8th meeting in the NORBARAG - fungicide subgroup

Vantaa, Finland 3rd March 2016

Presentations:

NORBARAG activity on cereals diseases •

Danish /Swedish resistance situation based on our monitoring. Lise Nistrup Jørgensen, Aarhus University, Denmark

Changes in field performances of azoles to Septoria in Sweden or other diseases. Gunilla Berg, Swedish Board of Agriculture

DFZ shifting in cereals. Helge Sierotzki, Syngenta

Sensitivity monitoring studies on pathogens in wheat. Andreas Mehl, Bayer

Resistance monitoring results for Septoria in cereals. Ilze Priekule, Adama

DuPont Fungicide resistance monitoring-Nordic & Baltic countries-2015. *R. secalis, P. teres and B. graminis* in cereals. Tone Glarborg, Dupont

Sensitivity monitoring studies on pathogens in barley. Gerd Stammler, BASF

Molecular investigation of Septoria Leaf Blotch resistance in Scandinavia. Thies Marten Wieczorek, Aarhus University, Denmark

Efficacy testing of Proline, Tilt and Zenit against net blotch in laboratory and field trials. Lotta Poikolainen, Luke, Finland

Sensitivity of *S. nodorum* to Amistar. Gunn Mari Strømeng

NORBARAG activity on potato diseases

Sensitivity monitoring studies on *Alternaria solani* in potatoes. Gerd Stammler, BASF

Resistance monitoring results for *Phytophthora infestans* in potatoes. Ilze Priekule, Adama (10 min)

Potato resistance work. Helge Sierotzki, Syngenta

NORBARAG activity on other crops

Fungicide resistance of Botrytis in fruit production and forest nurseries in Norway. Gunn Mari Strømeng

DuPont Fungicide resistance monitoring-Nordic & Baltic countries-2015. Cercospora in sugarbeets. Tone Glarborg

