Fungicide performance update for wheat, barley and oilseed rape (2020)

CEREALS & OILSEEDS

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

The graphs in the AHDB Agronomy Week presentation (1 December 2020) 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's (FRAG) web page: ahdb.org.uk\frag

Background information

Protectant and eradicant

- ‘Protectant’ curves indicate fungicide activity following application soon after the emergence of a leaf layer, before much infection has occurred
- ‘Eradicant’ curves indicate fungicidal activity following application after infection has occurred
- Performance of products on each leaf layer and at each site was classified as protectant or eradicant based on timing of leaf emergence relative to spray application
- Performance of active ingredients can be assessed by comparing dose-response graphs. These show average performance measured across a range of sites, seasons and leaf layers

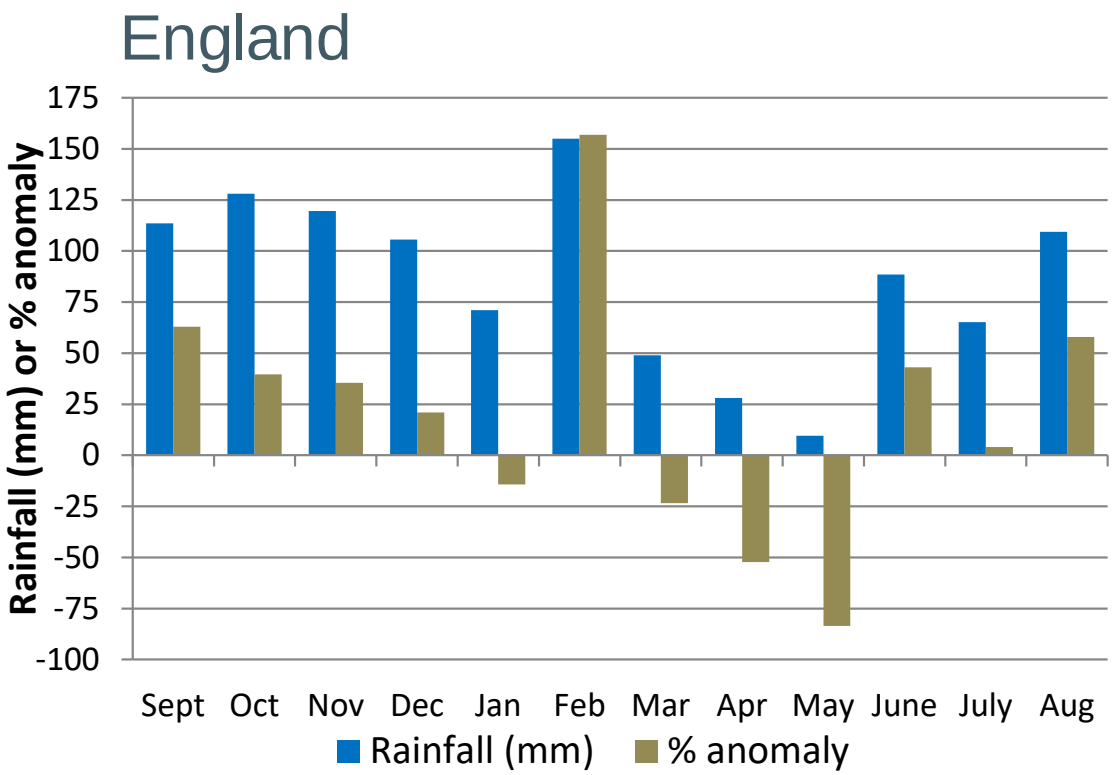
Background information

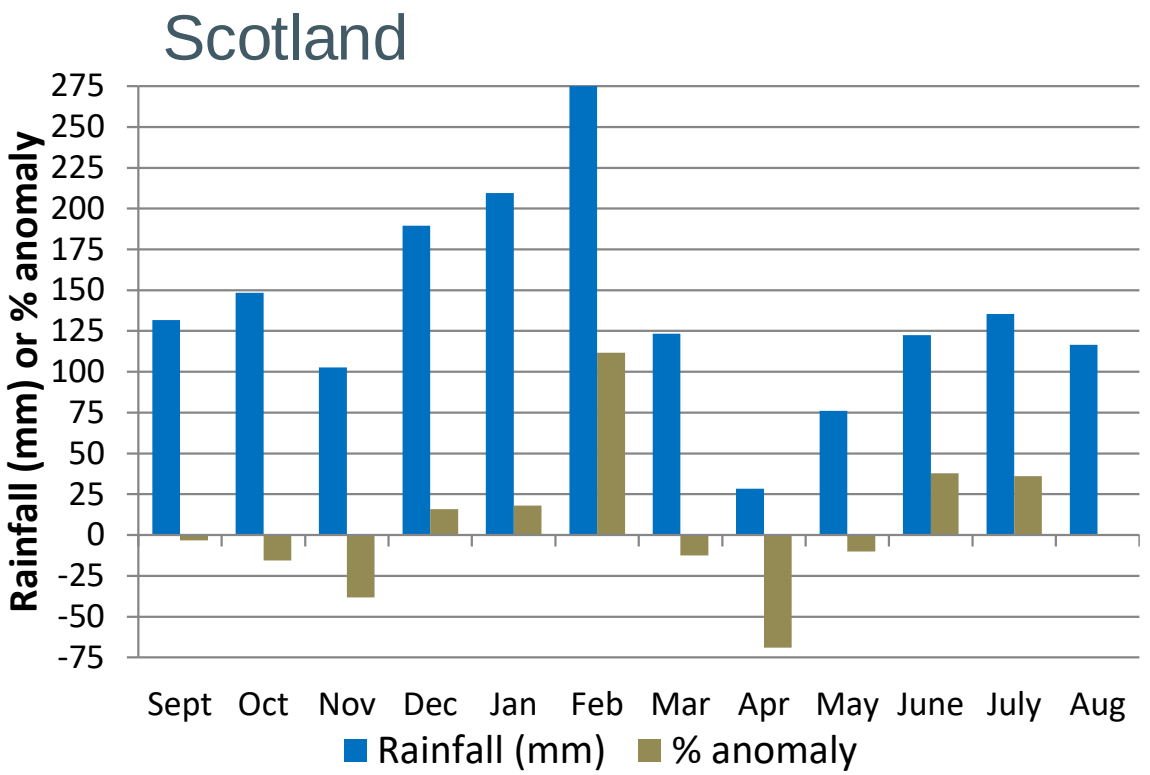
Trial methods (provide a good test of the fungicides):

- Trials are located in areas that are at high risk from the target disease (in most years)
- Trials are carried out on varieties that are very susceptible to the target disease and not too susceptible to other diseases
- If necessary, over-sprays that are not active against the target disease are used to reduce the effect of other diseases on the trial
- Fusarium trial inoculated with fusarium species and mist-irrigated before and after inoculation to establish infection

Background information

Rainfall: 2019/20 and 1981-2010 anomaly





Fungicide performance update: Wheat (2020)

Wheat trials and sites (2020)

Site	Target disease (timing)	Variety	Disease data collected
Rosemaund (ADAS)	Septoria tritici (T1.5)	KWS Santiago	protectant; eradicant
Cardigan (ADAS)	Septoria tritici (T2)	Elation	protectant
Sutton Scotney (NIAB)	Septoria tritici (T1)	Gravity	protectant
Telford (NIAB)	Septoria tritici (T2)	Elation	protectant; eradicant
Midlothian (SRUC)	Septoria tritici (T1)	Viscount	mixed
East Lothian (SRUC)	Septoria tritici (T2)	Viscount	protectant; eradicant
Carlow (Teagasc)	Septoria tritici (T1.5)	KWS Lumos	mixed; eradicant
Terrington (ADAS)	Yellow rust (T1)	Zulu	yellow rust
Cambridge (NIAB)	Brown rust (T2)	Crusoe	brown rust
Gleadthorpe (ADAS)	Fusarium (GS65)	RGT Illustrious	fusarium

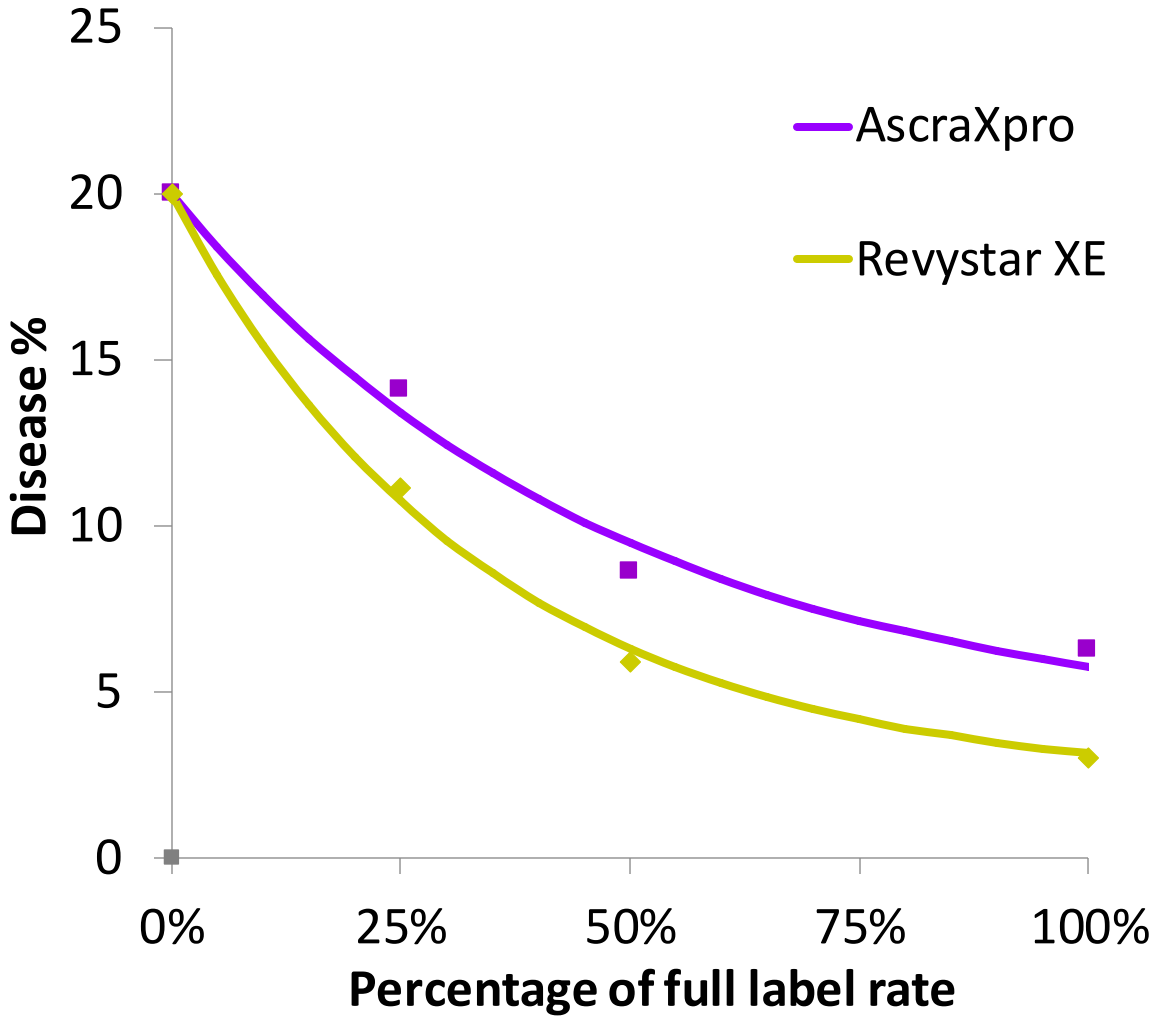
Wheat products

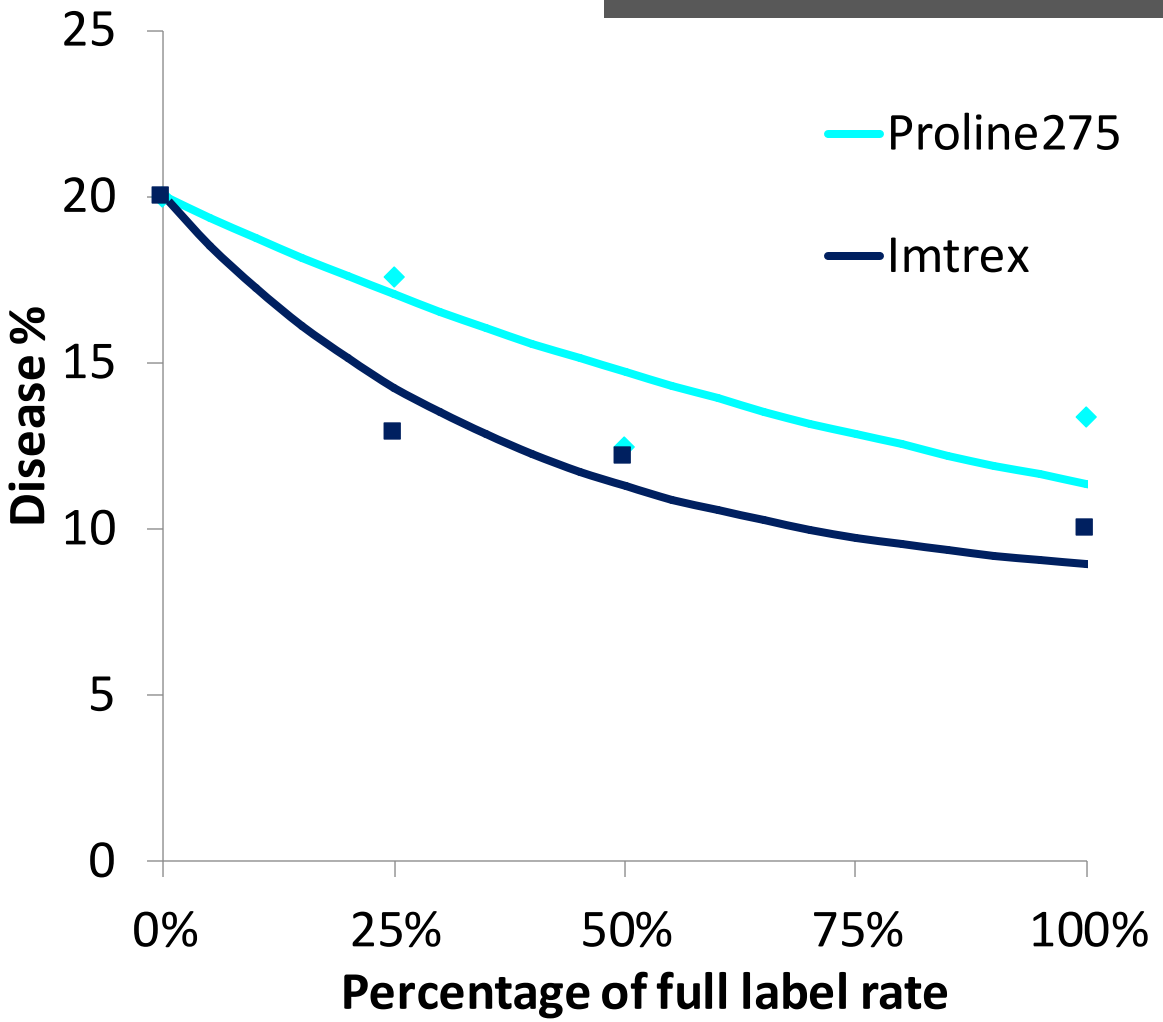
Product	Active(s)	Septoria	Yellow rust	Brown rust	Fusarium
Arizona	folpet	✓*			
Proline	prothioconazole	✓	✓	✓	✓
Imtrex	fluxapyroxad	✓	✓	✓	
Ascra Xpro	bixafen + fluopyram + prothioconazole	✓		✓	
Revystar XE	revysol + fluxapyroxad	✓	✓	✓	
Comet	pyraclostrobin		✓		
Elatus Era	solatenol + prothioconazole	(✓)	✓	(✓)	
Elatus Plus	solatenol (benzovindiflupyr)		✓	✓	
Myresa	revysol (mefentrifluconazole)		✓	✓	
Soleil	bromuconazole + tebuconazole				✓
Bravo	chlorothalonil**	(✓)			
Ignite	epoxiconazole		(✓)		
Librax	metconazole + fluxapyroxad			(✓)	
Unizeb Gold	mancozeb				(✓)

*Arizona at 100% dose only (✓) = not in trials in 2020 **no longer approved

Septoria eradicant 2020 (4 trials)

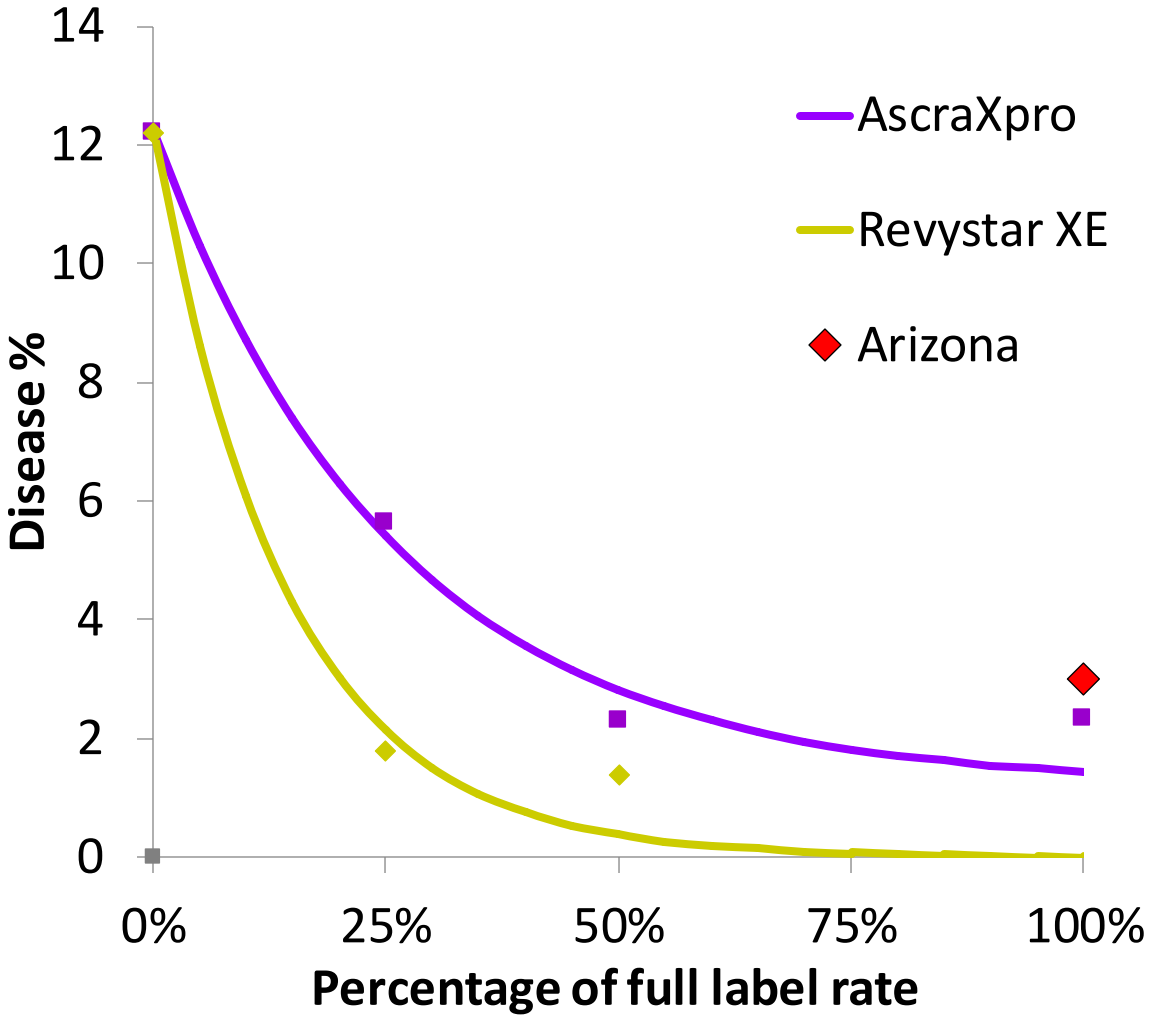
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

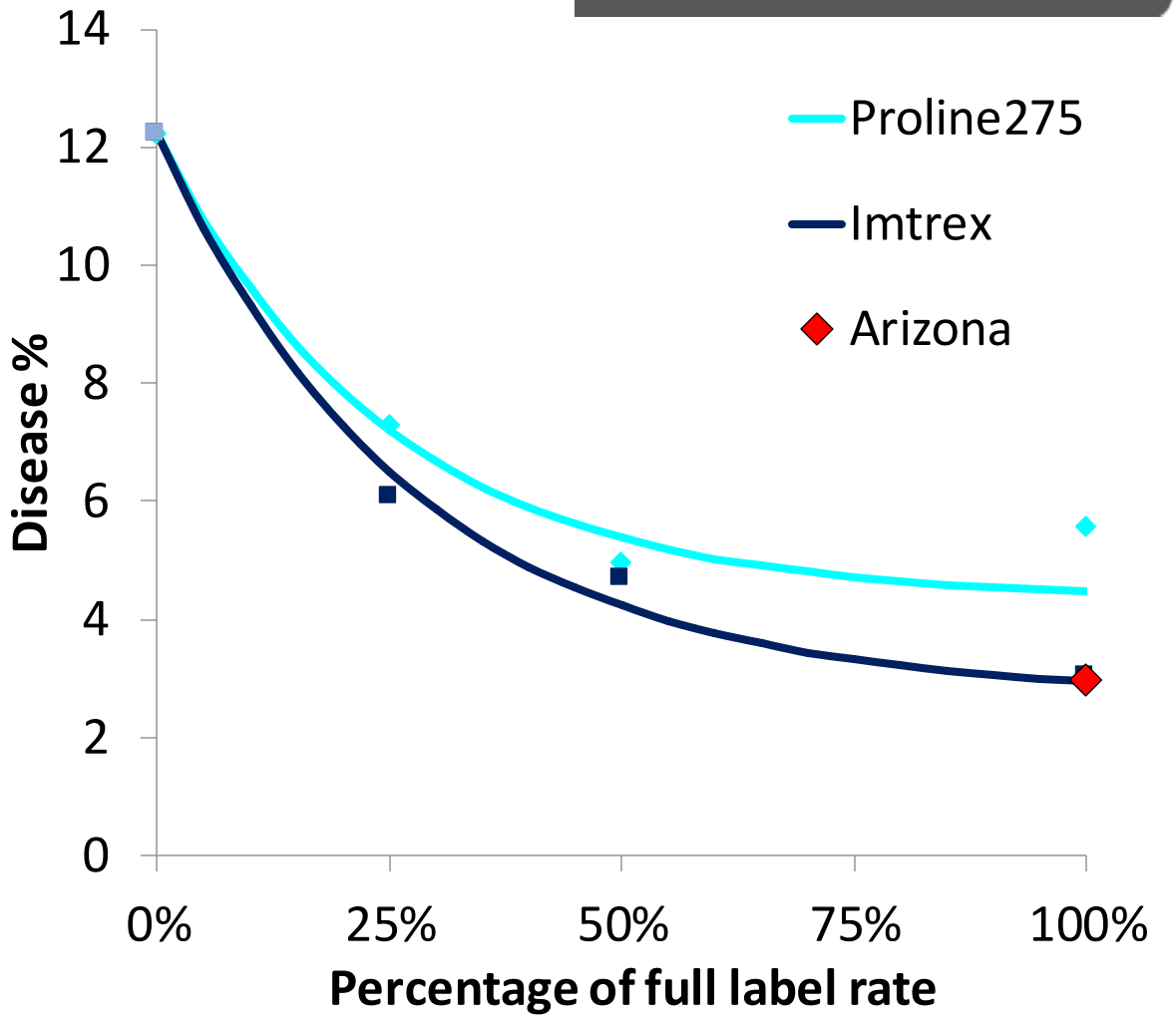




Septoria protectant 2020 (5 trials)

