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ROTHAMSTED
RESEARCH



Fungicide performance in wheat, barley and oilseed rape

December 2024



CEREALS & OILSEEDS

Fungicide performance update: introduction

**The graphs in this document show
dose-response curves up to 100% label dose.**

The AHDB Agronomy Conference presentation (11 December 2024) showed dose-response curves up to 200% label dose.

In these trials, most fungicides are tested at double rate to improve the 'fit' of the dose-response curves.

In commercial situations, do not exceed the recommended label dose (i.e. 100%).

ahdb.org.uk/fungicide-performance

Background information

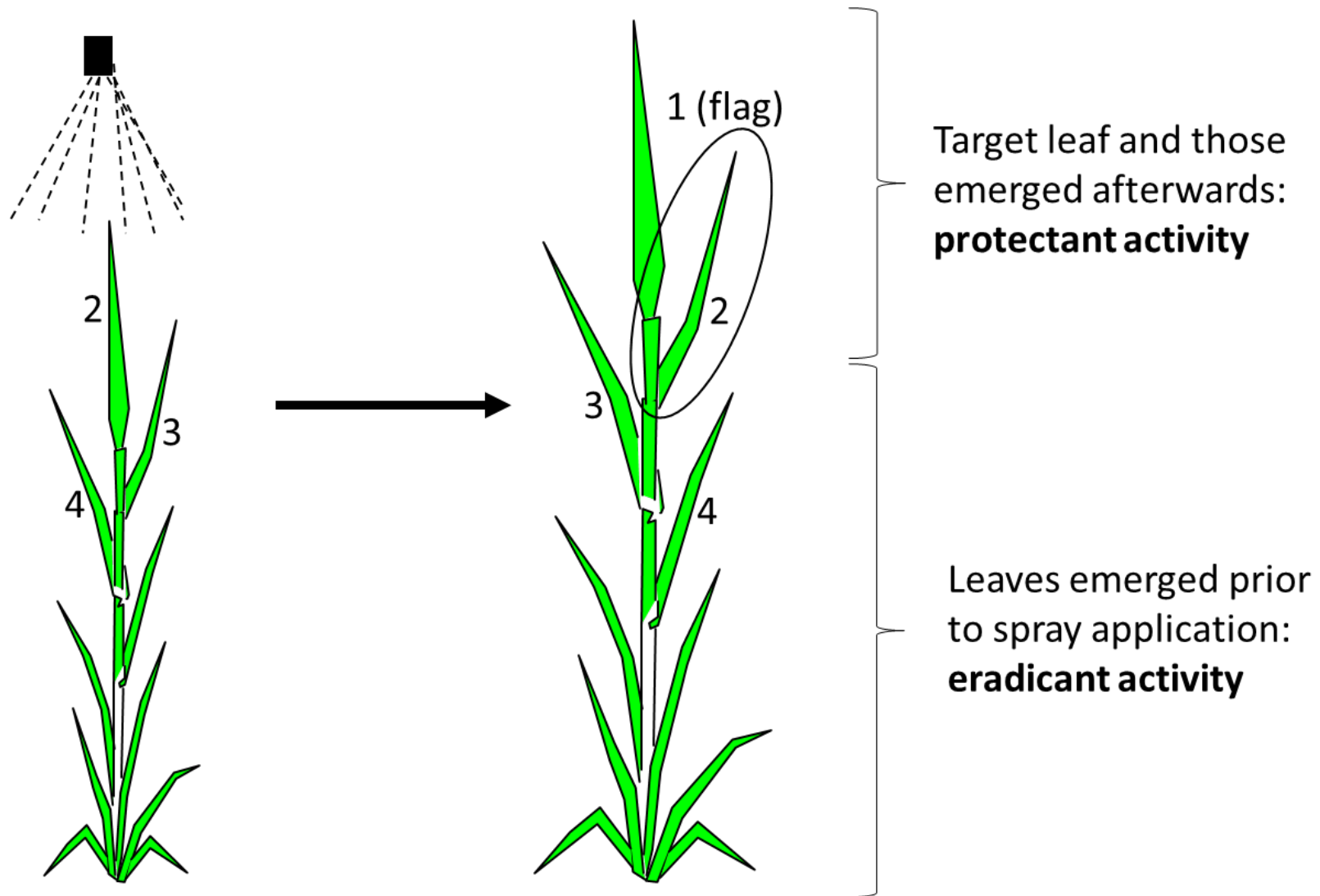
Choosing fungicides

- Match fungicides to the primary disease risk, which depends mainly on variety, sowing date, location and local weather
- Mixtures and alternations of fungicides with different modes of action, from different fungicide groups, are often most effective and reduce the likelihood that fungicide resistance will develop in pathogens
- Resistance poses a significant threat to the performance of fungicides. It is essential to take resistance management into account when planning fungicide programmes
- For further information, visit the Fungicide Resistance Action Group (FRAG) web page: ahdb.org.uk/frag

Trial methods

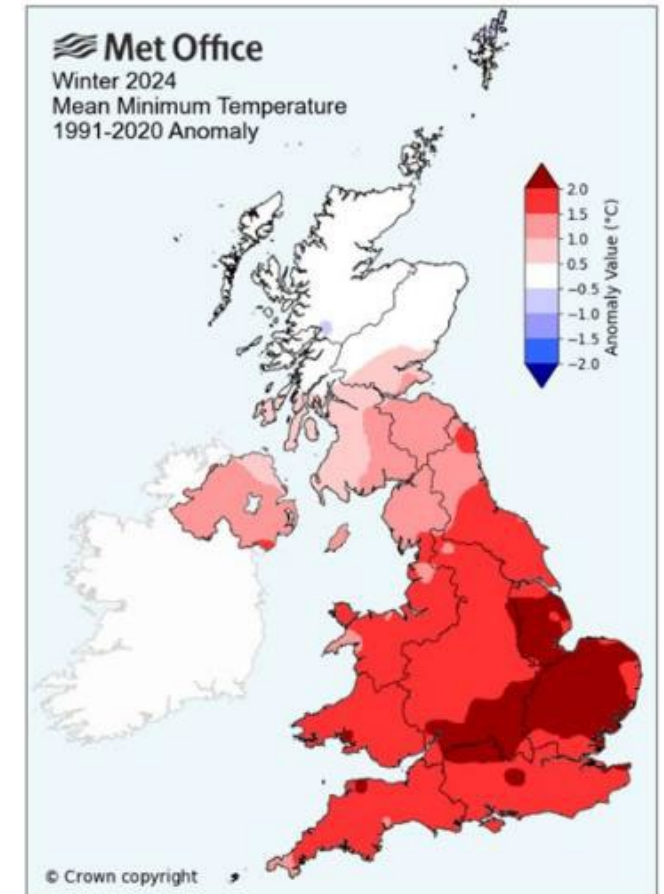
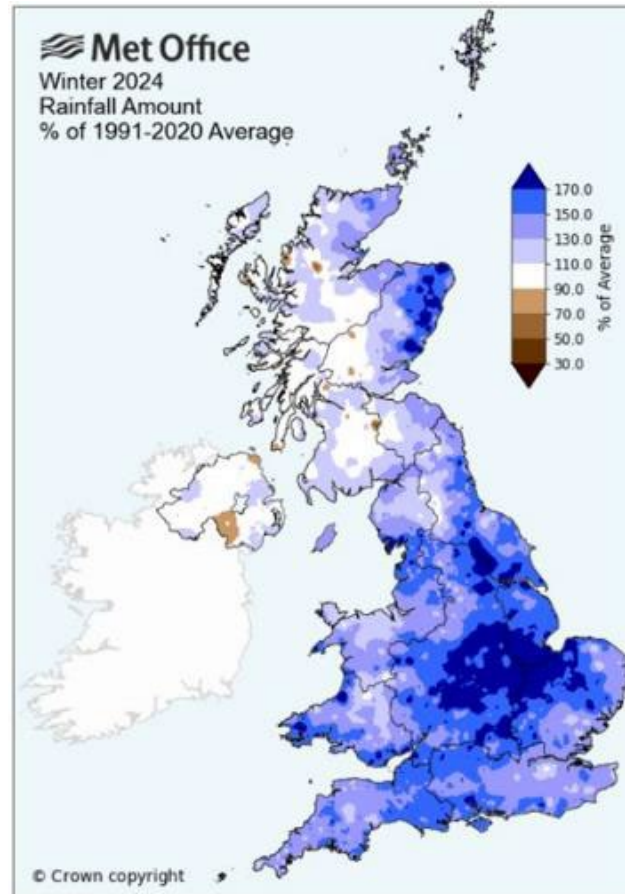
- To maximise differences between treatments on each disease
 - High risk locations
 - Highly susceptible varieties
 - One spray timing (cereals)
- Dose-response graphs show average performance, measured across a range of sites, seasons and leaf layers
- Cover-sprays that are not active against the target disease are sometimes used to reduce the effect of other diseases on the trial

Protectant and eradicant activity



Cropping season (2023-24)

- Wet autumn, winter and spring
- Mild winter, with few frosts
- Early or late drilled crops
- High levels of septoria and brown rust



Source: Met Office www.metoffice.gov.uk
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Fungicide performance update: wheat (2024)

Wheat trial sites (2024)

	Site	Spray timing	Target disease	Variety
1	Rosemaund	T2	Septoria tritici	LG Skyscraper
2	Sutton Scotney	T1	Septoria tritici	LG Skyscraper
3	East Lothian	T2	Septoria tritici	KWS Barrel
4	Terrington	T1	Yellow rust	Skyfall
5	Cambridge	T2	Brown rust	Crusoe
6	Gleadthorpe	T3	Fusarium	RGT Illustrious
7	Carlow	T2	Septoria tritici	KWS Dawsum
8	Cardigan	T2	Septoria tritici	RGT Gravity
9	Cirencester	T2	Septoria tritici	LG Skyscraper
10	Dundee	T1	Septoria tritici	LG Skyscraper

Wheat: registered products

Product	Active(s)	Mode of Action
Arizona*	folpet	Multi-site
Proline 275*	prothioconazole	DMI**
Myresa	mefentrifluconazole (revysol)	DMI**
Toledo	tebuconazole	DMI**
Peqtiga	fenpicoxamid (inatreq)	QII
Elatus Plus	benzovindiflupyr (solatenol)	SDHI
Imtrex	fluxapyroxad (xemium)	SDHI
Vimoy	isoflucypram (iblon)	SDHI
Miravis Plus	pydiflumetofen (adepidyn)	SDHI
Ipresso New	isoflucypram + prothioconazole	SDHI + DMI**
Revystar XE	fluxapyroxad + mefentrifluconazole	SDHI + DMI**
Ascra Xpro	bixafen + fluopyram + prothioconazole	SDHI + SDHI + DMI**
Univoq	fenpicoxamid + prothioconazole	QII + DMI**

*Arizona and Proline only tested at full dose on septoria
 **Azole

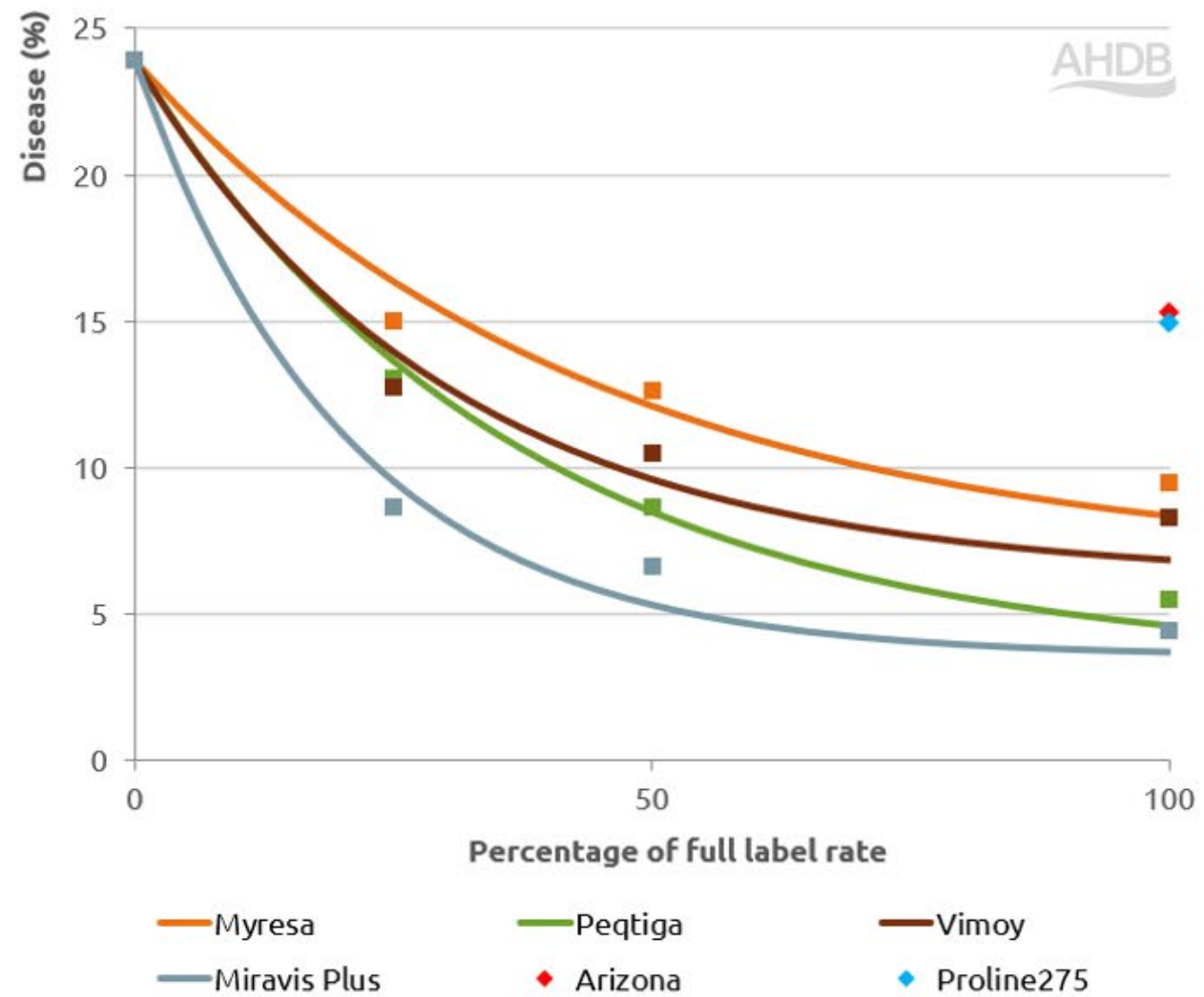
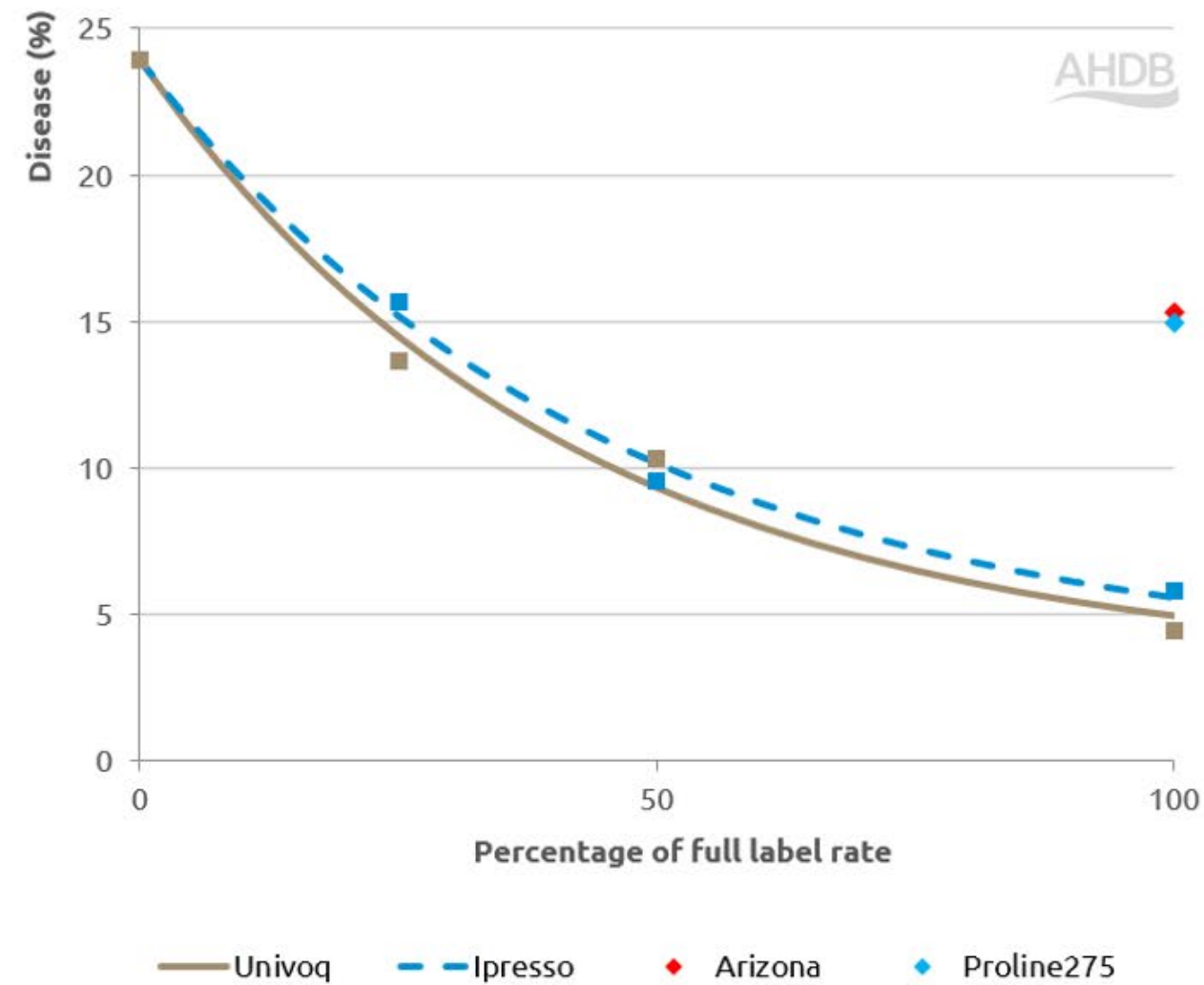
A further six unregistered products were tested in 2024. Data will be released upon registration.

Check labels prior to use: Myresa, Peqtiga, Elatus Plus, Imtrex, Vimoy and Miravis Plus should be used in mixtures with at least one fungicide with an alternative mode of action that has efficacy against the target disease

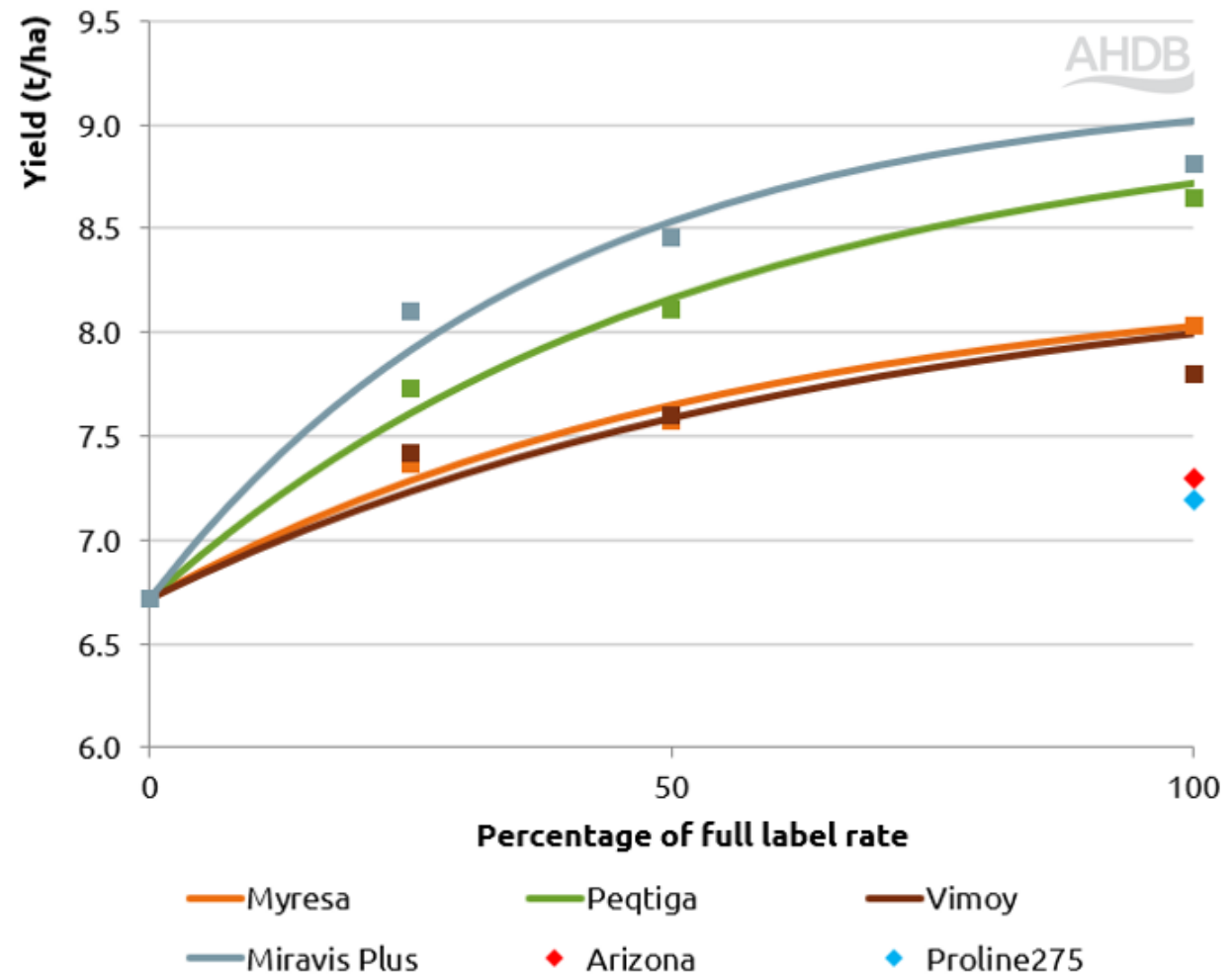
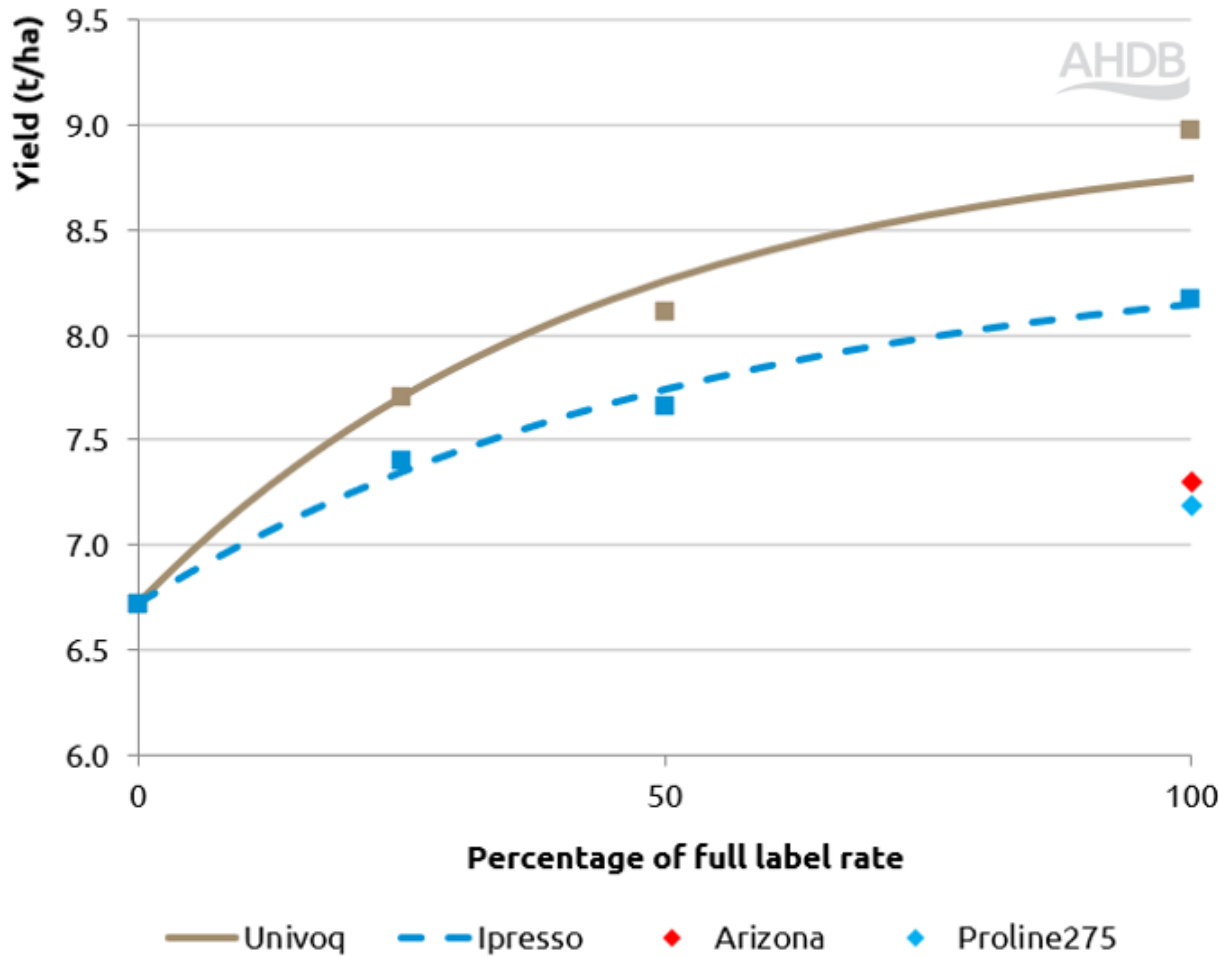
Wheat: septoria tritici efficacy data (2024)