Fungicide performances and resistance testing in cereals 2015

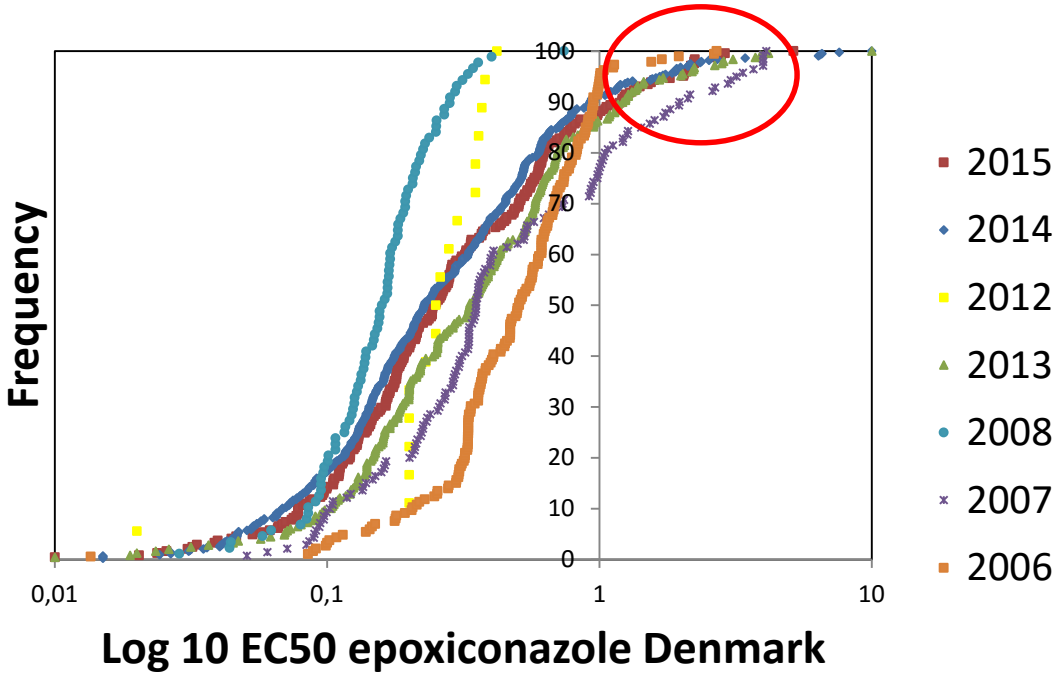
Summarised by Lise Nistrup Jørgensen

	Baltic States	Denmark	Sweden	Finland
Triazoles	cyroconazole epoxiconazole difenoconazole fluquinconazole metconazole prochloraz propiconazole prothioconazole tebuconazole triadimenol	epoxiconazole difenoconazole metconazole propiconazole prothioconazole tebuconazole	difenoconazole prochloraz propiconazole prothioconazole**	metconazole prochloraz propiconazole prothioconazole
Strobilurines	azoxystrobin fluoxastrobin kresoxim-methyl picoxystrobin pyraclostrobin	azoxystrobin picoxystrobin pyraclostrobin	azoxystrobin picoxystrobin pyraclostrobin	azoxystrobin picoxystrobin pyraclostrobin
SDHI	bixafen boscalid fluxapyroxad penthiopyrad*	boscalid		
Others†	cyprodinil chlorothalonil fenpropidin fenpropimorph folpet metrafenon spiroxamin thiophenate-methyl	cyprodinil metrafenon mancozeb folpet	cyflufenamid cyprodinil fenpropidin fenpropimorph metrafenon thiophenate-methyl	cyprodinil fenpropidin

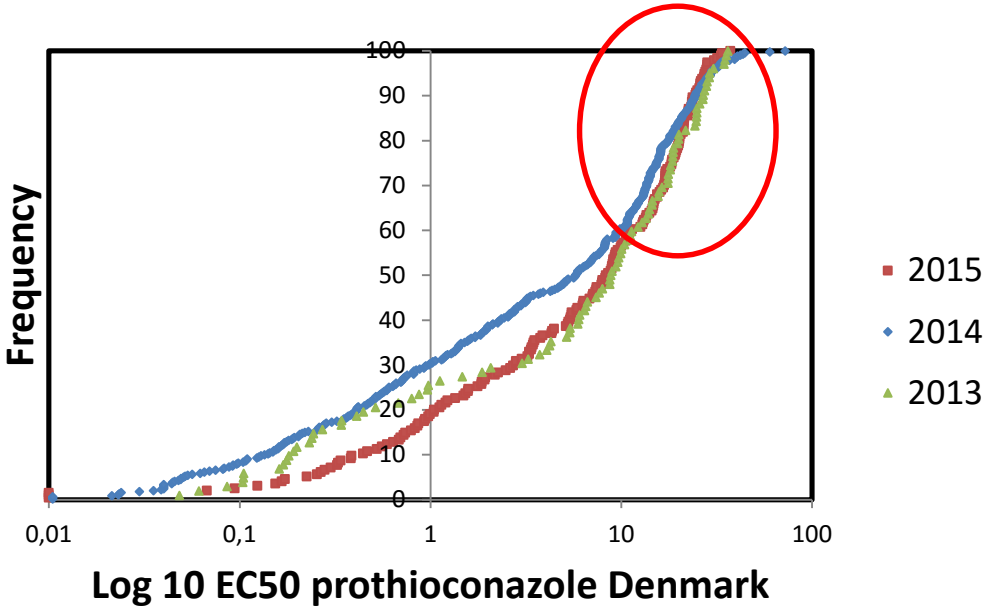
† MBC, morphines, anilinpyrimides, benzofenones, fenylacetamides; * only Estonia; ** until the end of 2015

Summary- septoria

- Azoles still under pressure, but no clear changes in EC50 values measured in 2015 compared to previous years
- Field performances from Azoles are challenged but products still provide important control and significant yield responses
- New CYP51 mutations are developing in region
- There is evidence that that diversification of azoles and different Moa can help to keep down the selection pressure
- IPM needed to help keeping down disease pressure and no. of treatments
- Currently part of the Northern zone is challenged as SDHI's are not or only available in limited form



No major changes in Sensitivity 2015



Average of 2 trials in wheat 2015

Newer mutations!

