

# Fungicide performances and resistance testing in cereals 2015

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# EuroWheat - project

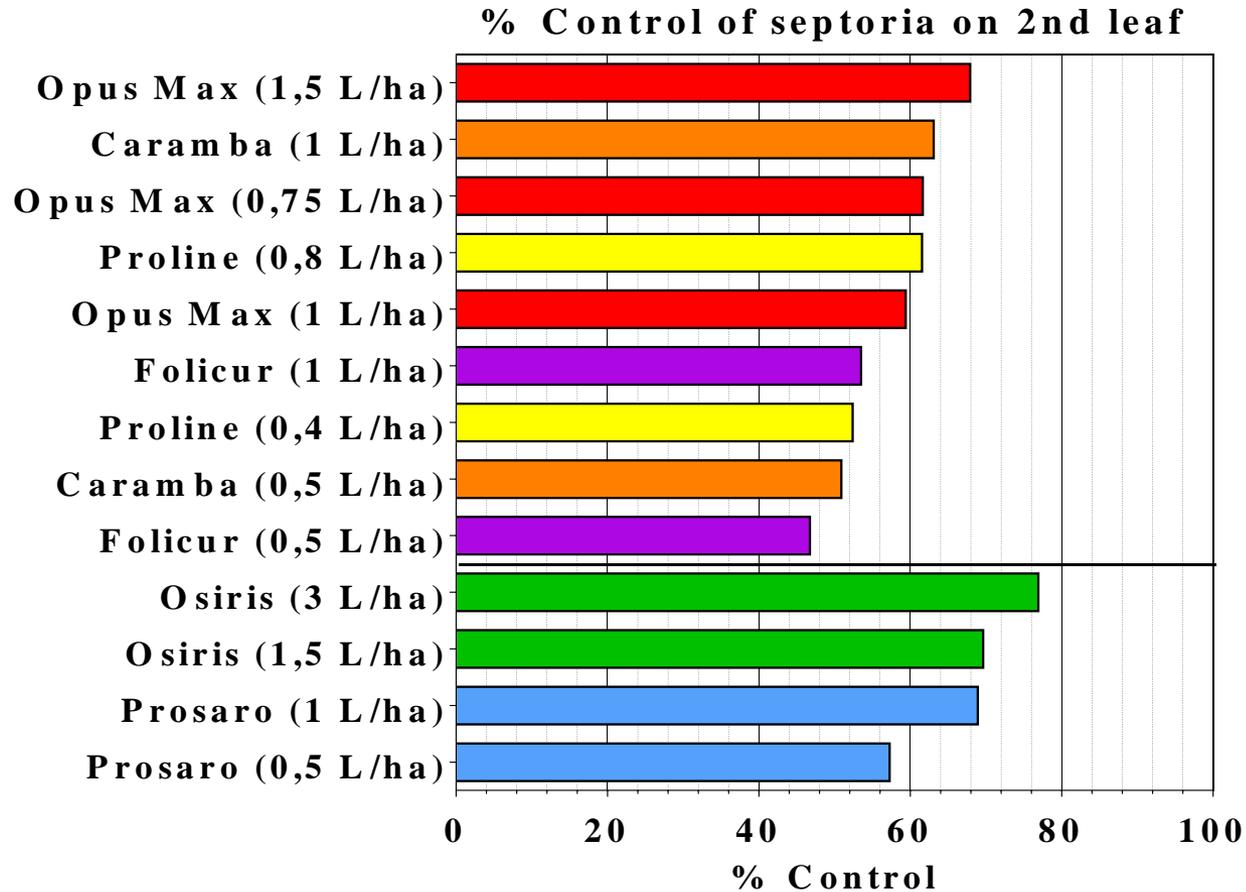
## Trial localities – 26 trials in 2015



15 trials had septoria as main disease  
7 trials had significant yellow rust attack  
4 trials had significant brown rust attack