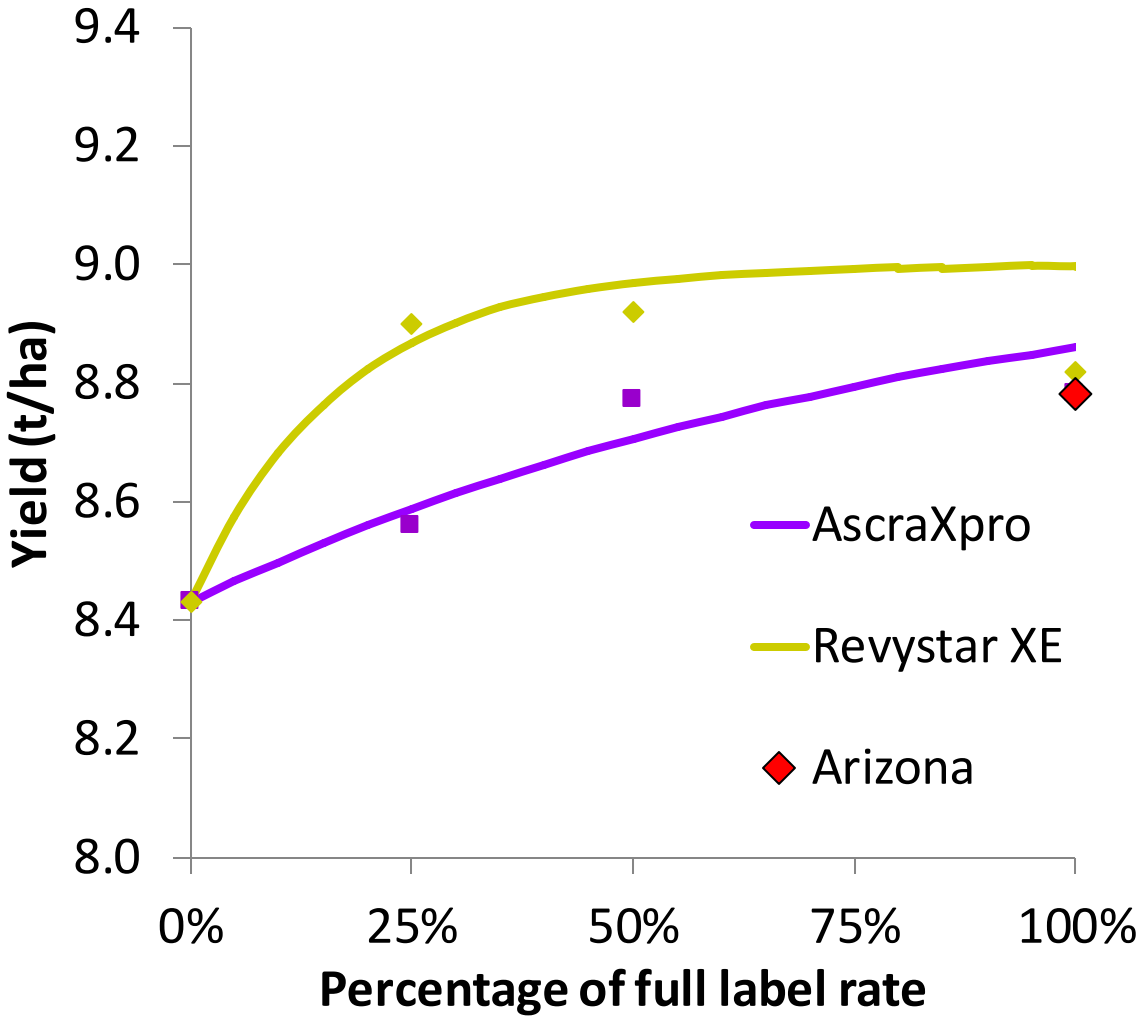
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

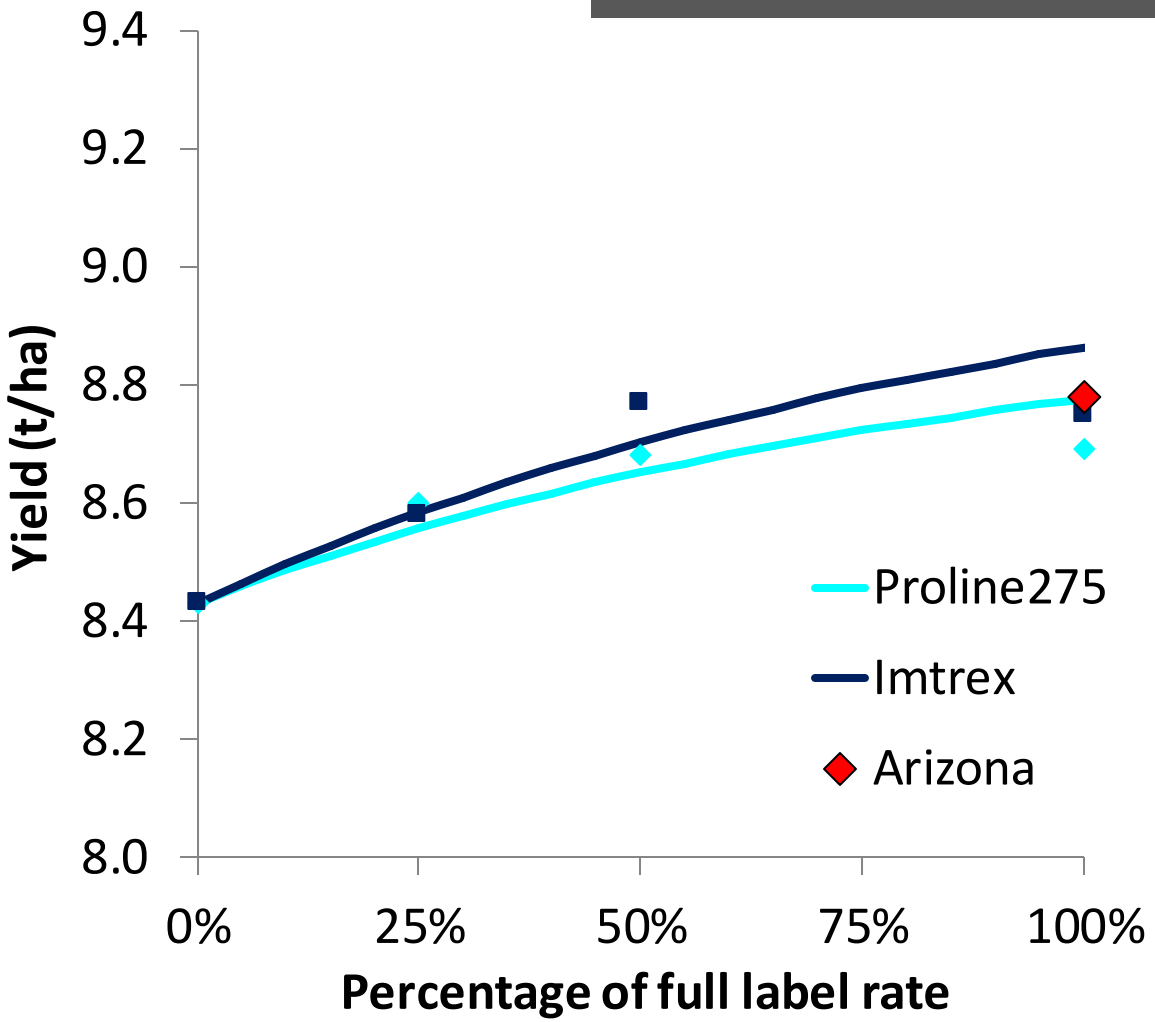




Septoria yield 2020 (7 trials)

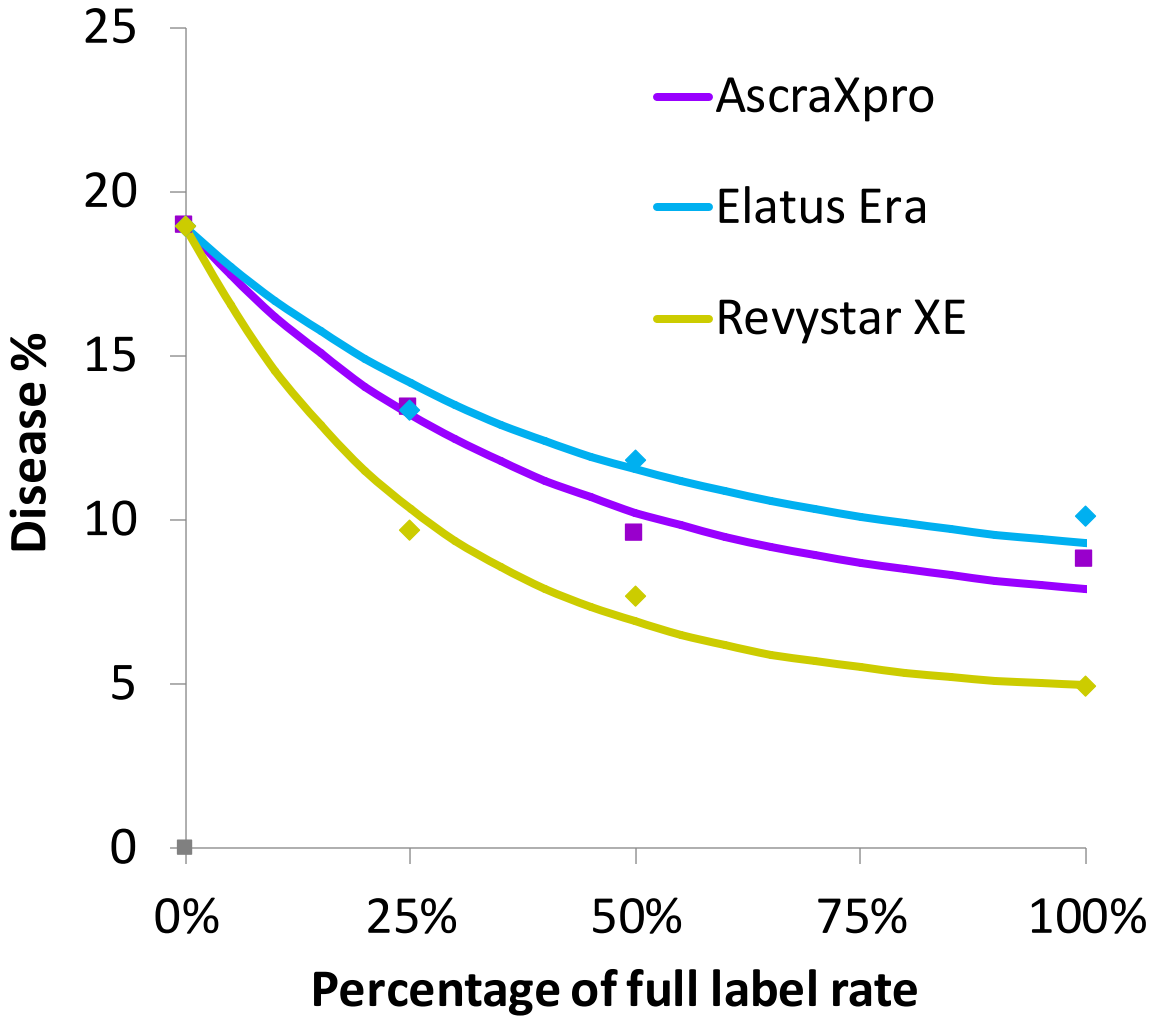
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

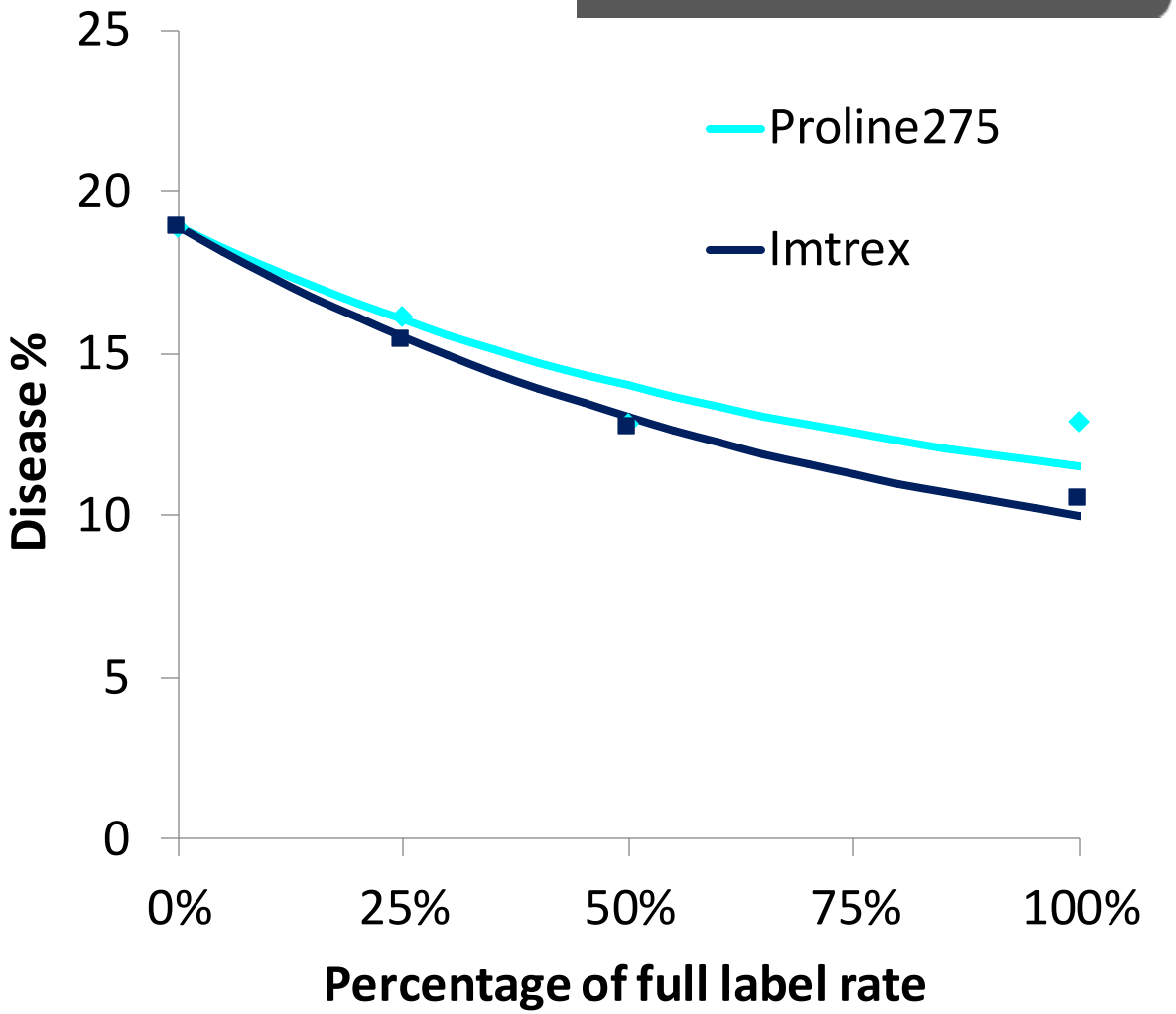




Septoria eradicant 2018–20 (8 trials)

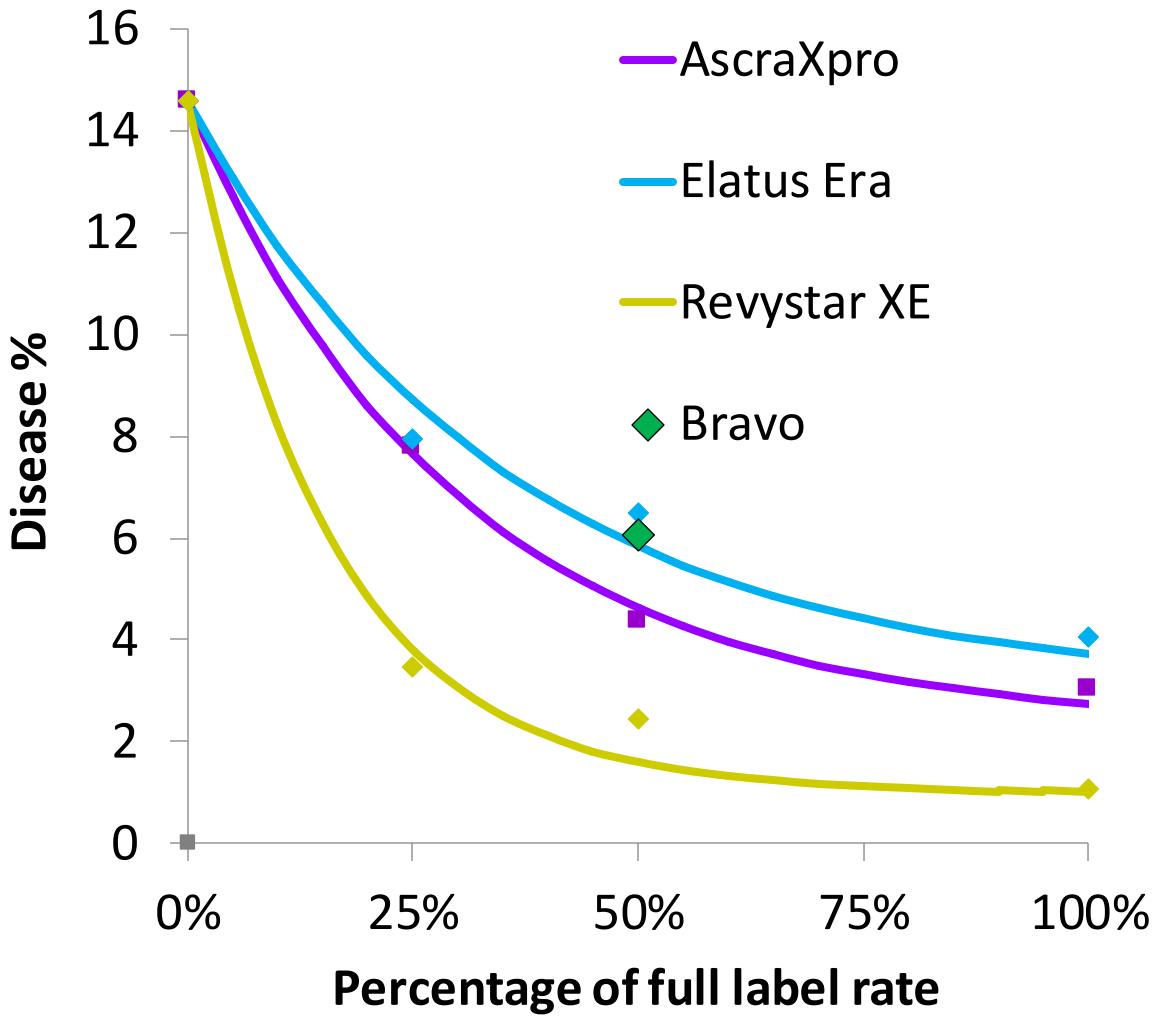
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

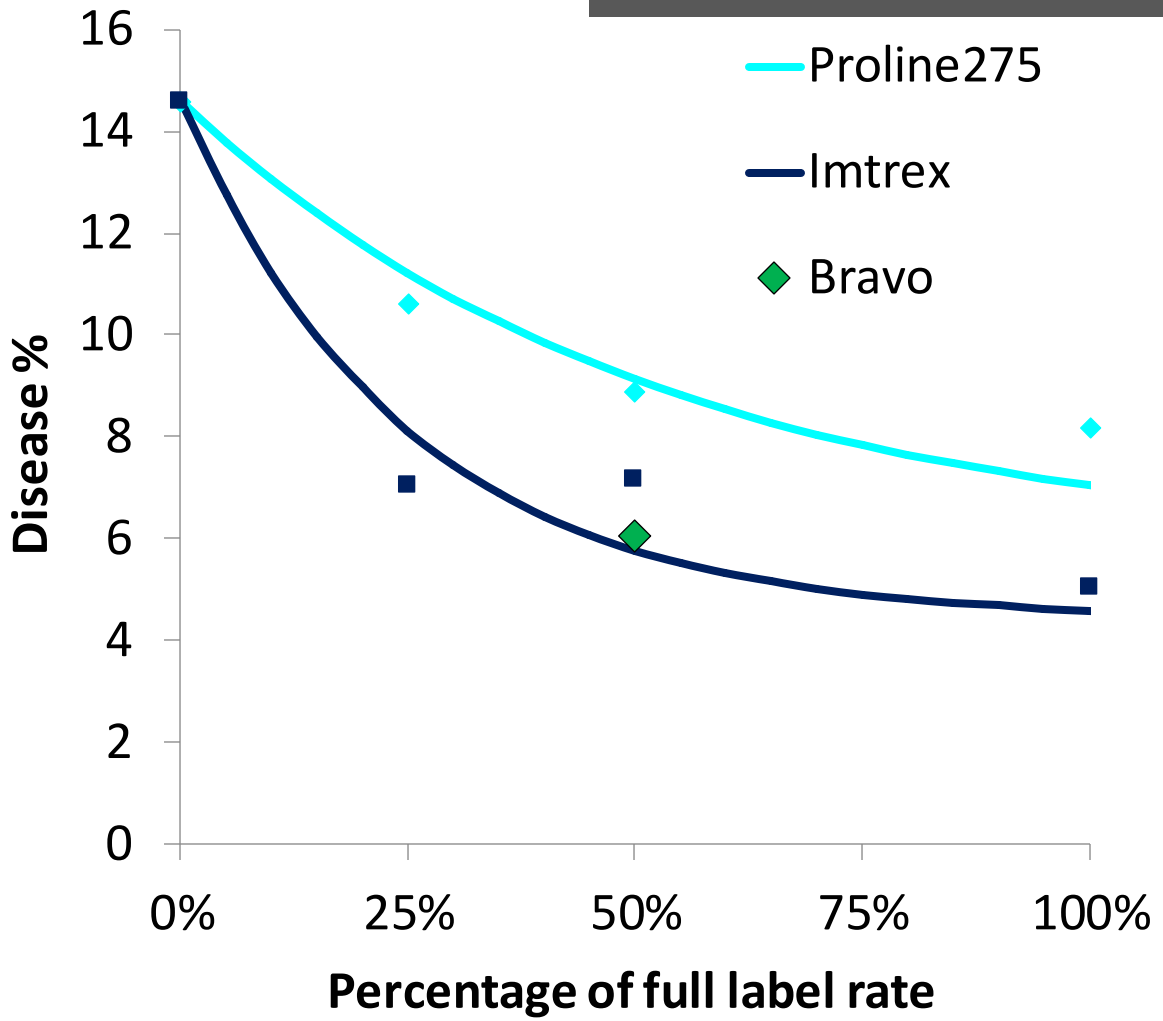




Septoria protectant 2018–20 (14 trials)