Old mutations

		GS 31-32	Dose	GS 33-37	Dose	GS 55	Dose	S524T	D134G	V136A	v136C	A379G	I381V
	1	Untreated		-		-		2 c	6 e	23 def	6 abc	43 bc	93 bcd
A	2	Proline	0,4	Proline	0,4	Proline	0,4	13 a	55 a	66 a	4 bc	18 e	89d
	3	Proline	0,4	Bell	0,5	Proline	0,4	10 a	35 b	48 b	5 abc	24 e	91cd
B	4	Proline	0,4	Bell	0,5	Prosaro	0,5	8 b	26 bc	37 c	8 ab	32 d	96 ab
	5	Proline	0,4	Bell	0,5	Armure	0,4	2 c	6 e	29 cde	3 c	54 a	90 d
	6	Proline + Folpan	0,4 + 1,0	Bell + Folpan	0,4 + 1,0	Prosaro	0,5	6 b	25 bc	31 cd	4 bc	36 cd	97 a
C	7	Folpan	1,5	Bell	0,5	Prosaro	0,5	5 bc	0 c	16 f	5 abc	47 ab	94 bc
	9	-	-	Bell	0,5	Prosaro	0,5	2 c	16 cd	22 ef	9 a	41 bcd	98 abc
	10	-	-	Bell	1,0	-	-	2 c	15 d	26 de	7 abc	44 bc	91 cd

A = treatmetns, which increase resistance most – marked with red

B = treatments, which select to some extend for resistance – marked with pink

C = treatments, which gives least or no selection for resistance – marked with yellow and green

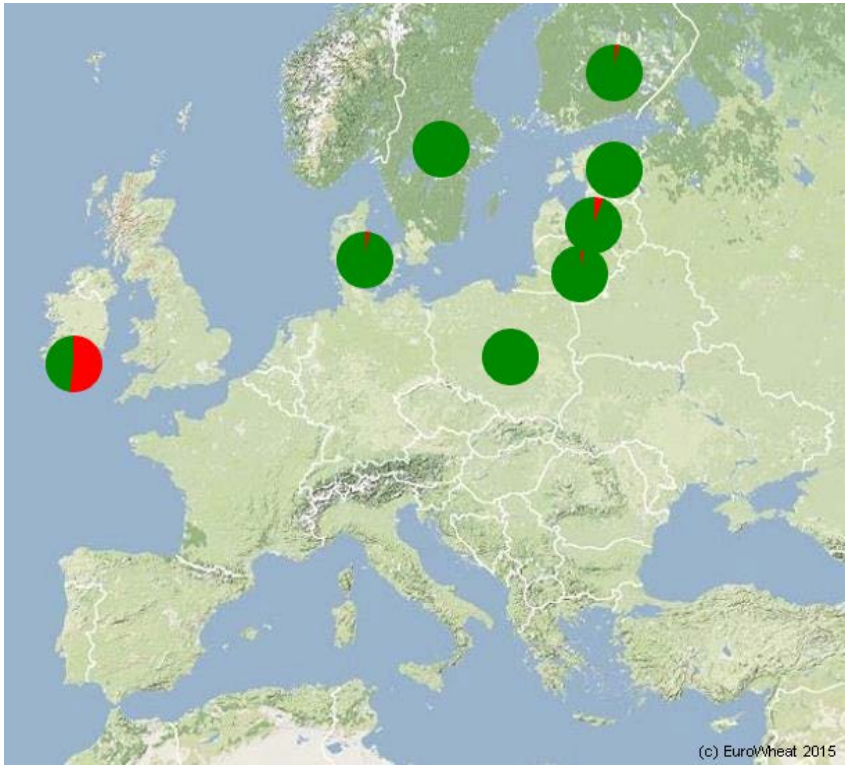
Conclusion on selection trial

- The more diversity in treatments; the less selection was seen for new mutations
  - The bigger the diversity in azoles the less the selection
  - Fewer treatments with azoles select less
  - Replacing treatments with folpan (Chlorothalonil?) reduces selection
  - Mixing azoles with Folpan improves control but does not reduce selection
- Some treatments compromises control and yield responses
- **Clear message to farmers**: You can do something your self to reduce selection by diversifying !!
- DK recommendation:
  - Only spray when needed and use resistant cultivars
  - Never use the same azol more than twice.
  - Max 3 and preferably less azoles per season
  - In case of rust and mildew use other chemistry