Trial site		Protectant	Eradicant	Mixed
1	Rosemaund T2	X	X	
2	Sutton Scotney T1	X		
7	Carlow T2	X		X
8	Cardigan T2	X		
9	Cirencester T2	X		

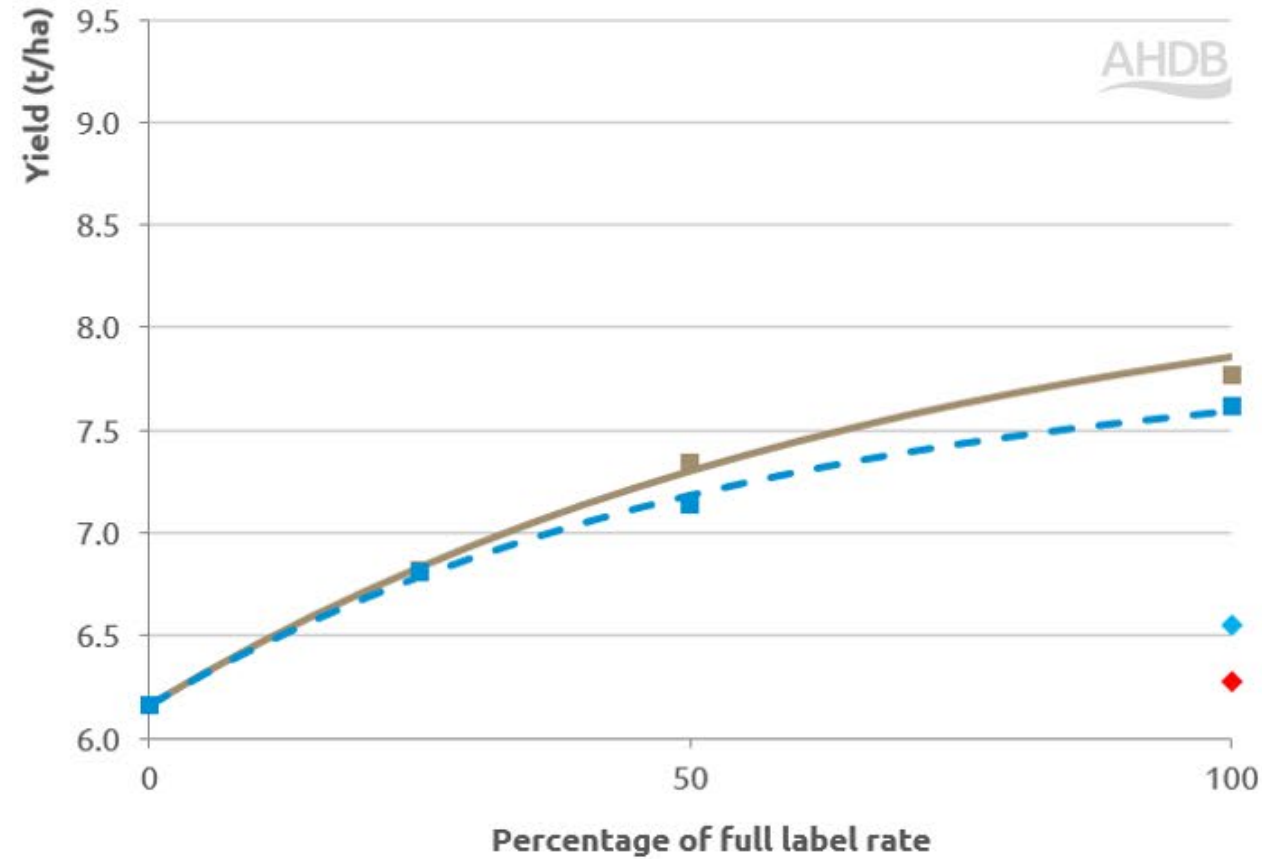
Septoria protectant 2024 (5 trials)



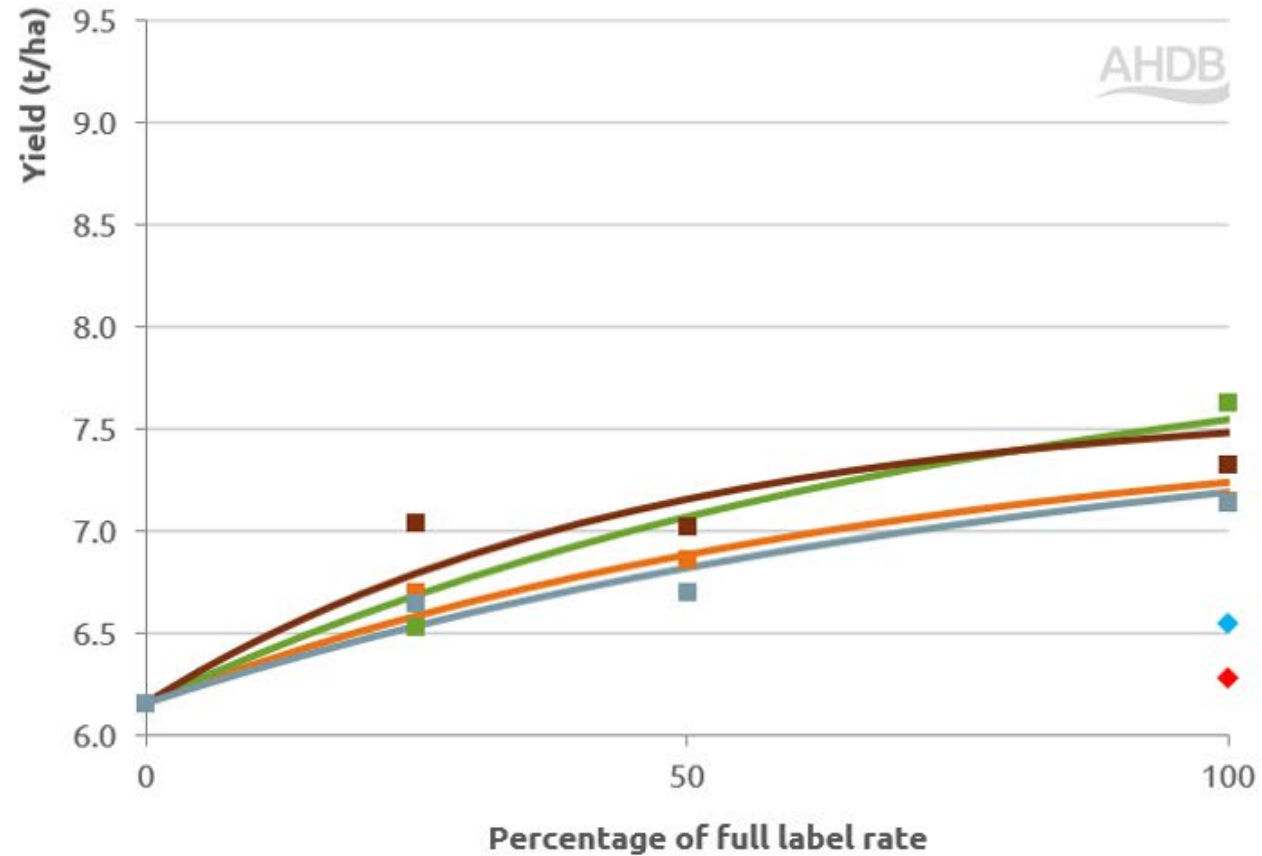
Septoria yield 2024 (3 trials without brown rust)



Septoria yield 2024 (2 trials with brown rust)

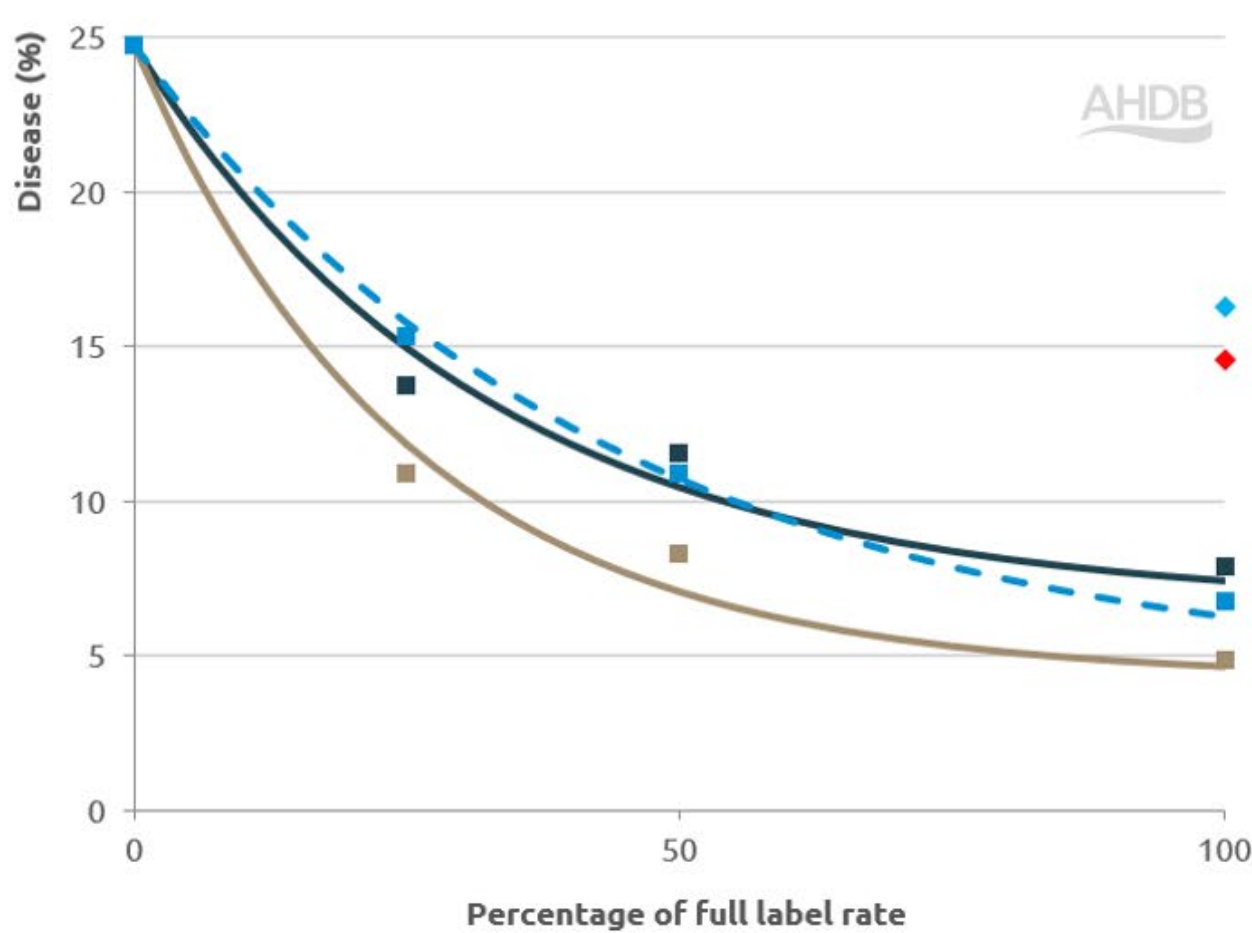


— Univoq - - Ipresso ◆ Arizona ◆ Proline275

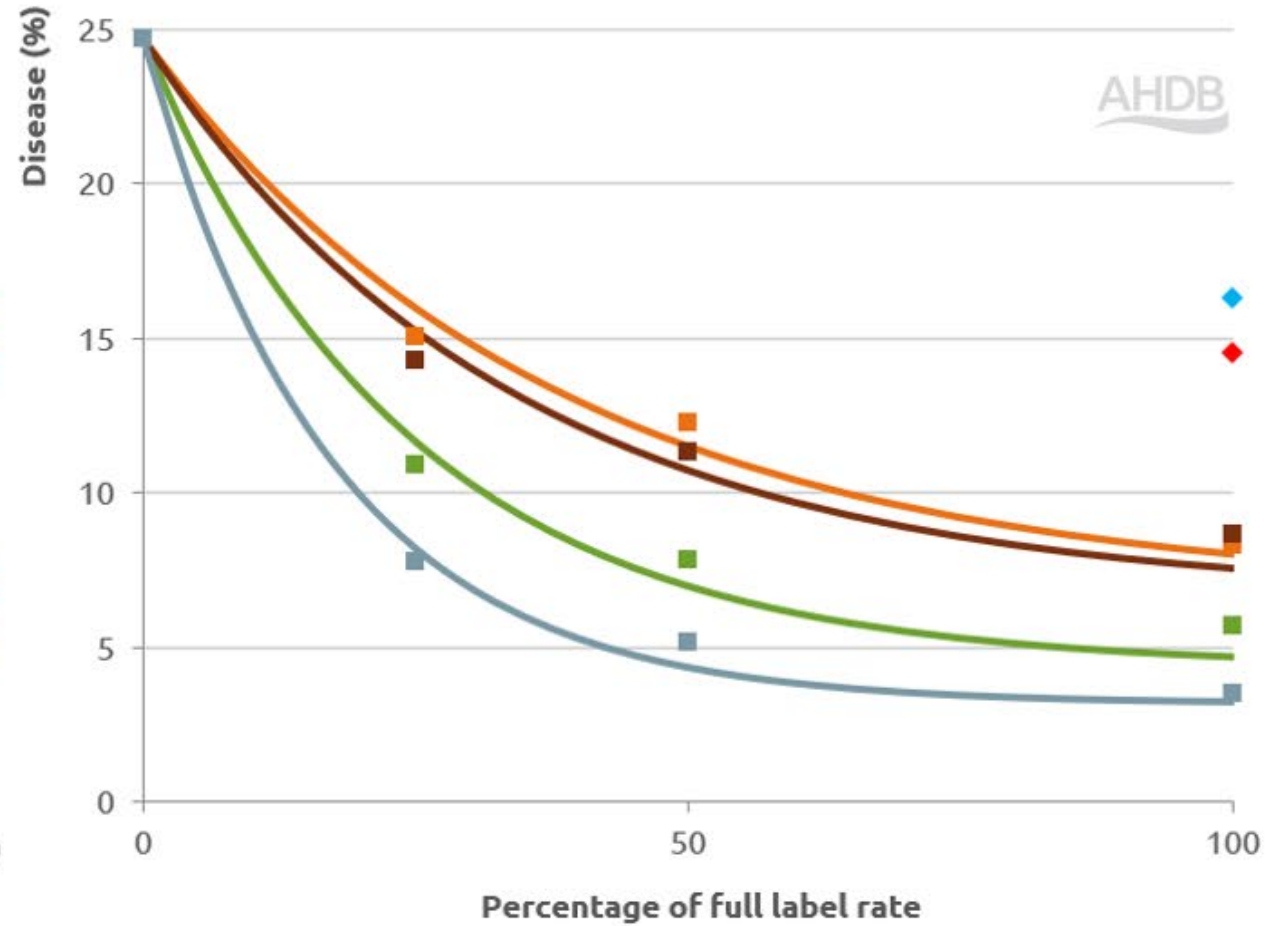


— Myresa — Peqtiga — Vimoy
 — Miravis Plus ◆ Arizona ◆ Proline275

Septoria protectant overyear 2022-24 (16 trials)

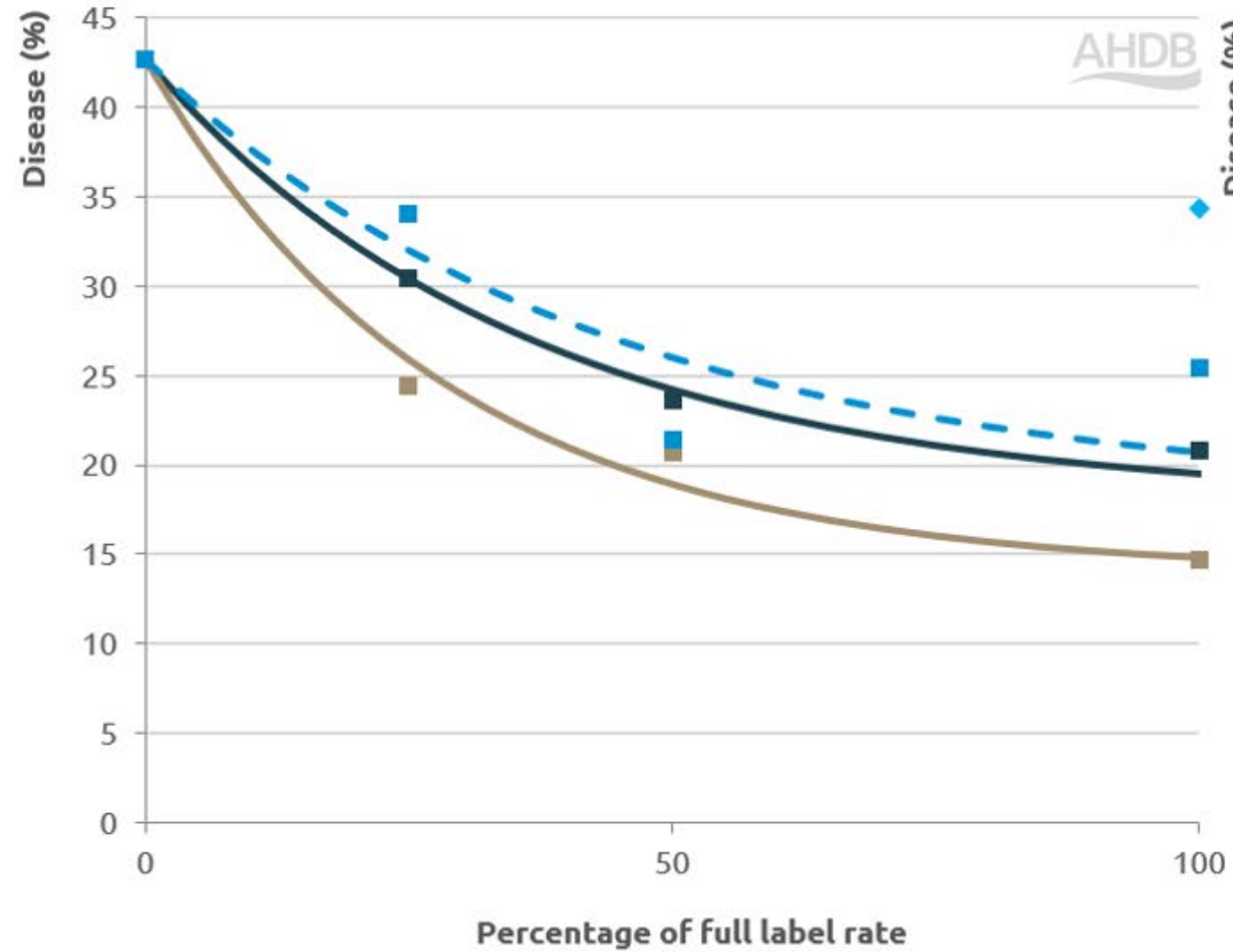


—■ Revystar XE
 —■ Univoq
 - -■ Ipresso
 ◆ Arizona
 ◆ Proline275

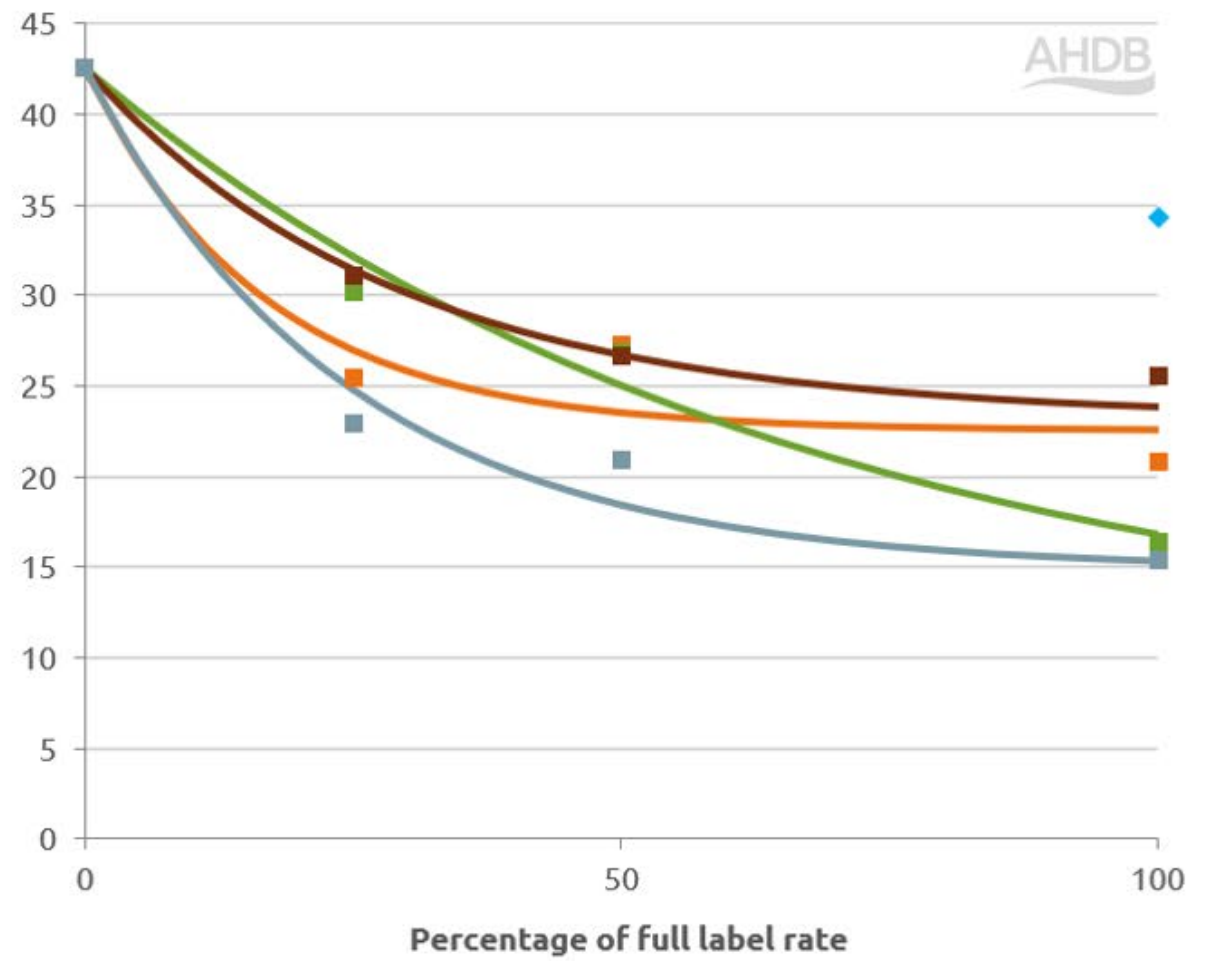


—■ Myresa
 —■ Peqtiga
 —■ Vimoy
 —■ Miravis Plus
 ◆ Arizona
 ◆ Proline275

Septoria eradicant overyear 2022-24 (4 trials)