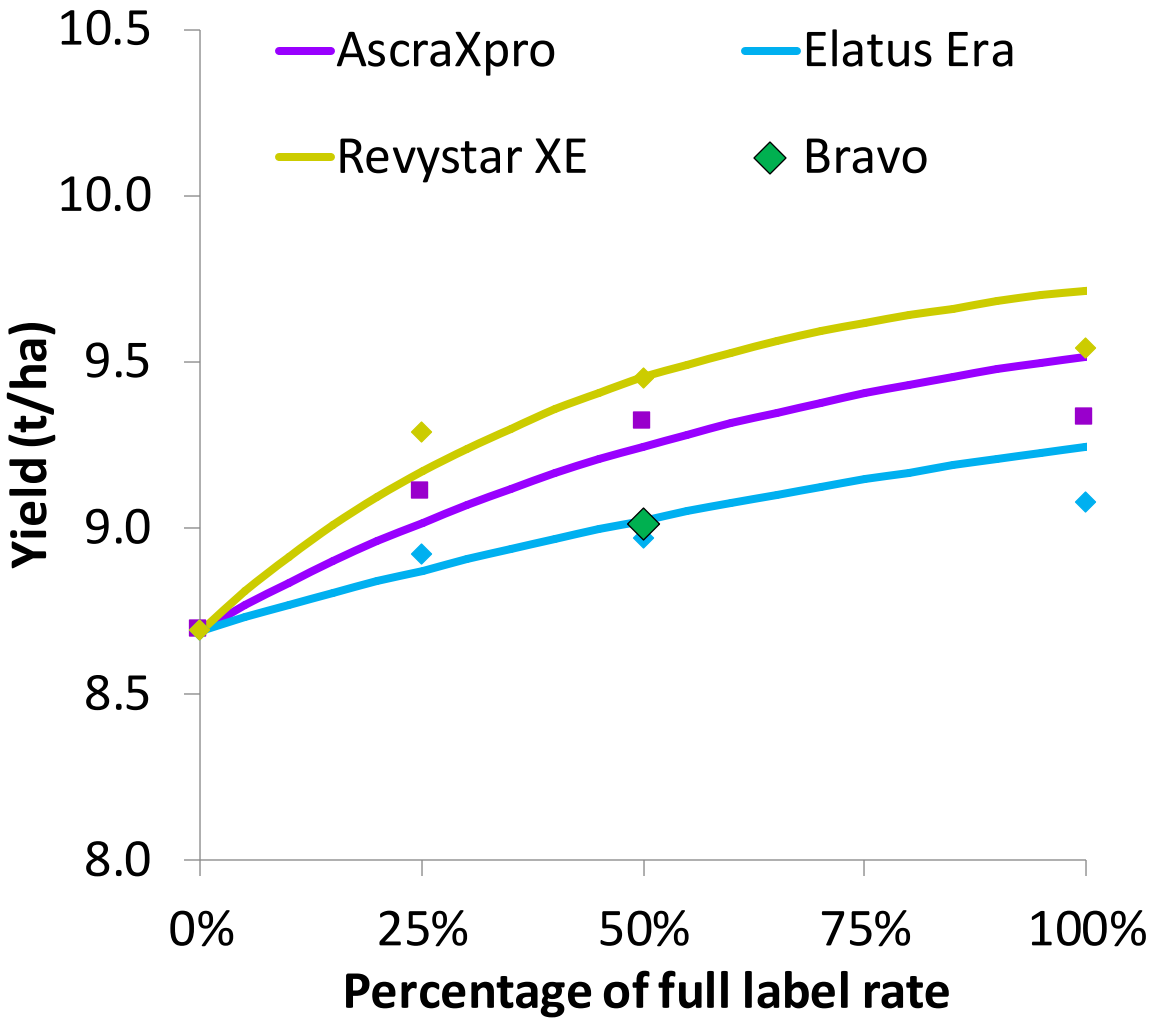
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

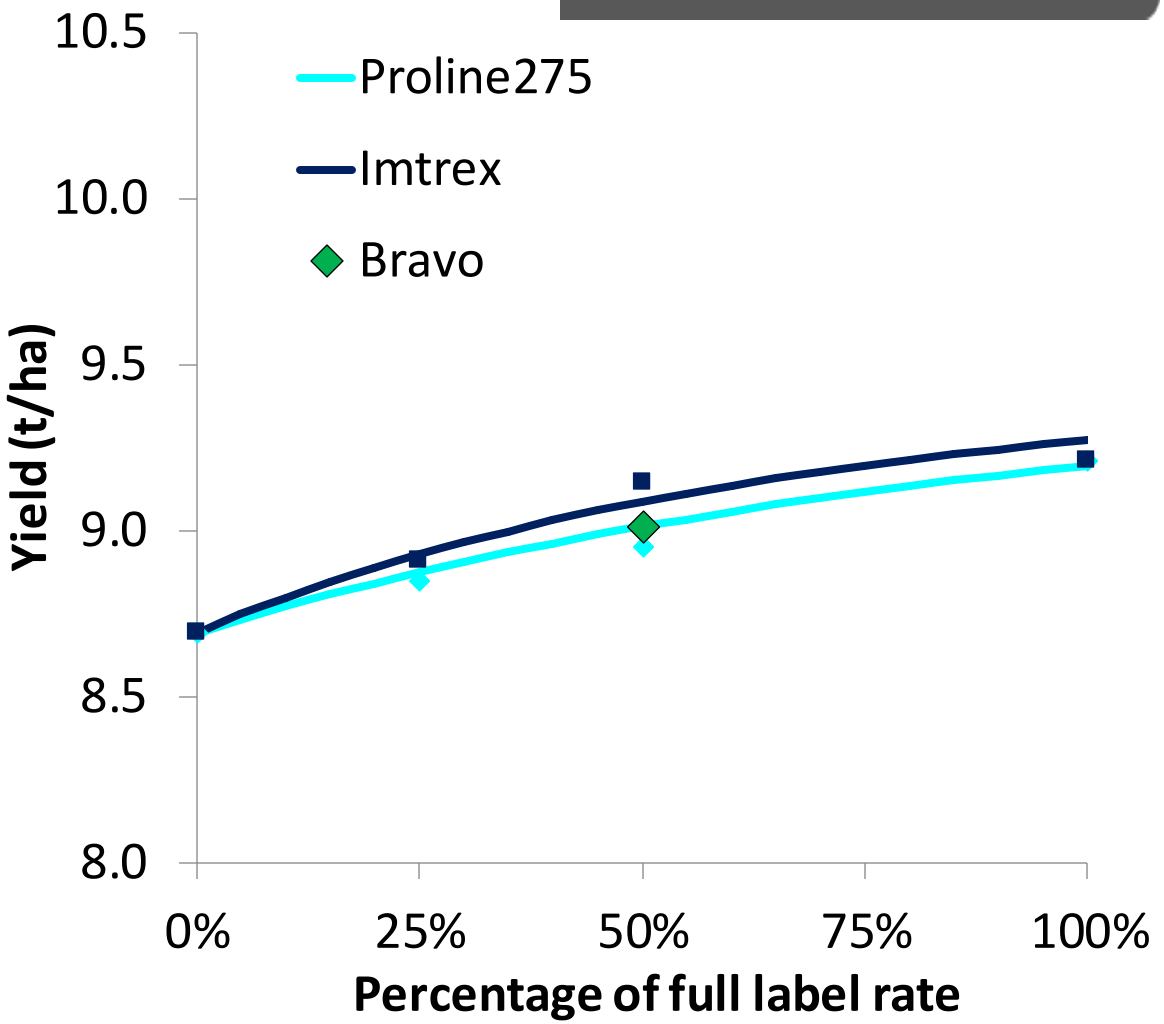




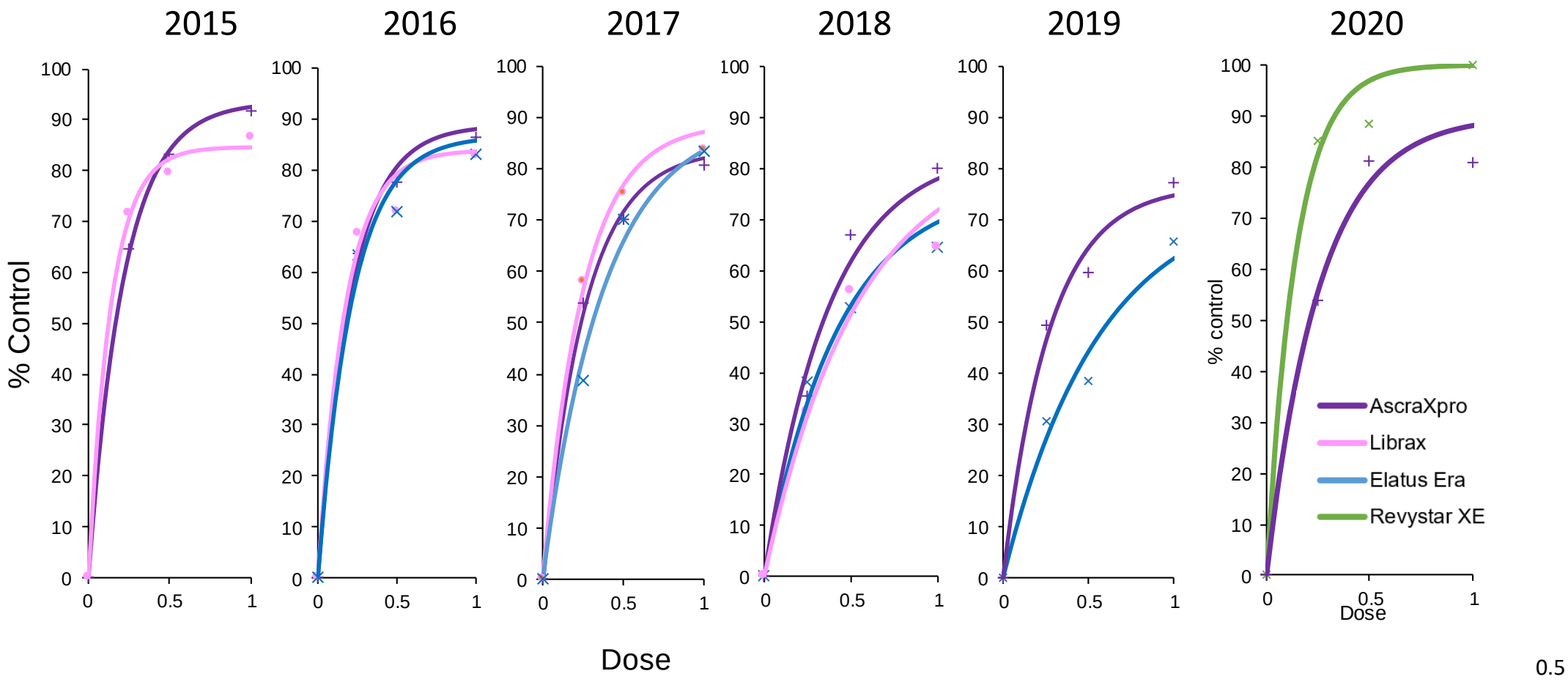
Septoria yield 2018–20 (21 trials)

Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease





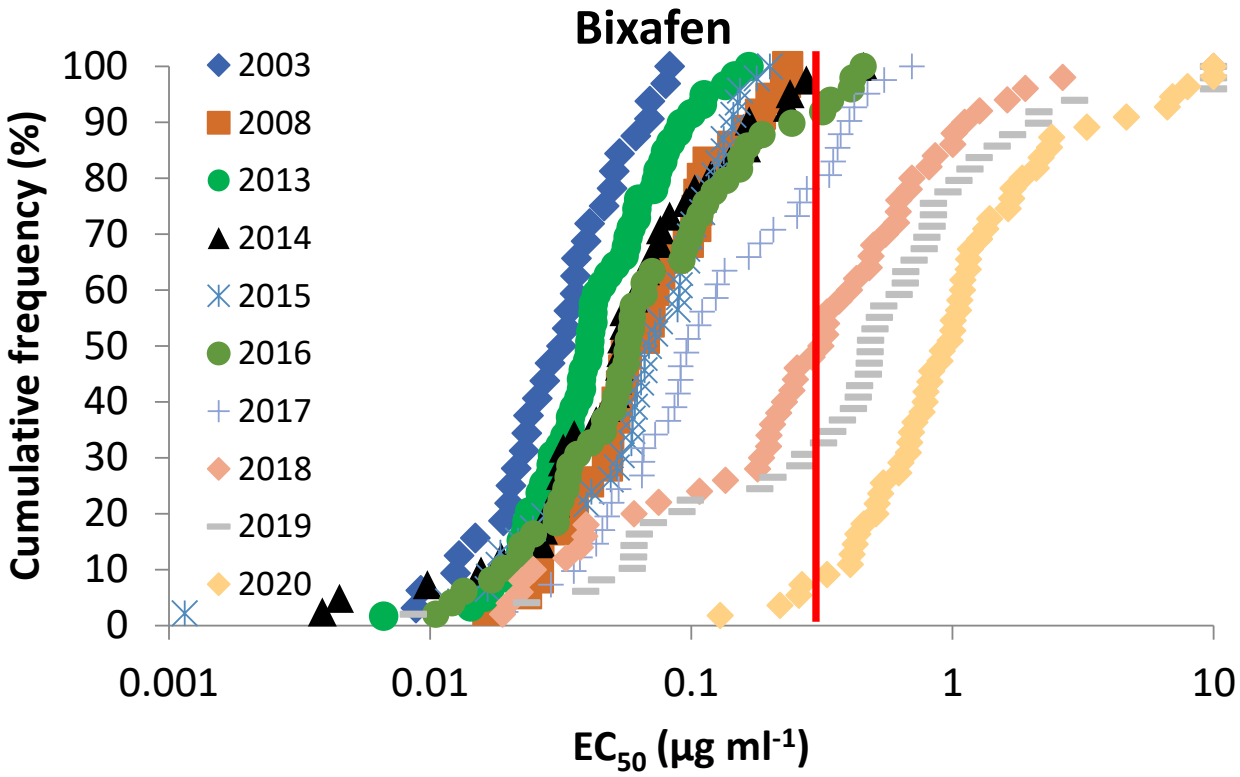
SDHI + azole protectant activity over time

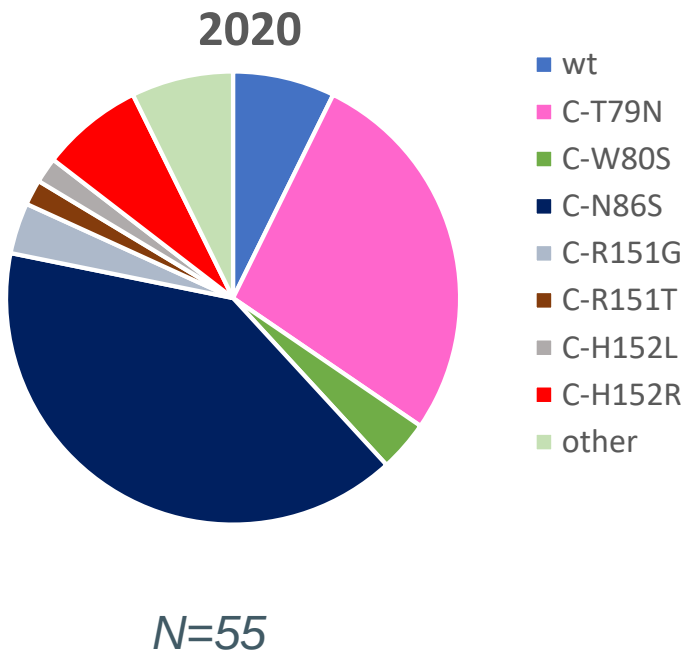


0.5

SDHI sensitivity and 2020 Sdh mutations

Monitoring of early season untreated septoria population at Rothamsted

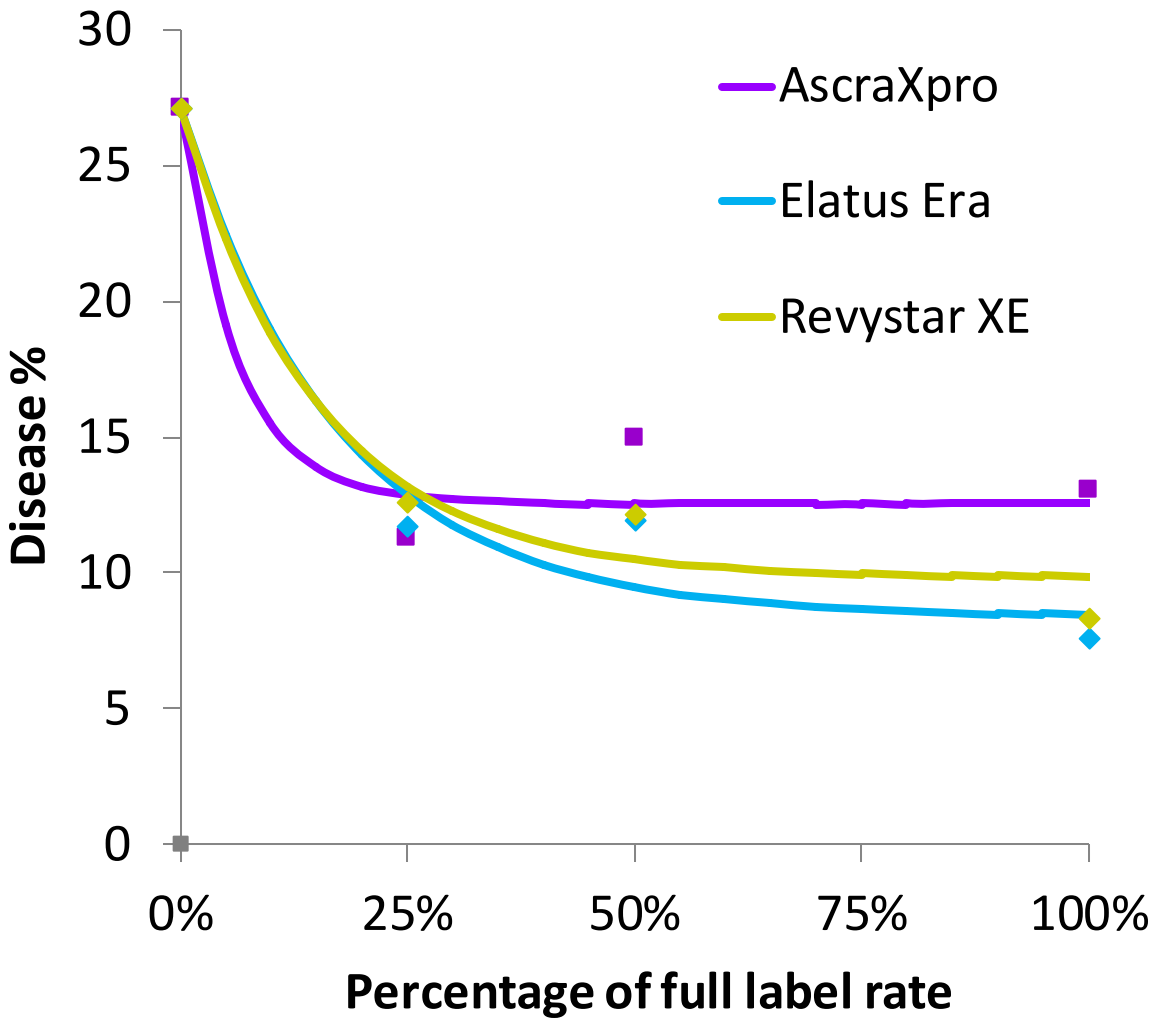




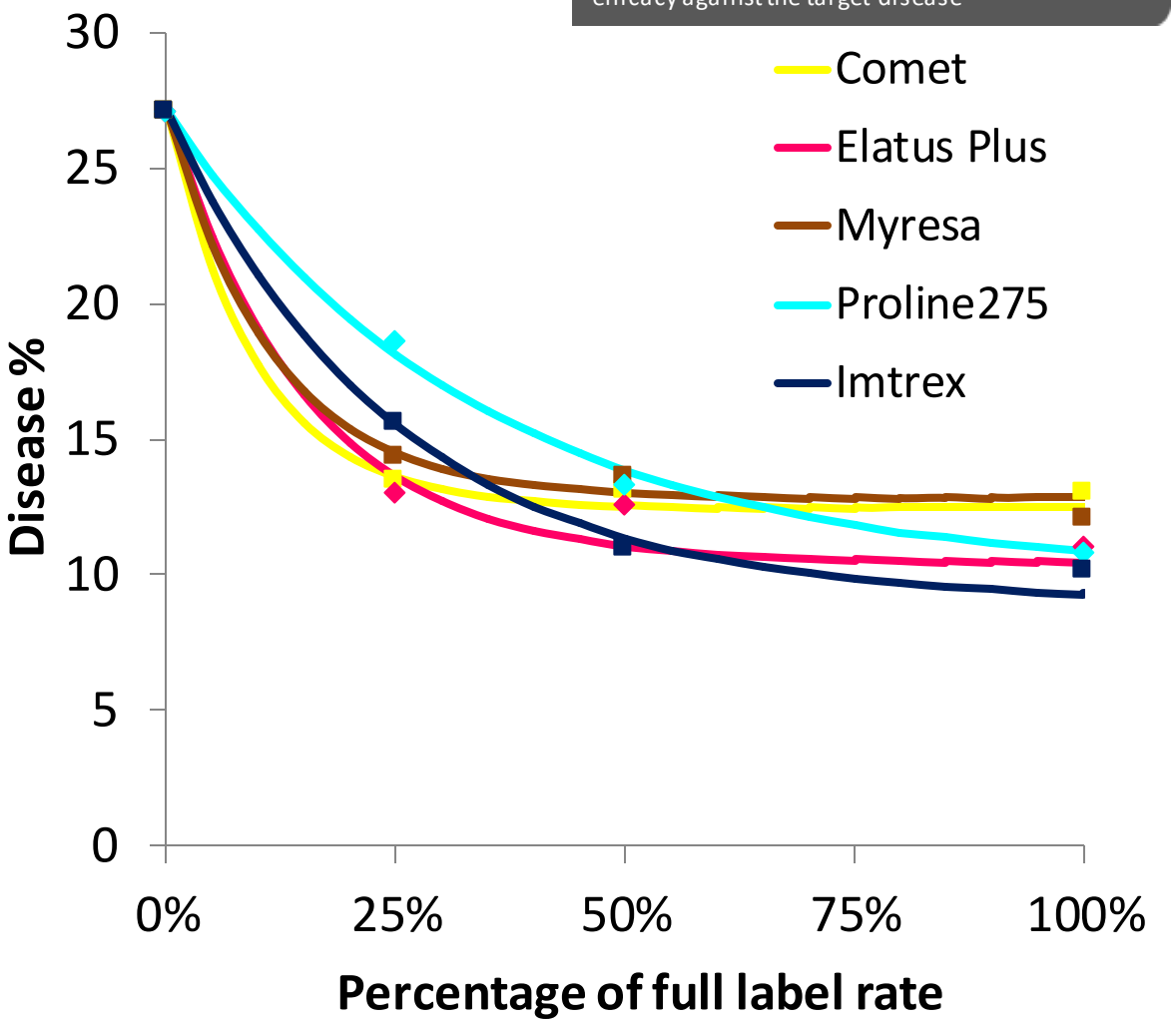
N=55

- Isolates with EC_{50} > 0.3 ppm for bixafen have mutations in Sdh subunits B, C and/or D, and/or increased efflux pump activity.
- Bixafen shows strong cross-resistance with other SDHIs
- Some isolates (C-H152R strains) from 2019 and 2020 have EC_{50} > 10 ppm but are shown as 10 ppm

Yellow rust 2020 (1 trial, mean of leaf layers 1-4)