# % control of septoria -17 trials 2015

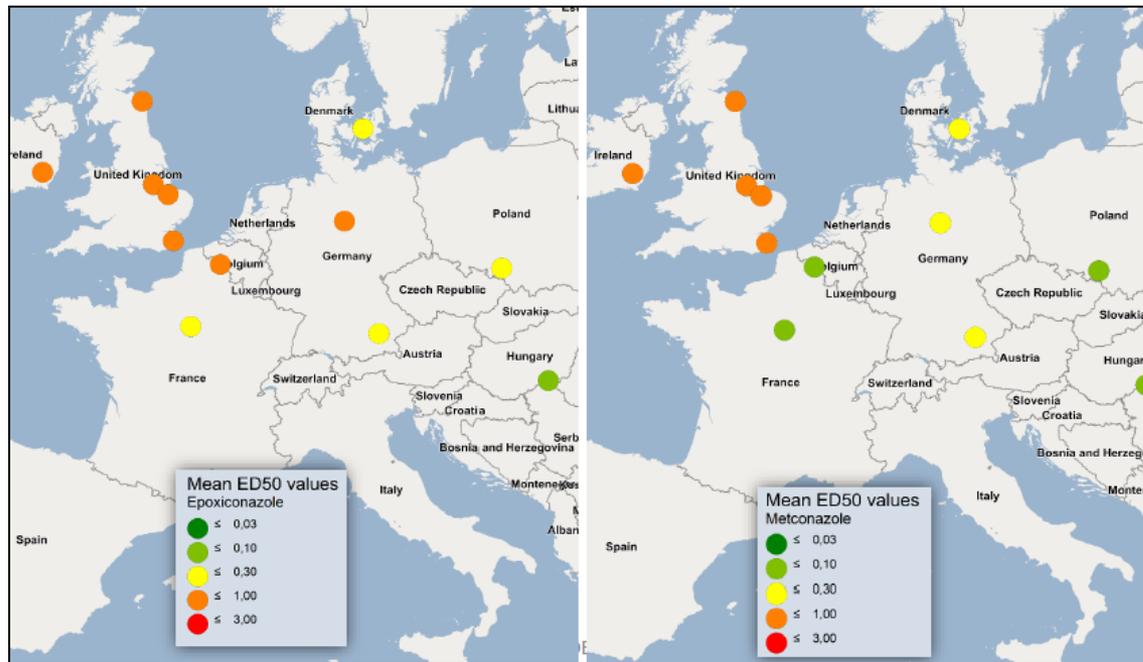
## 2nd leaf – more curative



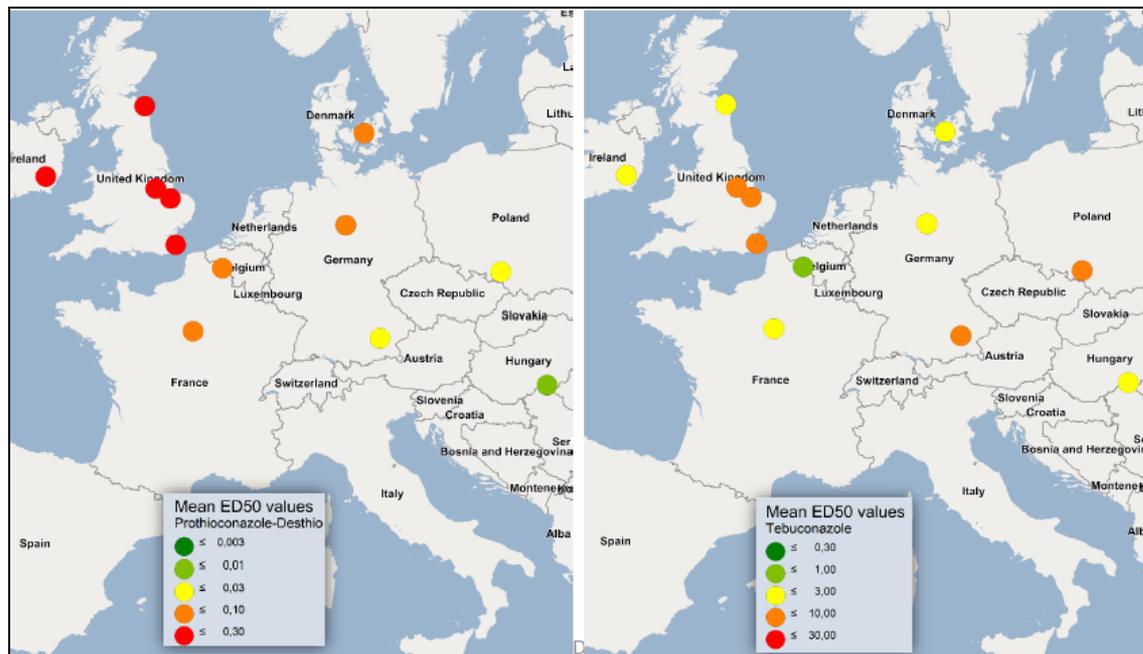
# %Control of septoria – 2nd leaf

## Curative control

% Control of septoria					-	1,5 L/ha	0,8 L/ha	1 L/ha	1 L/ha
Trial	Country	Leaf	GS	DAA	Untr.	Opus Max	Proline	Caramba	Folicur
380-2	Denmark	2	75	47	72,5	76	79	62	55
380-3	Denmark	2	75	46	58,8	60	52	45	43
380-4	Denmark	2	75	43	40	75	63	47	47
380-6	Poland	2	75	58	5,3	45	59	62	62
380-8	Poland	2	75	46	17,5	90	63	56	62
380-10	France	2	75	41	79,7	58	48	69	57
380-15-2	Germany	2	75	37	30	80	93	77	50
380-22	Ireland	2	85	42	74,9	60	38	84	69
380-23	Belgium	2	87	50	35,5	28	63	46	72
380-24	Belgium	2	70	42	28,3	56	70	57	58
380-25	Hungary	2	75	39	45	83	56	47	11
380-26	Hungary	2	75	39	50	72	60	67	70
<b>Average % control - Leaf 2</b>					<b>44,8</b>	<b>65</b>	<b>62</b>	<b>60</b>	<b>55</b>



EC<sub>50</sub> values from 4 azoles. Samples taken from untreated plots in EURO-wheat trials 2015