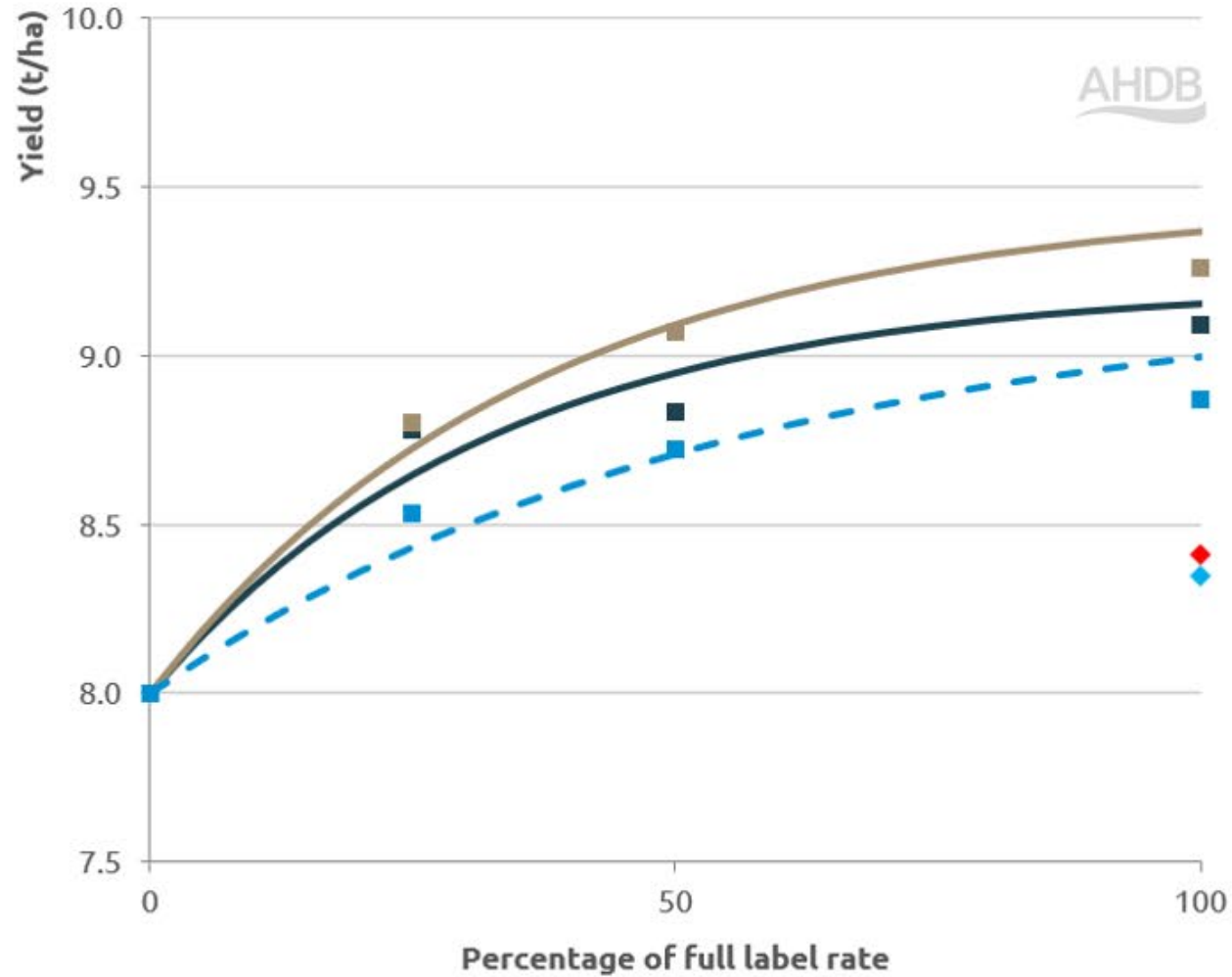


— Revystar XE — Univoq - - Ipresso ◆ Proline275

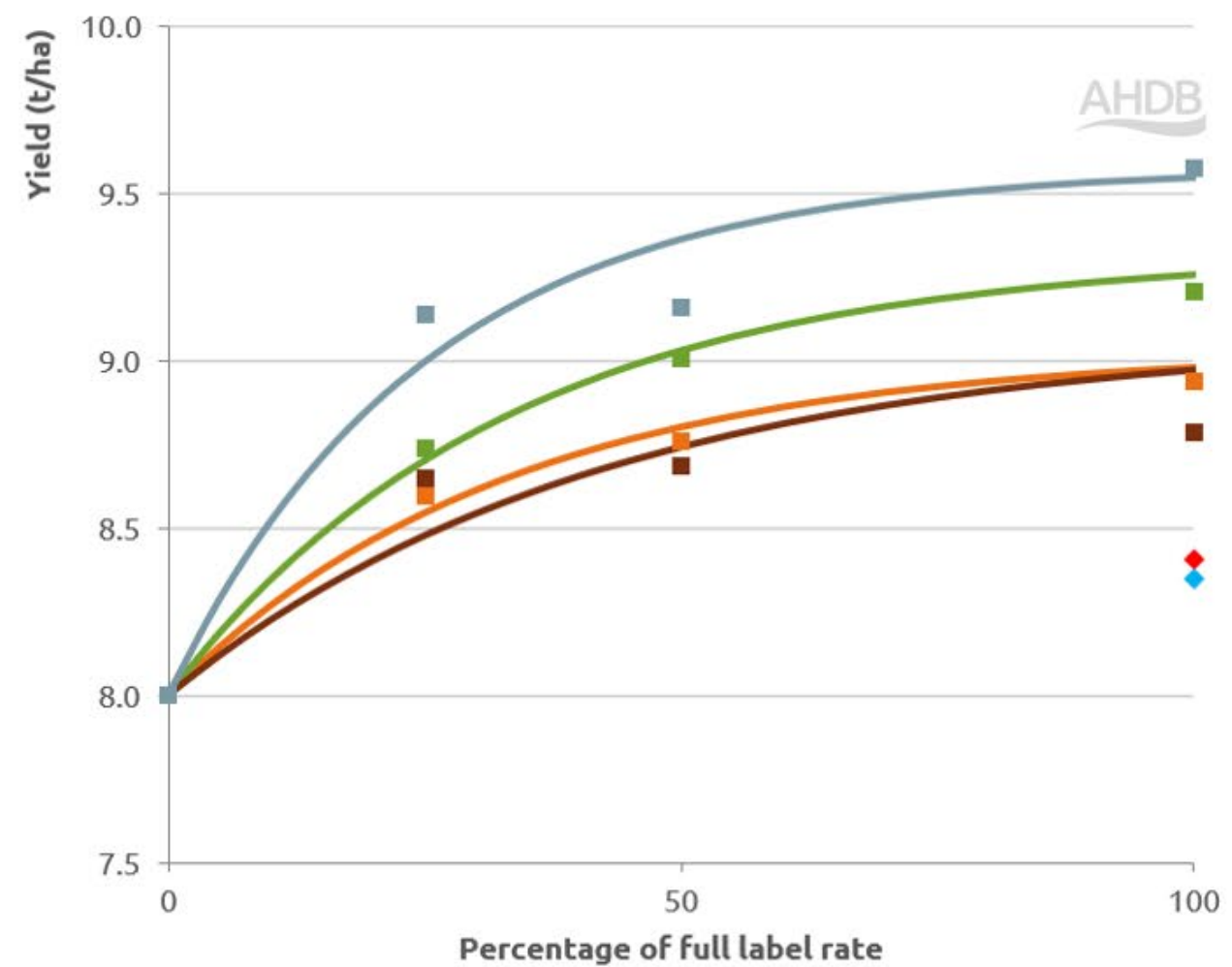


— Myresa — Peqtiga — Vimoy — Miravis Plus ◆ Proline275

Septoria yield overyear 2022-24 (12 trials)



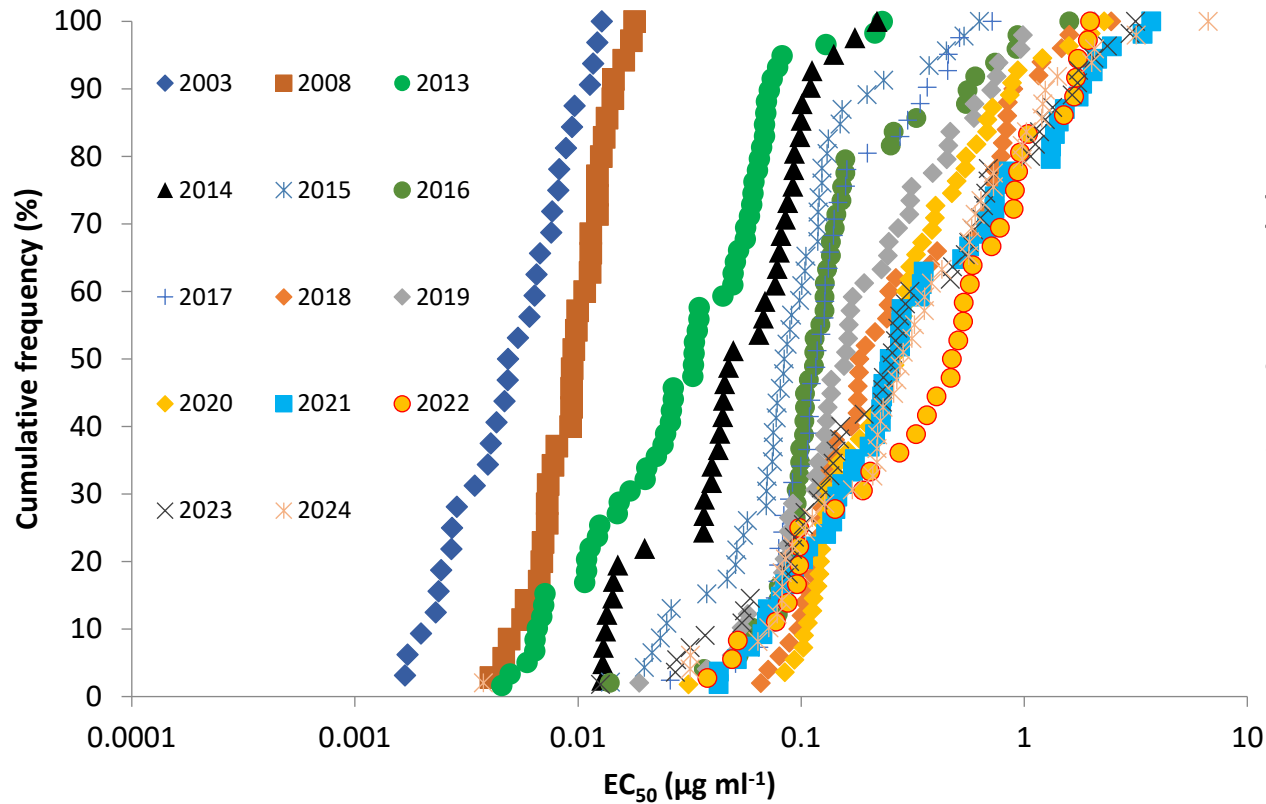
— Revystar XE — Univoq - - Ipresso ◆ Arizona ◆ Proline275



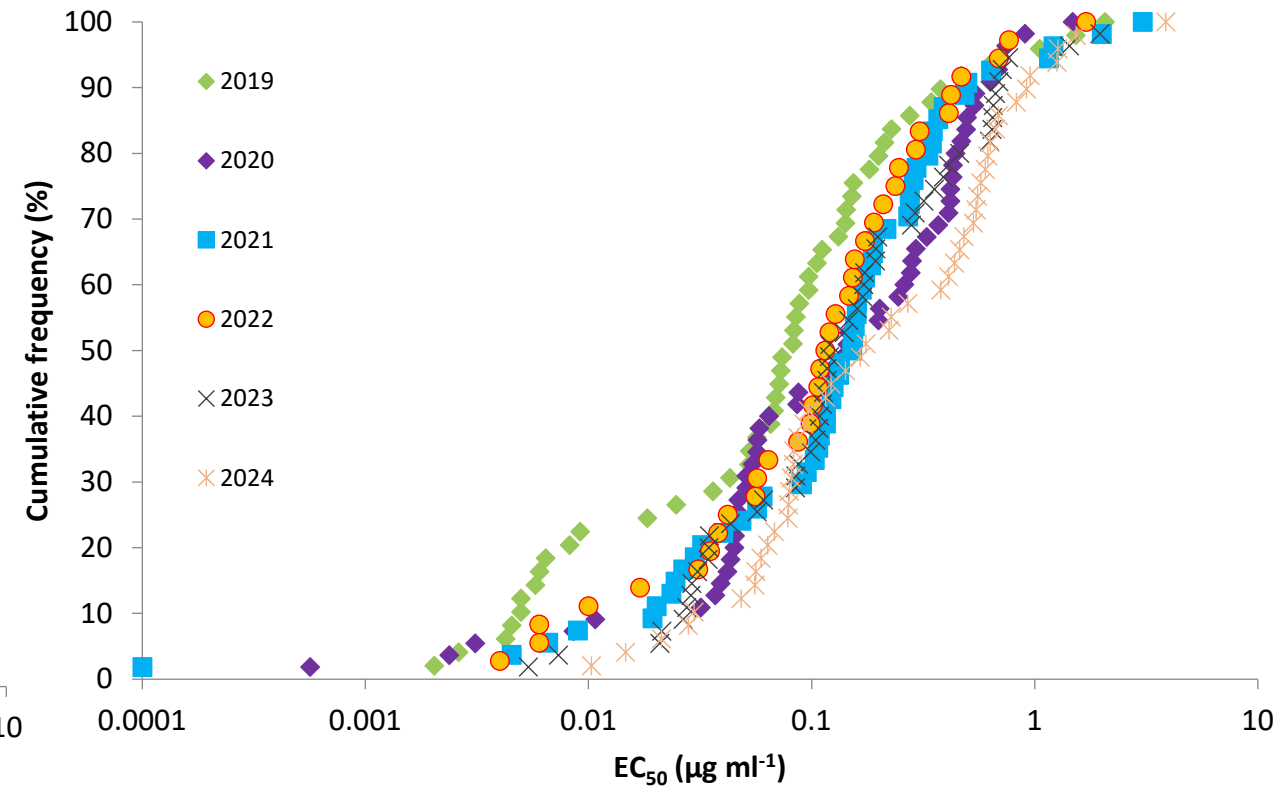
— Myresa — Peqtiga — Vimoy
— Miravis Plus ◆ Arizona ◆ Proline275

Septoria sensitivity to azole fungicides over time (Rothamsted, early season)

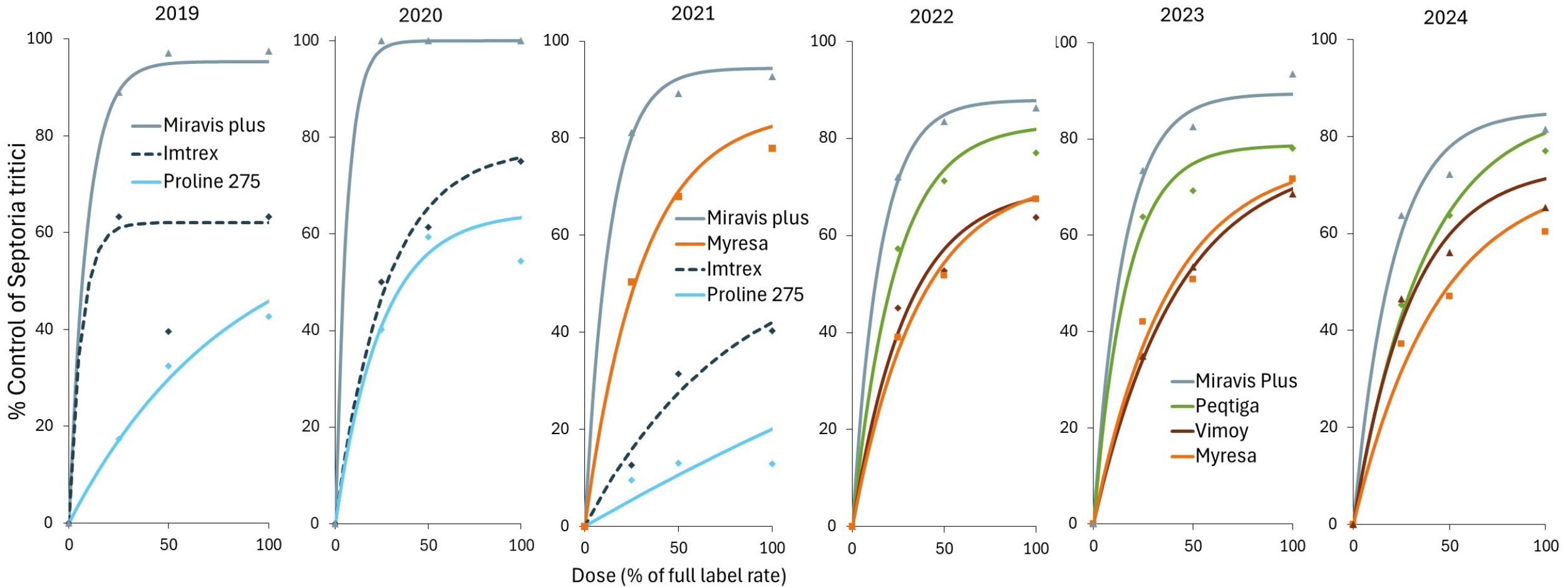
Prothio-desthio



Mefentrifluconazole



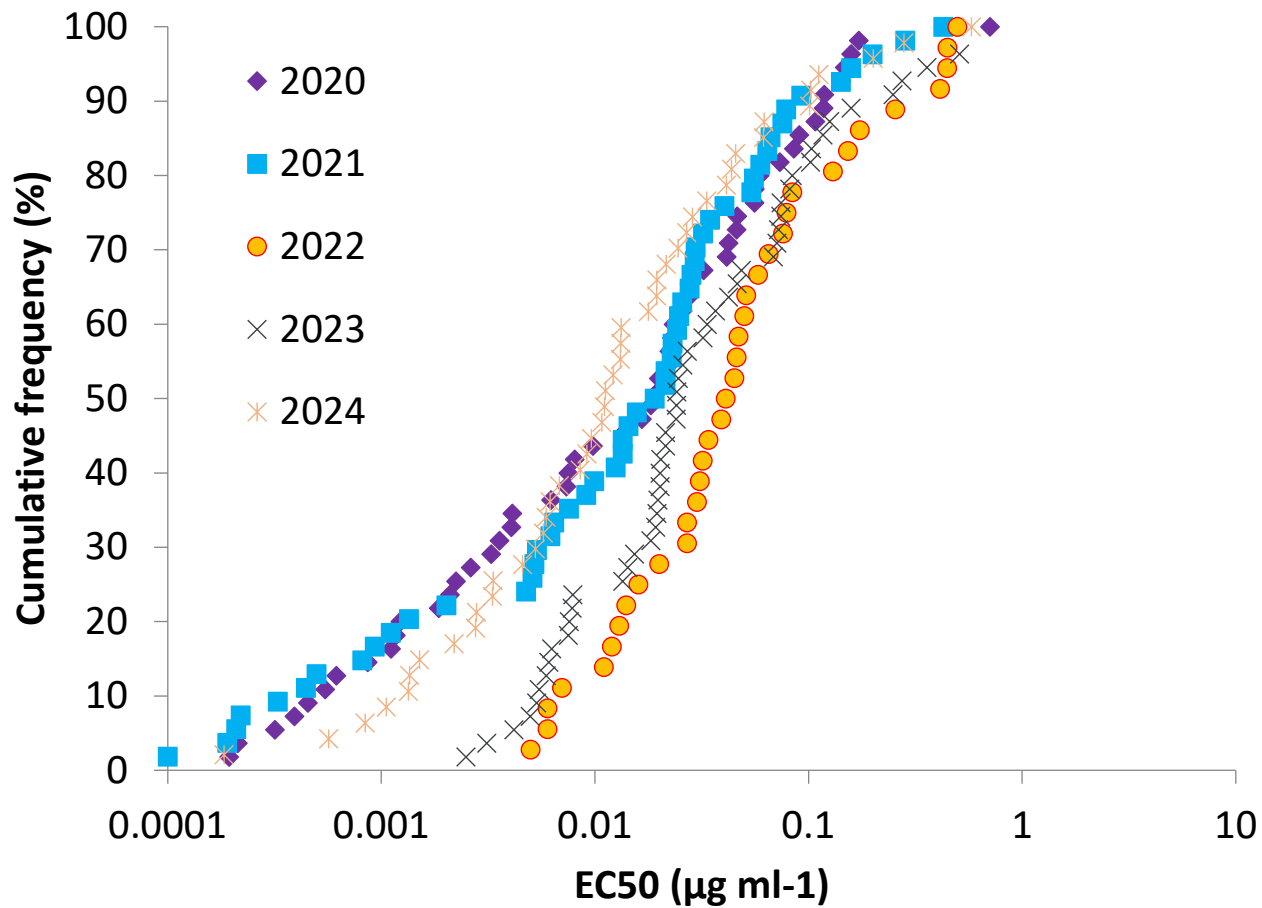
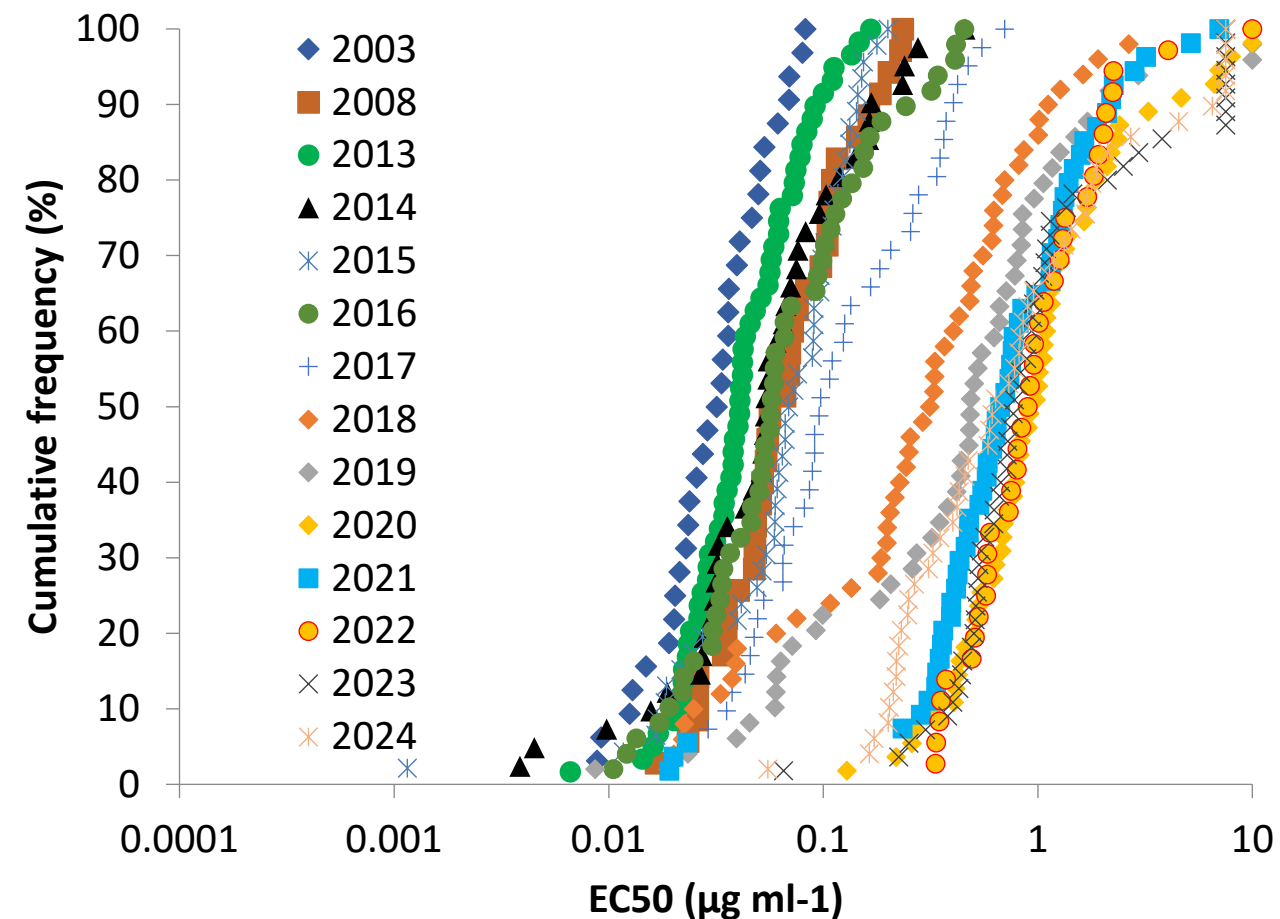
Changes in septoria protectant activity of single site MoAs (in fungicide performance trials)



Septoria sensitivity to SDHI fungicides over time (Rothamsted, early season)