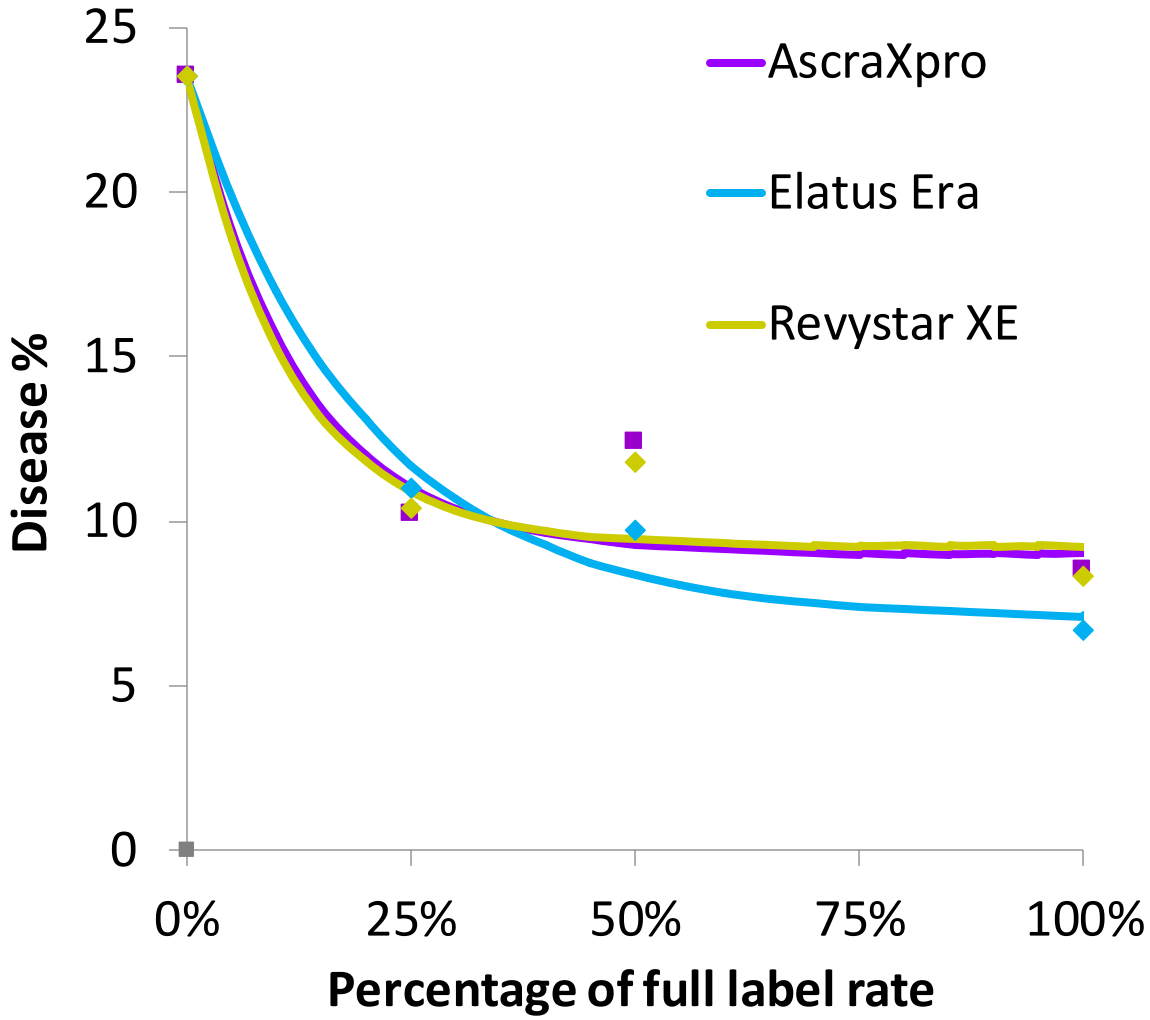
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

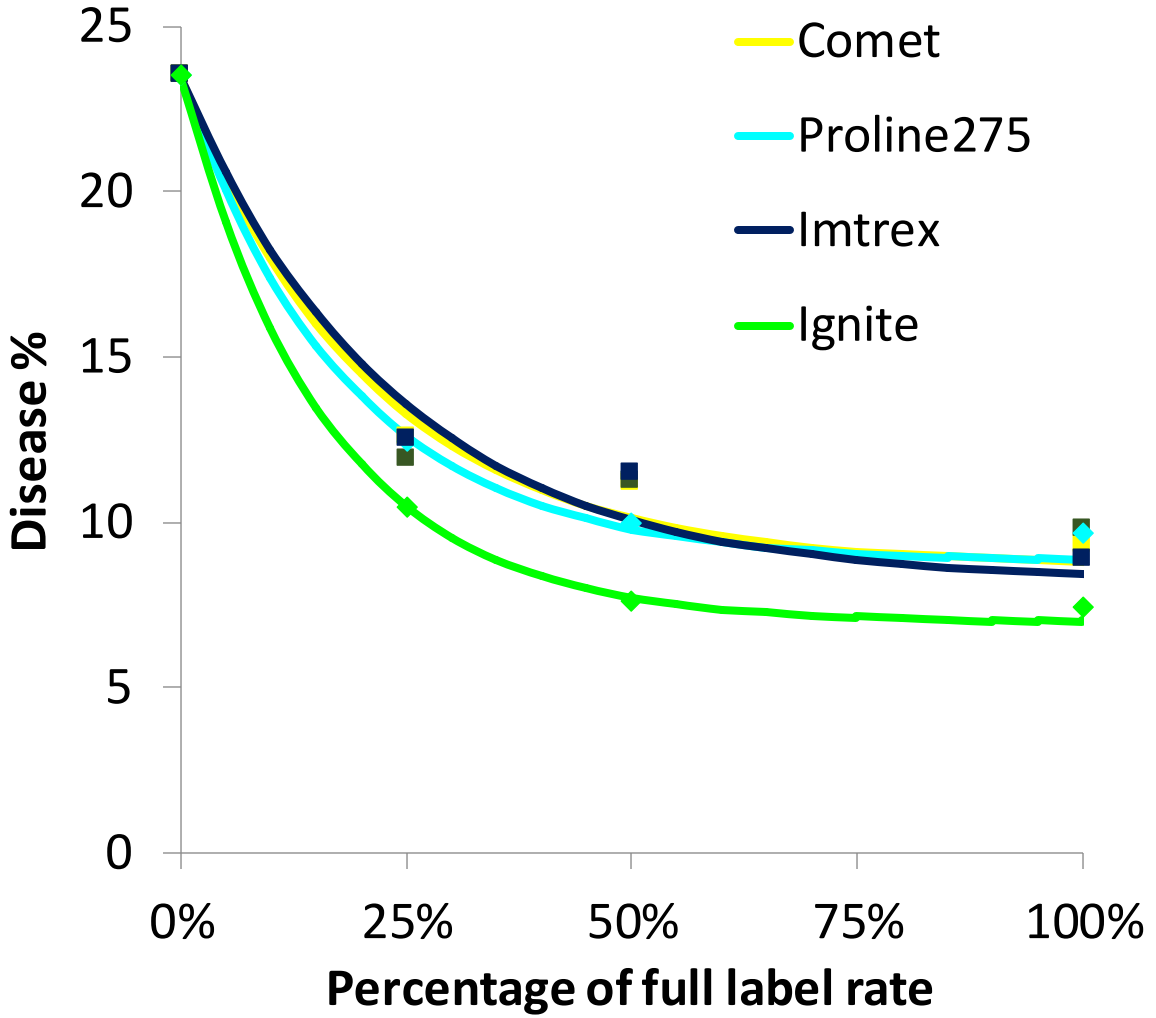


Sprayed at GS33 (leaf 2) on 6/5

Yellow rust 2018–20 (4 trials)

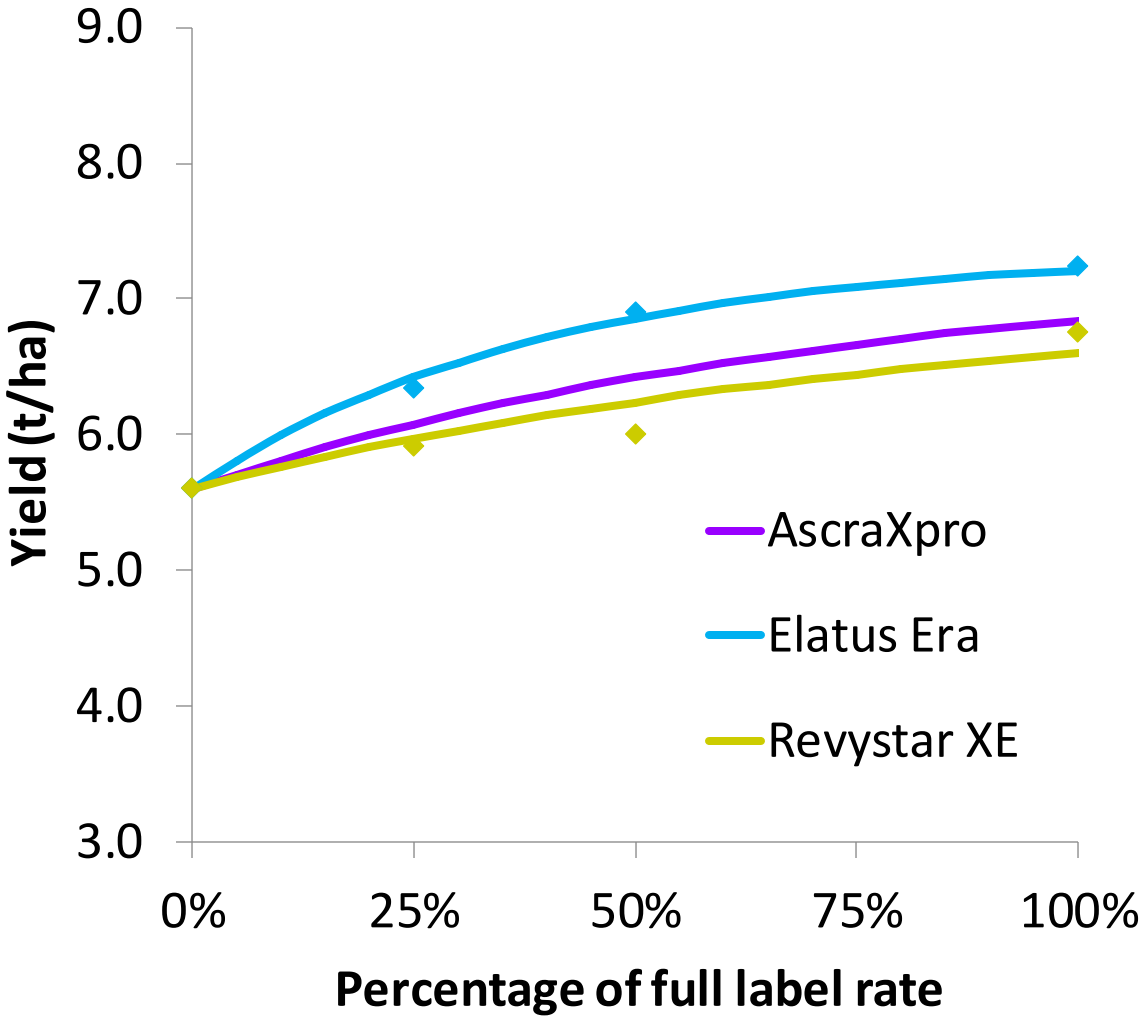
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

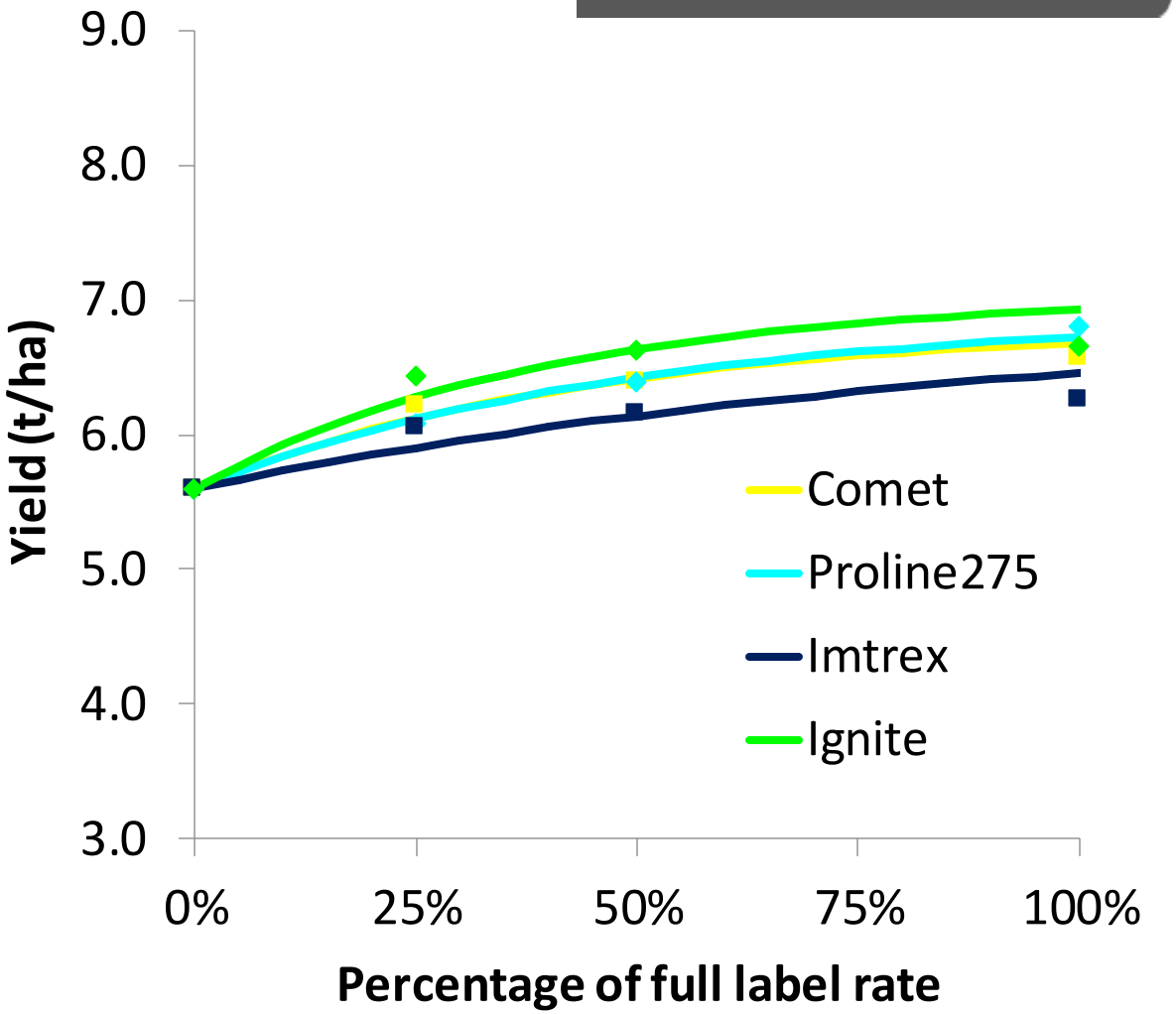




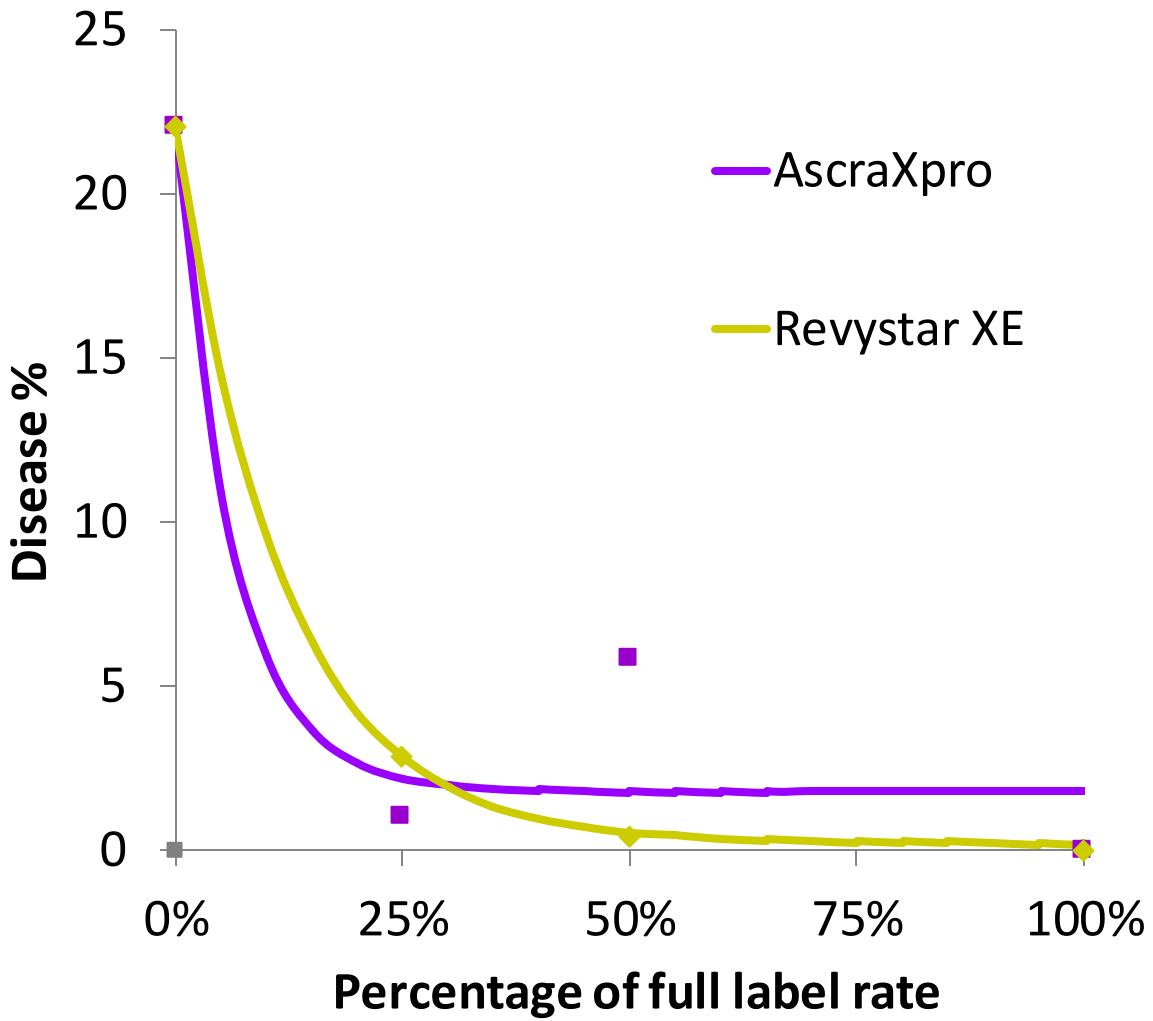
Yellow rust yield 2018–20 (3 trials)

Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

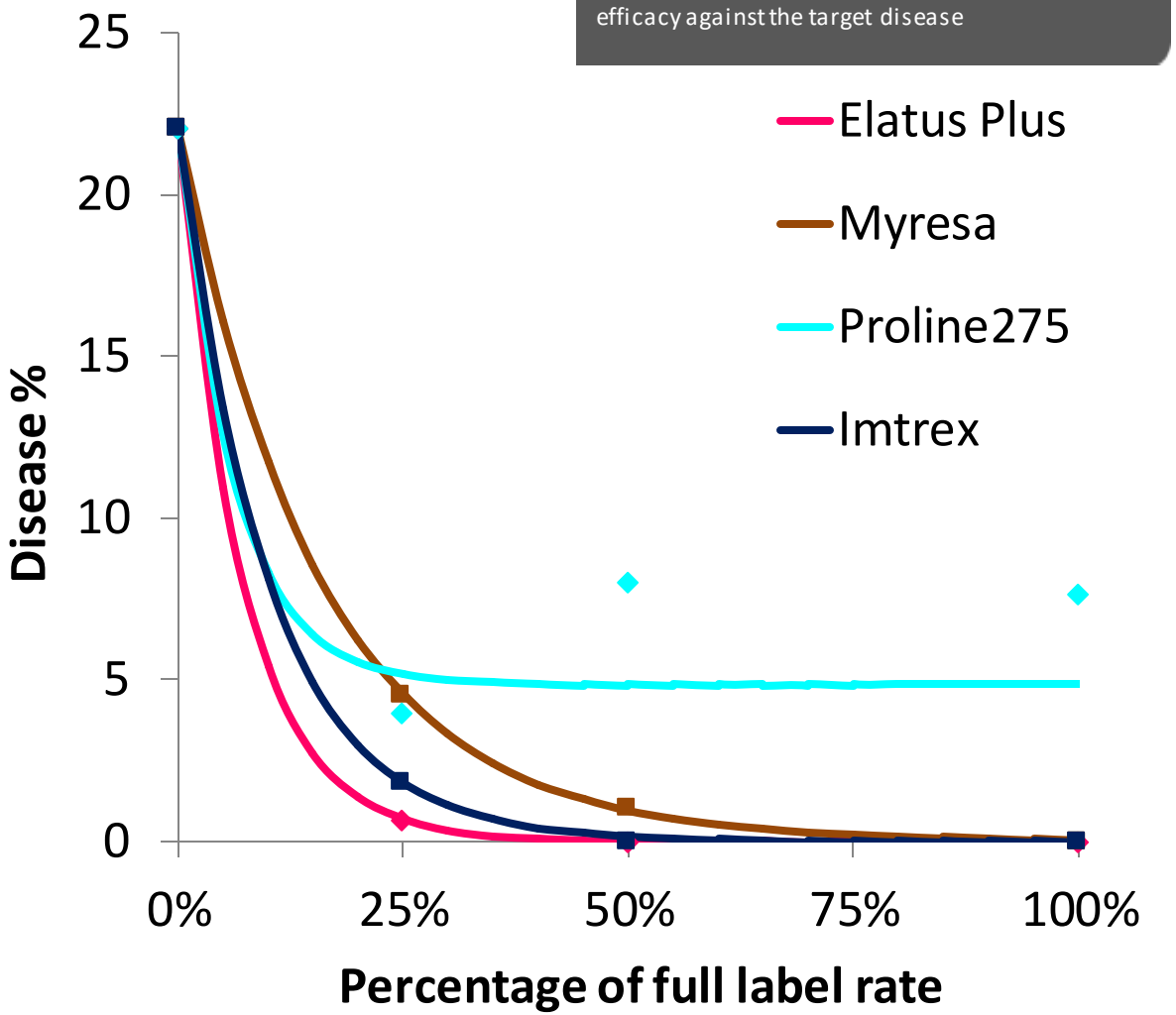




Brown rust 2020 (1 trial, mean of leaf layers 1-2)