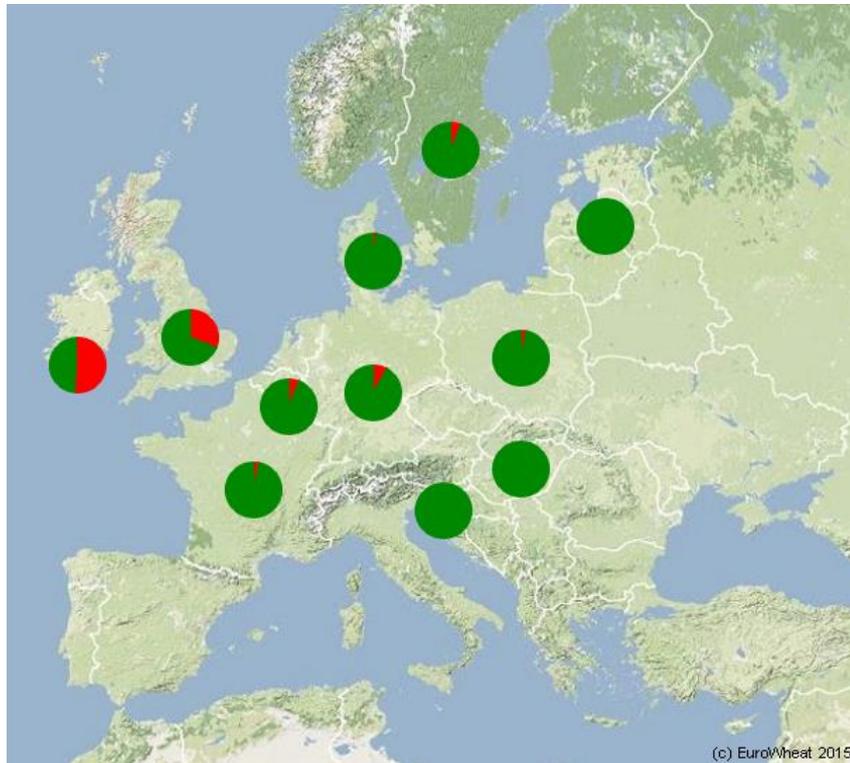
Tested by Epilogic

# EuroWheat tool box

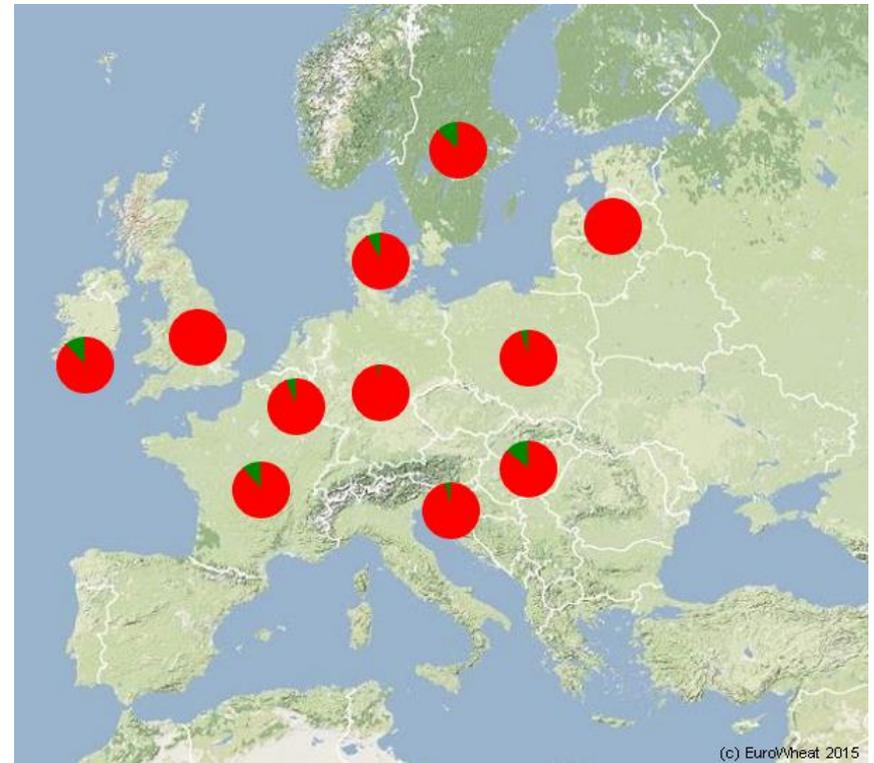
## CYP51-mutations in *Z. tritici* – untreated plots

D134G, V136A, V136C, I381V, A379G by pyrosequencing S524T with QPCR

### S524T-mutationer i 2015



### I381V -mutationer i 2015



Data from Eurowheat and NORBARAG

# Summary - septoria efficacy

- Attack of septoria varied considerably across the localities – low attack in UK and Lithuania
  - Azole mixtures (Osiris and Prosaro) performed most stable across all trials
  - Epoxi performed well in Denmark, Poland, France
  - Met performed well in France and Ireland
  - Prothio performed poorly in France and Ireland, but better in Germany and Denmark
  - Tebu performed relatively well in Belgium and Ireland and poorly in other trials
  - Some clear links between EC50, mutations and efficacy – but not in all cases!!

# 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
B 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
C 5	Proline	0,4	Bell	0,5	Armure	0,4	2 c	6 e	29 cde	3 c	54 a	90 d
C 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
C 9	-	-	Bell	0,5	Prosaro	0,5	2 c	16 cd	22 ef	9 a	41 bcd	98 abc
C 10	-	-	Bell	1,0	-	-	2 c	15 d	26 de	7 abc	44 bc	91 cd