Bixafen

Pydiflumetofen

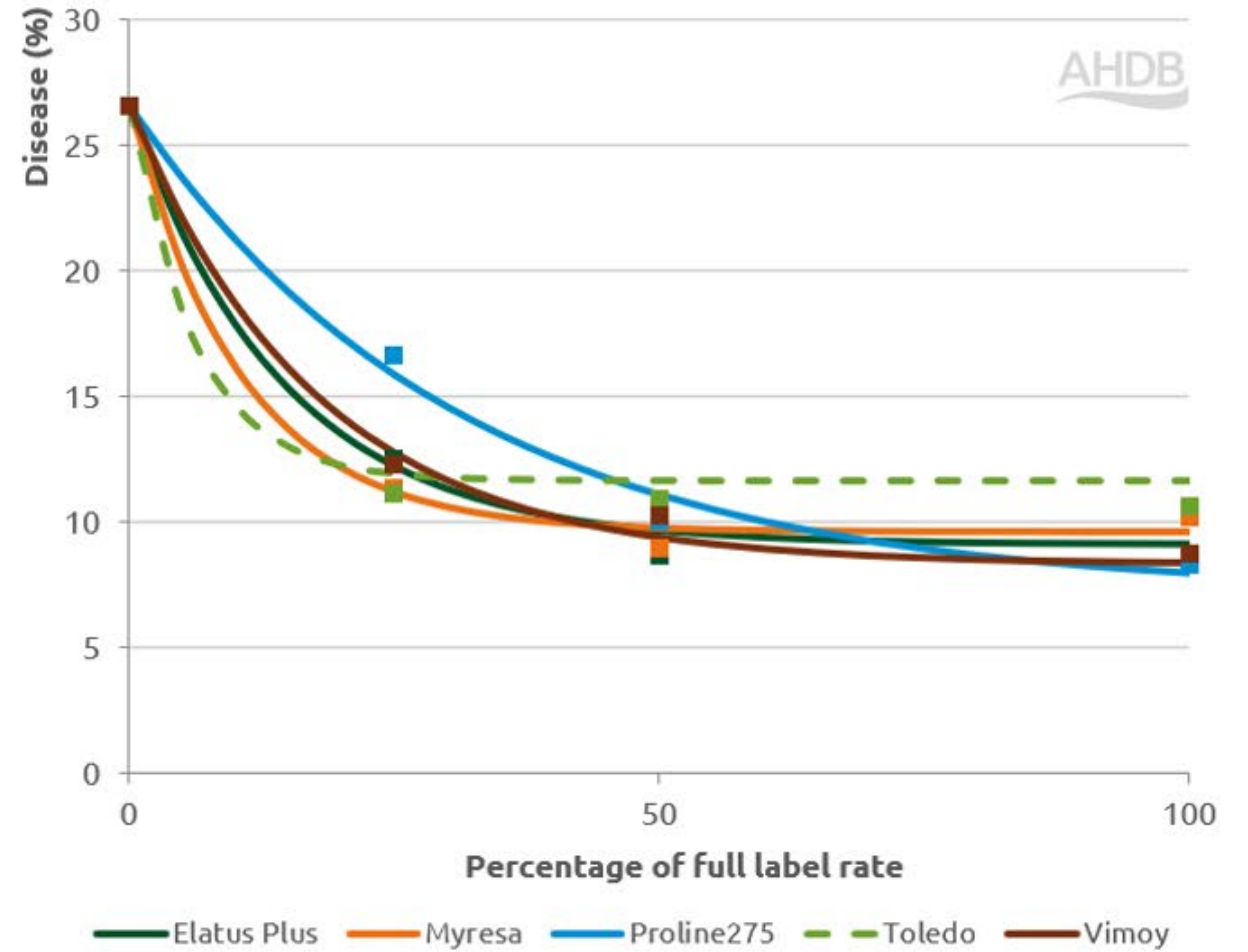
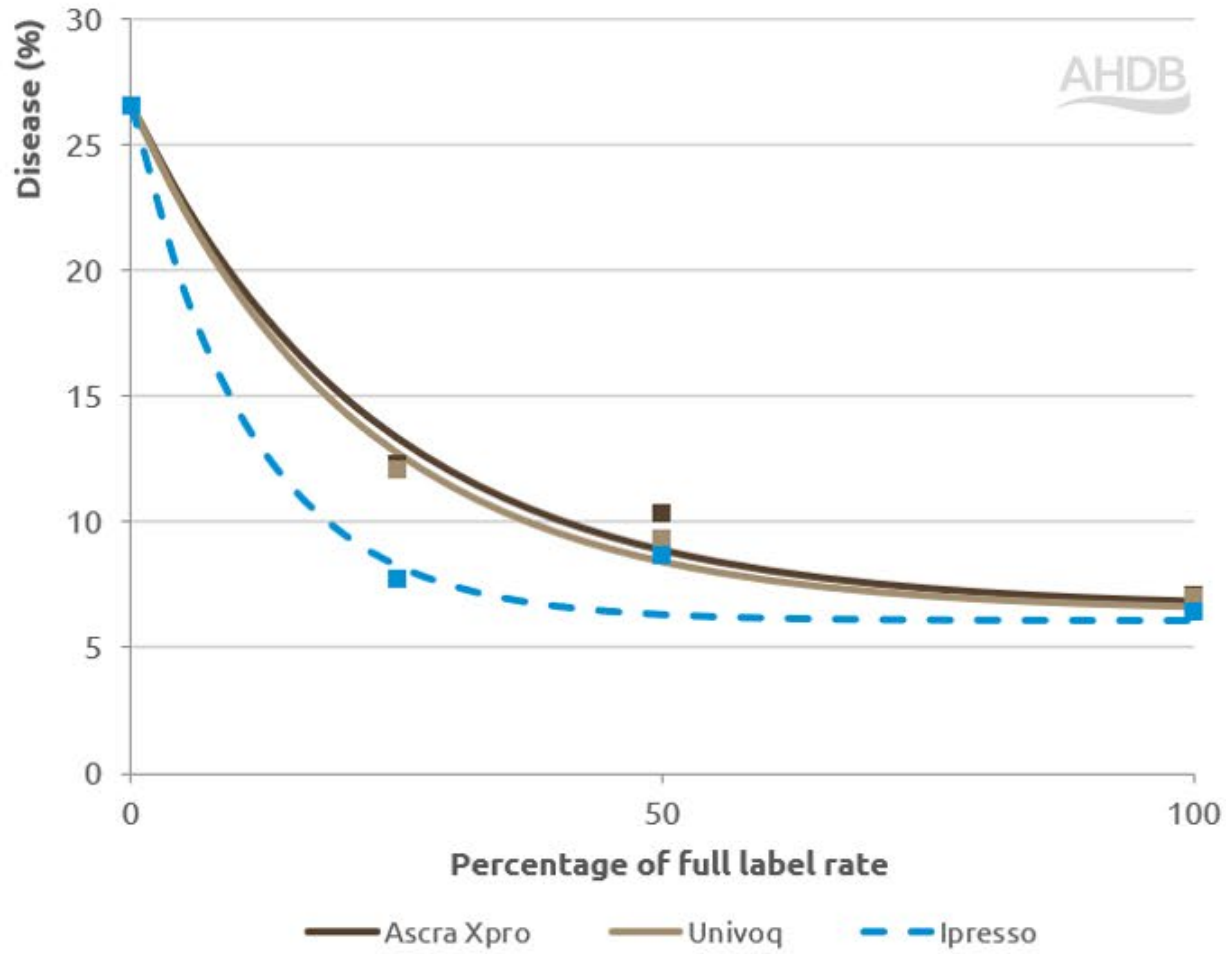


Rust trial data in 2024

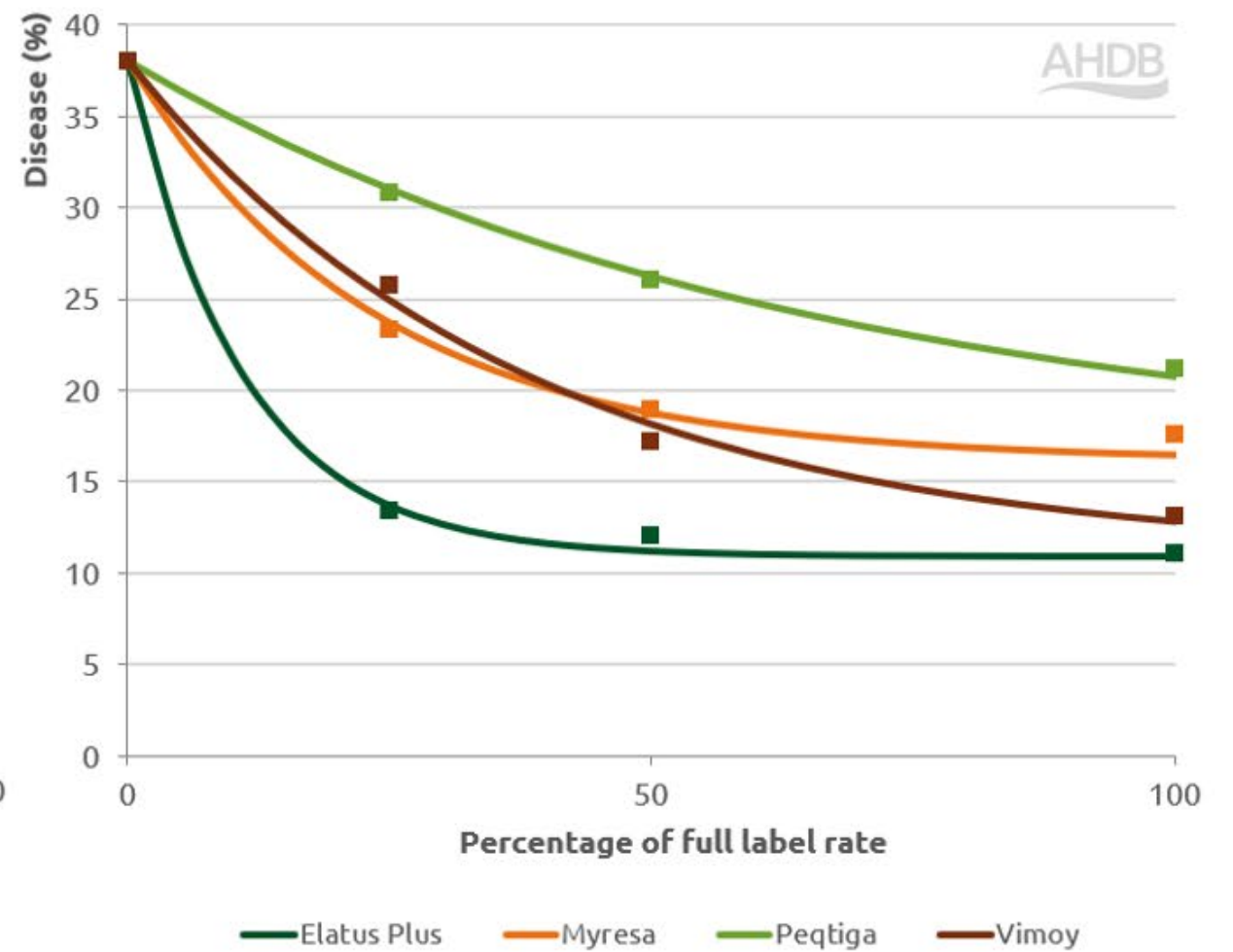
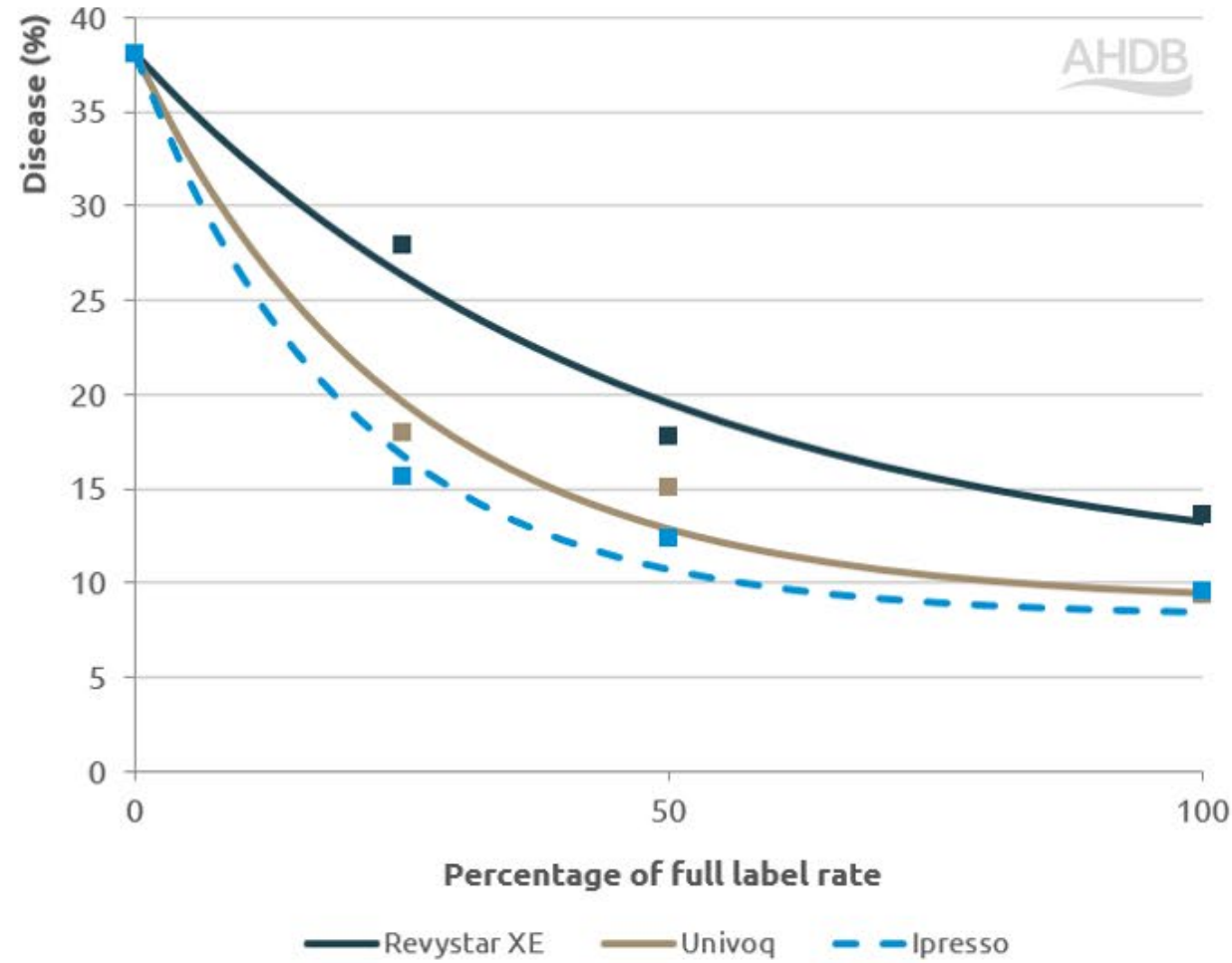
Site	Yellow rust	Brown rust	Yield
Terrington	x		x
Cambridge		x	x



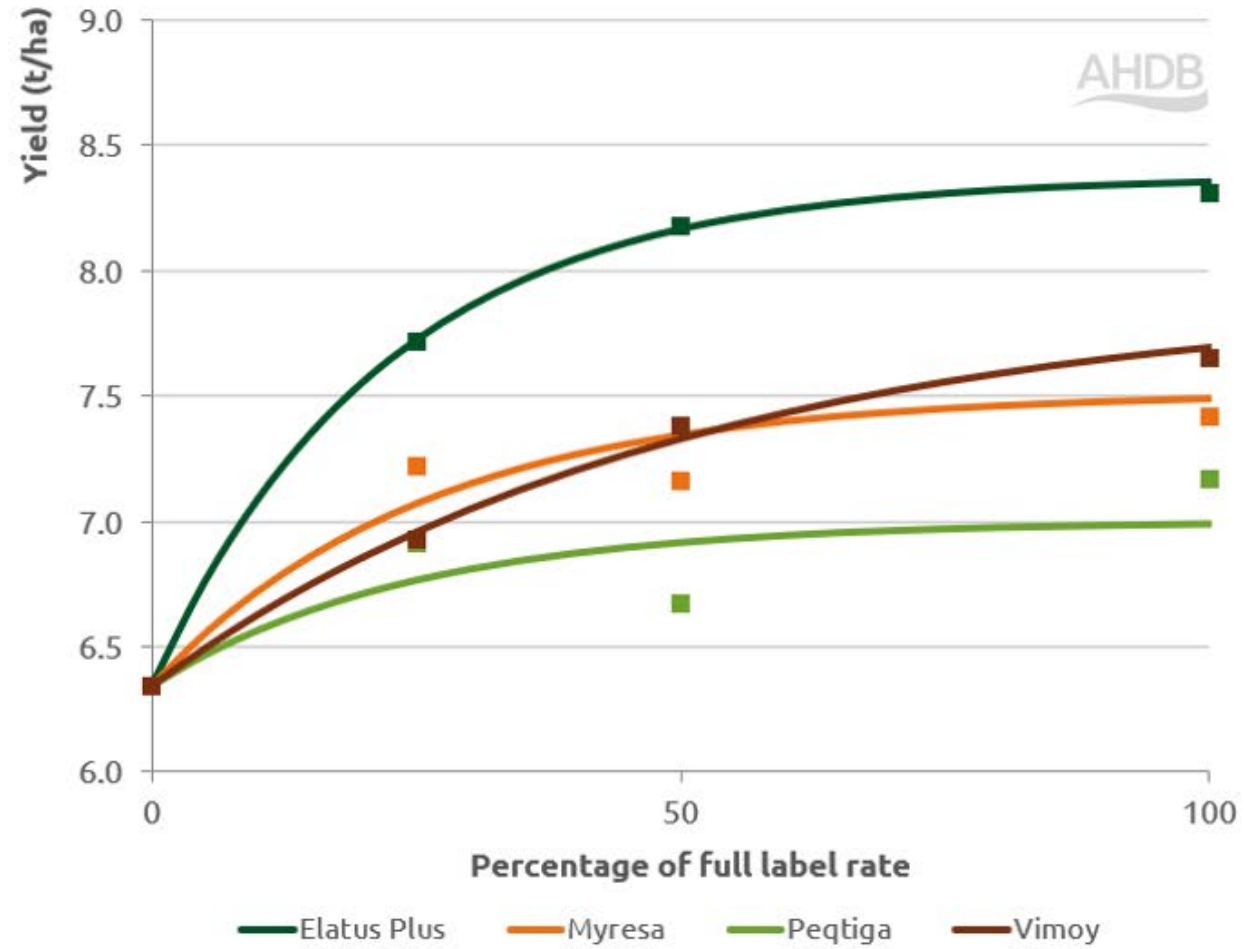
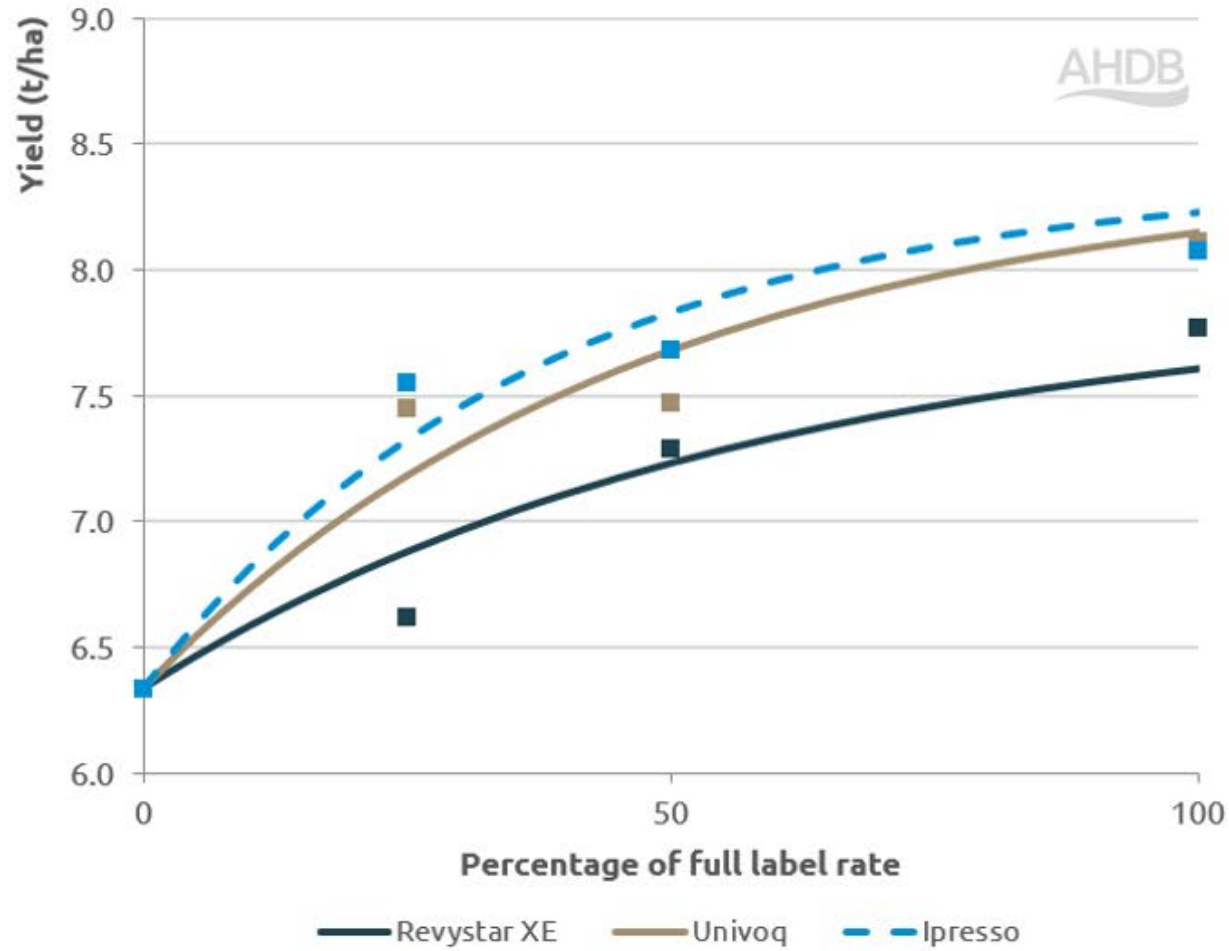
Yellow rust 2024 (1 trial)



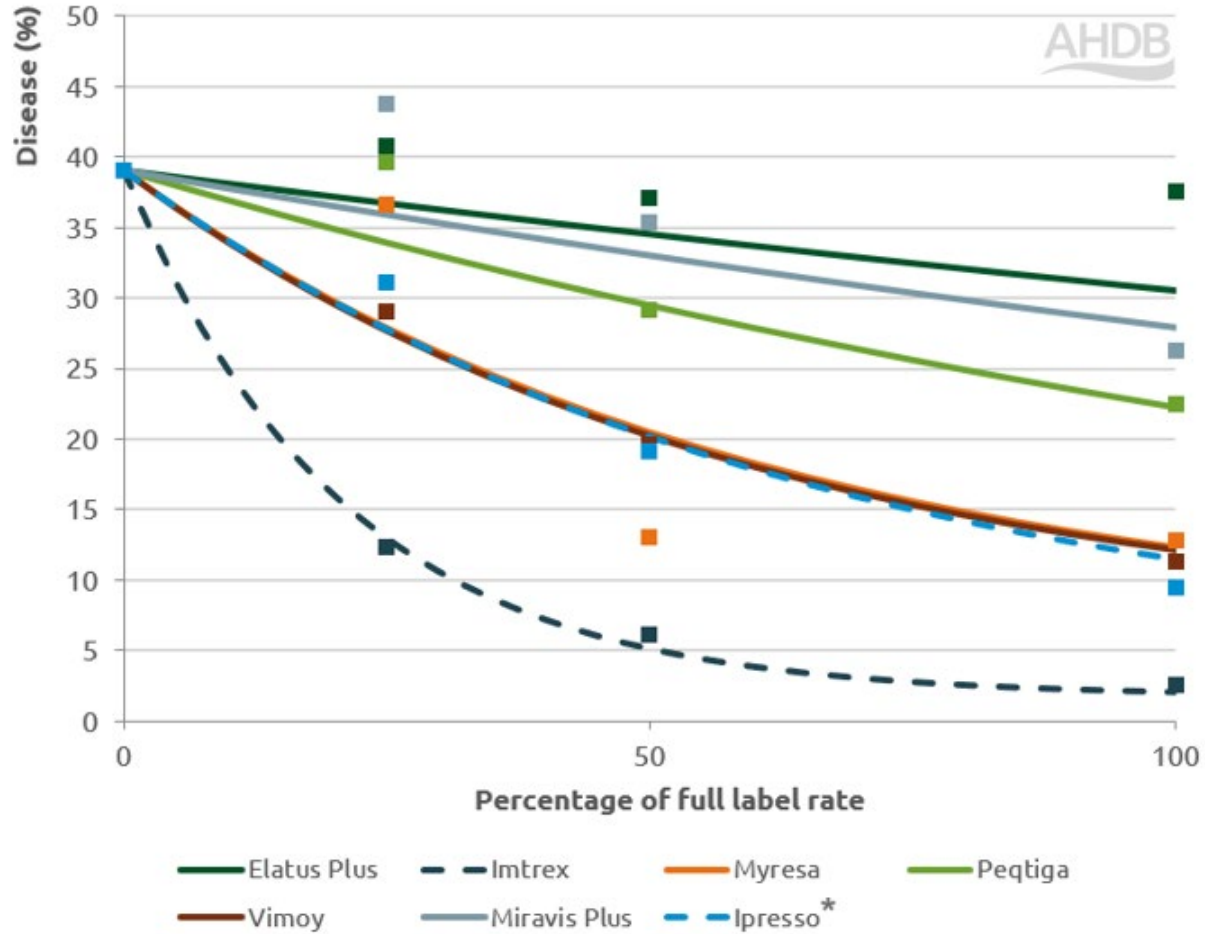
Yellow rust overyear 2022-24 (3 trials)



Yellow rust yield overyear 2022-24 (3 trials)