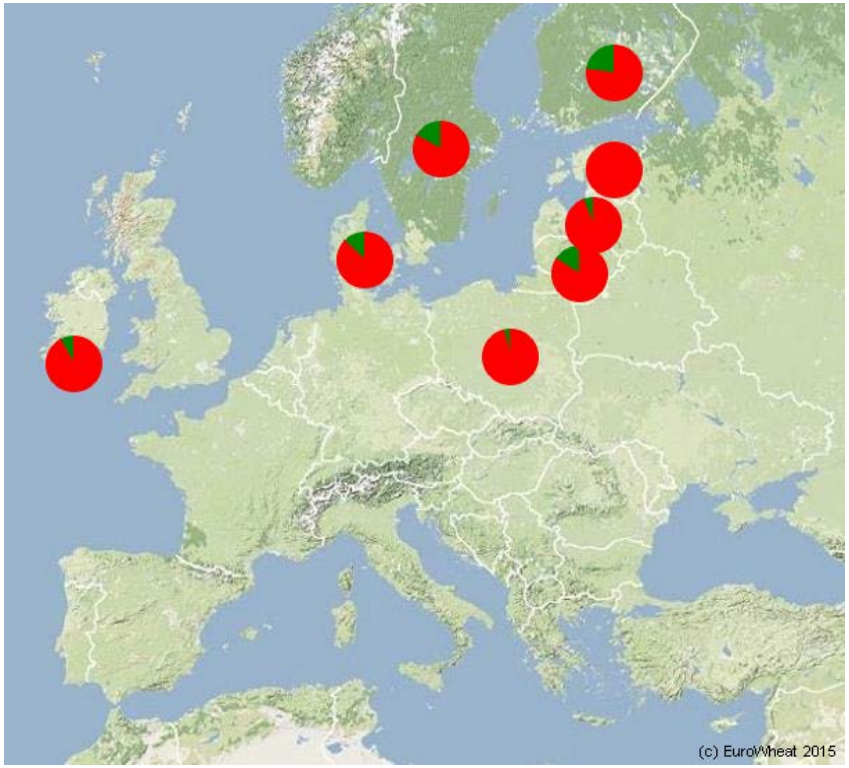
Eurowheat tool box

Eksempler på forekomst af CYP51-mutationer i septoria

S524T-mutationer i 2014



I381V-mutationer i 2014

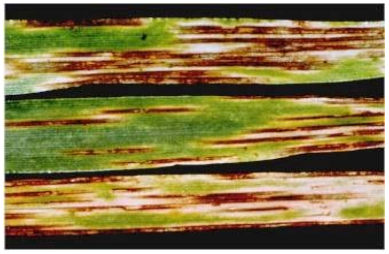


Data fra NORBARAG og Thies Wieczoreks phd

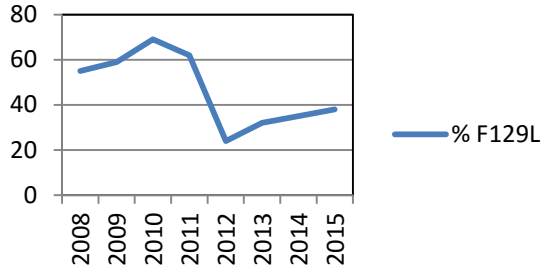
Common NORBARAG Trial with net blotch DATA 2014

Table 2. Control of net blotch and yield responses in 6 trials with spring or winter barley (14339). The trial was treated at GS 39 and placed in Denmark, Sweden, Finland, Latvia and Lithuaria.