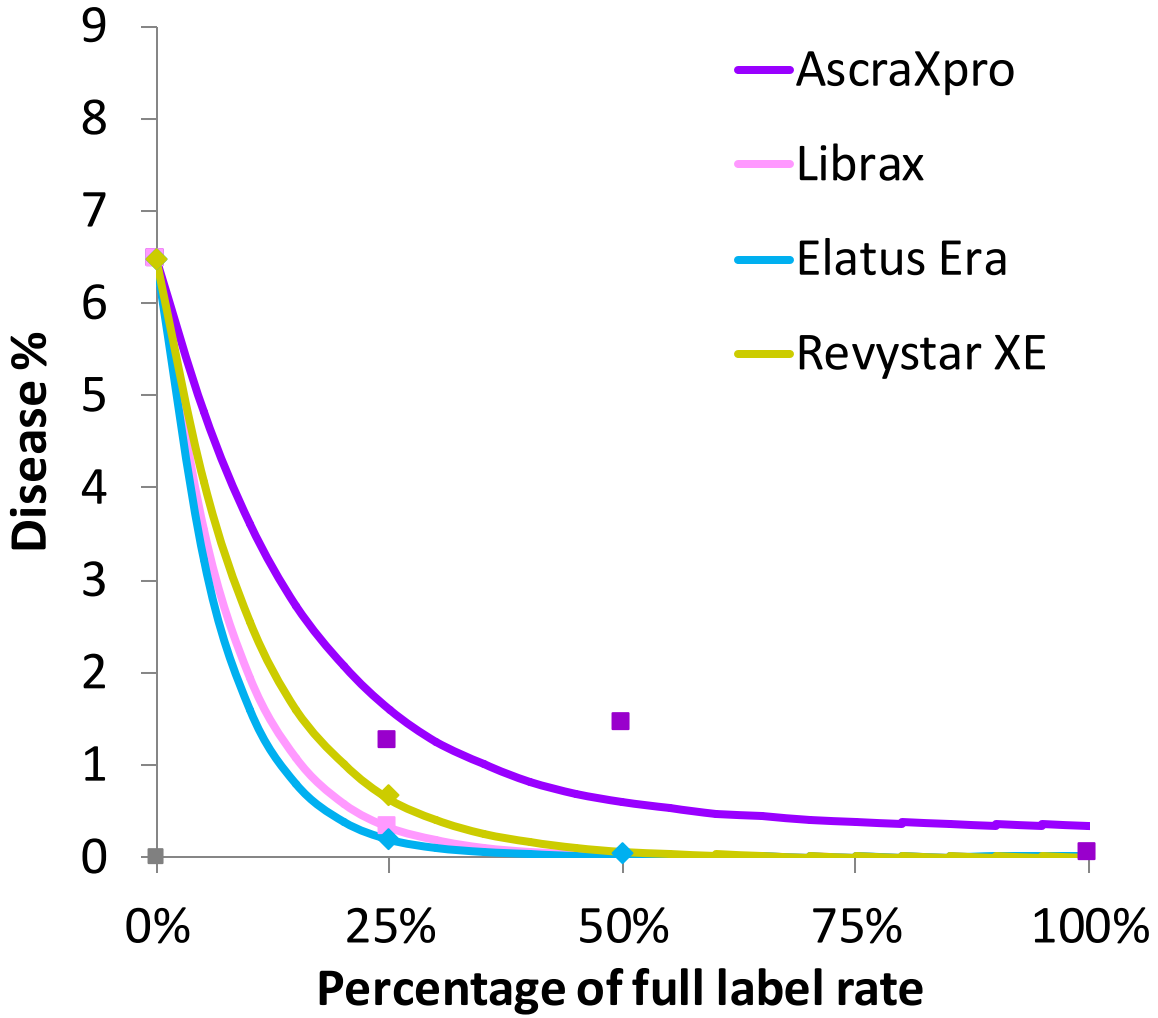
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

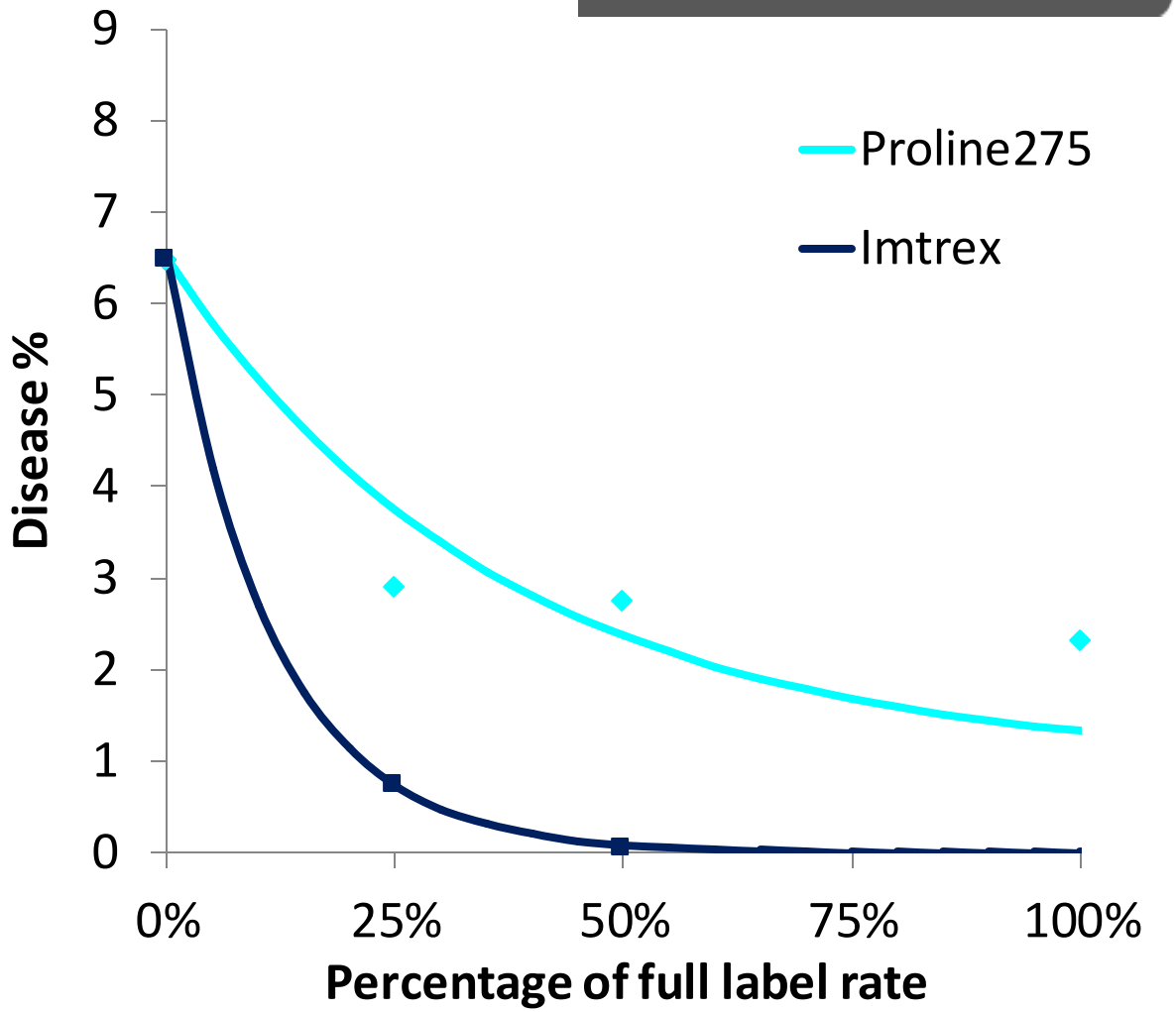


Sprayed at GS39 (flag leaf) on 20/5

Brown rust 2018–20 (5 trials)

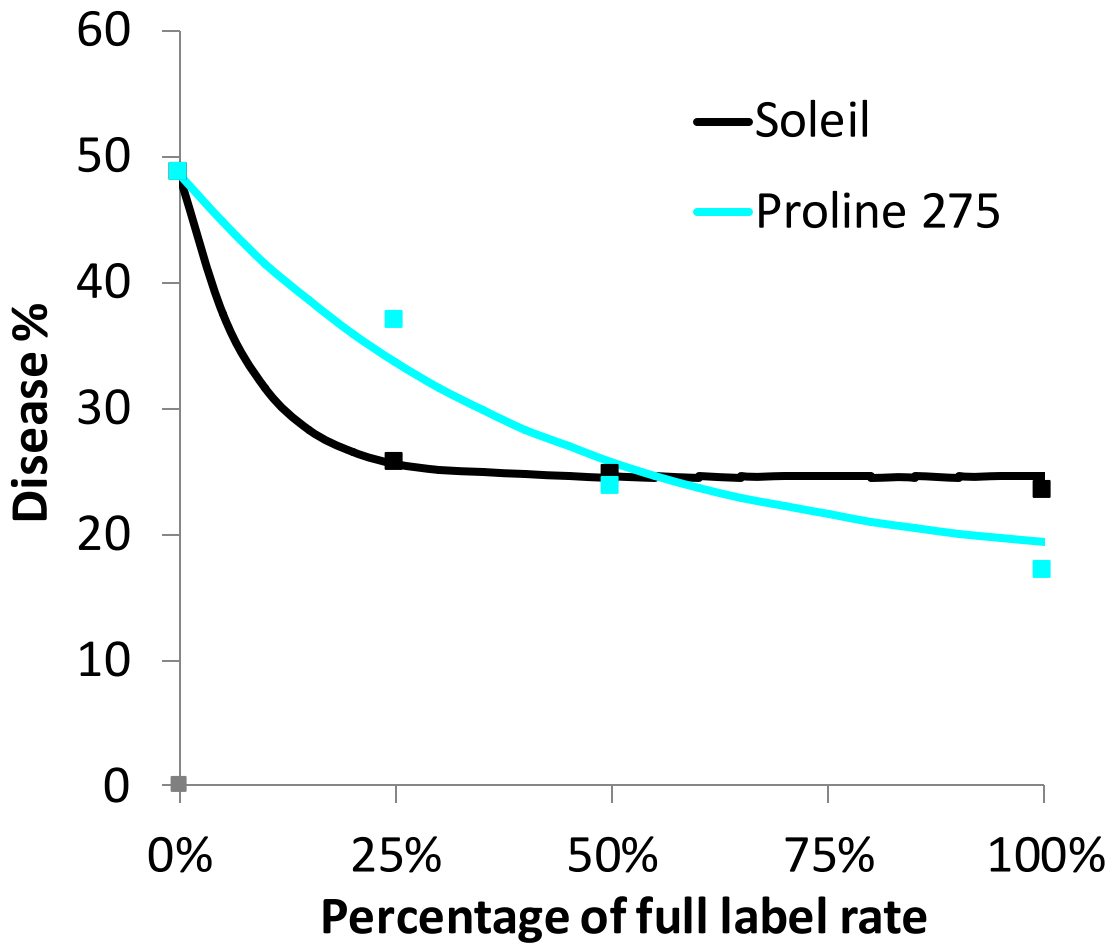
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

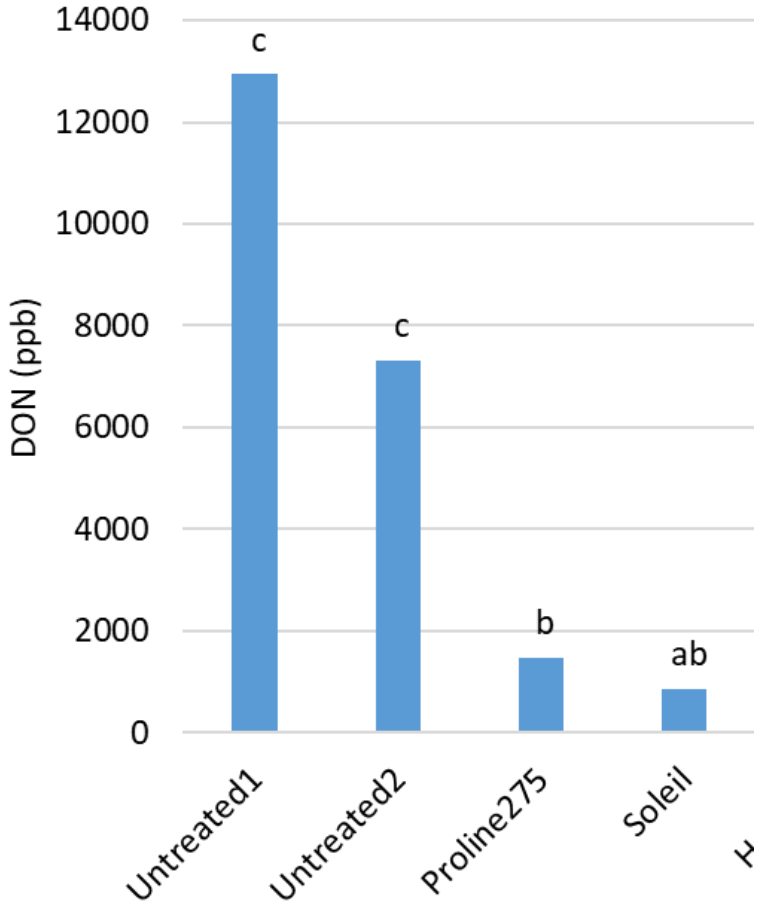




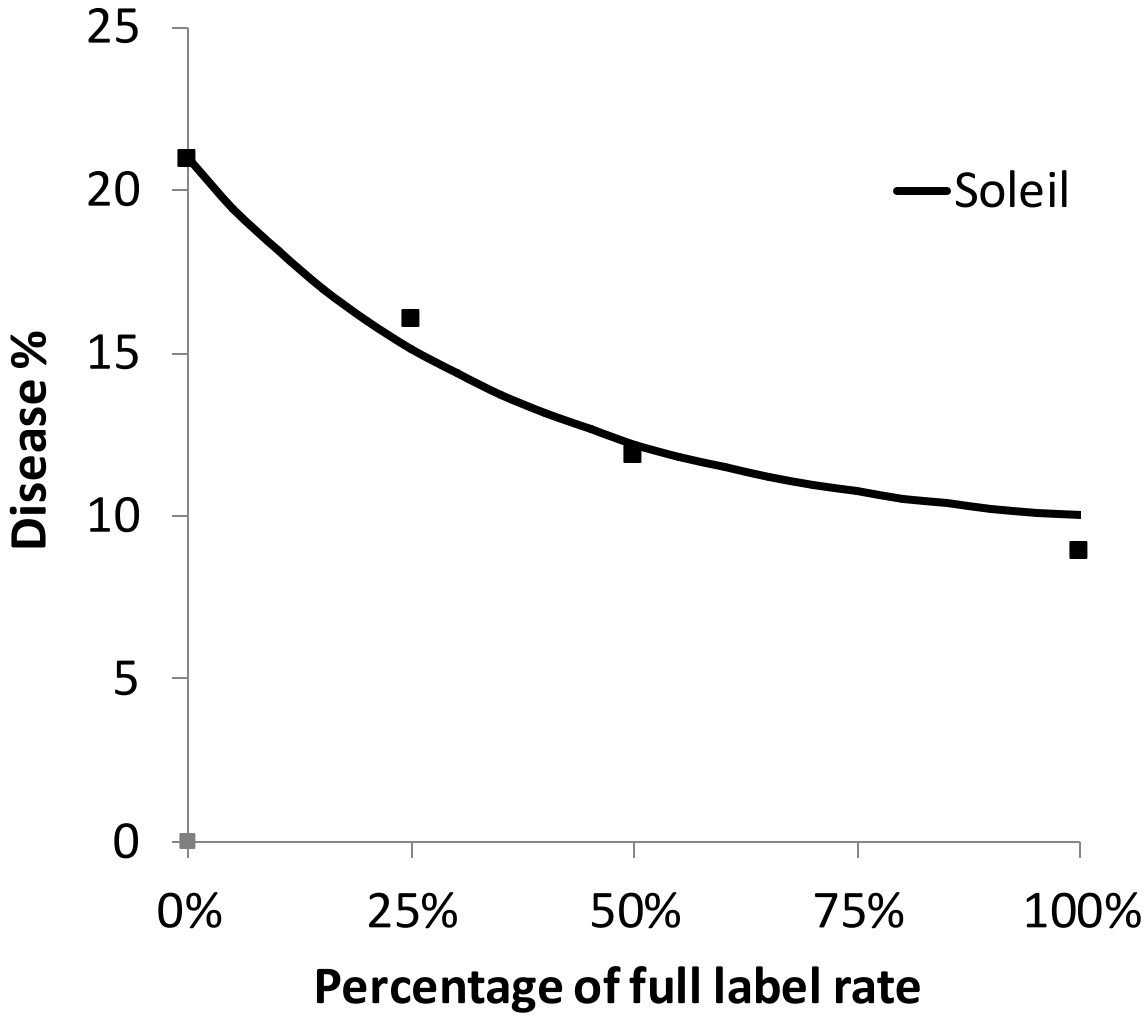
Fusarium 2020 (1 trial)

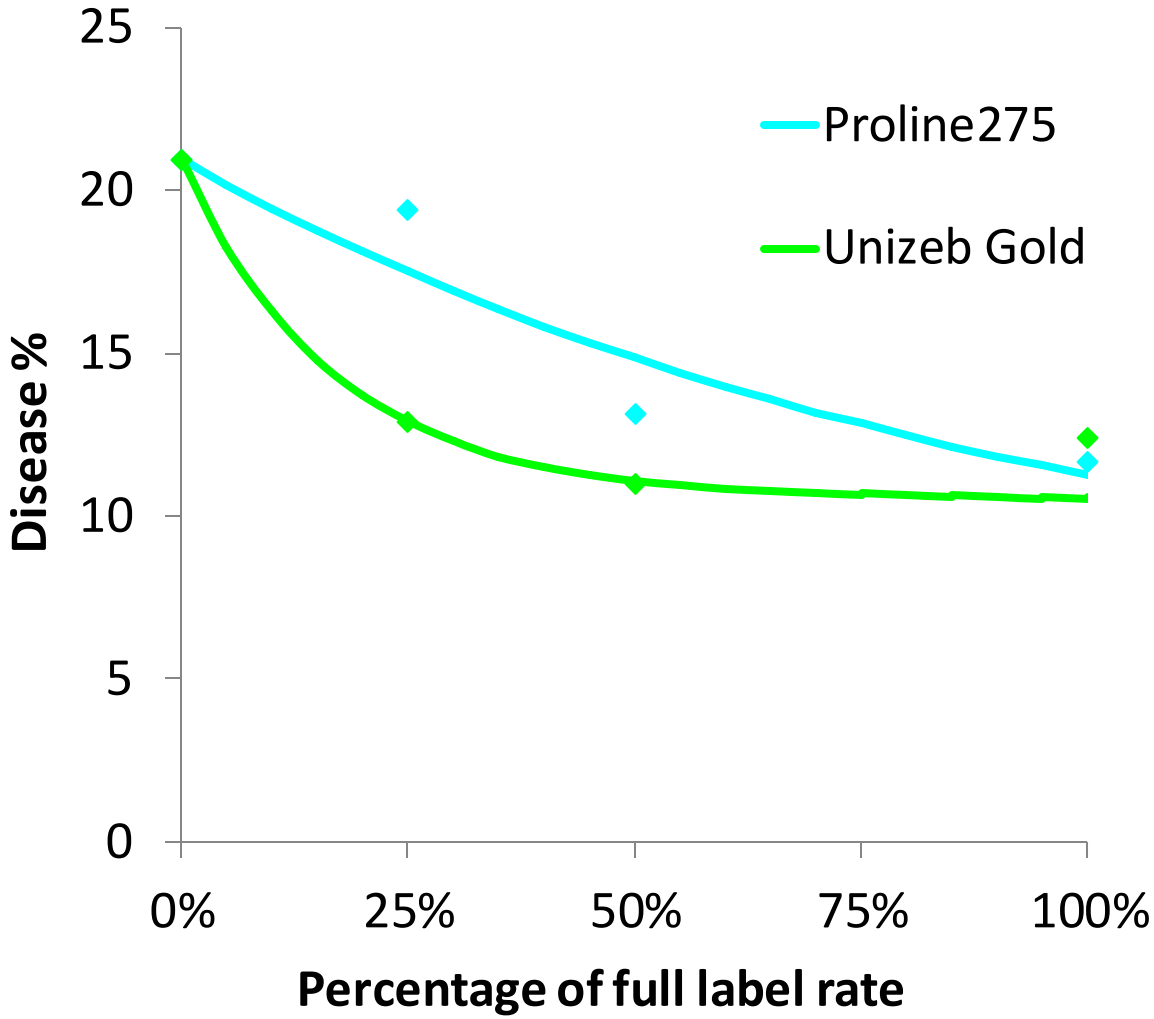
Visual symptoms and DON levels





Fusarium 2018–20 (3 trials)





Wheat summary for 2020

- Septoria:
  - SDHI + azole mixtures continue to give the highest levels of control
  - Revystar XE offers highly effective control, substantially better than Imtrex alone
  - Full dose Arizona gave good septoria protection in 2020, which was reflected in yield
  - Possible further shift in SDHI sensitivity but overall efficacy similar to 2018/19
- Rusts:
  - Small differences in yellow rust control between SDHI, azole and strobilurin products
  - Proline not as effective against brown rust as Myresa (revysol) or the SDHI products
  - Elatus Era more effective than Ascra Xpro on both yellow rust and brown rust
  - Revystar XE is active against yellow rust and very effective against brown rust
- Fusarium: Soleil performing similarly to Proline, and as effective at reducing DON levels

Fungicide performance update: Barley (2020)

Barley trials and sites (2020)

Site	Target disease	Variety	Disease data collected
Cardigan (ADAS)	Rhynchosporium	KWS Cassia	rhynchosporium (mixed)
Lanark (SRUC)	Rhynchosporium	KWS Tower	rhynchosporium (eradicant)
Carlow (Teagasc)	Rhynchosporium	KWS Cassia	rhynchosporium (eradicant)
Norfolk (NIAB)	Net Blotch	Flagon	net blotch (eradicant)
High Mowthorpe (ADAS)	Net Blotch	KWS Creswell	mildew only
Carlow (Teagasc)	Ramularia	Pixel	no significant disease