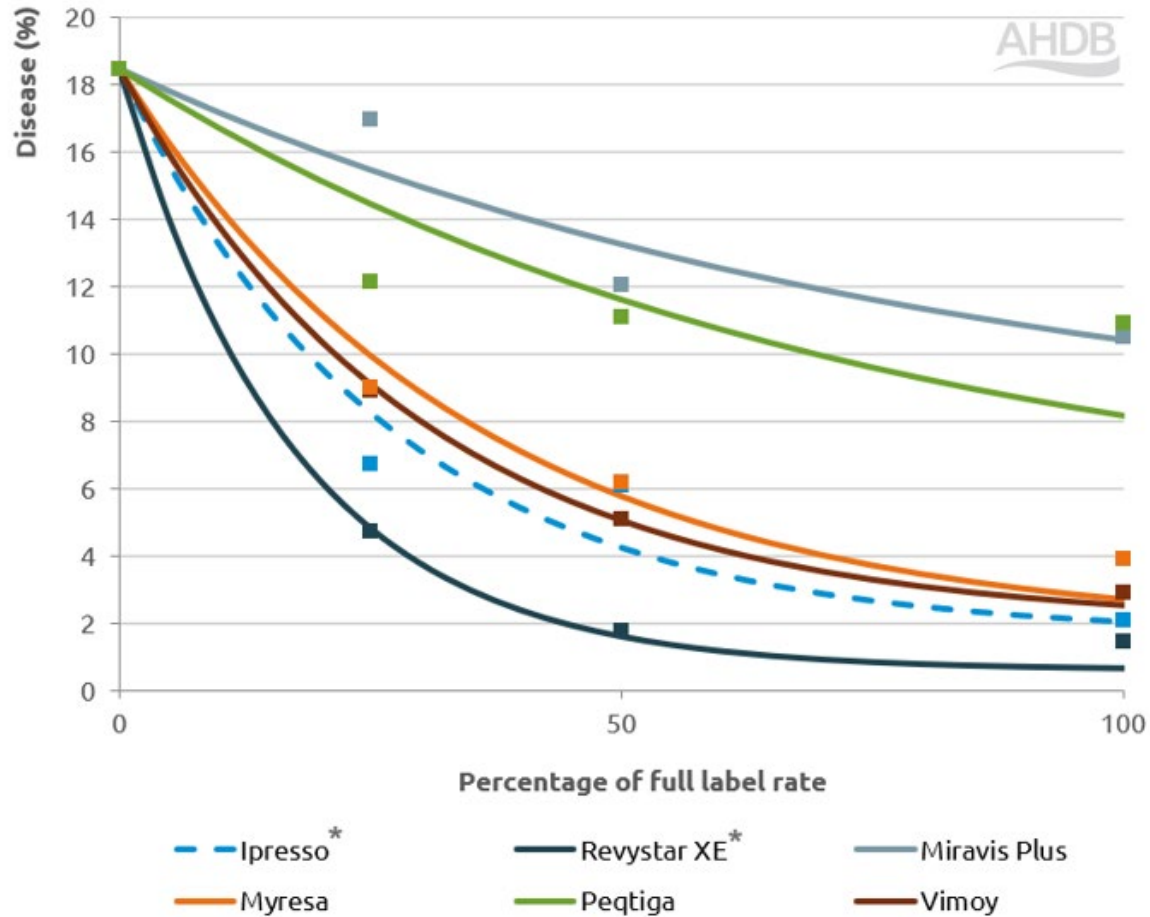


Brown rust 2024 (1 trial)



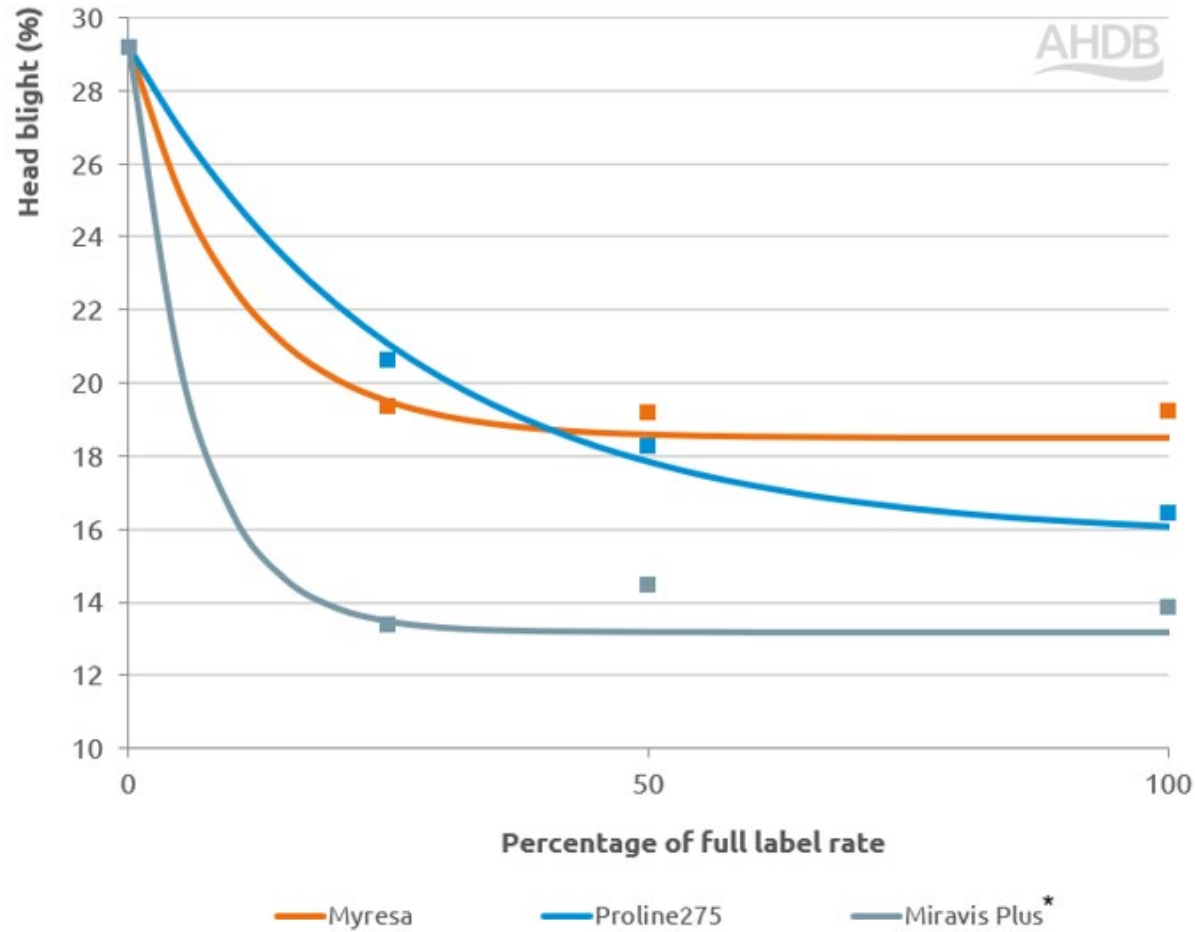
Products marked with an * are mixtures containing more than one active ingredient

Brown rust overyear 2022-24 (3 trials)



Products marked with an * are mixtures containing more than one active ingredient

Head blight overyear 2022-24 (3 trials)



*Full label rate of Miravis Plus for fusarium head blight control is 3.2 l/ha

Wheat summary

- Miravis Plus (pydiflumetofen), Peqtiga (fenpicoxamid), Ipresso (isoflucypram + prothioconazole) and Univoq (fenpicoxamid + prothioconazole) achieved the highest levels of septoria control
- Vimoy (isoflucypram) and Myresa (mefentrifluconazole) maintained good activity
- Good yellow rust control from azoles and SDHIs tested, but mixtures Ascra Xpro (bixafen + fluopyram + prothioconazole), Ipresso, Revystar XE (fluxapyroxad + mefentrifluconazole) and Univoq have been more effective
- Challenging year for managing brown rust. Imtrex (fluxapyroxad) gave highest level of control, but Ipresso, Vimoy and Myresa were also effective
- Further small shifts in fungicide sensitivity in septoria population at some sites
- Mixtures offer more robust disease control and yields than straights. Use a combination of fungicide groups to reduce the risk of resistance development

Fungicide performance update: barley (2024)

Barley trial sites (2024)

	Site	Spray timing	Target disease	Diseases present	Variety
1	Lanark	T1	Rhynchosporium	Rhynchosporium	LG Mountain
3	Cardigan	T1	Rhynchosporium	Rhynchosporium Net blotch Septoria nodorum	Bolton
4	High Mowthorpe	T2	Net blotch	Net blotch	Craft
5	Newton Abbot	T2	Net blotch	Very low disease	LG Dazzle
6	Midlothian	T2	Ramularia	Ramularia Rhynchosporium	Laureate
7	Carlow	T1.5	Rhynchosporium	Ramularia	KWS Cassia
8	Carlow	T2	Ramularia	Ramularia	Pixel

Barley – registered products

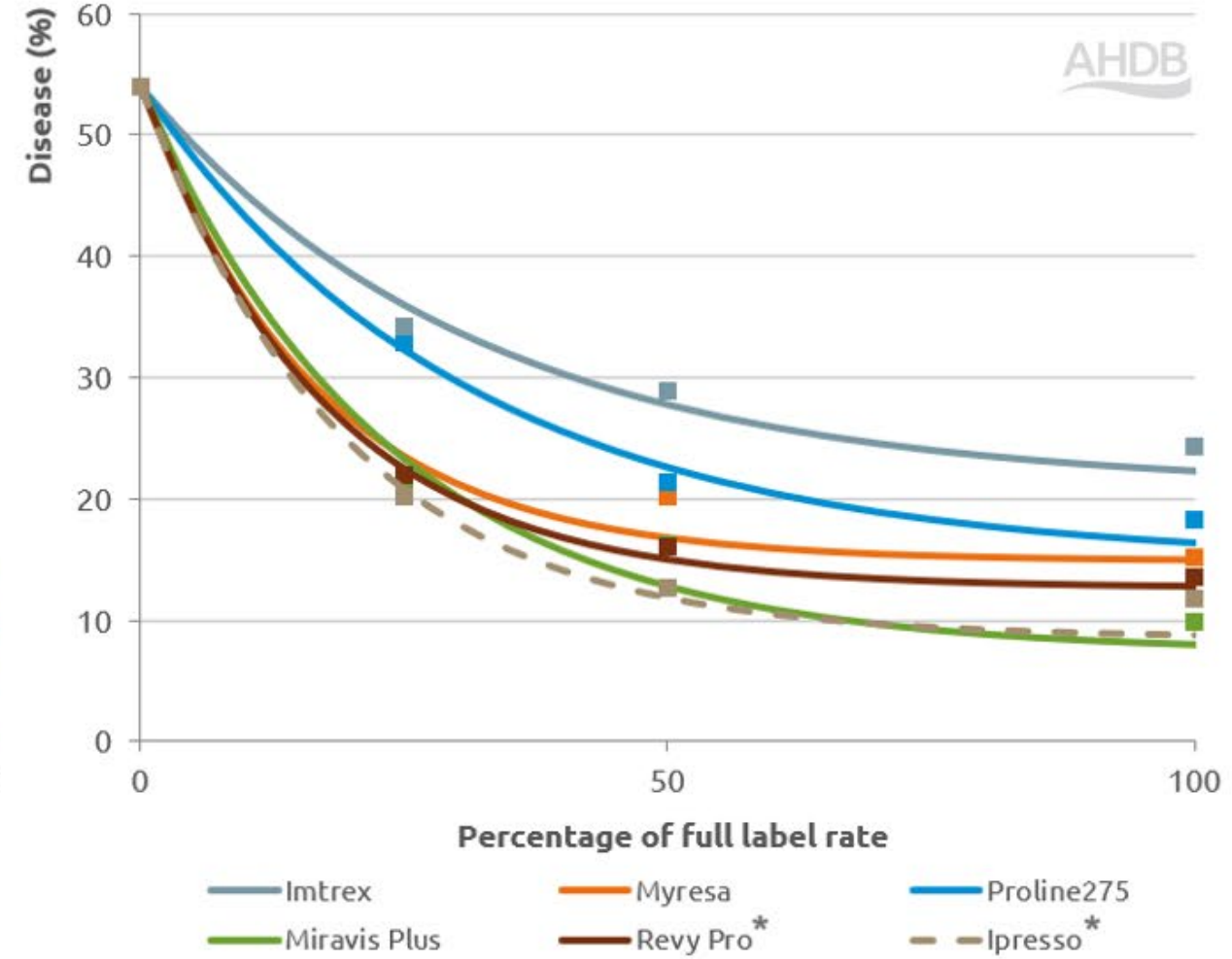
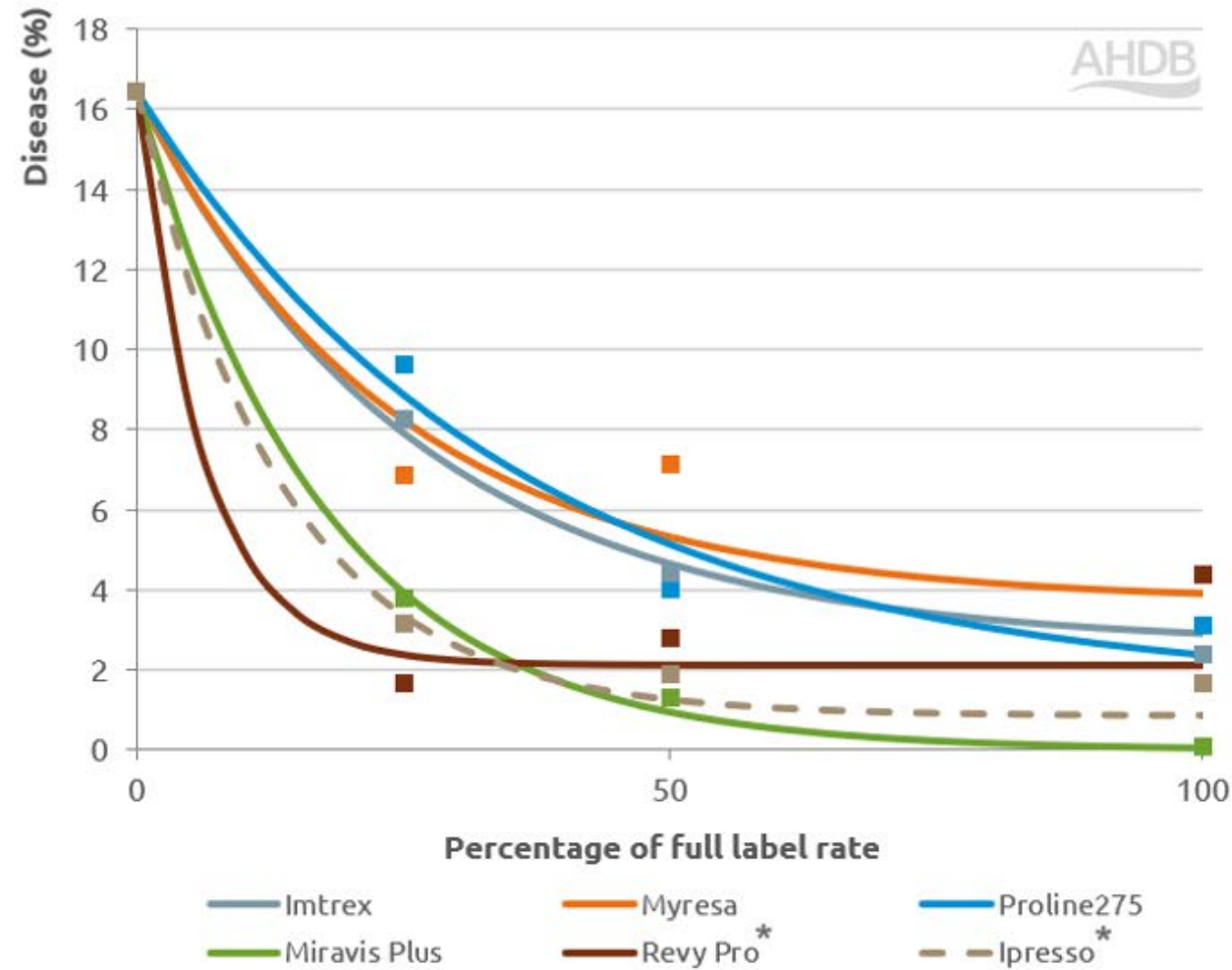
Product	Active(s)	Mode of Action
Proline 275	prothioconazole	DMI (azole)
Myresa	mefentrifluconazole	DMI (azole)
RevyPro New	mefentrifluconazole + prothioconazole	DMI (azole)
Comet 200	pyraclostrobin	QoI (strobilurin)
Imtrex	fluxapyroxad	SDHI
Miravis Plus	pydiflumetofen	SDHI
Ipresso New	isoflucypram + prothioconazole	SDHI + DMI (azole)
Ascra Xpro	bixafen + fluopyram + prothioconazole	SDHI + SDHI + DMI (azole)

A further four unregistered products were tested in 2024.
Data on these will be released upon registration

Check labels prior to use: Myresa, Comet, Imtrex and Miravis Plus should be used in mixtures with at least one fungicide with an alternative mode of action that has efficacy against the target disease.

Rhynchosporium protectant 2024 (2 trials)

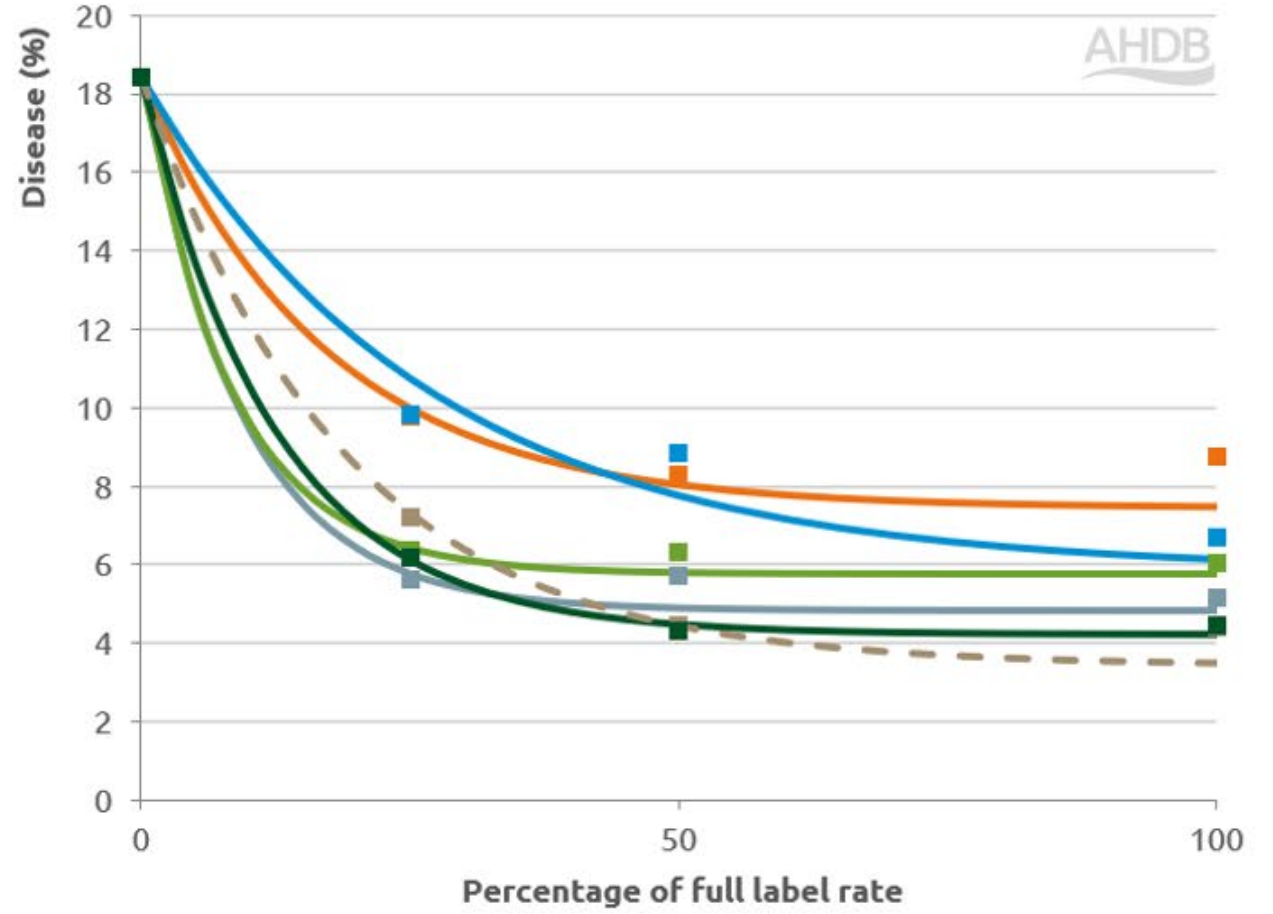
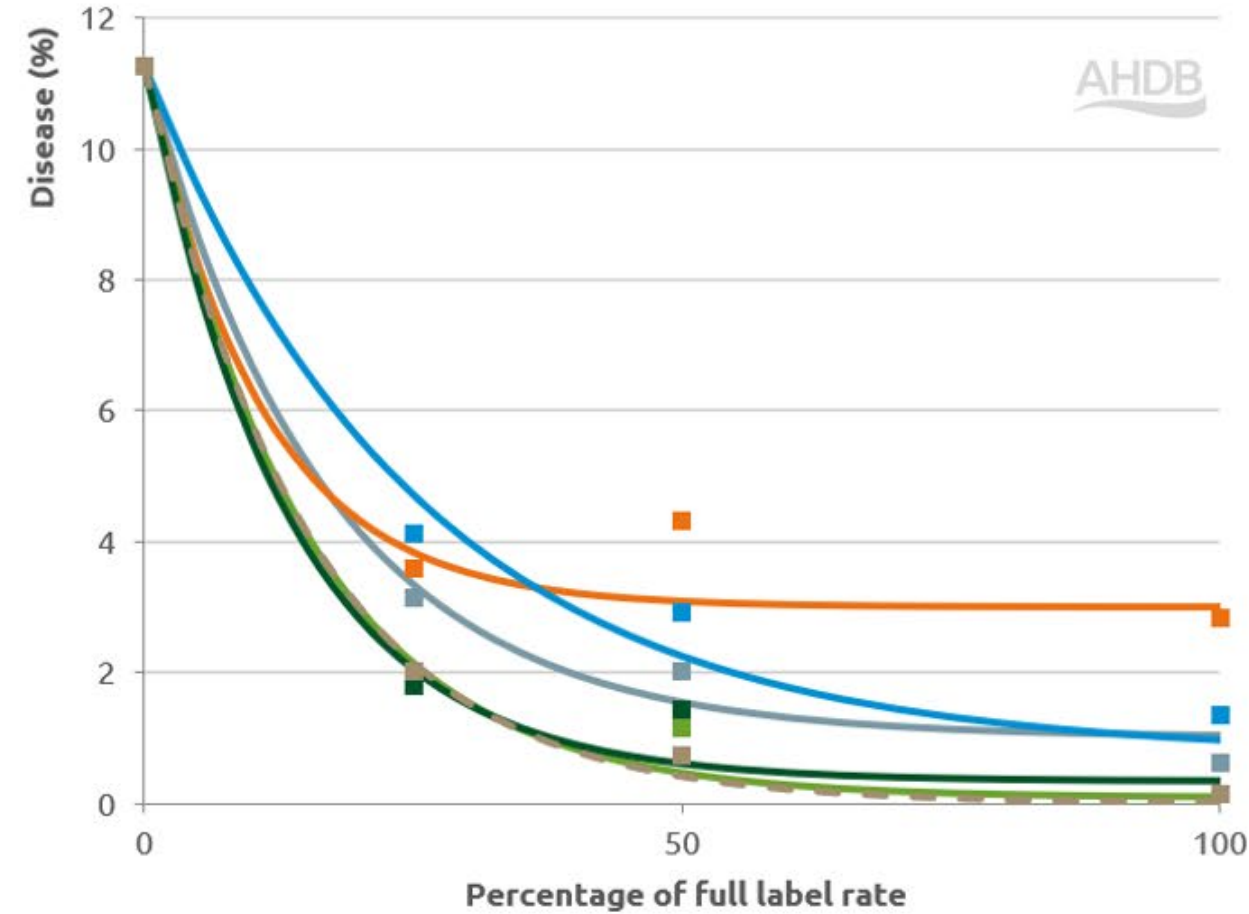
Rhynchosporium mixed 2024 (2 trials)



Products marked with an * are mixtures containing more than one active ingredient

Rhynchosporium protectant overyear 2022-24 (5 trials)

Rhynchosporium eradicator overyear 2022-24 (4 trials)