Treatments l/ha GS 39	% net blotch	Green leaf area	Yield and increases	TGW	% strobe resistance	% SDHI Resistance
	GS 75-77	GS 77	hkg/ha	G	F129L	C-G79R
1. Untreated	35.1	36	65.4	41.8	63	10
2. 1.0 Imtrex + 0.5 Comet	0.7	83	+12.2	45.2	76	0
3. 1.0 Imtrex	1.2	84	+11.4	45.4	59	23
8. 0.4 Proline EC 250 + 0.5 Comet	1.5	74	+10.3	45.3	88	0
4. 0.5 Siltra	1.8	79	+10.2	45.5	70	0
5. 0.5 Siltra + 0.5 Comet	0.9	84	+11.1	45.7	92	0
6. 0.4 Proline EC 250	6.1	63	+8.6	43.9	65	0
No. of trials	5	4	6	6	1	1
LSD_{95}	3.1	7.3	2.9	0.8	-	-



Summary D.teres



- Good field performances seen in Norbarag trials (strobes, SDHI, Azoles)
- Low to moderate leavels of Strobilurin resistance (F129L) in DK, SW, Fi, No,
- Low levels of SDHI resistance (c-G79R) seen in DK 2014, 2015
- Less sensitive strains to azoles of D.teres are quite common – but field performances from particular Prothioconazole is still significant

Barley diseases

	DMI	Strobes	SDHI	chlorotalonil
Net blotch	Low to moderate problems	moderate	New mutations	-
Rhynchosporium	Low to moderate problems	Few cases	No mutations found	-
Ramularia	No known problems	Widespread resistance	New mutations	-
mildew	Low to moderate	Moderate problems	-	-
Rust	No problems	No problems	No problems	-

Wheat diseases –resistance situations

	DMI	Strobes	SDHI	metrafenon
Septoria	moderate to high risk problems	Widely distribute	Few new cases found - Ireland	-
DTR	No evidence of problems	Several cases found	Weak on this disease	-
Stagonospora	No known problems	Resistance know in the region	No known problems	-
mildew	Low to moderate	Resistance widespread	-	Moderate resistance
Fusarium	No problems verified.			
Rust	No problems	No problems	No problems	-

Monitoring 2016

	DK	Sw	Fin	N	La	Li	Est
Wheat							
Septoria azoles SDHI/ Flakkebjerg/BASF/Bayer	25	35	5	5	5	5	5
Stagonospora Bioforsk - N	3	3	3	3	2	2	2
Mildew metrafenon	BASF	BASF			Leaf samples to Epilogic		
Tan spot BASF	QoI resistance – few samples from field trials						
Yellow rust	To be decided						
Barley							
Net blotch QoI/SDHI/DMIBASF/Bayer /syngenta	20	20	10	10	5	5	5
Ramularia	5	5	5	5	3	3	3
Mildew QoI Epilogic							
Rhyncho, Dupont	5	5	5	5	5	5	5

Discussions and needs

- Harmonized monitoring with support from companies
- Common trial plans?
- Dose discussion still an issue !
- Common general recommendation
  - Cereals
    - Needs for fungicides for diversification

Fungicide subgroup meeting:
Potato session
Other crops session

Summarised by Gunn Mari Strømeng

Potato session


Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

Alternaria alternata and *A. solani* – the causes of **early blight**

- Same symptoms, but different resistance situations
- DMI, situation stable
- More resistance to QoI and SDHI in *A. alternata* than *A. solani*
- *A. alternata* show up earlier in the season than *A. solani*?
- Increase in early blight?


Photo: A. Hermansen, NIBIO

Phytophthora infestans – the cause of **late blight**

- Dimetomorph (CAA) - full sensitivity in Europe
- PA-fungicides – decrease in resistant isolates, more intermediate isolates
- Fluazinam – decrease in mutant population in Europe probably due to antiresistant practices

Other crops session

Gray mold (*Botrytis*) in

- Strawberry, raspberry: high numbers of resistant isolates to fenhexamid, SDHI, QoI (> 60 %)
- Norway spruce in forest nurseries: Reduced/ no effect of thiophanate methyl
- Multi drug resistance

Cercospora beticola in sugar beet

- Picoxystrobin (QoI)
- Presence of isolates with high EC_{50}-values in Sweden and Denmark, but not in Lithuania
- Few samples

Topics of discussion

Alternation or mixtures of fungicides

Dose rates and number of sprayings during the season

Farmers can make a difference themselves

Anti-resistance strategies
- Preventive applications
- Alternate between different modes of action
- Limit number of fungicide applications