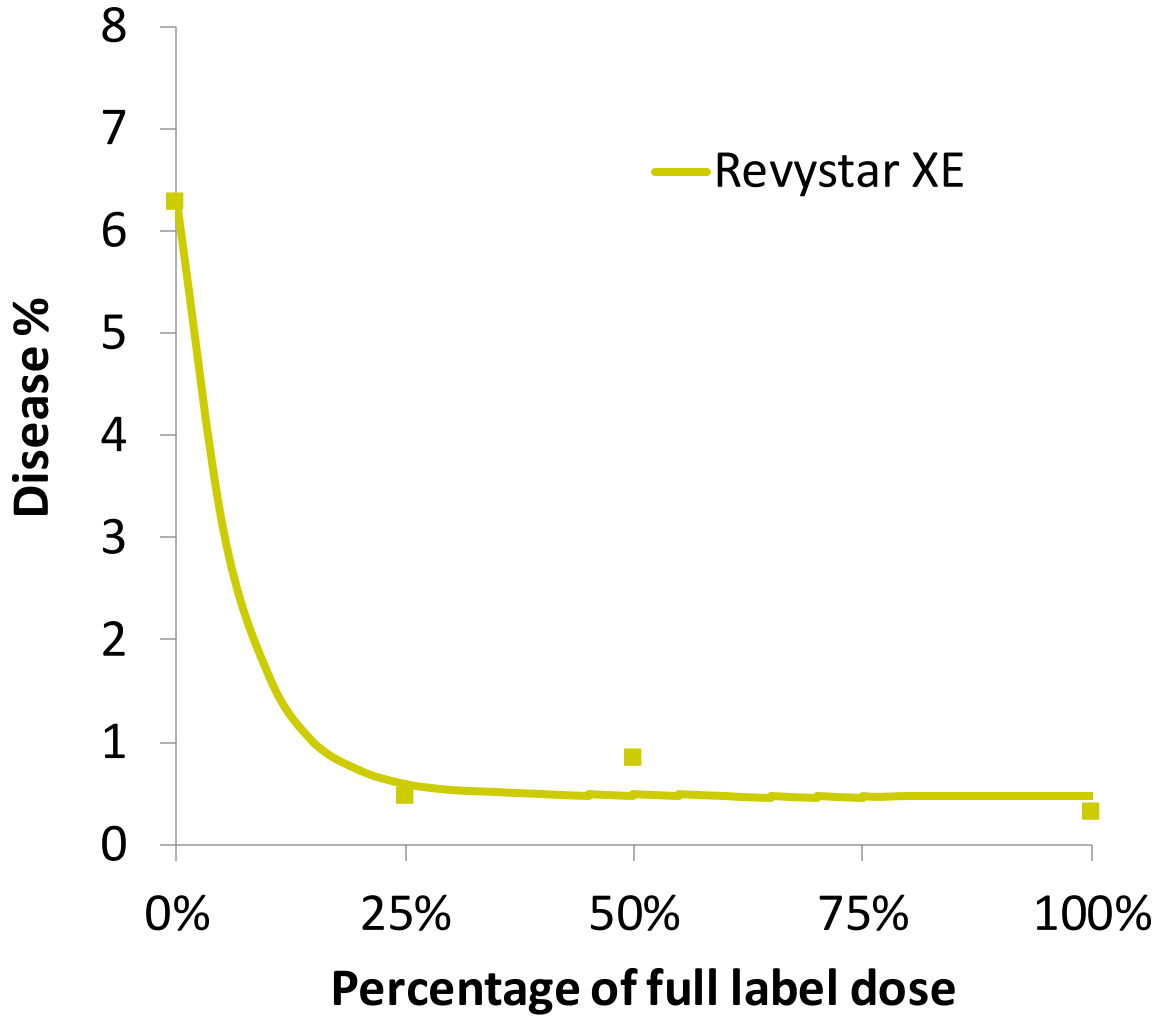
Barley products

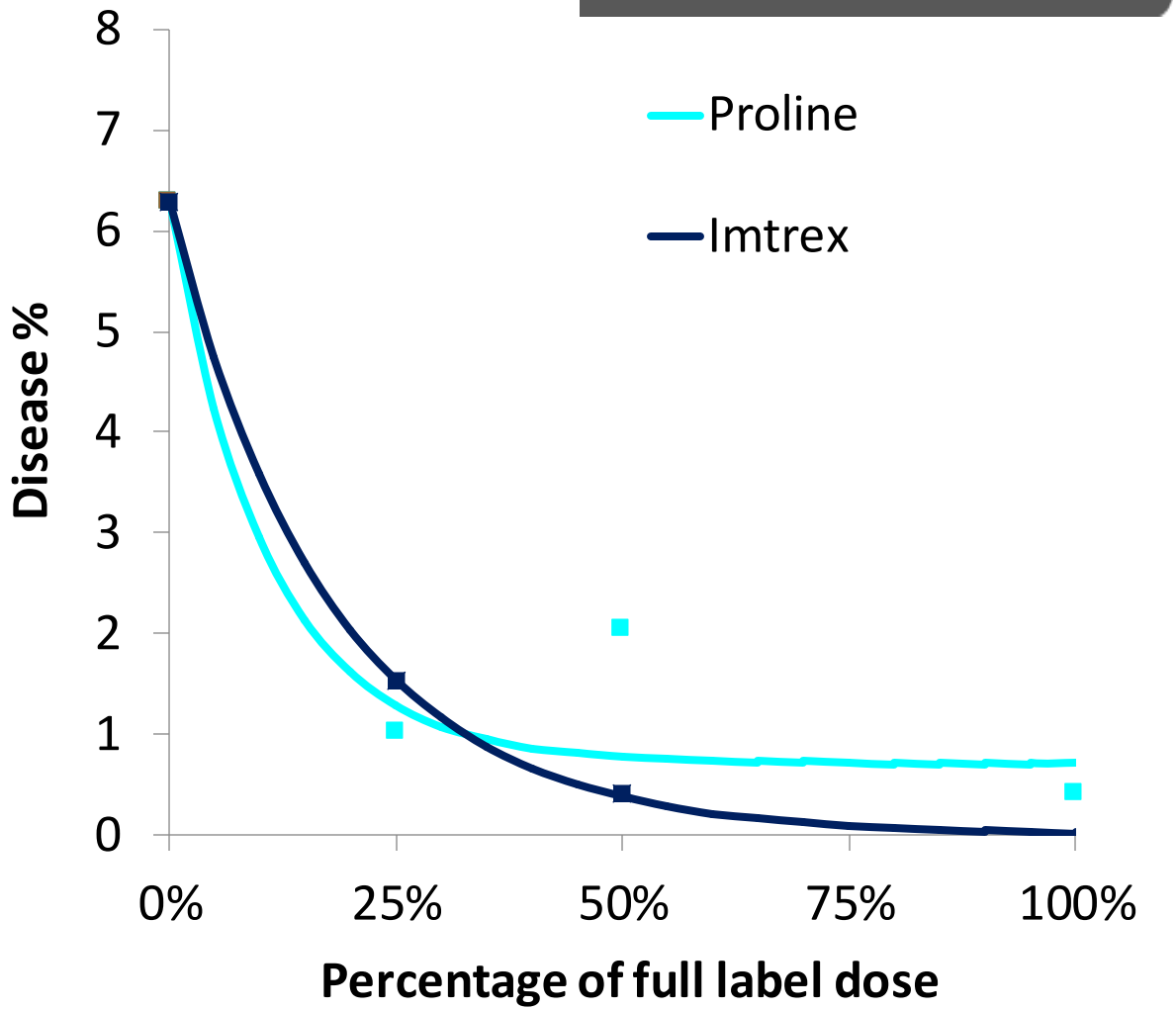
Product	Active(s)	Rhynchosporium	Net blotch	Ramularia
Proline	prothioconazole	✓	✓	✓
Imtrex	fluxapyroxad	✓	✓	
Revystar XE	revysol + fluxapyroxad	✓	✓	✓
Myresa	revysol (mefentrifluconazole)			✓
Siltra Xpro	bixafen + prothioconazole	(✓)		
Kayak	cyprodinil		(✓)	
Bravo	chlorothalonil**			(✓)

(✓) = not in trials in 2020
** no longer approved

Rhynchosporium eradicant 2020 (2 trials)

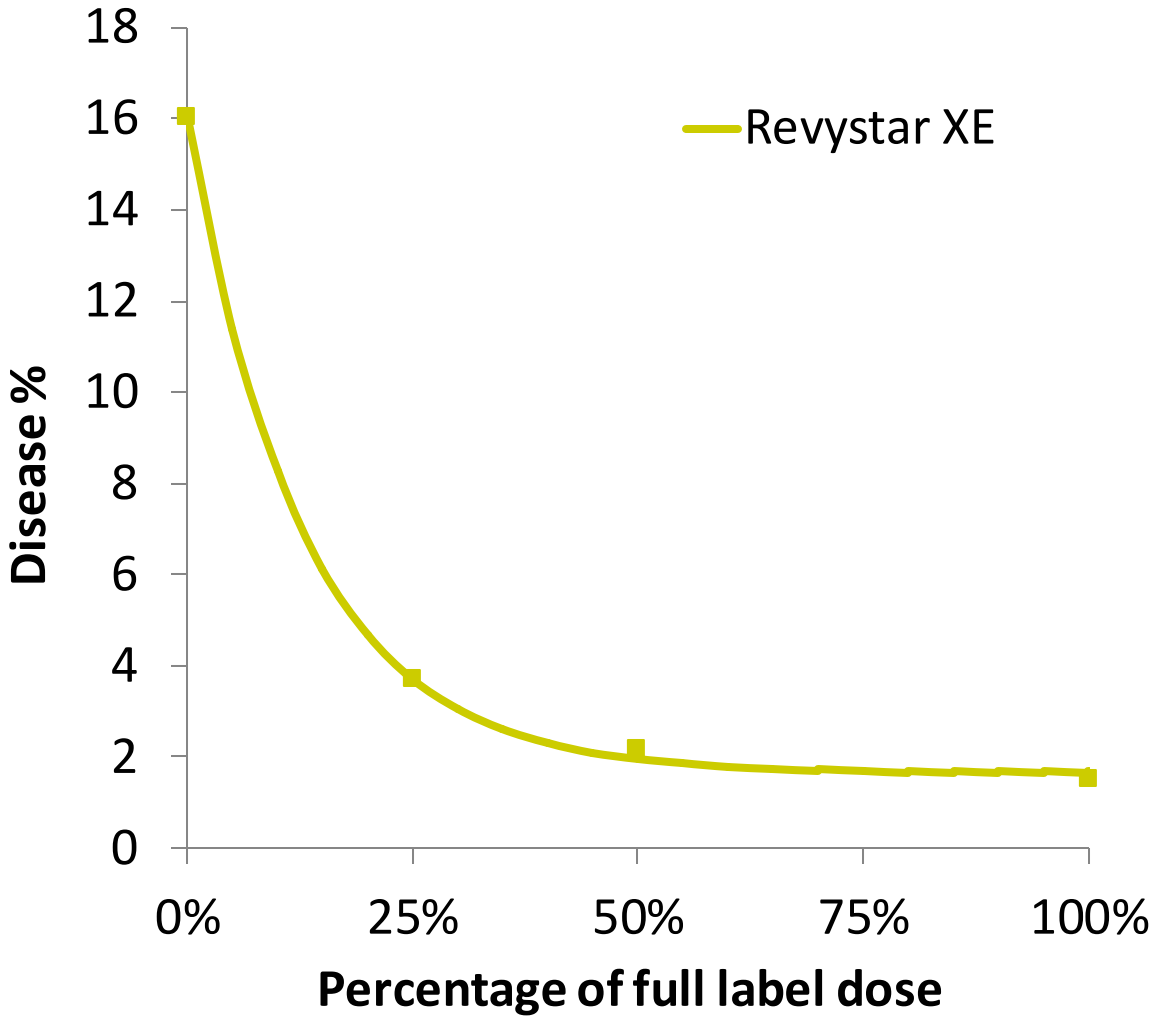
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

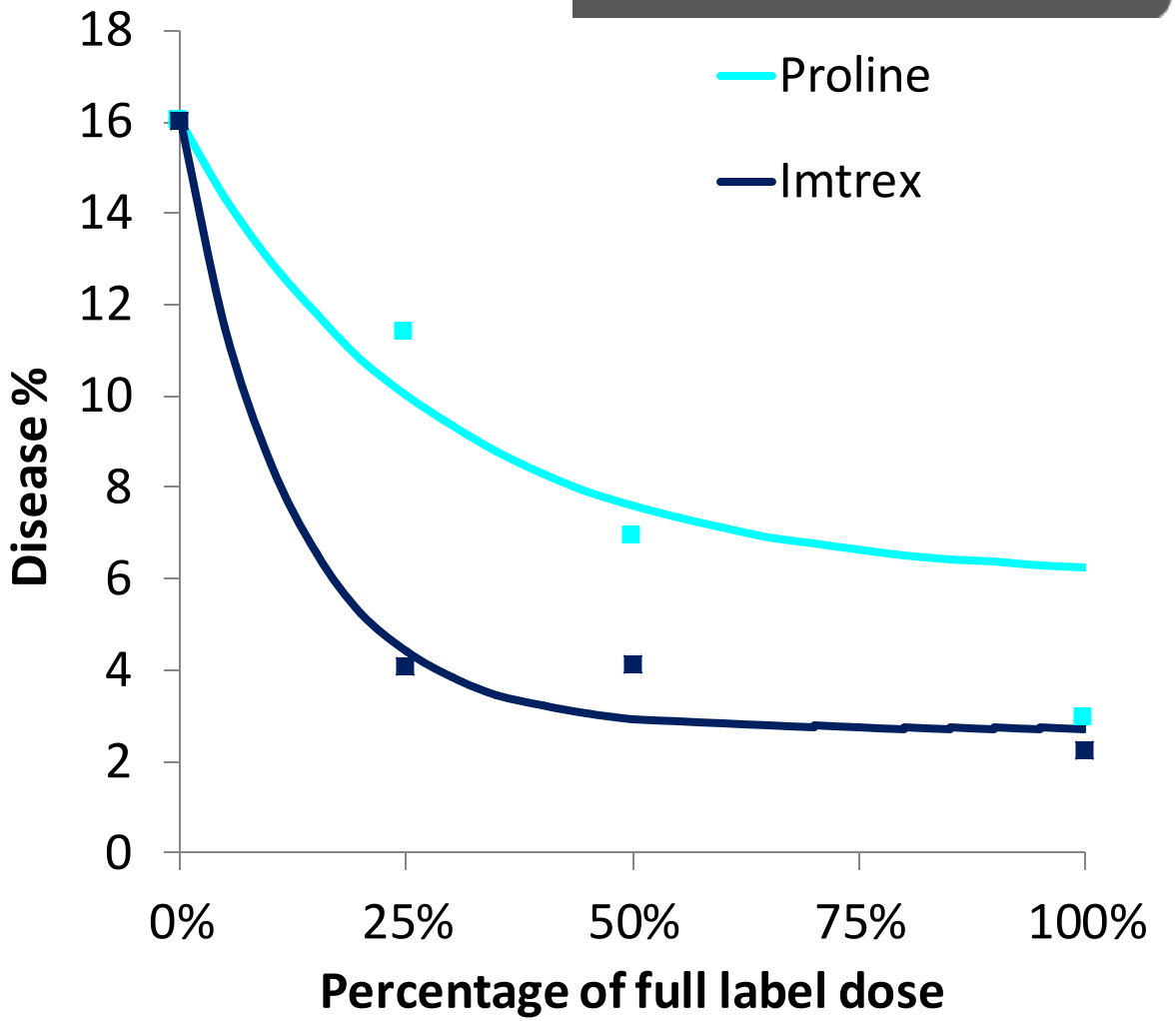




Rhynchosporium mixed 2020 (1 trial)

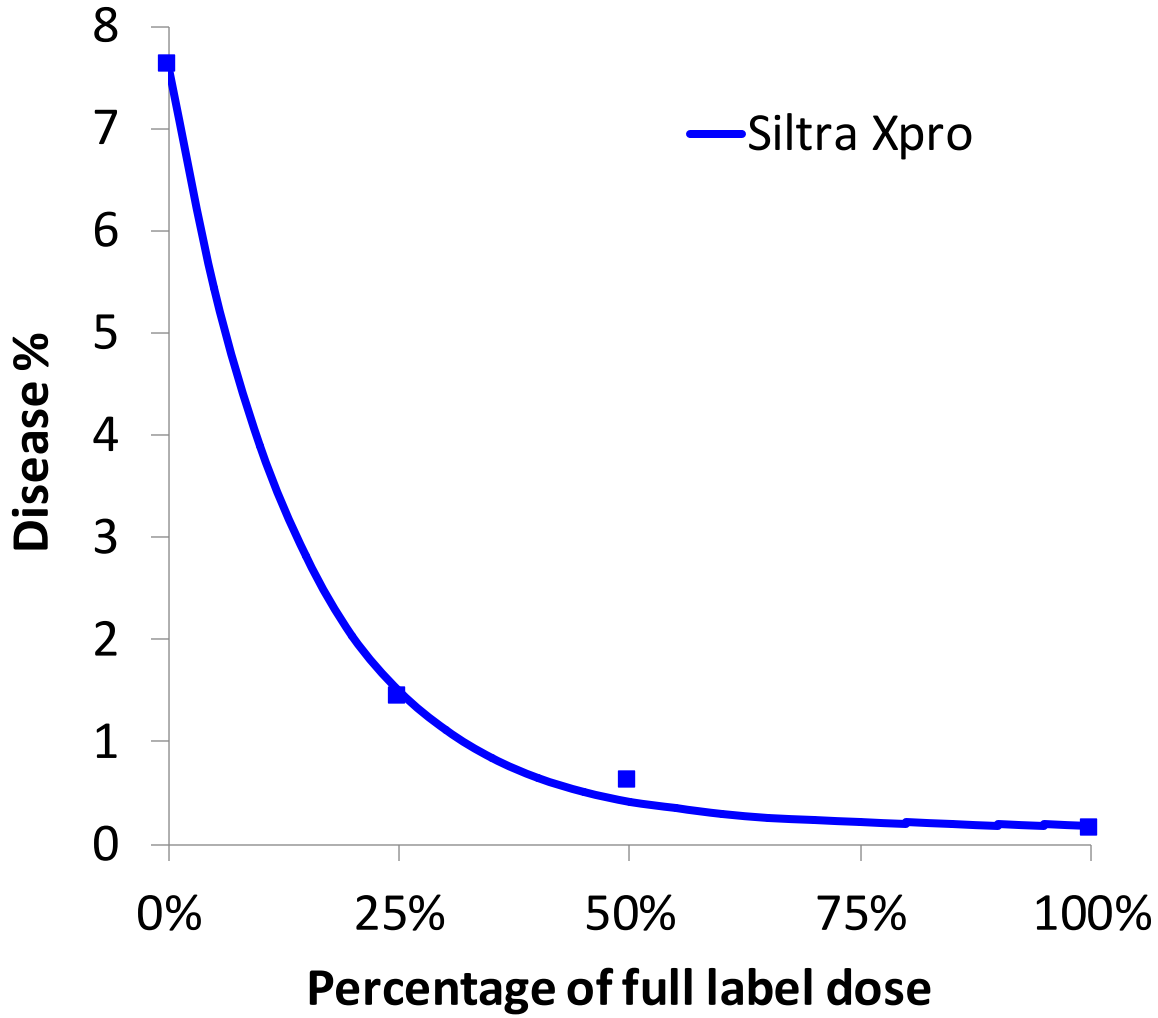
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

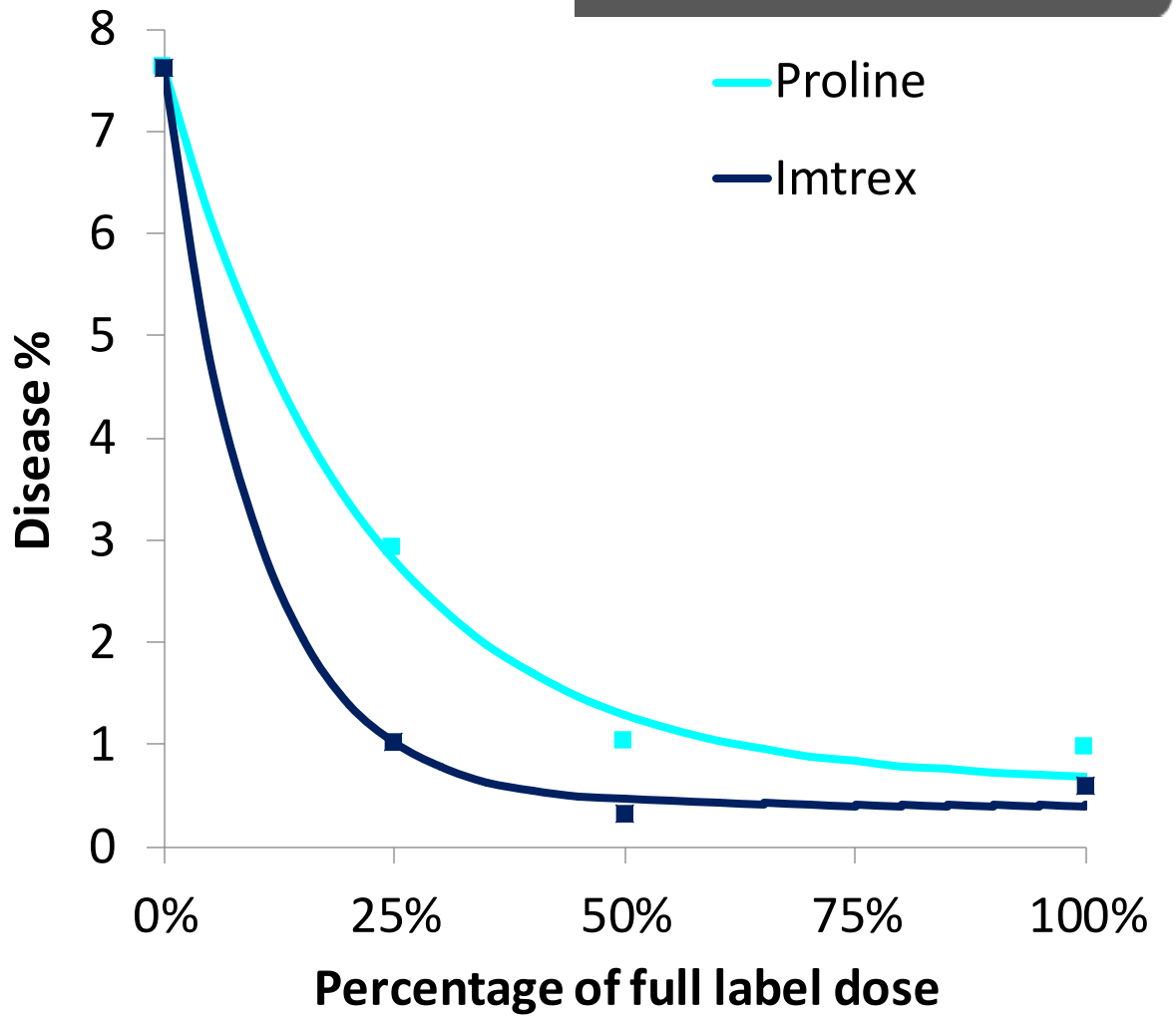




Rhynchosporium protectant 2018–19 (6 trials)

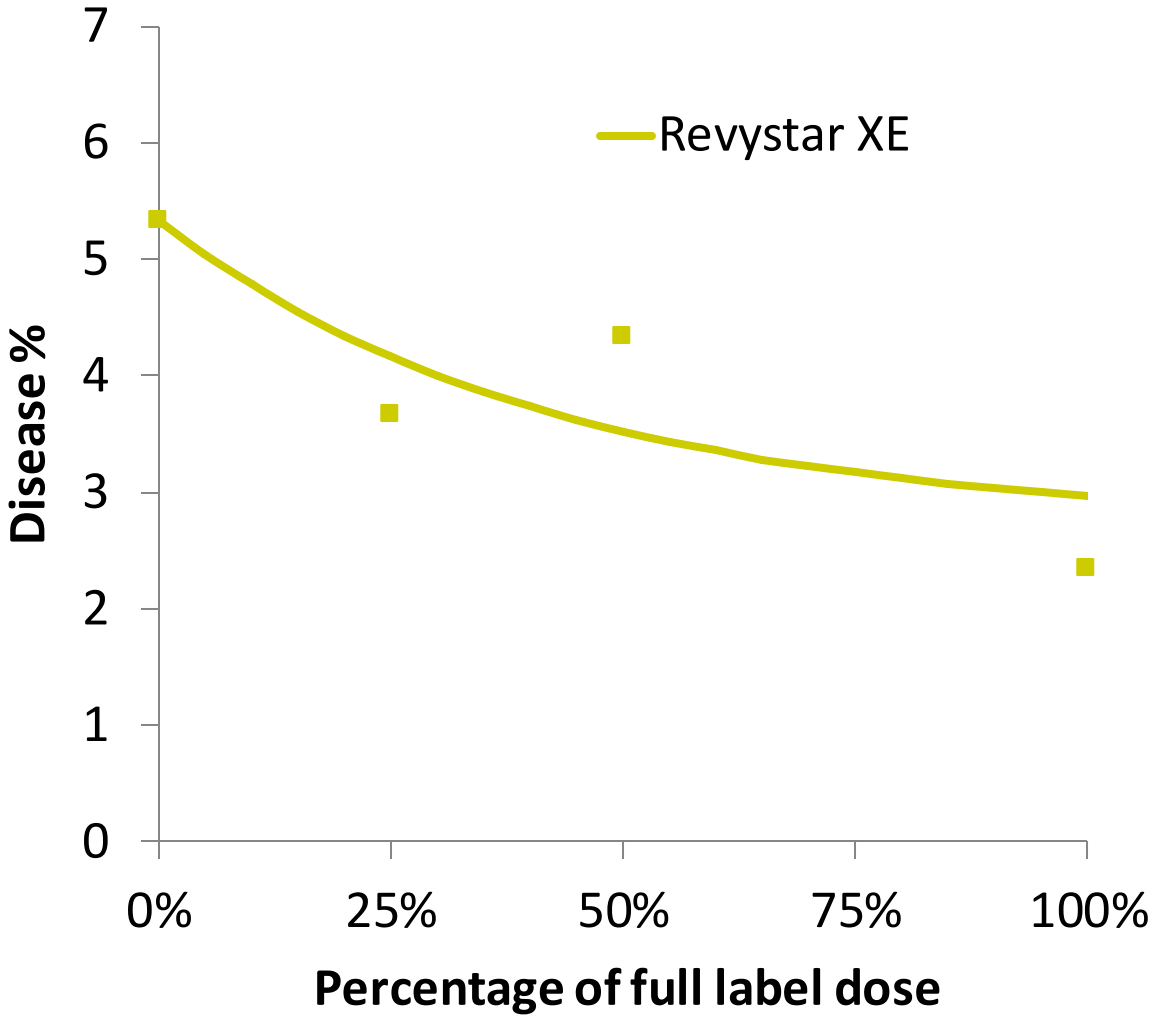
Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