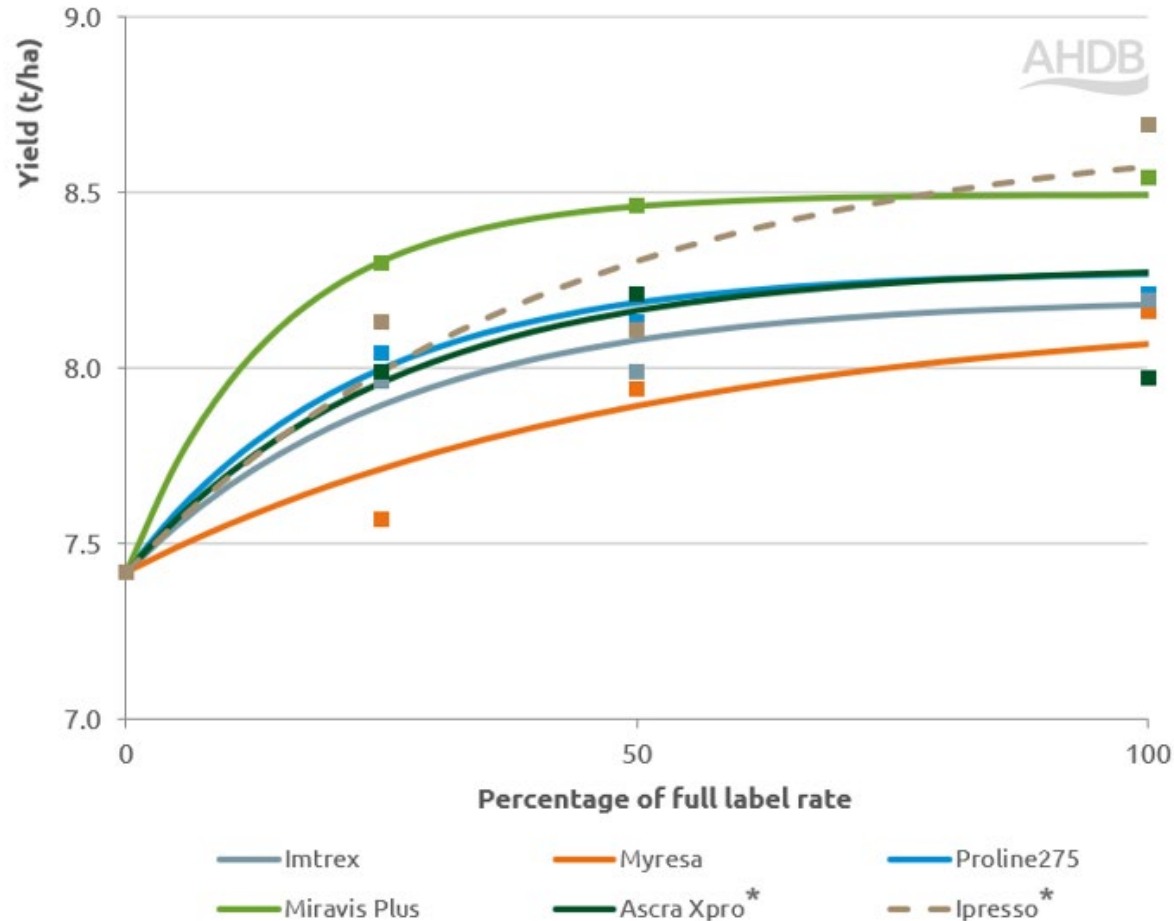


Imtrex Myresa Proline275
 Miravis Plus Ascra Xpro* Ipresso*

Imtrex Myresa Proline275
 Miravis Plus Ascra Xpro* Ipresso*

Products marked with an * are mixtures containing more than one active ingredient

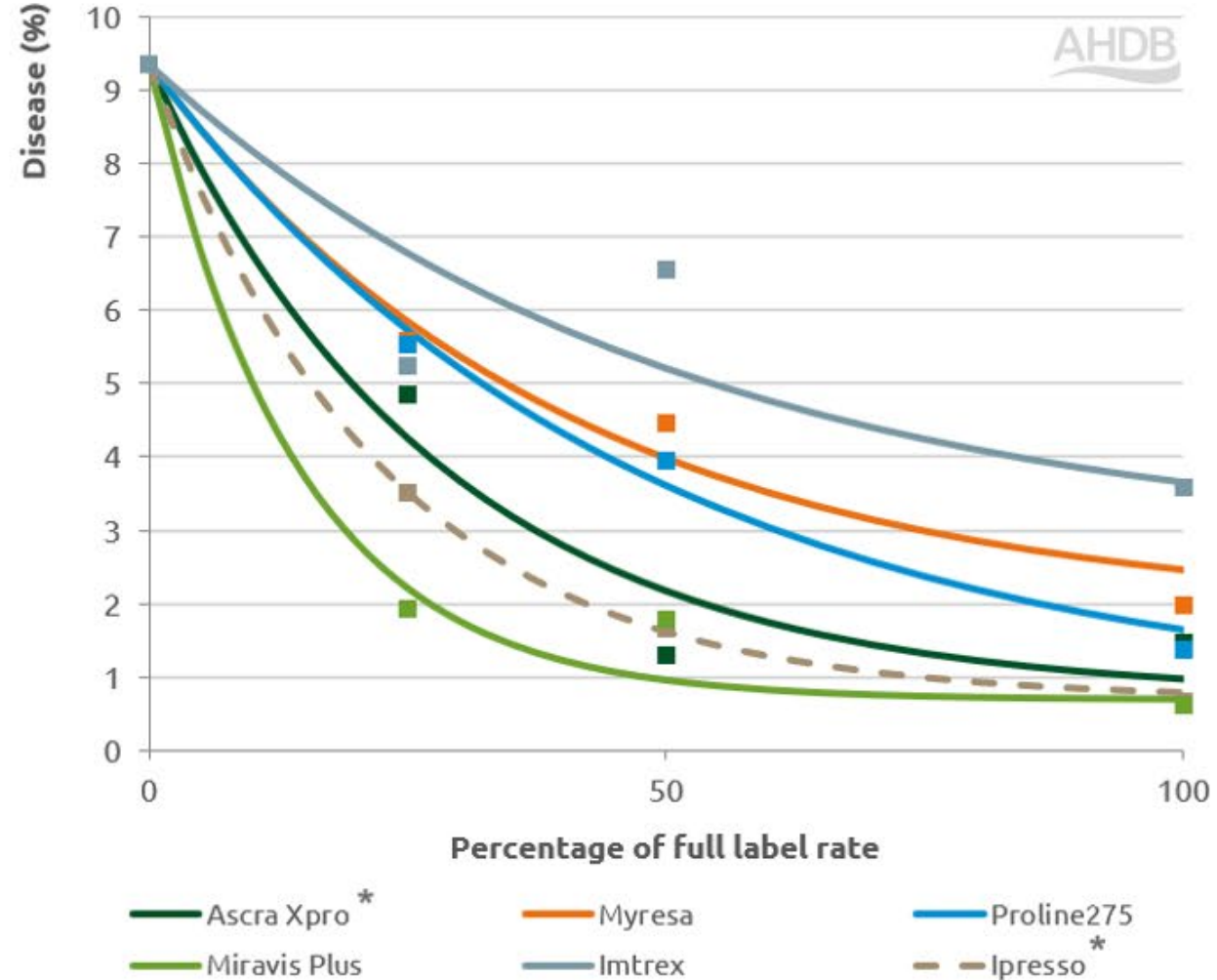
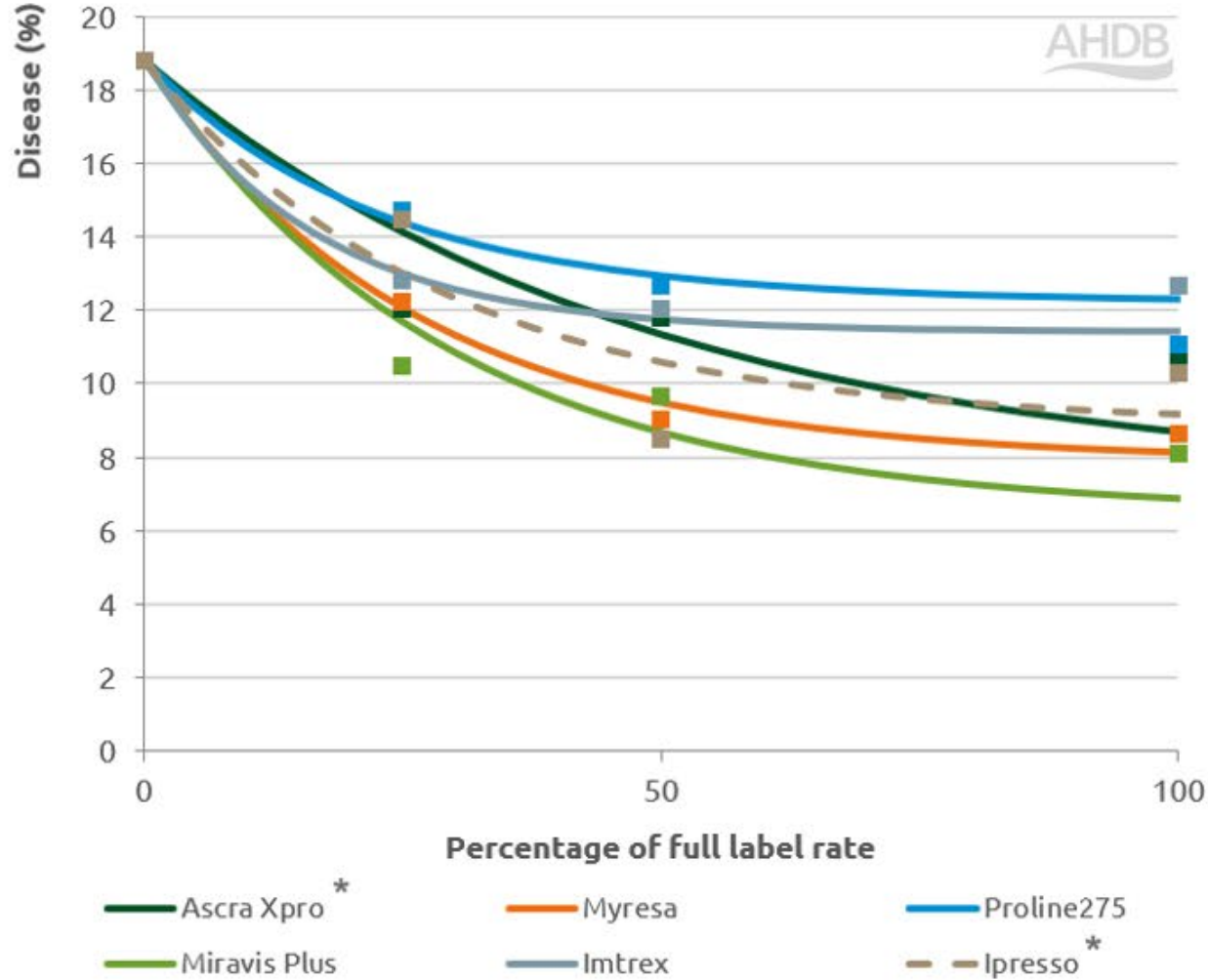
Rhynchosporium yield overyear 2021-24 (6 trials)



Products marked with an * are mixtures containing more than one active ingredient

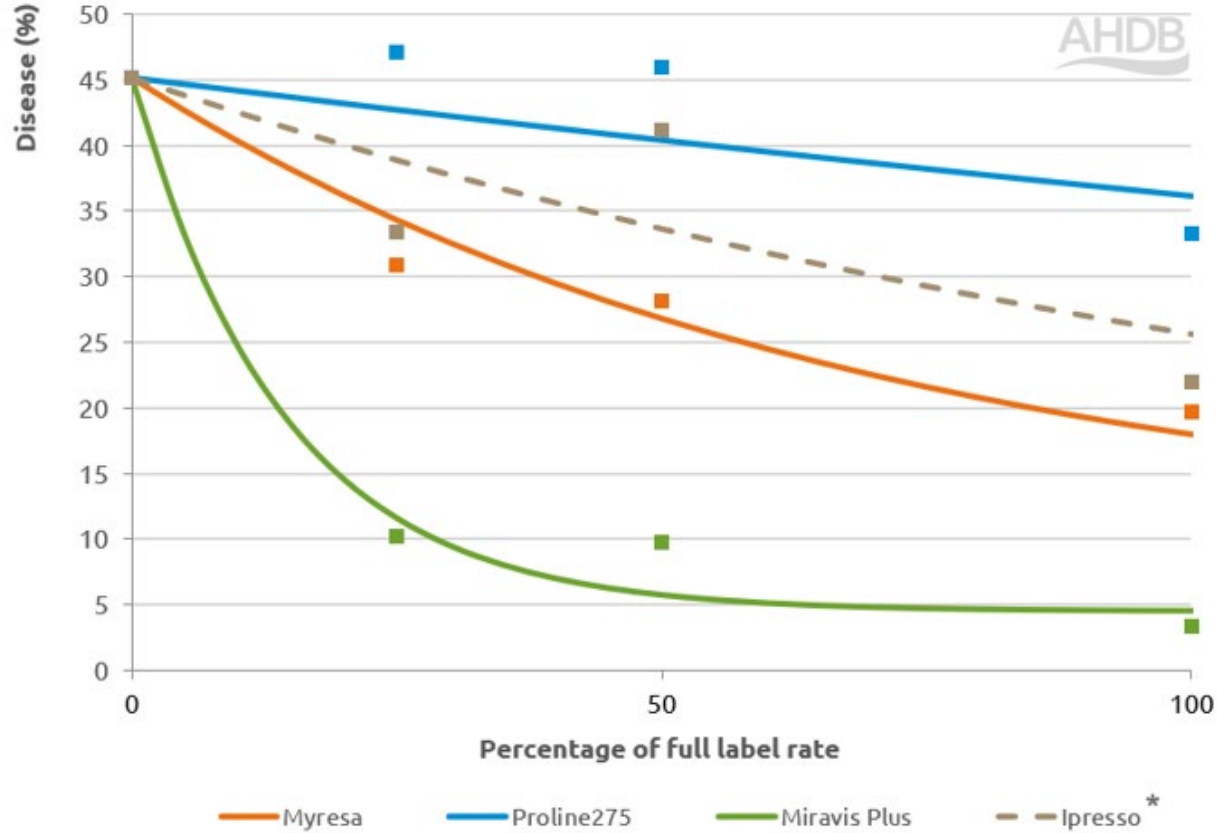
Net blotch protectant overyear 2022-24 (3 trials)

Net blotch eradicator overyear 2021-24 (3 trials)



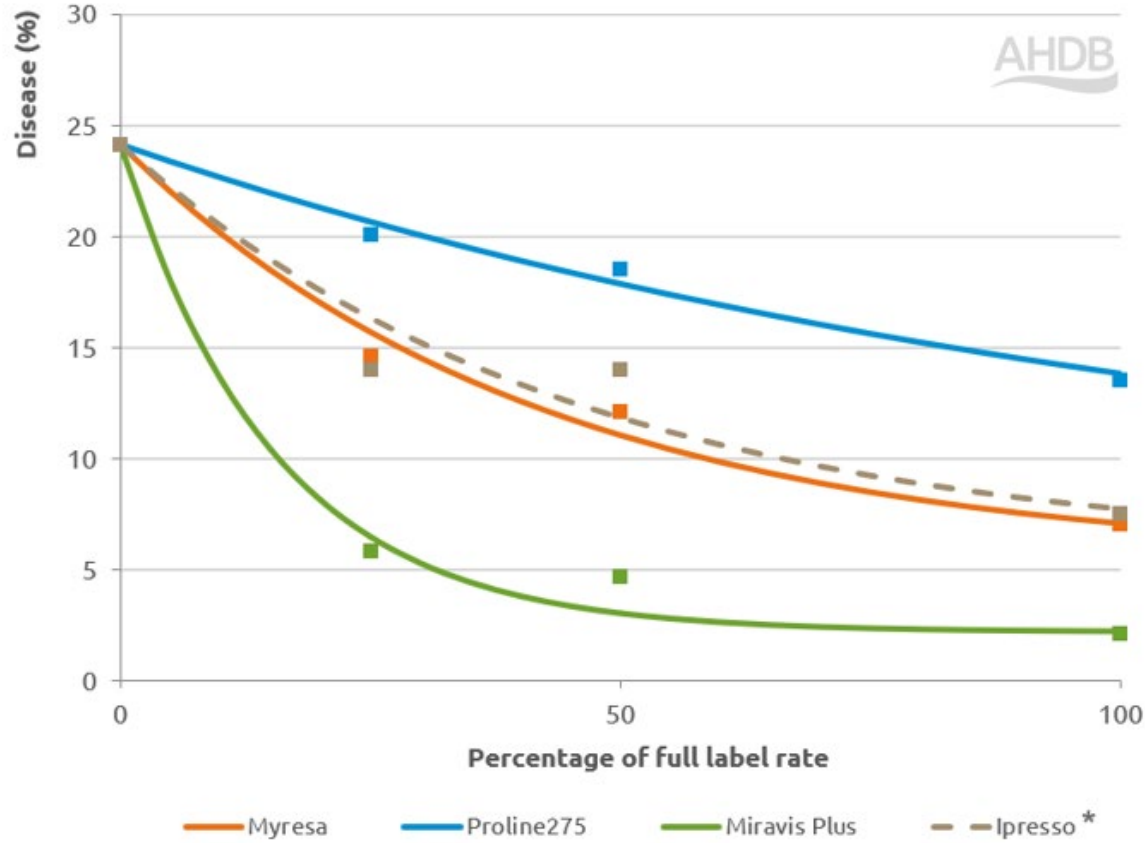
Products marked with an * are mixtures containing more than one active ingredient

Ramularia 2024 (3 trials)



Products marked with an * are mixtures containing more than one active ingredient

Ramularia overyear 2022-24 (9 trials)



Products marked with an * are mixtures containing more than one active ingredient

Barley summary

- Miravis Plus (pydiflumetofen), Ipresso (isoflucypram + prothioconazole), Ascra Xpro (bixafen + fluopyram + prothioconazole) and RevyPro (mefentrifluconazole + prothioconazole) have given the highest levels of rhynchosporium control
- Good activity from Imtrex (fluxapyroxad), Myresa (mefentrifluconazole) and Proline (prothioconazole) also
- Miravis Plus has shown the highest levels of net blotch control, but the mixtures Ascra Xpro and Ipresso have also maintained good efficacy
- Myresa and Ipresso were more effective than Proline against ramularia, but Miravis Plus gave the highest levels of control
- Mixtures offer the broadest spectrum and most robust control

Fungicide performance update: oilseed rape (2024)

Fungicide performance in oilseed rape

Trial site	Target disease	Data
Terrington	Phoma stem canker	Canker index Yield
Rosemaund	Phoma stem canker	Canker index Yield
High Mowthorpe	Light leaf spot	None
Midlothian	Light leaf spot	Light leaf spot severity

Oilseed rape products

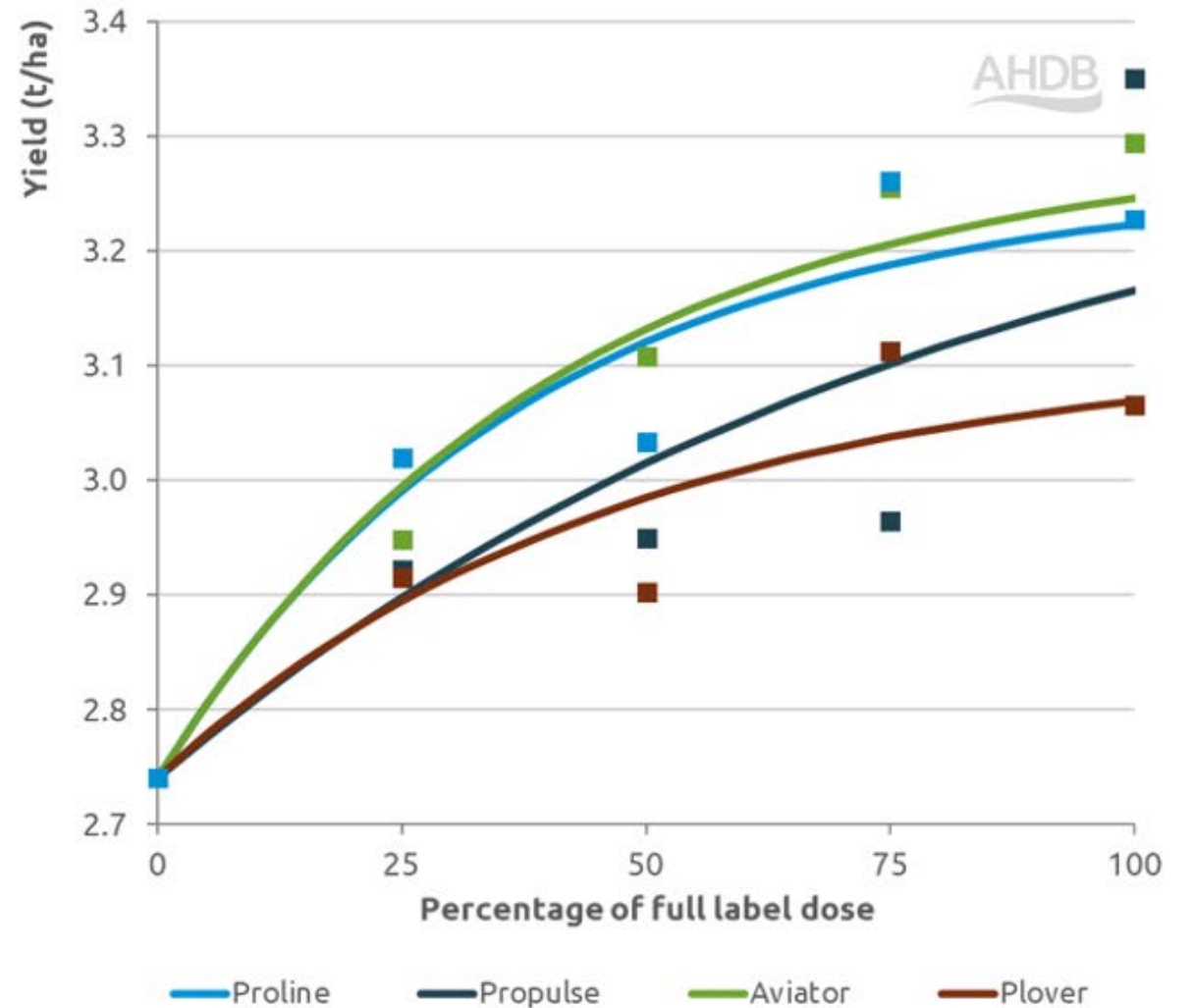
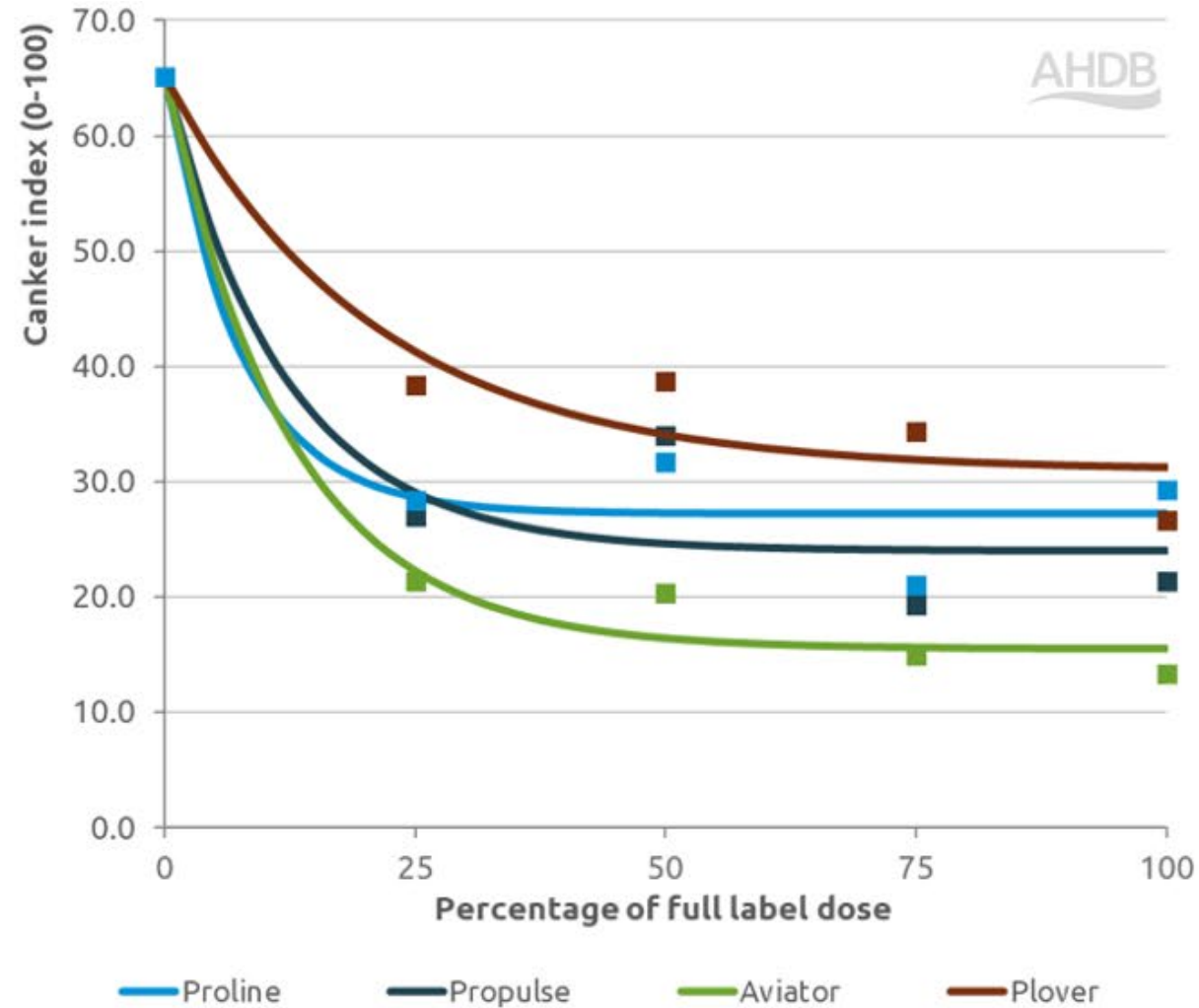
Product	Active(s)	Mode of action
Proline 275	prothioconazole	DMI
Aviator 235 Xpro	bixafen + prothioconazole	SDHI + DMI
Plover	difenoconazole	DMI
Propulse	prothioconazole + fluopyram	SDHI + DMI

A further four unregistered products were tested in 2024.
Data on these will be released upon registration.

