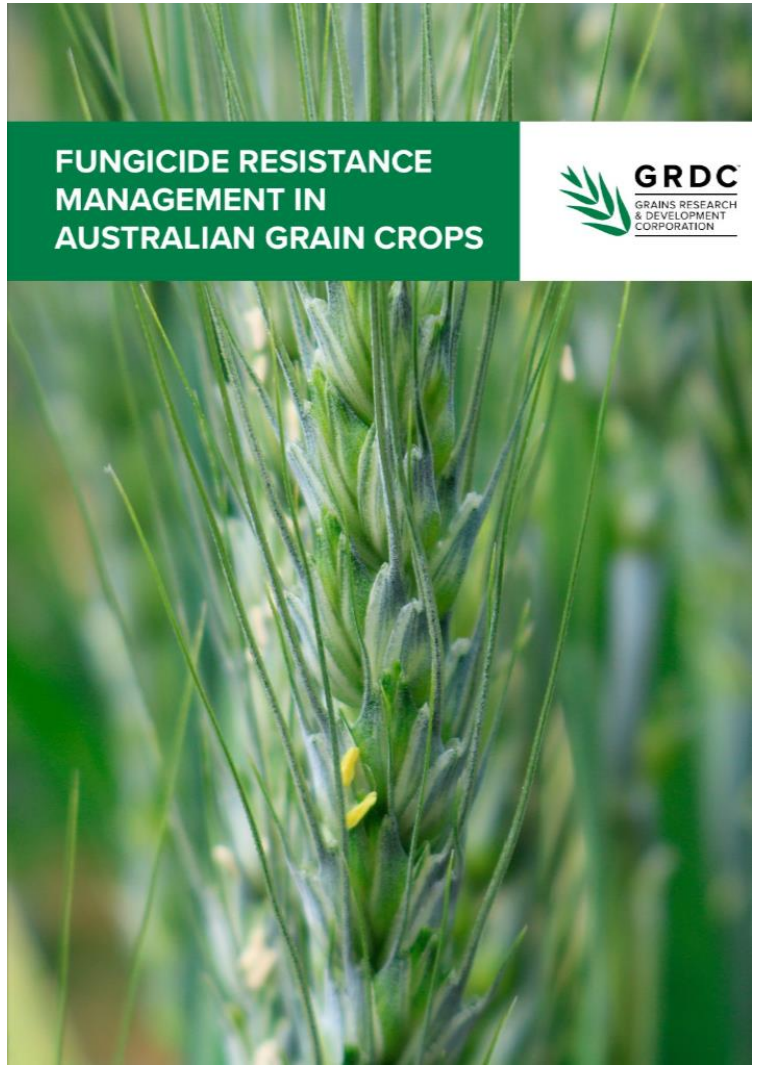
- AFREN Fungicide Resistance Management Guide

  afren.com.au/resources

- Crop Life Australia: www.croplife.org.au

- Fungicide Resistance Action Committee: www.frac.info



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- Fungicide resistance management guide
- Workshops, info sessions & webinars
- Factsheets, updates & email alerts

If you suspect fungicide resistance, let us know what's happening & send us a sample!