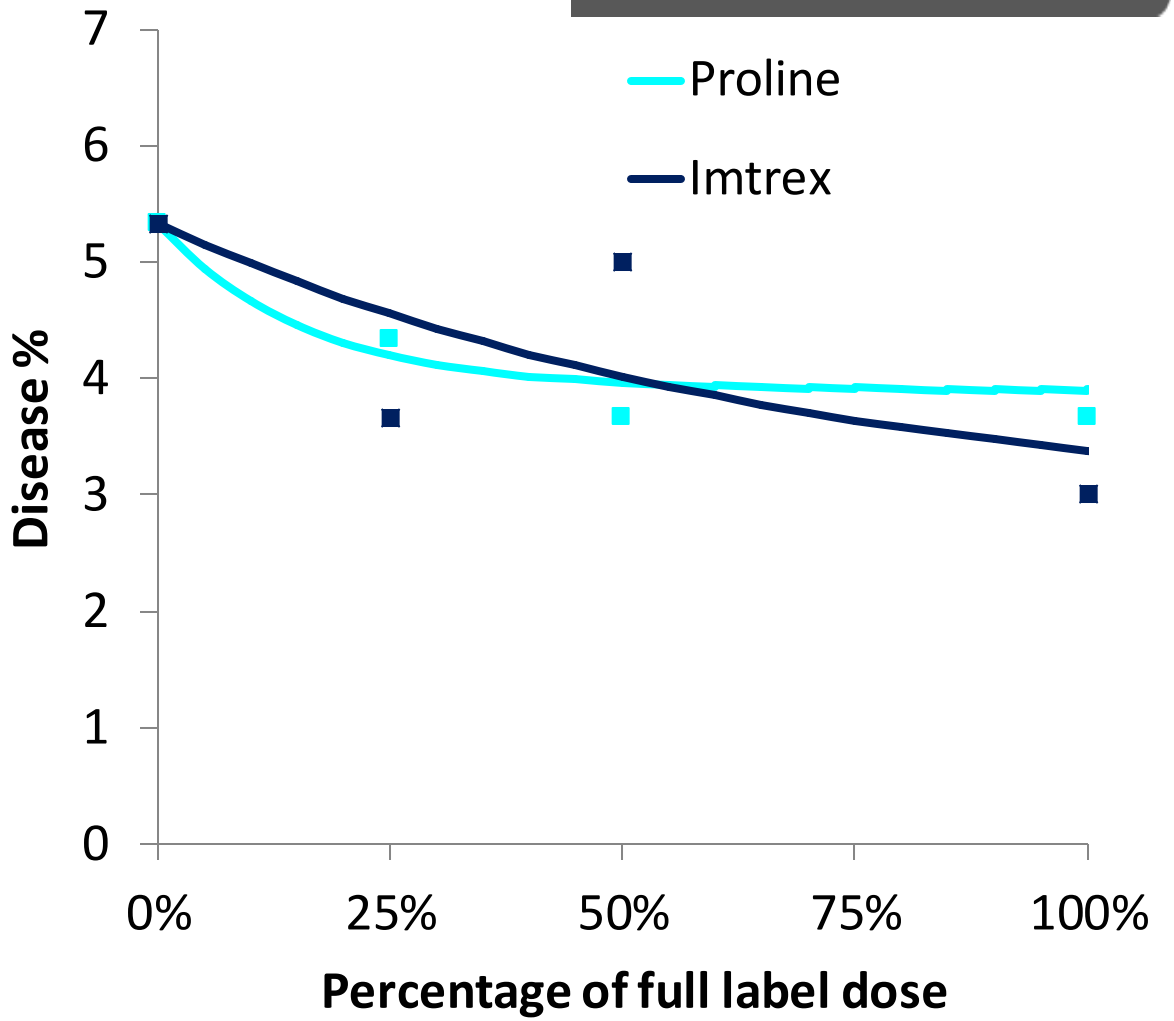




Net blotch eradicant 2020 (1 trial)

Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease

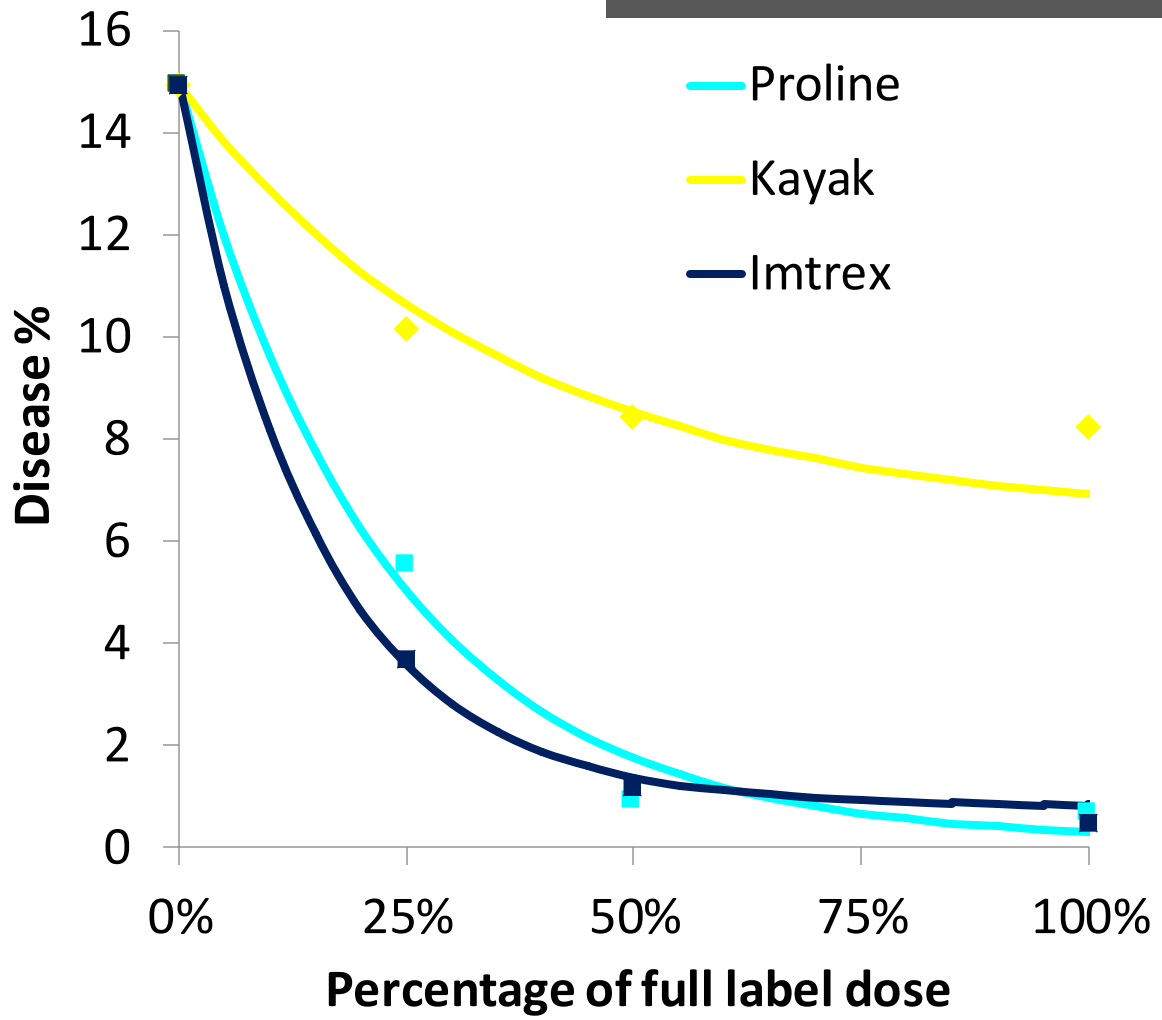




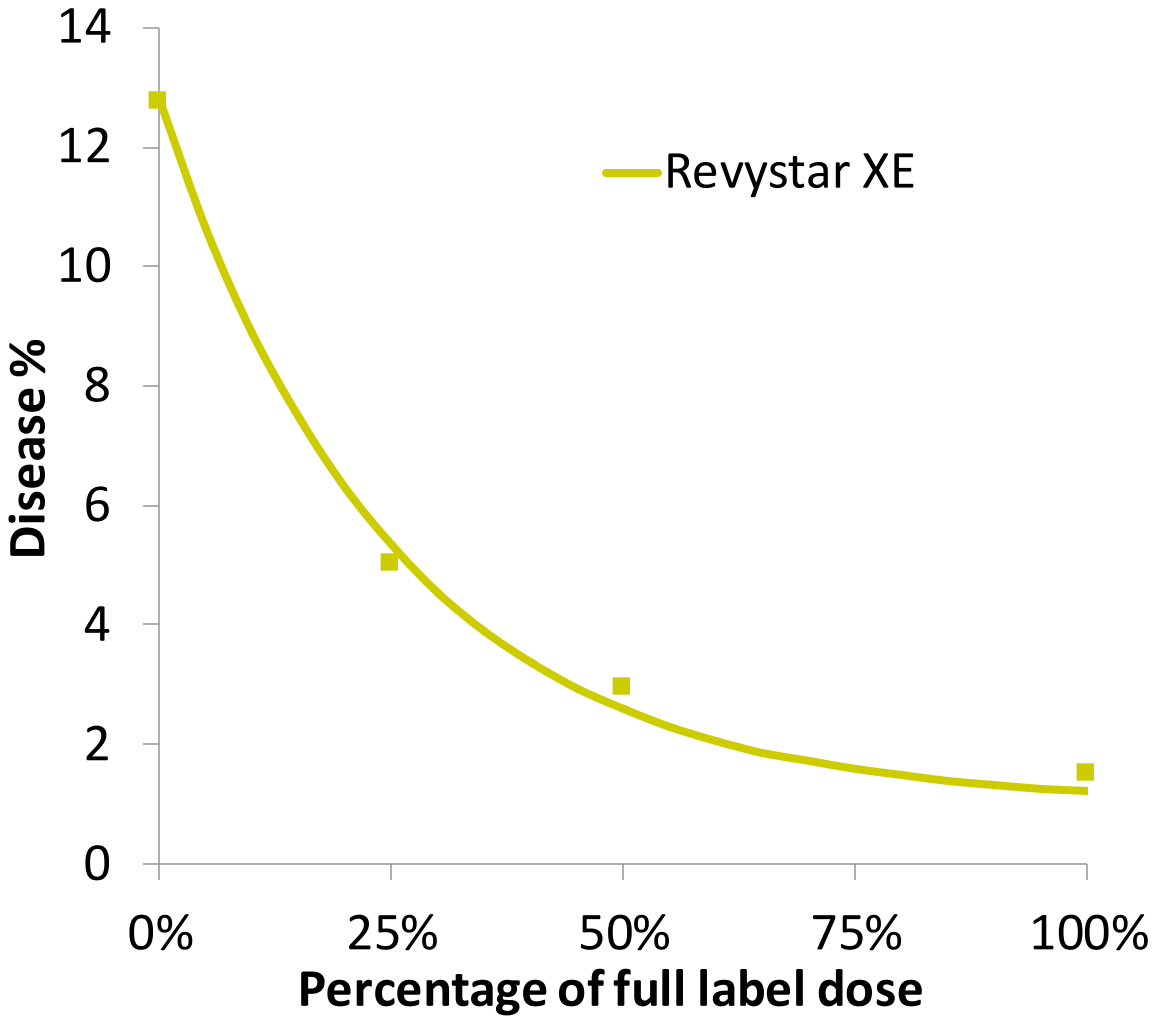
Net blotch protectant 2018–19 (2 trials)

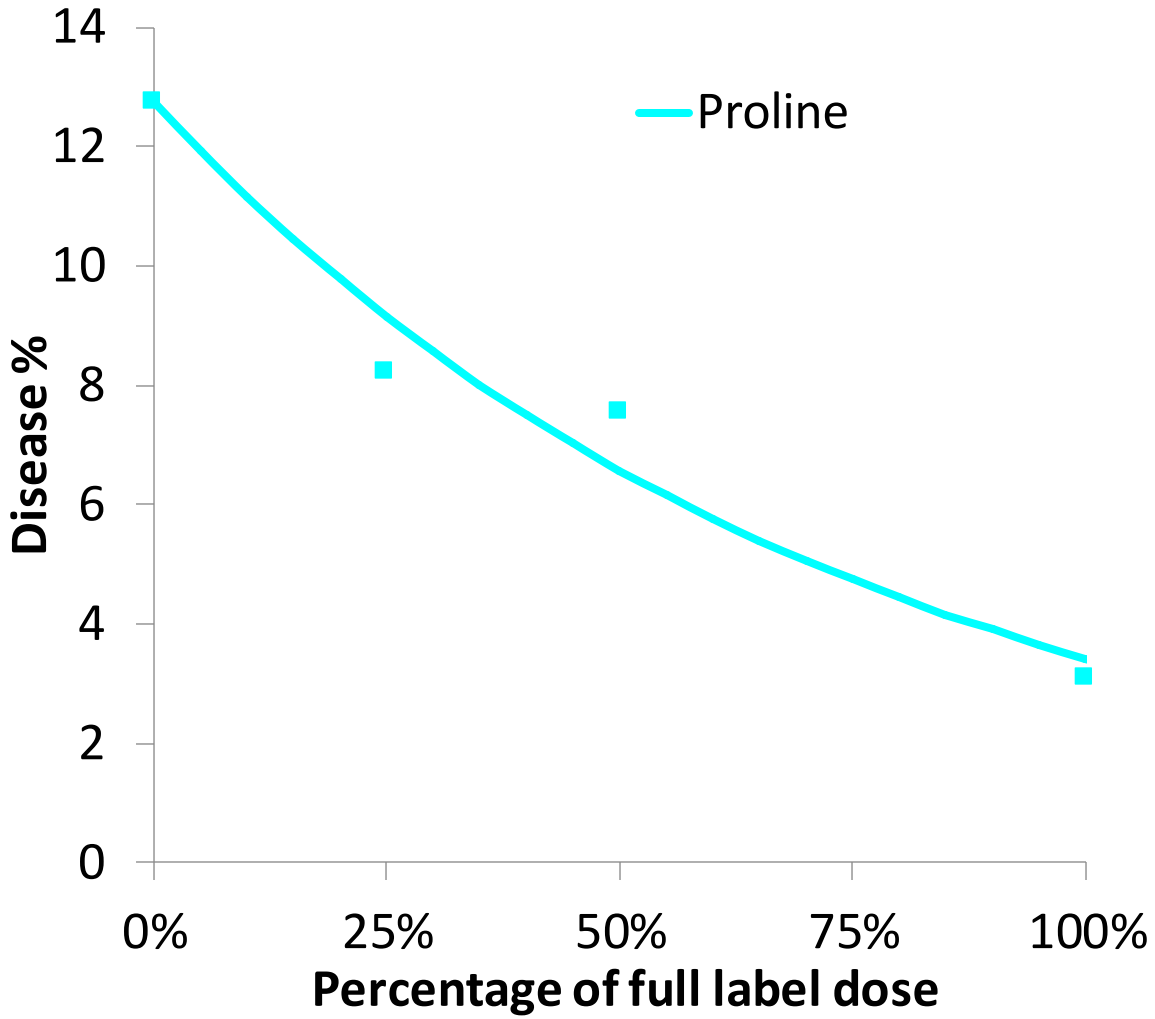
No data

Use Imtrex only in mixture with at least one fungicide with an alternative mode of action that has efficacy against the target disease



Ramularia 2019 (1 winter and 1 spring barley trial)





Barley summary for 2020

- Rhynchosporium:
  - SDHI (Imtrex) gave a higher level of control than azole (Proline) in 2020
  - Revystar XE has demonstrated good protectant and eradicant activity, similar to Imtrex
- Net blotch:
  - Revystar XE showed similar eradicant activity to Proline and Imtrex in 2020
  - Proline and Imtrex were highly effective as protectants in 2018 and 2019
- Ramularia:
  - Revystar XE demonstrated good ramularia activity in 2019, and better than Proline

Fungicide performance update: Oilseed rape (2020)

Oilseed rape trials and sites (2020)

Site	Target disease	Variety
Herefordshire (ADAS)	Phoma stem canker	Flamingo
Norfolk (ADAS)	Phoma stem canker	Flamingo
North Yorkshire (ADAS)	Light leaf spot	Fencer
Midlothian (SRUC)	Light leaf spot	Fencer

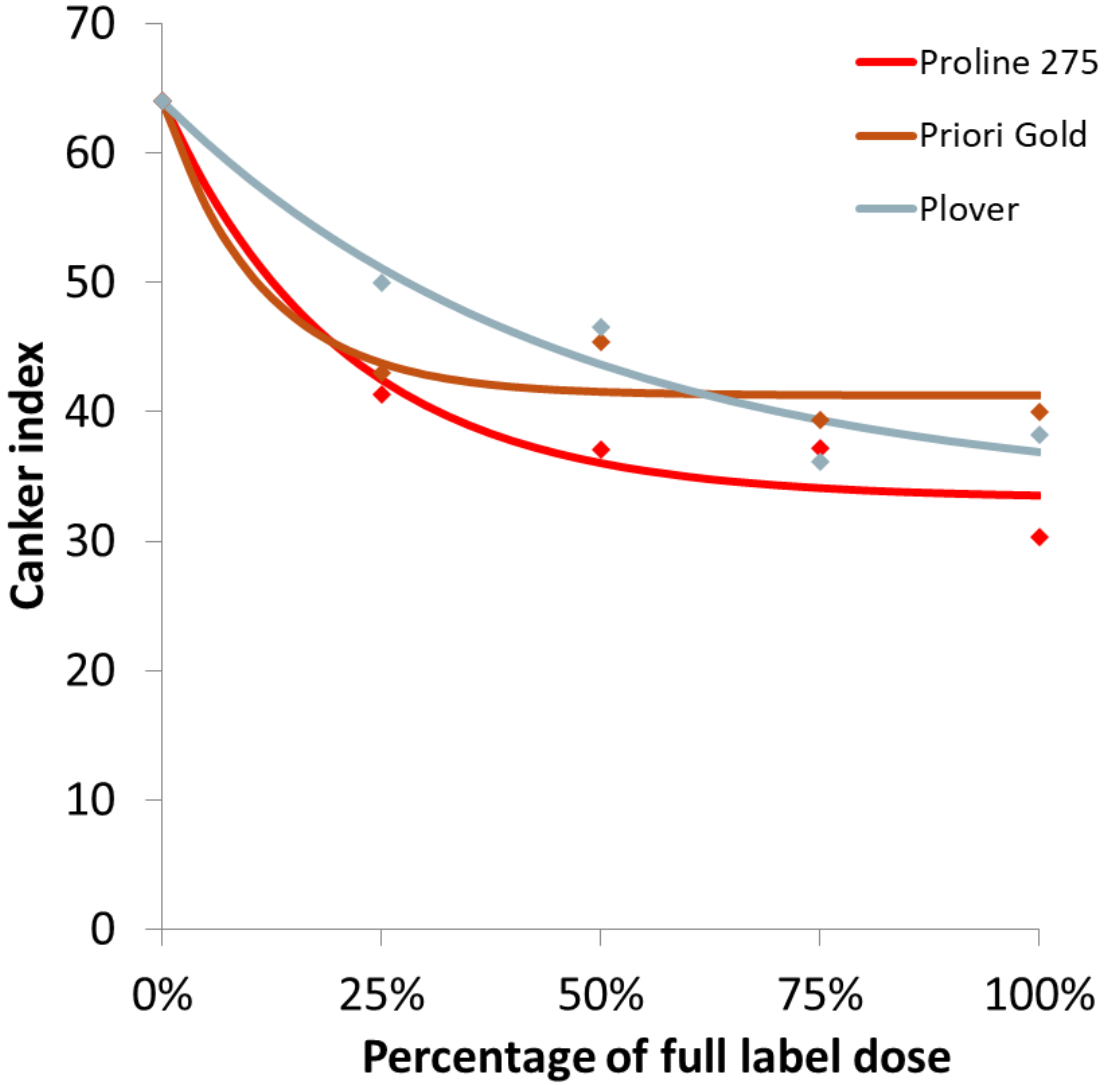
Oilseed rape products

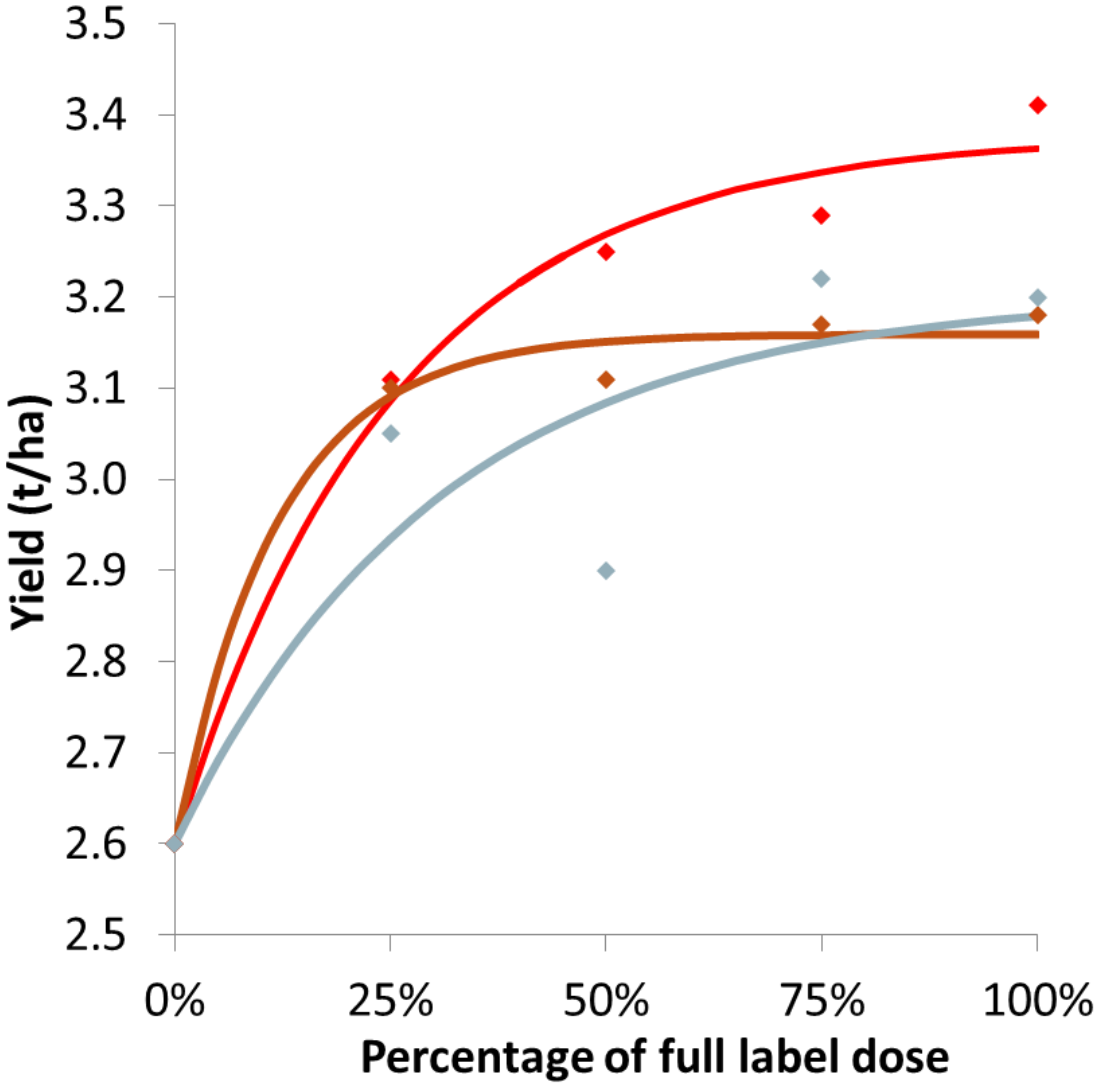
Product	Active(s)	Phoma stem canker	Light leaf spot
Plover	difenoconazole	✓	
Proline	prothioconazole	✓	✓
Priori Gold (Angle)	azoxystrobin + difenoconazole	✓	✓*
Aviator	bixafen + prothioconazole	(✓)	✓
Filan	boscalid	(✓)	(✓)*
Pictor	dimoxystrobin + boscalid		(✓)