Terrington

- Location: Norfolk
- Target: Phoma
- Variety: Flamingo
- T1 spray: 06/12/2023
- T2 spray: 29/01/2024
- Data used
 - Canker index
 - Yield

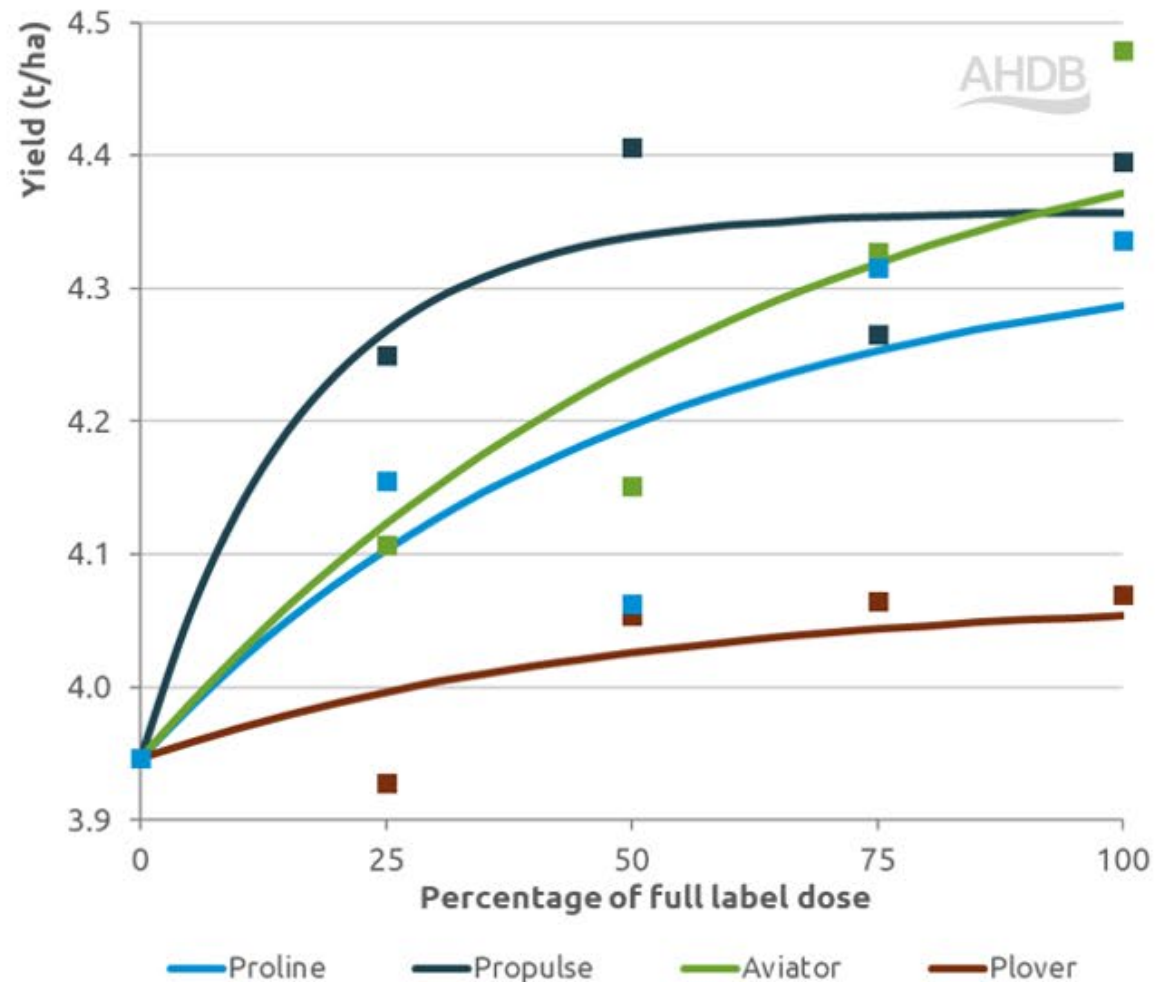
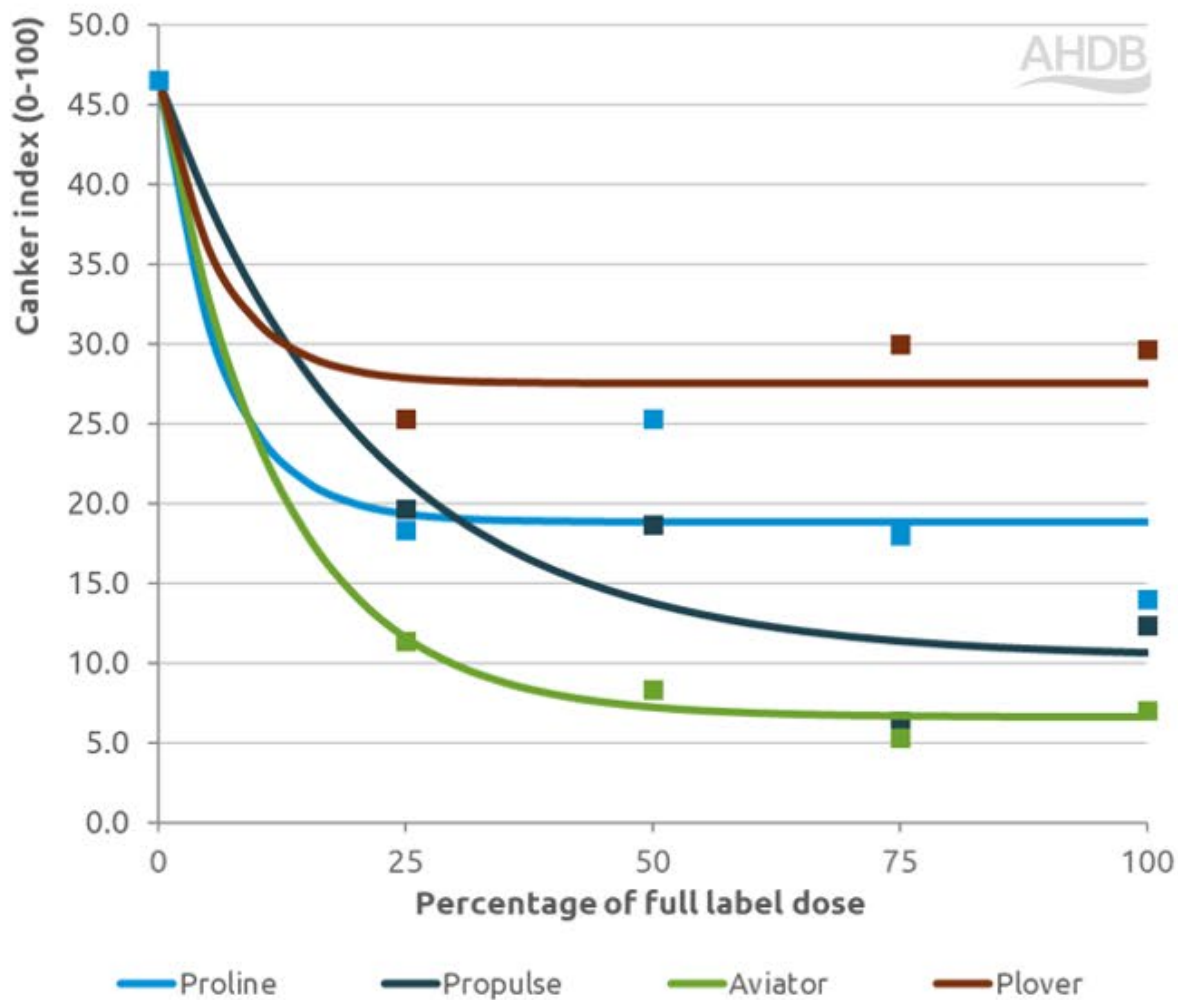
Phoma stem canker and yield (Terrington, 2024)



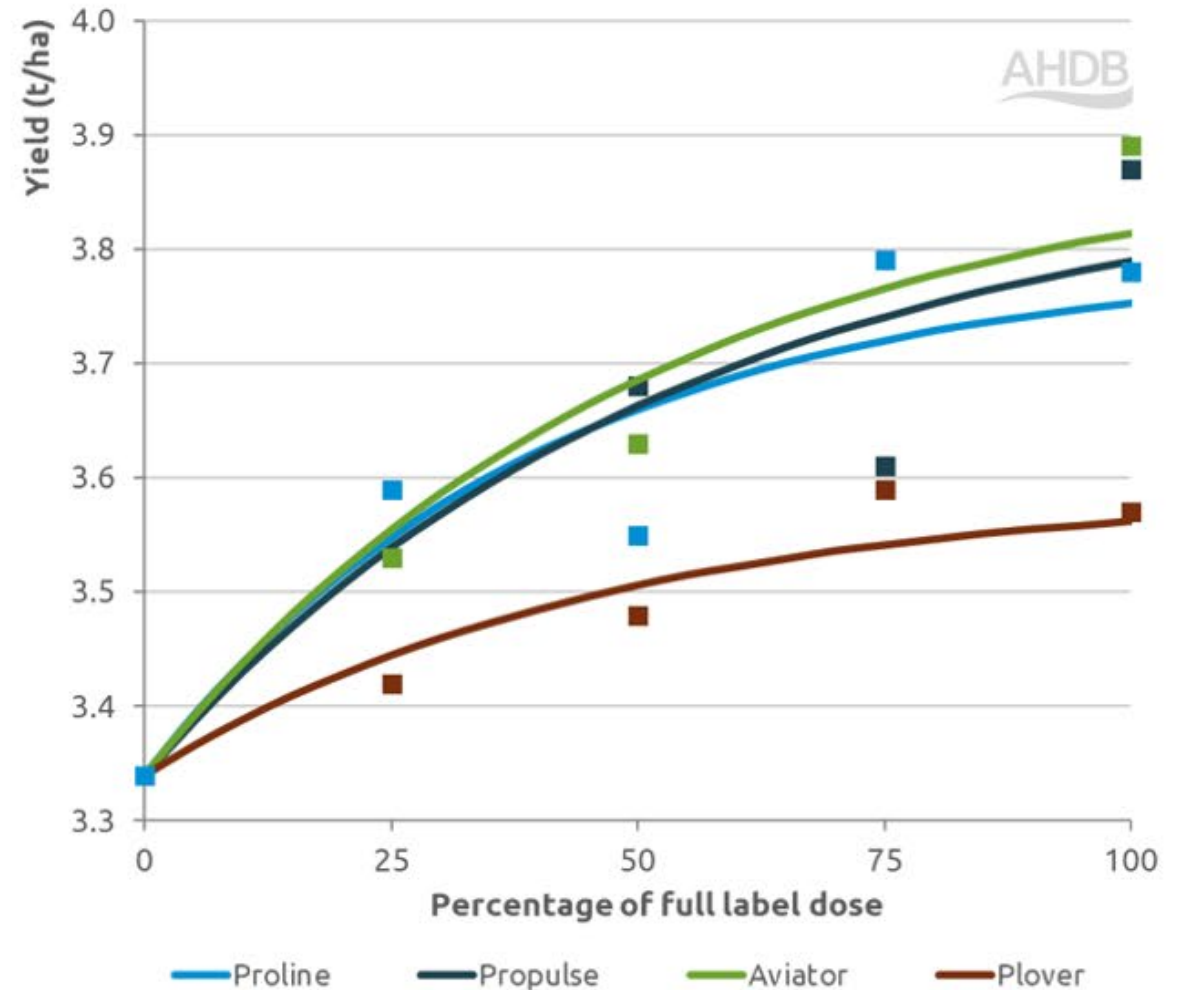
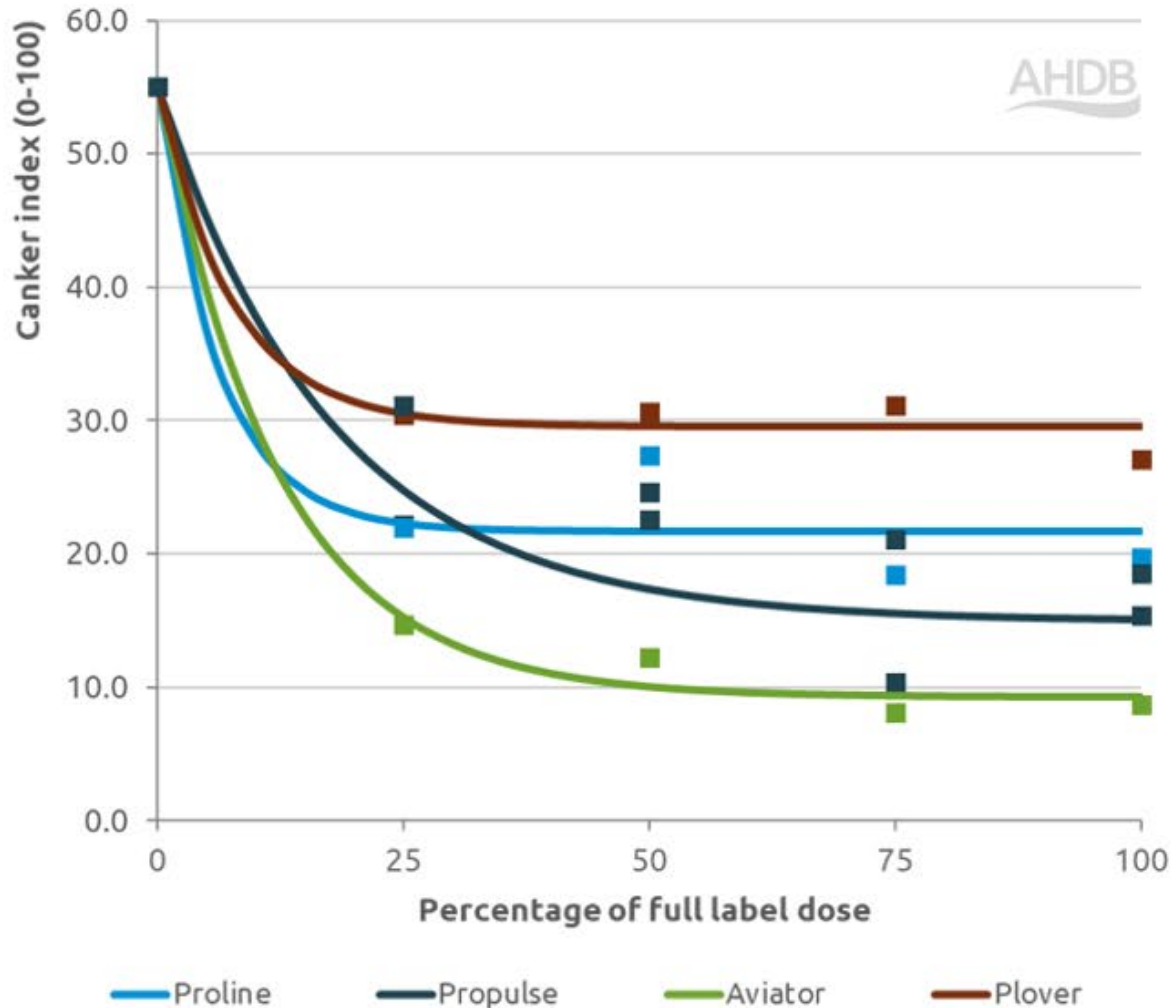
Rosemaund

- Location: Herefordshire
- Target: Phoma
- Variety: Aspire
- T1 spray: 16/10/2023
- T2 spray: 22/11/2023
- Data used
 - Canker index
 - Yield

Phoma stem canker and yield (Rosemaund, 2024)

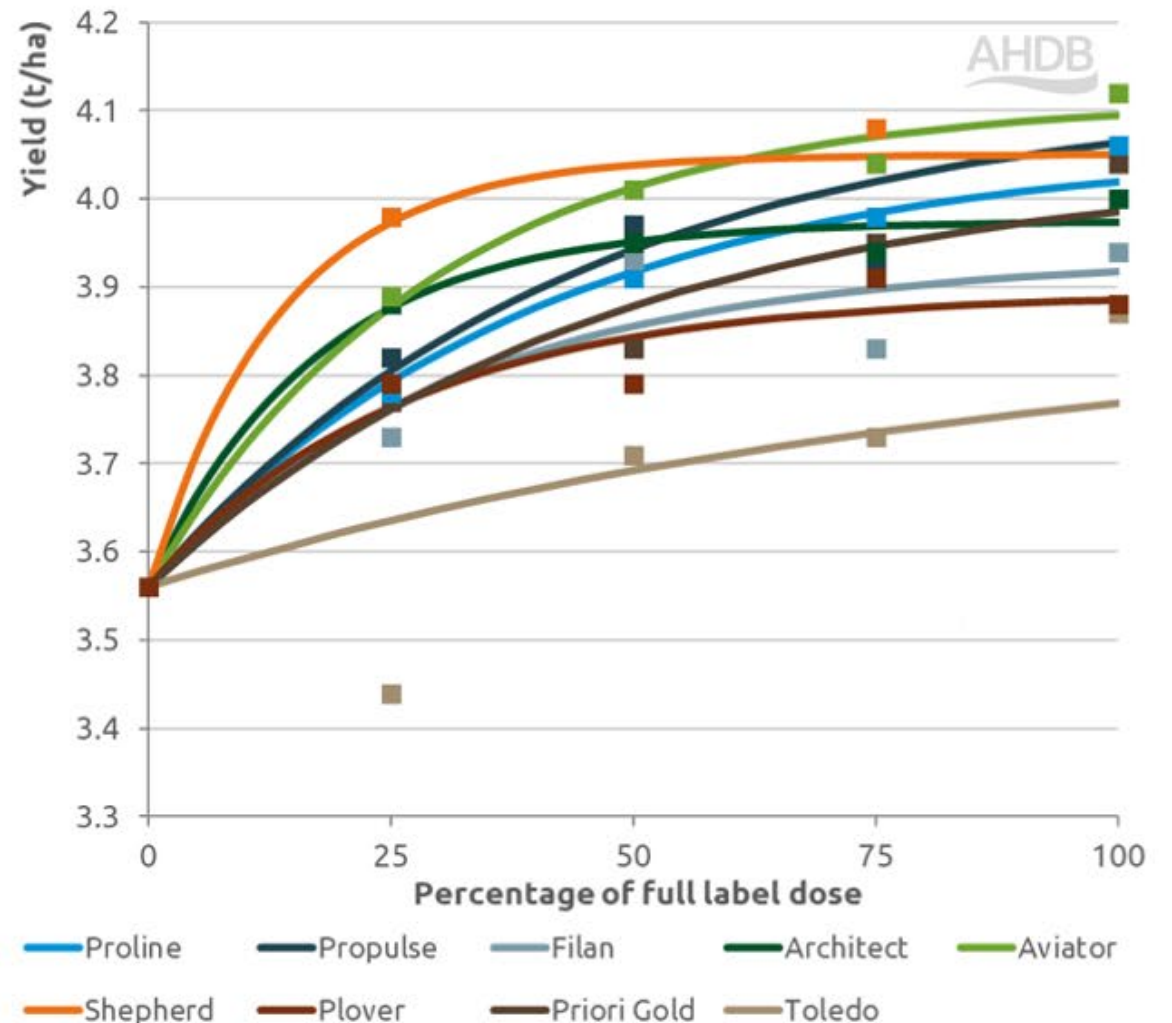
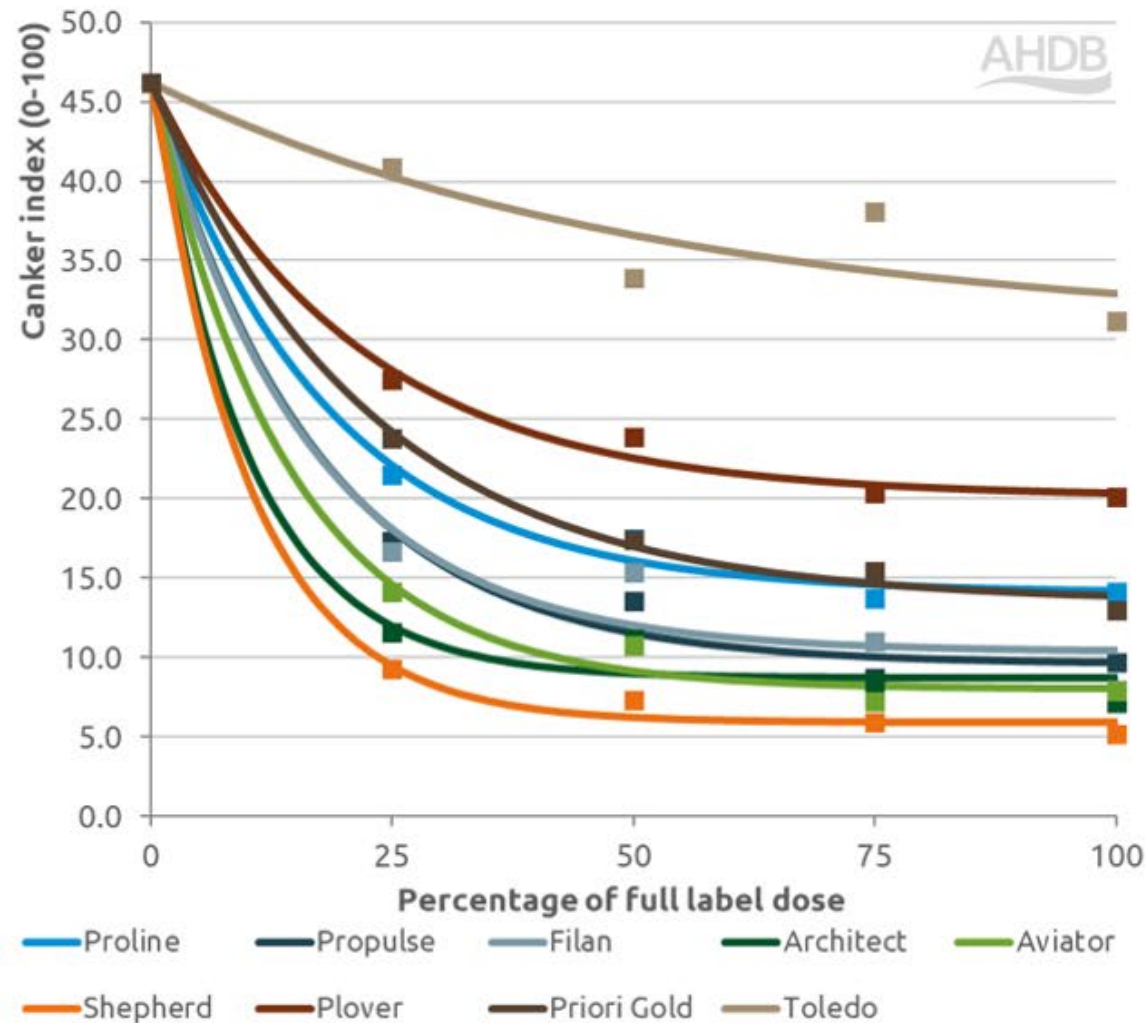


Phoma stem canker and yield (Terrington and Rosemaund, 2024)



Stem canker and yield 2015–24 (16 trials)