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

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

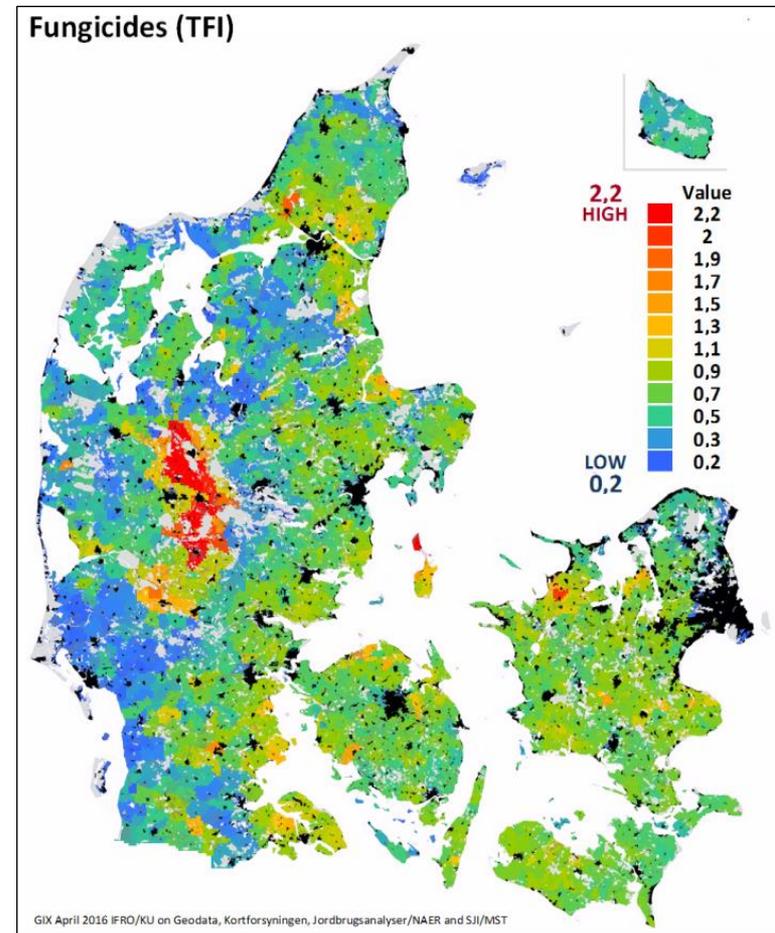
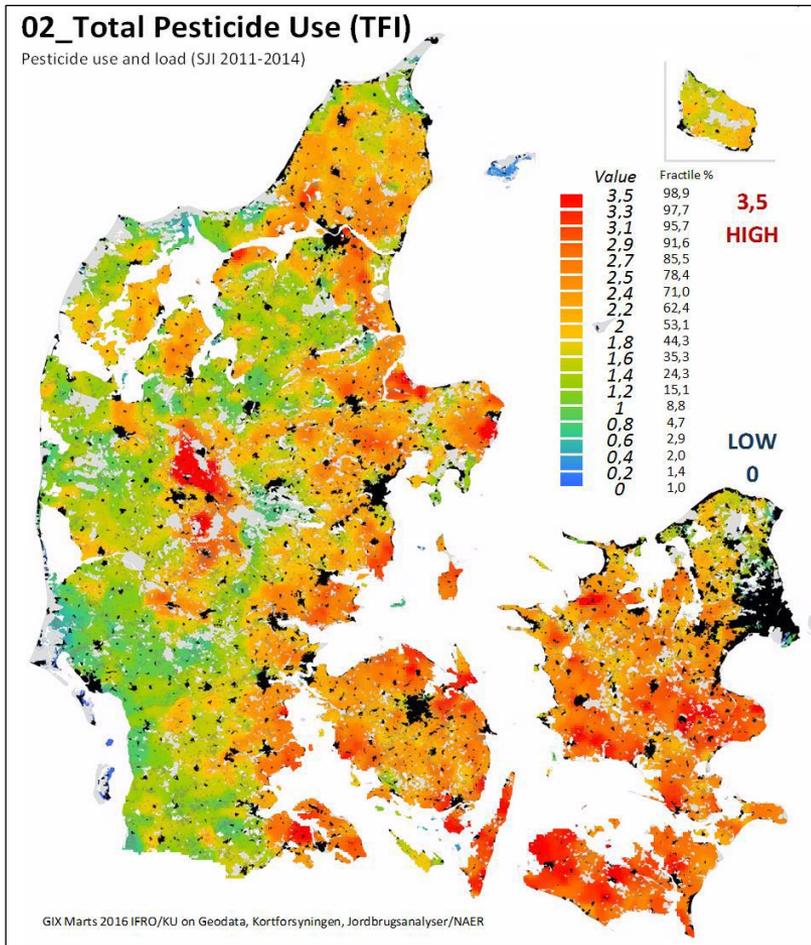
C = treatments, which gives least or no selection for resistance – marked with yellow and green