(✓) = not in trials in 2020

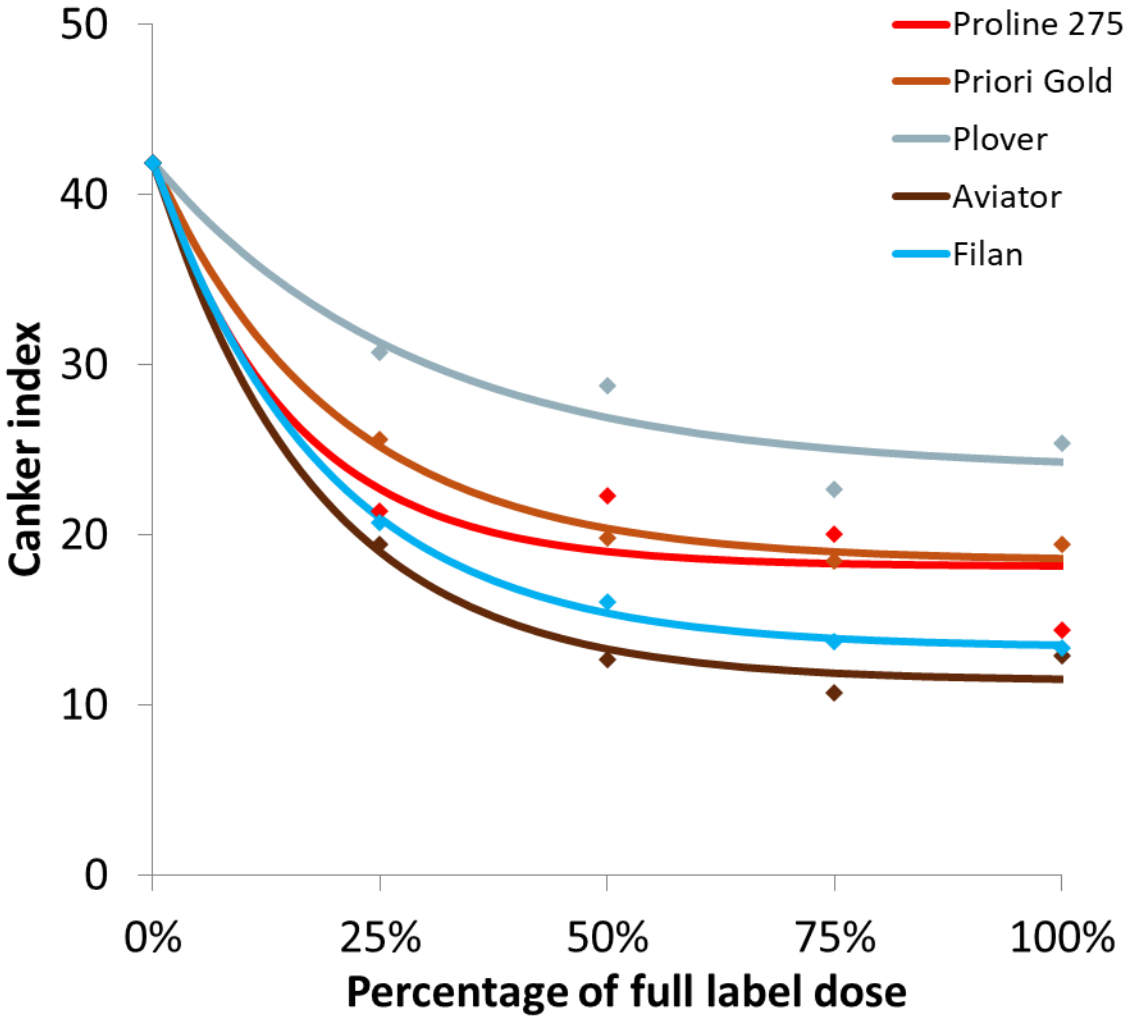
*These products do not have a label recommendation for light leaf spot control but may be applied at the appropriate time, for the control of other diseases

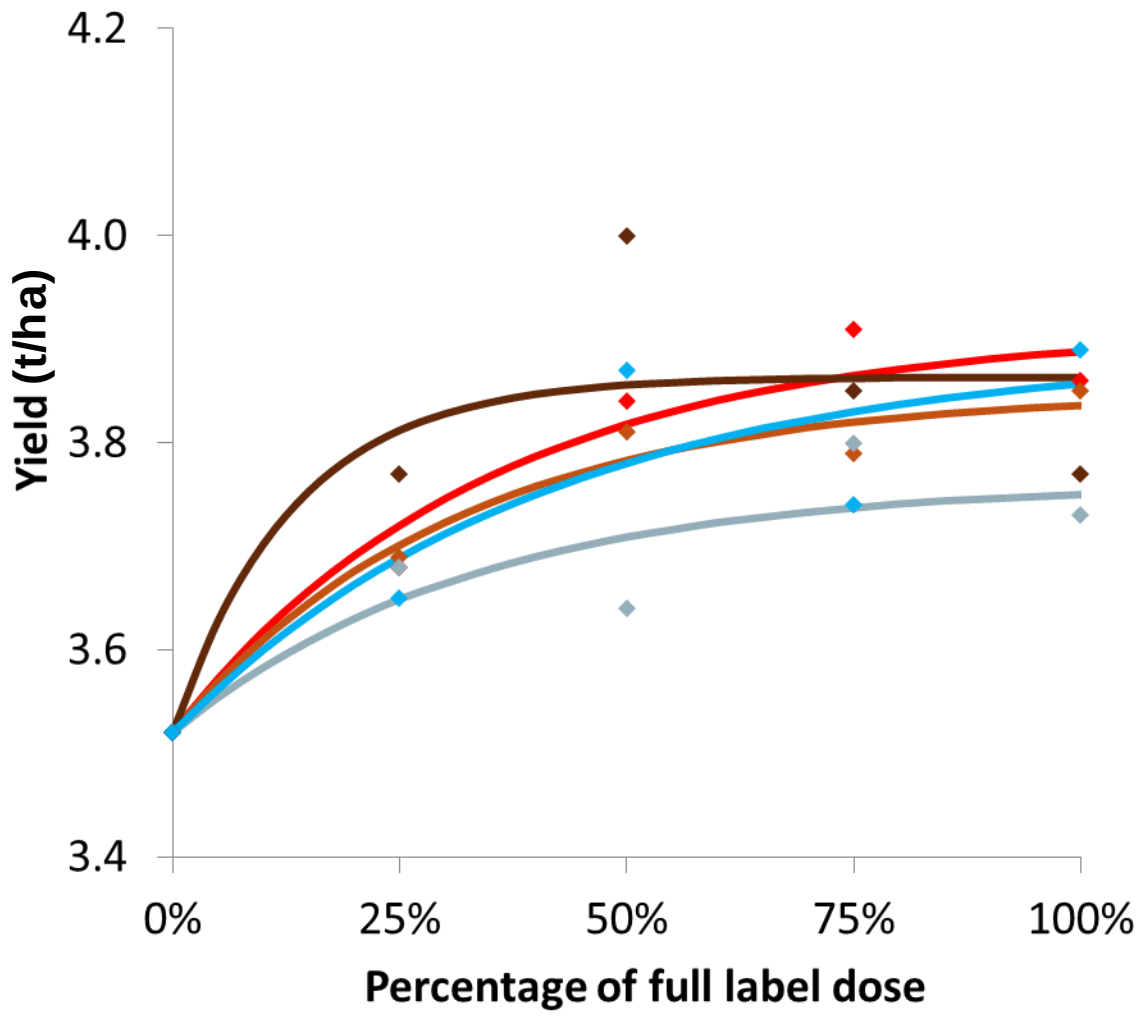
Phoma stem canker and yield 2020 (2 trials)



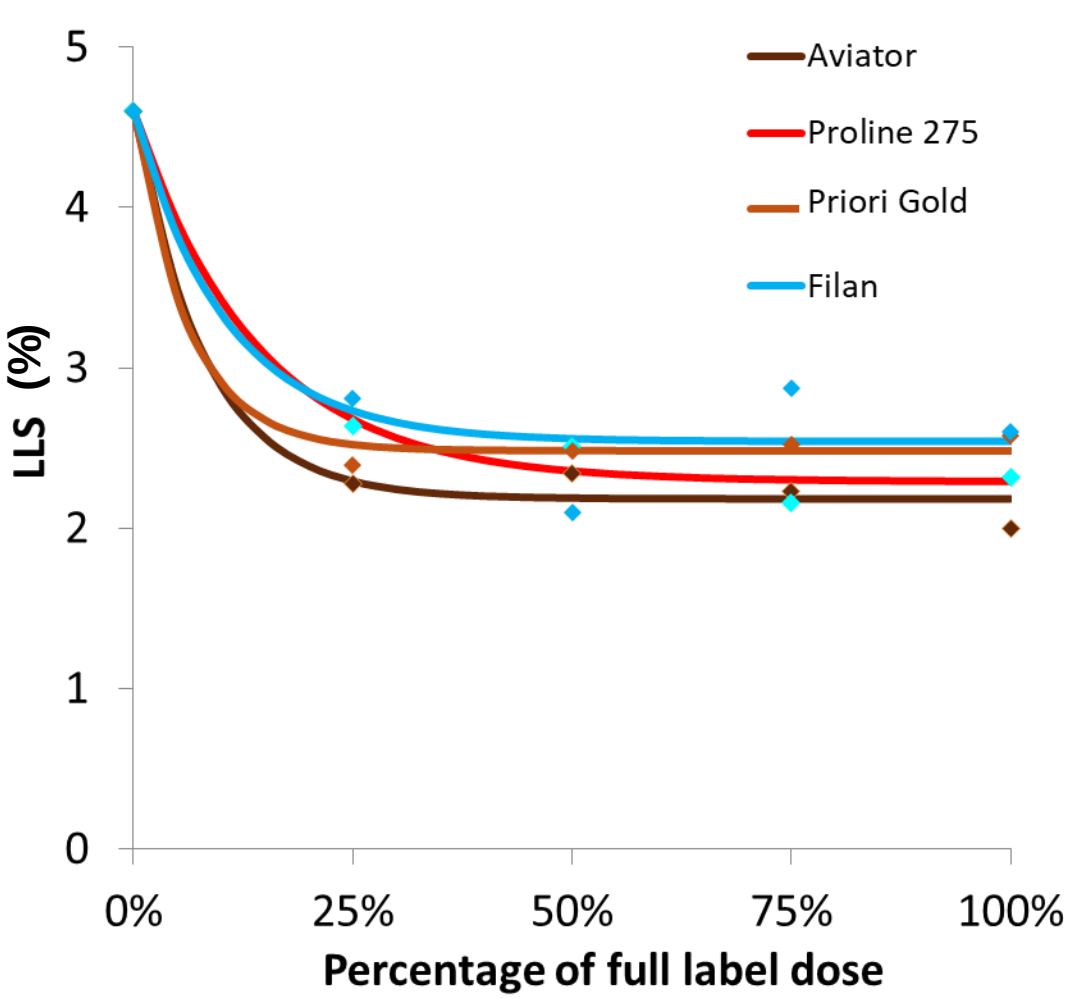


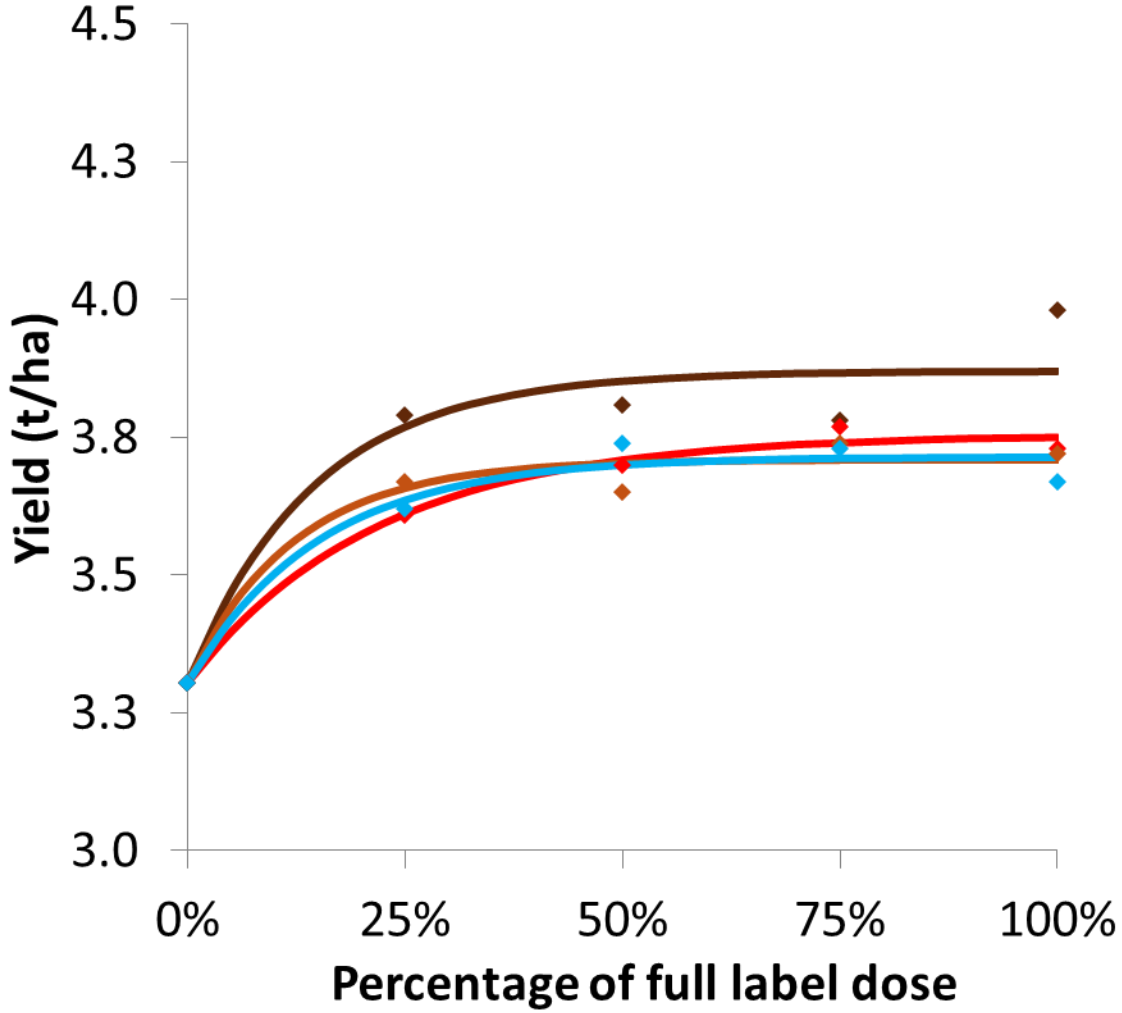
Phoma stem canker and yield 2017–20 (8 trials)



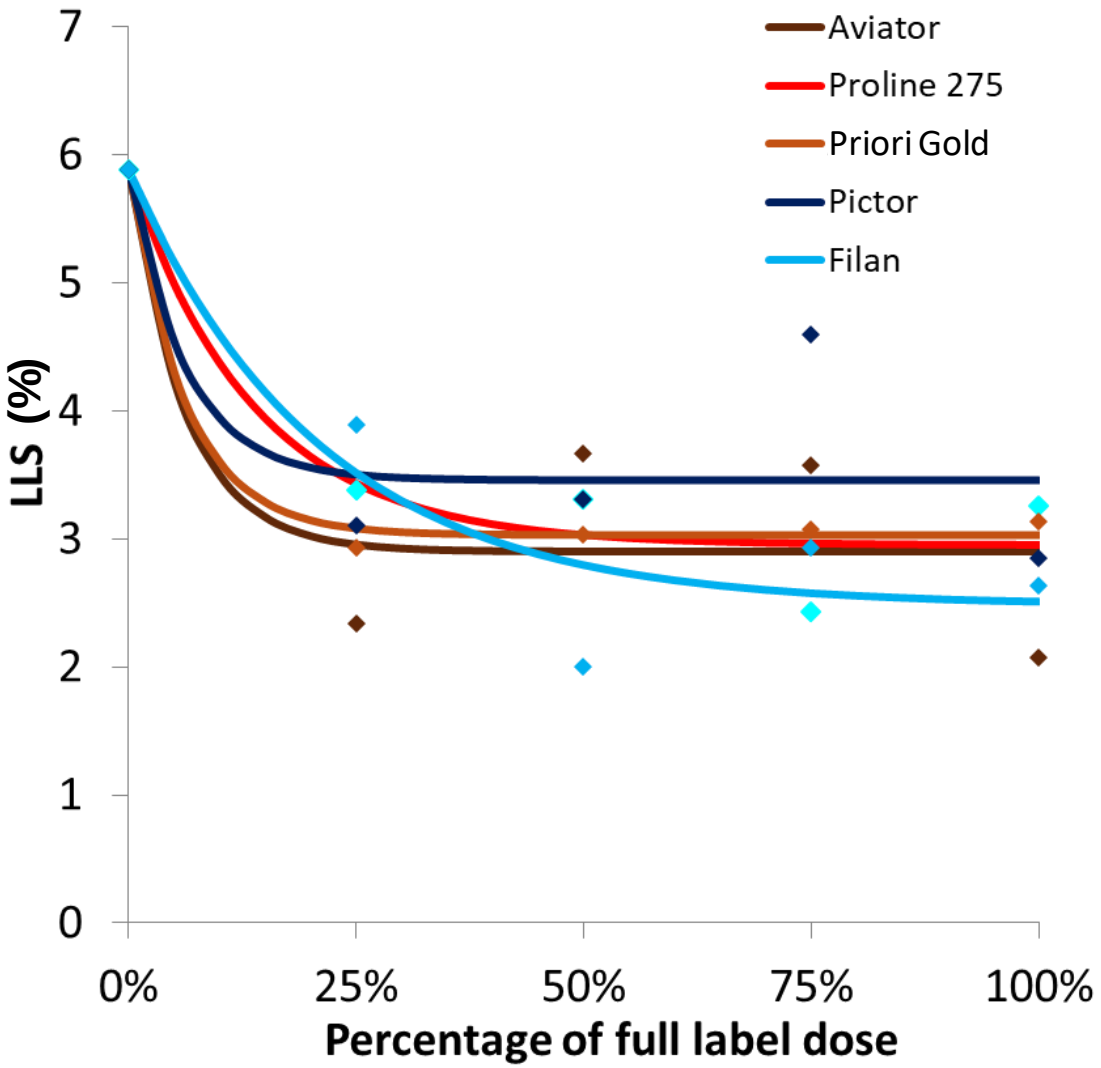


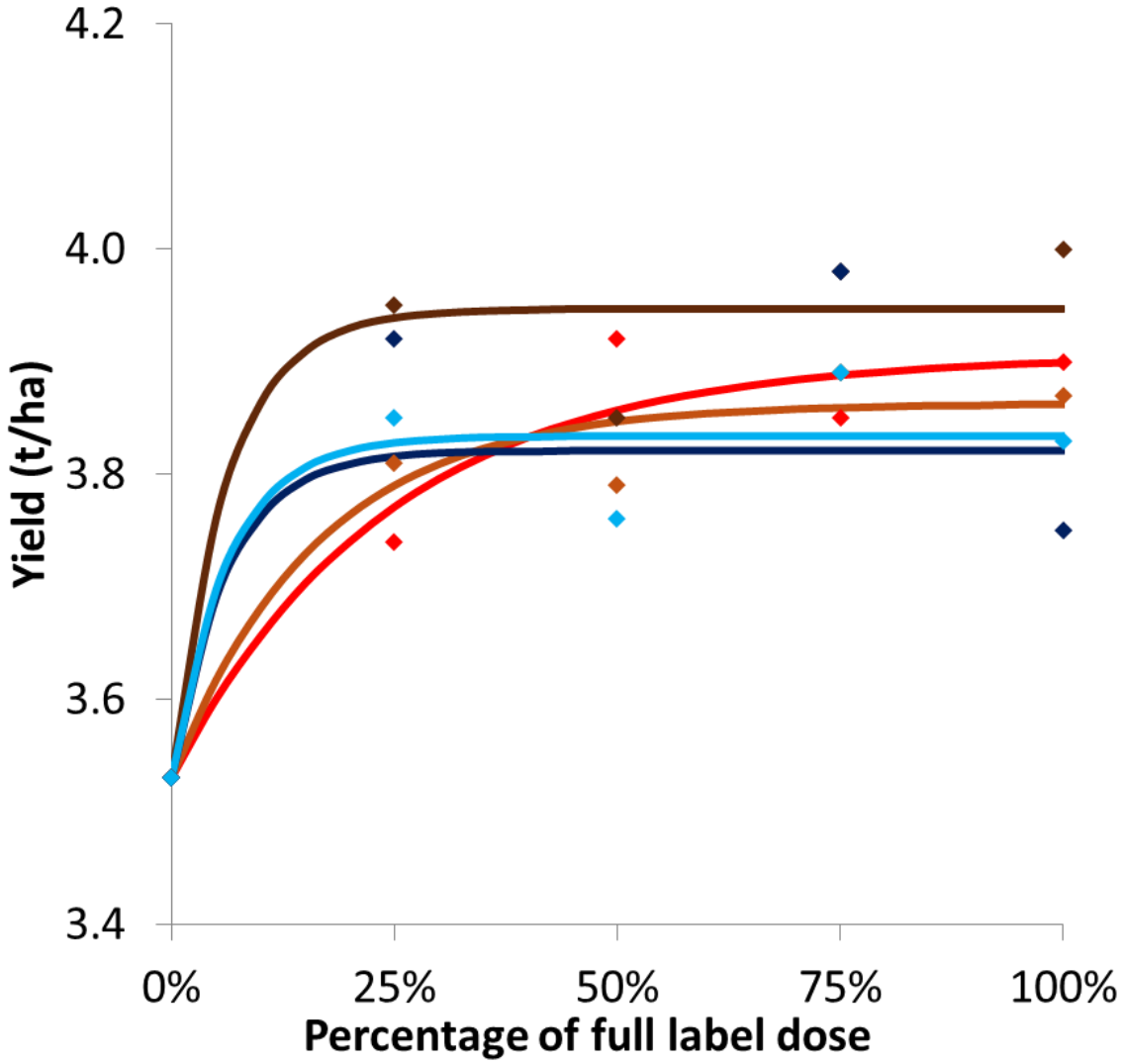
Light leaf spot disease and yield 2019–20 (3 trials)





Light leaf spot disease and yield 2015–20 (7 trials)





Oilseed rape summary for 2020

- Phoma stem canker
  - Range of modes of action for phoma control
  - Average yield response *c*. 0.3 t/ha, with little benefit from applying >50% of full label rate
  - Some differences in canker control between products but not much difference in yield (0.1-0.2 t/ha), especially where index reduced to <30
- Light leaf spot
  - Azoles and non-azoles providing similar levels of control and yield
  - Light leaf spot population known to have decreased sensitivity to azoles in the UK
  - Consider the use of different modes of action across the fungicide programme

Acknowledgements

Catherine Harries and Jason Pole, AHDB

Stuart Knight, NIAB

Jonathan Blake and Faye Ritchie, ADAS

Fiona Burnett, SRUC

Simon Edwards, Harper Adams University

Bart Fraaije, Rothamsted Research / NIAB

Stephen Kildea, Teagasc


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