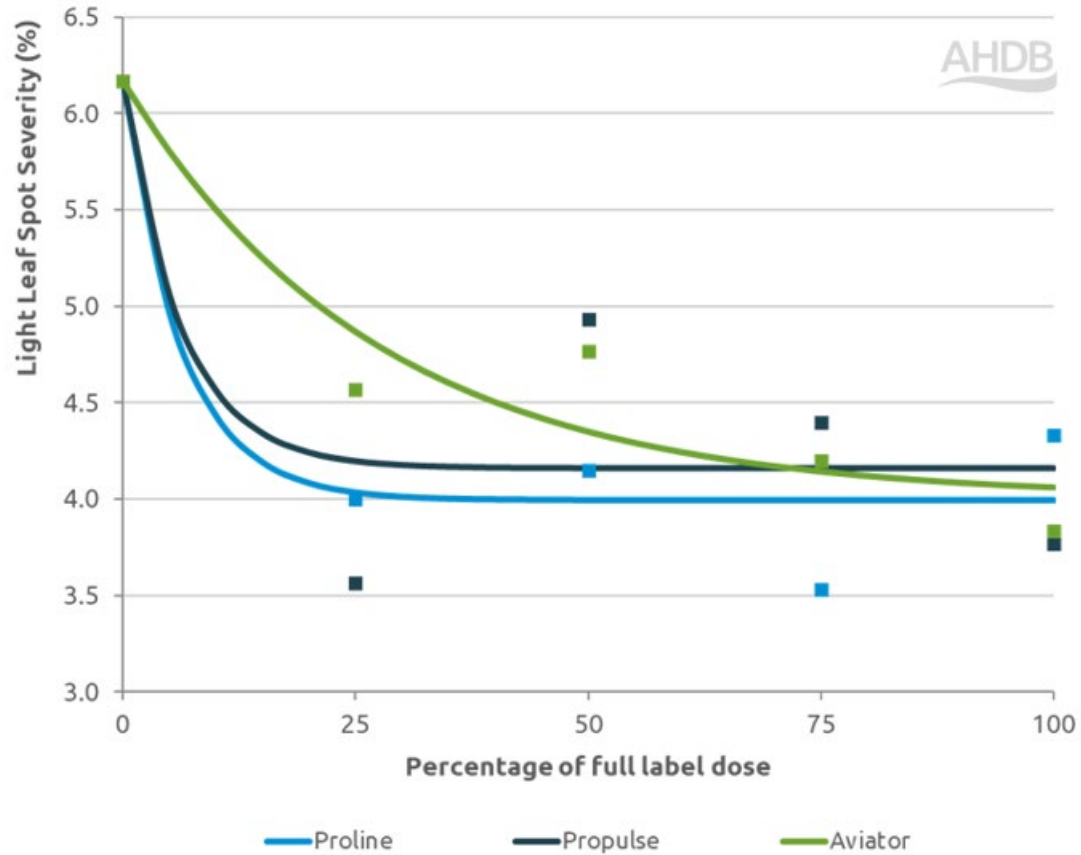
Toledo data from 2023 only



Midlothian

- Location: Midlothian
- Target: Light leaf spot
- Variety: Campus
- T1 spray: 31/10/2023
- T2 spray: 10/04/2024
- Data used
 - Light leaf spot severity

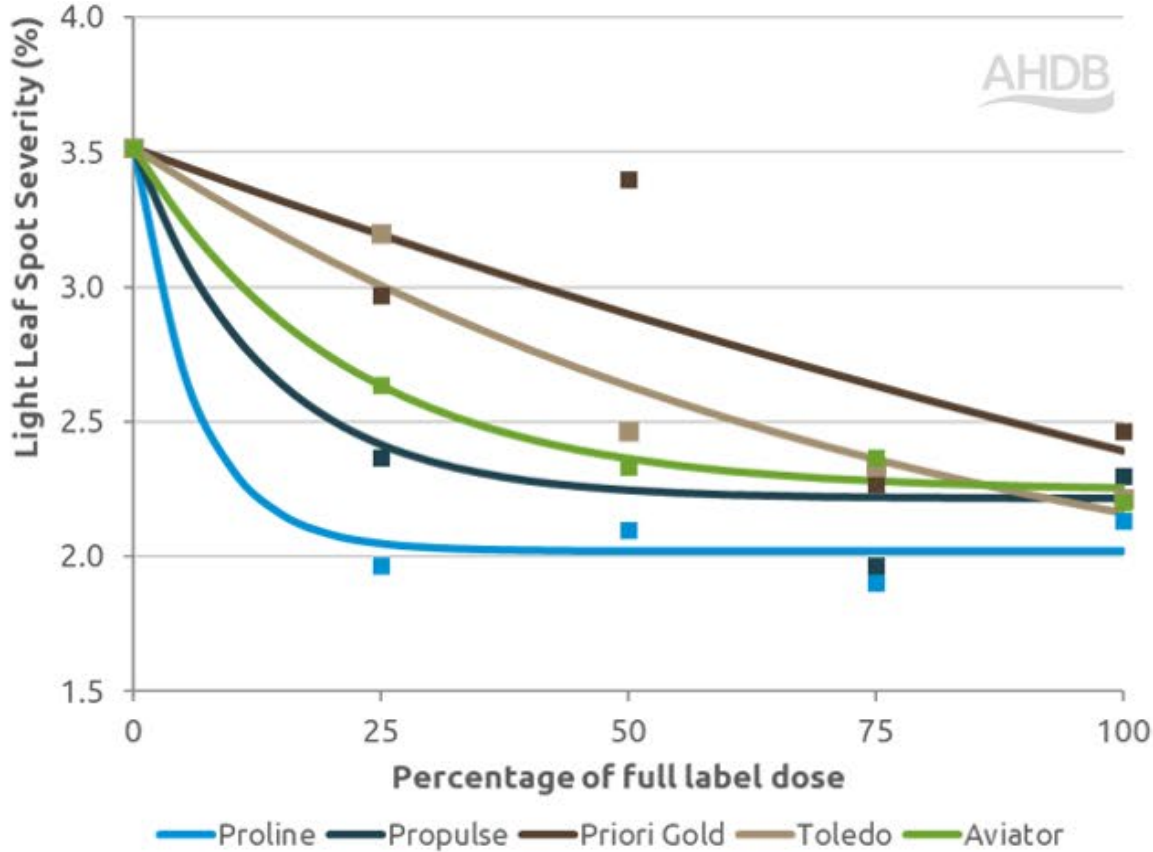
Light leaf spot disease (Midlothian, 2024)



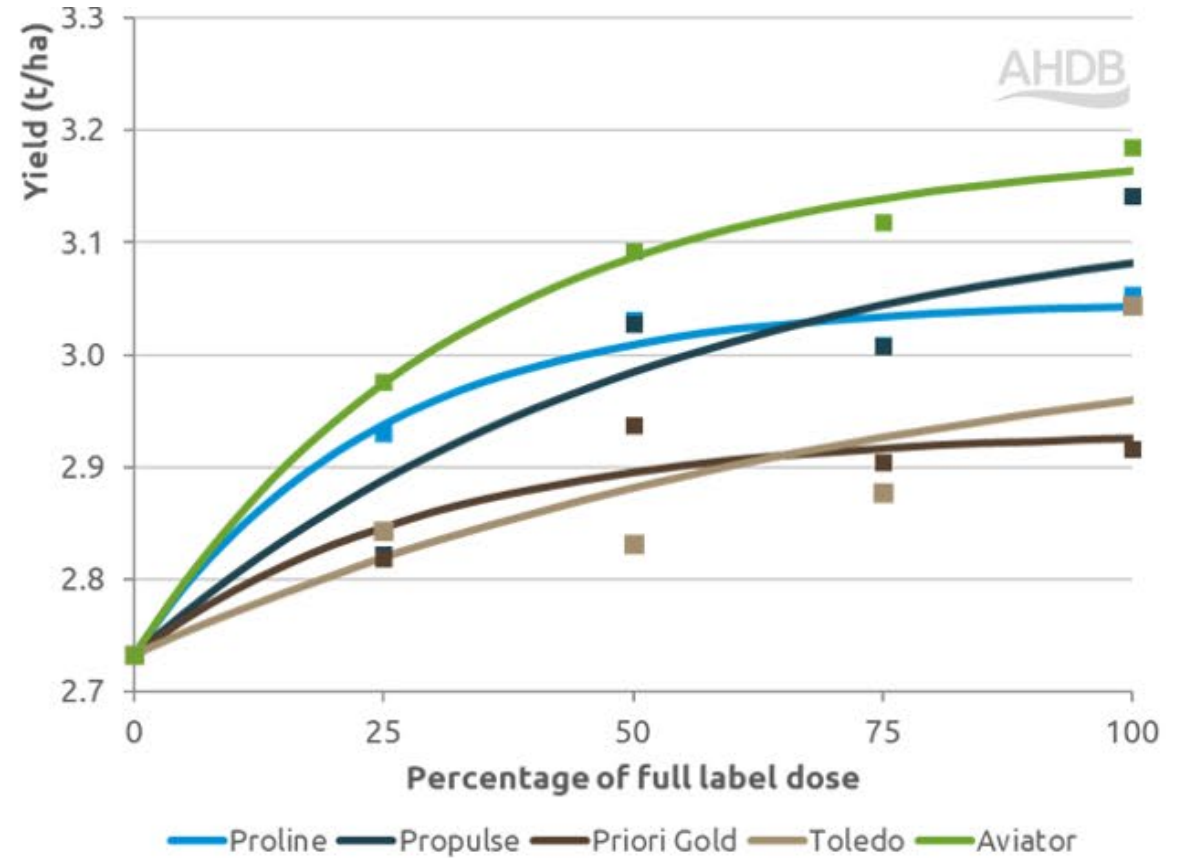
Treatment	Application timing	Data (%)
Untreated/Half Proline	T2 April 10	4.95
Untreated/Full Proline	T2 April 10	4.90
Half Proline/Untreated	T1 October 31	4.63
Full Proline/Untreated	T1 October 31	4.60

Light leaf spot disease and yield

(High Mowthorpe, 2023)

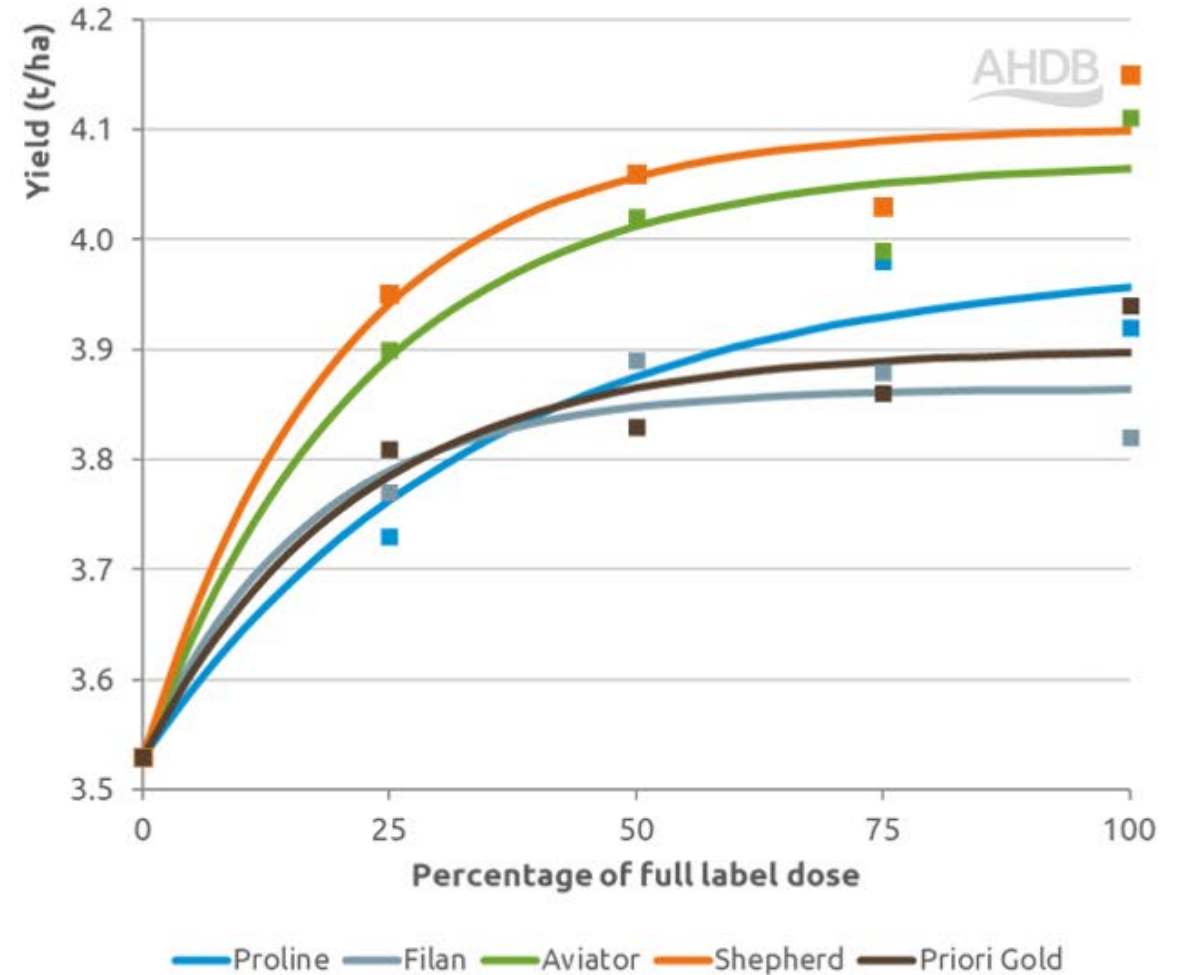
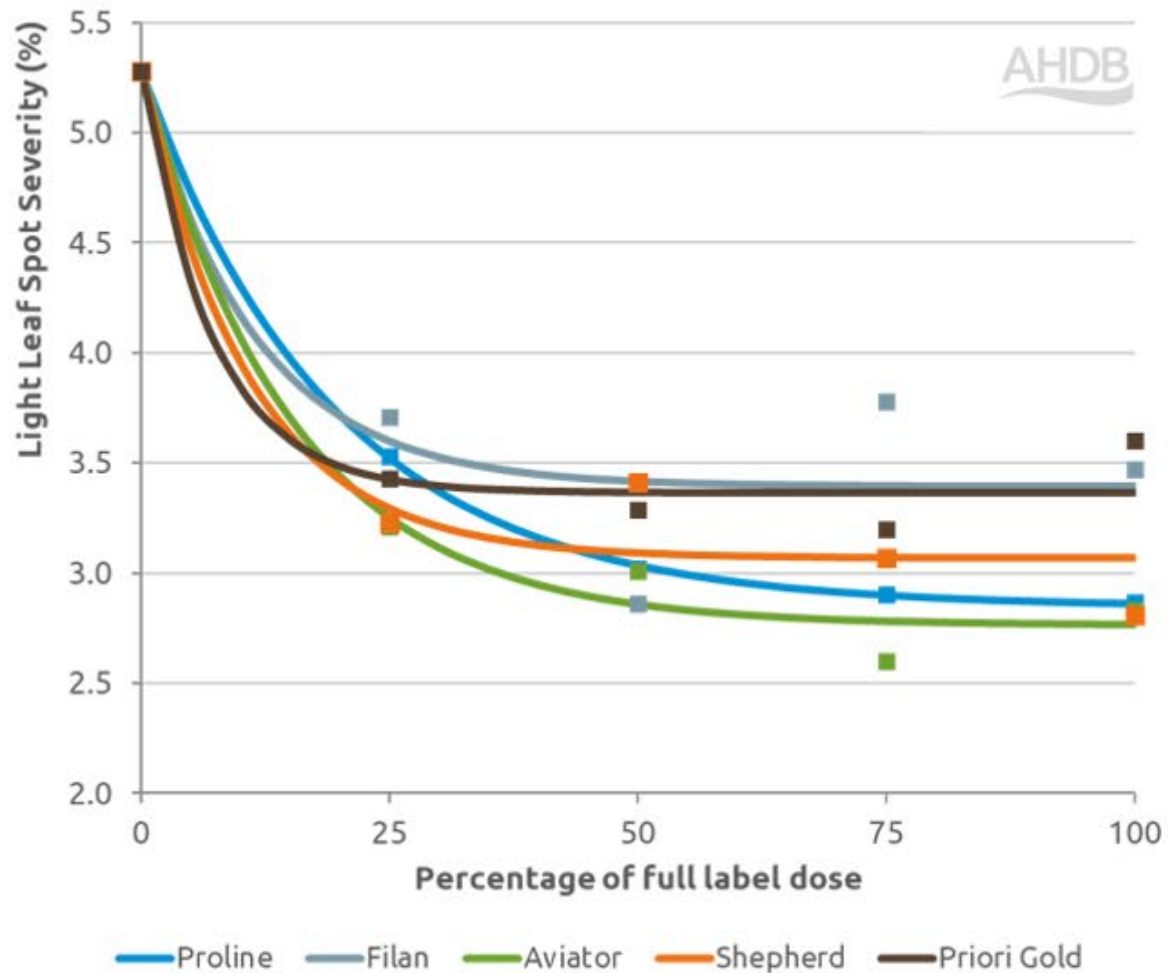


Treatment	Application timing	Data (%)
Untreated/Half Proline	T2 March 27	2.70
Untreated/Full Proline	T2 March 27	3.10
Half Proline/Untreated	T1 November 30	2.57
Full Proline/Untreated	T1 November 30	2.20

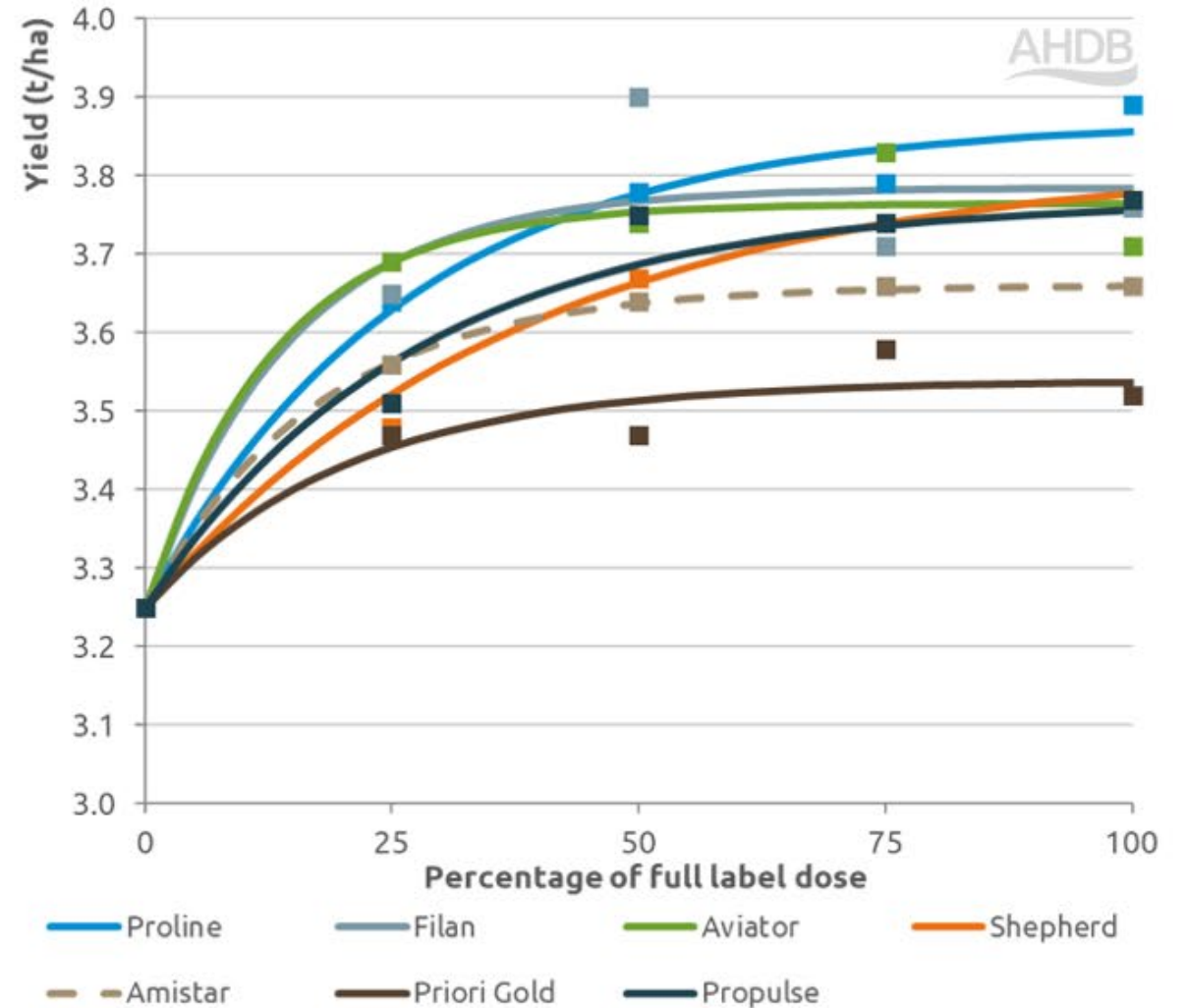
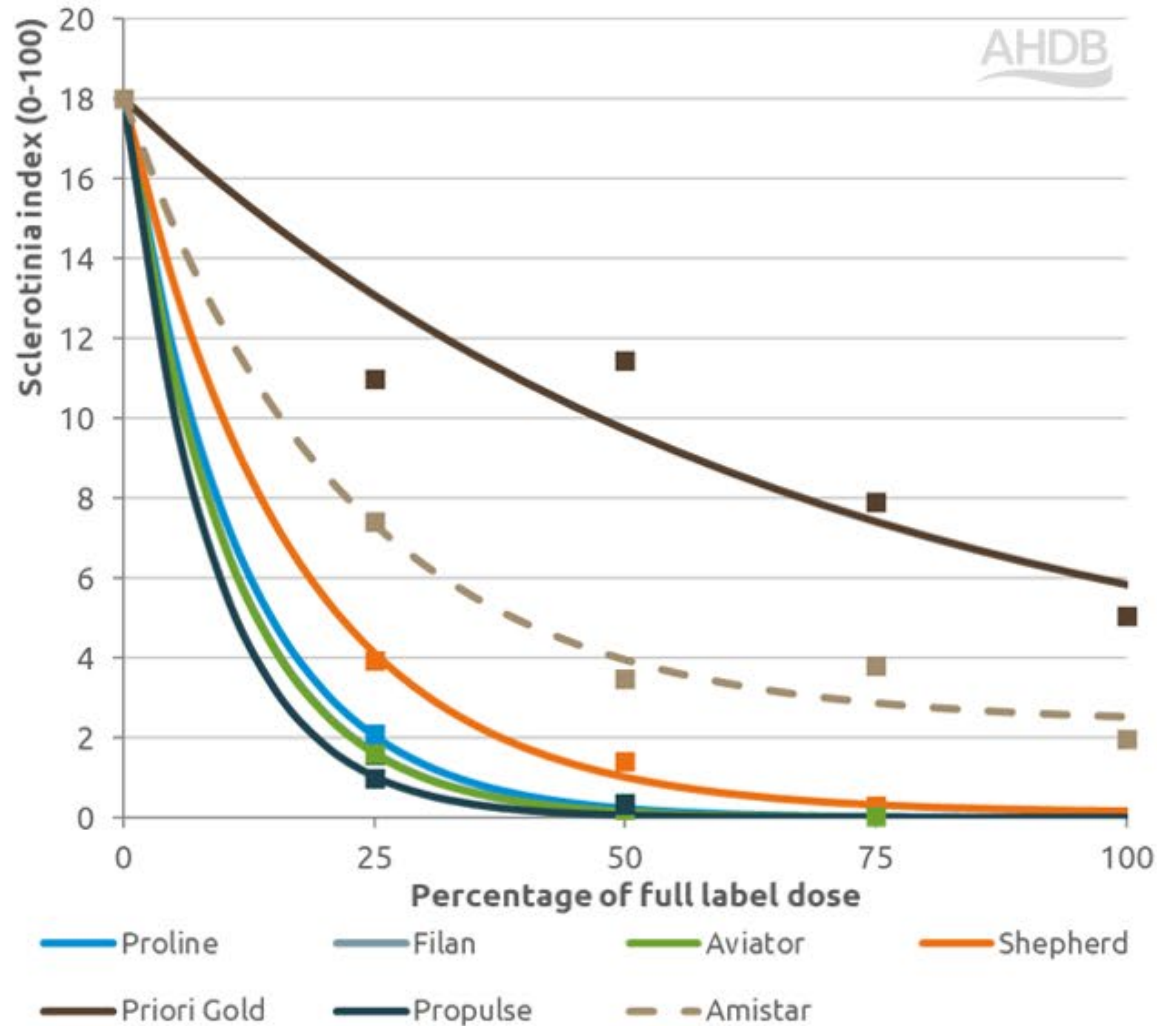


Treatment	Application timing	Data (t/ha)
Untreated/Half Proline	T2 March 27	2.81
Untreated/Full Proline	T2 March 27	2.79
Half Proline/Untreated	T1 November 30	3.01
Full Proline/Untreated	T1 November 30	3.04

Light leaf spot disease and yield 2019–21 (5 trials)



Sclerotinia stem rot and yield 2015–17 (5 trials)



Oilseed rape summary

Phoma stem canker

- Effective azole and non-azole options for phoma stem canker control
- Yield responses ranged from 0.20 to 0.55 t/ha in 2024, with little benefit from applying >50% of full label rate (as part of a two-spray programme)
- Product differences in canker control and yields more evident when disease pressure was high

Light leaf spot

- Azoles, non-azoles and co-formulations effective and providing similar control of disease and yield
- Both azole and non-azole chemistry available for use in the autumn
- Timing of application important to achieve control and yield protection

Sclerotinia stem rot

- All modes of action available for sclerotinia control can now be used elsewhere in the fungicide programme
- Consider what active ingredients have been used previously within the fungicide programme and use alternation and mixtures for resistance management

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A vibrant landscape of a green field at sunset. The sun is low on the horizon, casting a warm glow over the scene. The sky is filled with colorful clouds, and the field is lush and green. A path leads from the foreground towards the horizon. In the foreground, there are several thin, white, wavy lines that appear to be part of a design or graphic element.

**‘Inspiring our farmers, growers
and industry to succeed in a
rapidly changing world’**