# Conclusion on selection trial

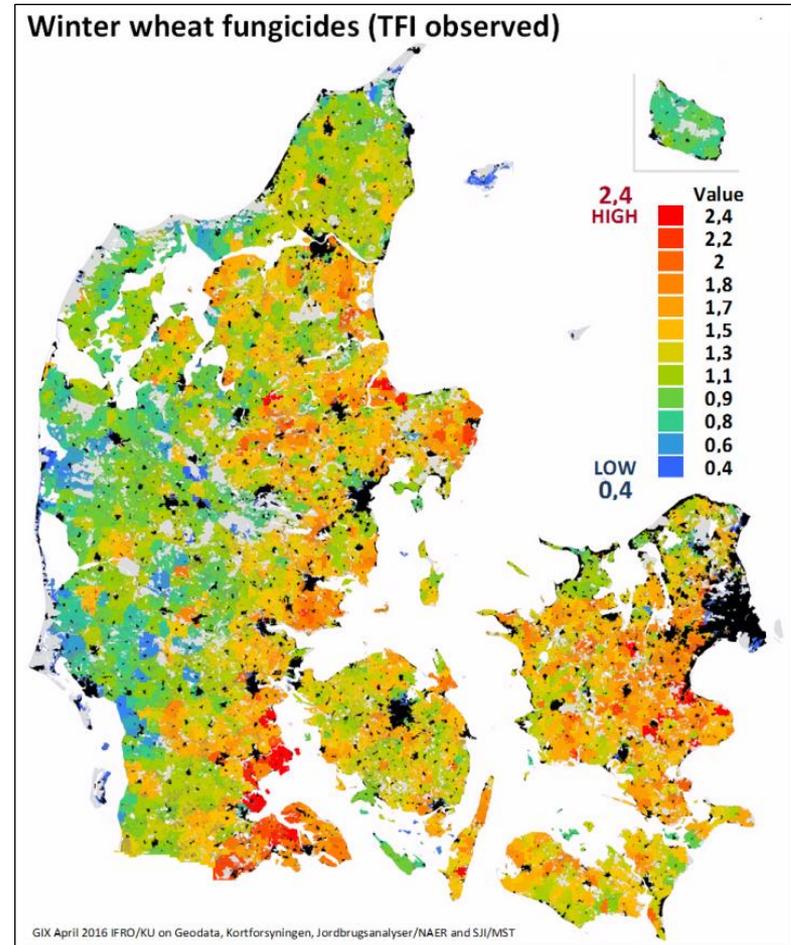
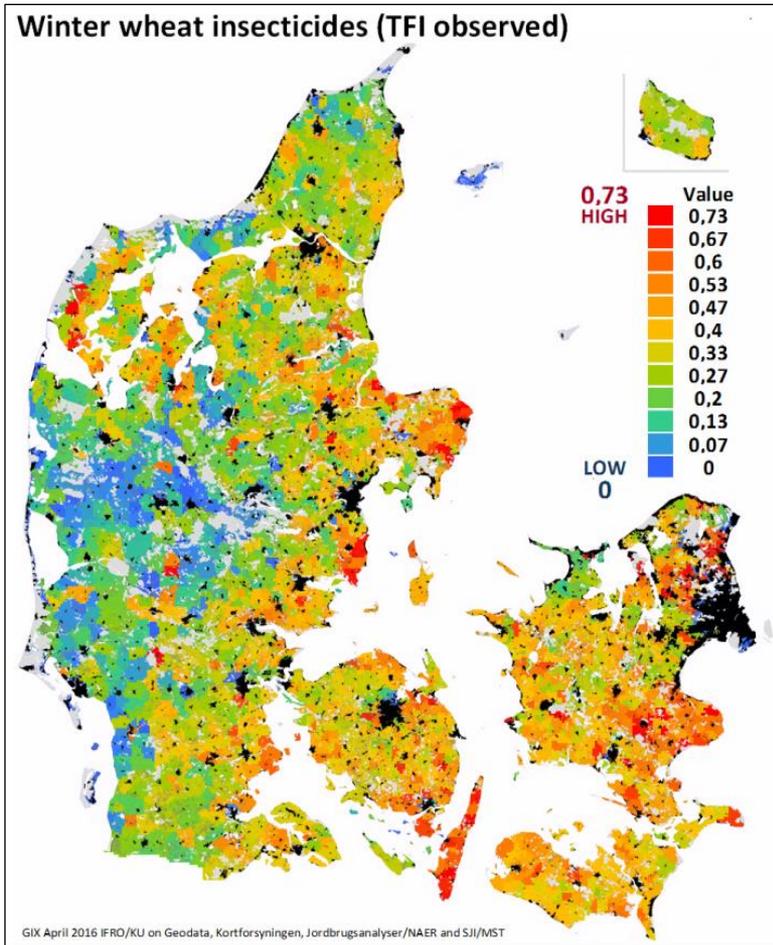
- The more diversity in treatments; the less selection was seen for new mutations
  - The bigger the diversity in azoles the less the selection
  - Fewer treatments with azoles select less
  - Replacing treatments with folpan (Chlorothalonil?) reduces selection
  - Mixing azoles with Folpan improves 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

# Norbarag activities

# Average of 4 years use of pesticides based on farmers reporting



# Average of 4 years use of pesticides based on farmers reporting



# Resistance situation - 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	-

# Norbarag agreed monitoring 2016

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