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Oilseed rape pests in Norway

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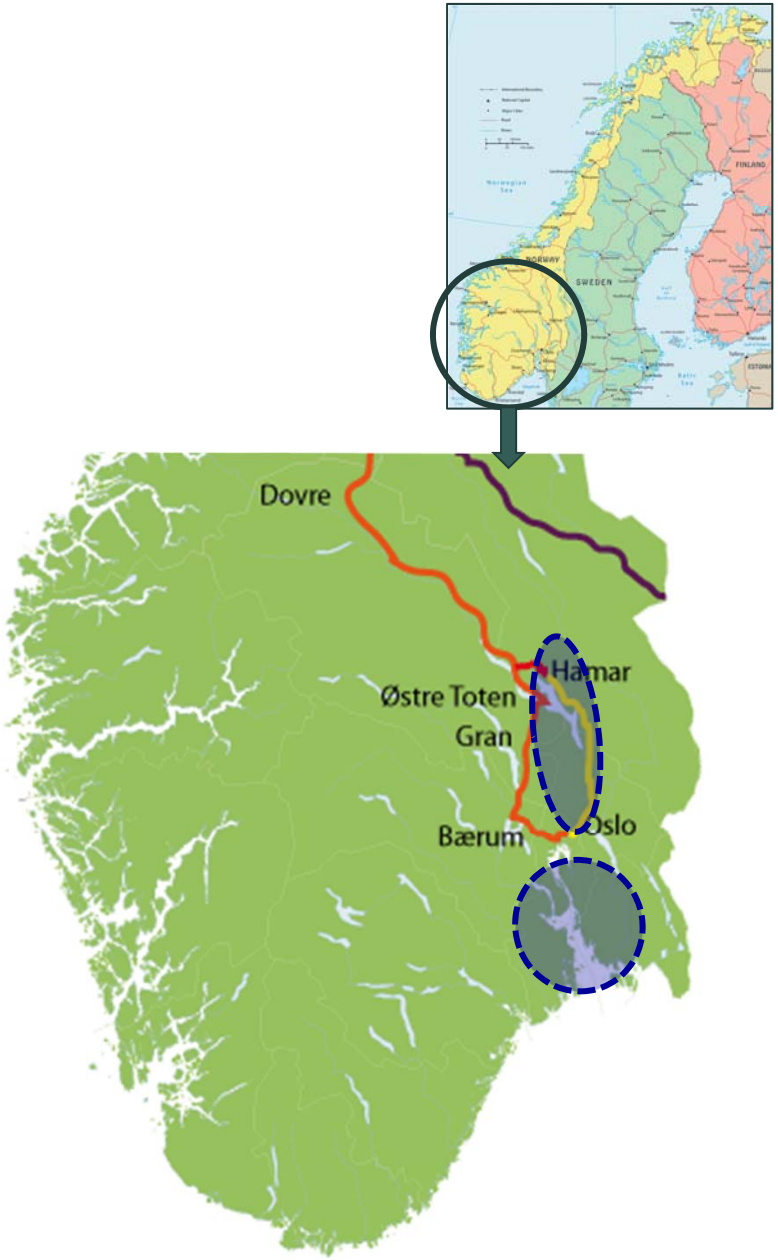
OILSEED RAPE PRODUCTION

- Mainly in South-East Norway
- 4160 ha
- 87 % spring rape
  - 2/3 spring oilseed rape
  - 1/3 spring turnip rape
- 13 % winter oilseed rape



PESTS

Regular

- Pollen beetles (Brassicogethes/*Meligethes* spp.)
- Flea beetles (*Phyllotreta* spp)

Occasional

- Diamondback moth (*Plutella xylostella)*
- Brassica pod midge (*Dasineura brassicae*)
- Turnip seed weevil (*Ceutorrhynchus obstrictus =C. assimilis)*
- Cabbage stem weevil (*Ceutorrhynchus quadridens = C. pallidactylus)*
- Turnip sawfly (*Athalia rosae*)

PEST CONTROL

- Mainly insecticides
- Area treated
  - Spring oilseed rape 70 %
  - Winter oilseed rape 10 %

- Treatment threshold (pollen beetles) or at appearance

Growth stage	No. of pollen beetles/plant
Early bud stage	0,5-1,0
Medium bud stage	1-2
Late bud stage	2-3

ACTIVE SUBSTANCES 2017

MoA-group	Active ingredient	Field rate (AI/ha)	Treatments/ year	Pollen beetle	Flea beetles*, DBM*, Turnip sawfly*	Cabbage seed pod weevil	Cabbage stem weevil, Brassica pod midge
3A	Alpha-Cypermethrin	10.0 - 12.5	2	X	X		
	Deltamethrin	5.0 – 7.5	1	X	X	X	
	Esfenvalerate	7.5 - 15	2	X	X	X	
	Lambda-cyhalothrin	5.0	1-2	X	X	X	
	Tau-fluvalinate	48.0	1-2	X		X	X
4A	Thiacloprid	72.0	1-2	X		X	
22A	Indoxacarb	25.5	1	X			

* Pests also in other crops

SEASONAL OCCURRENCE OF MAIN PESTS

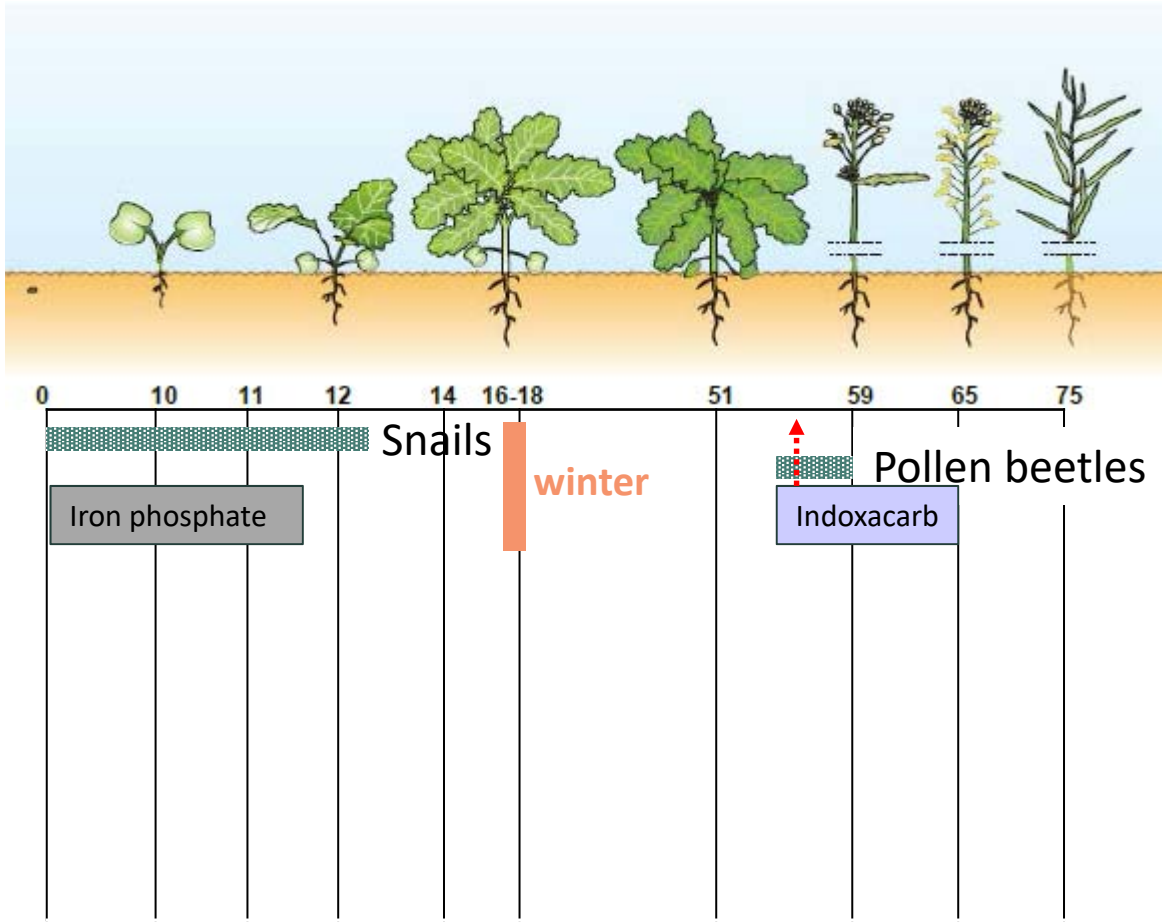


Figure from: Bekämpningsrekommendationer. Svampar och insekter 2017. Jordbruksverkets växtskyddscentraler, mars 2017
http://www2.jordbruksverket.se/download/18.44d1a6d715b53cf7b561f74c/1491802974655/be17v19.pdf

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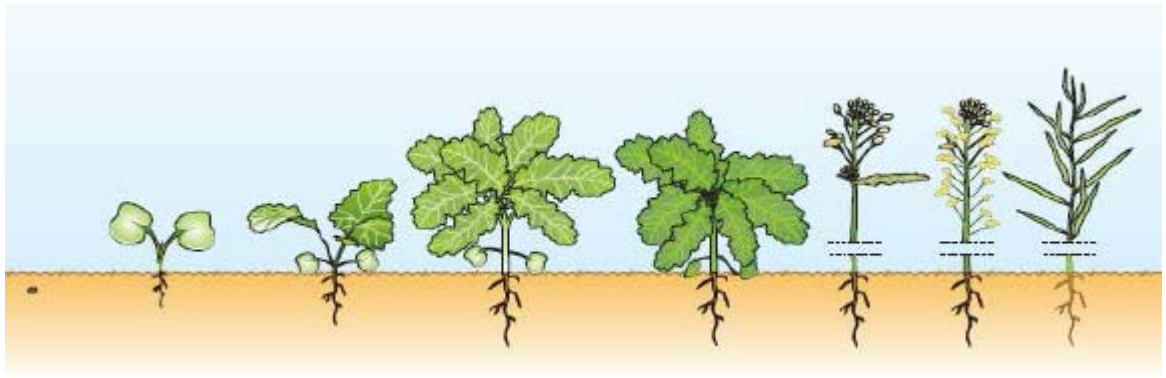

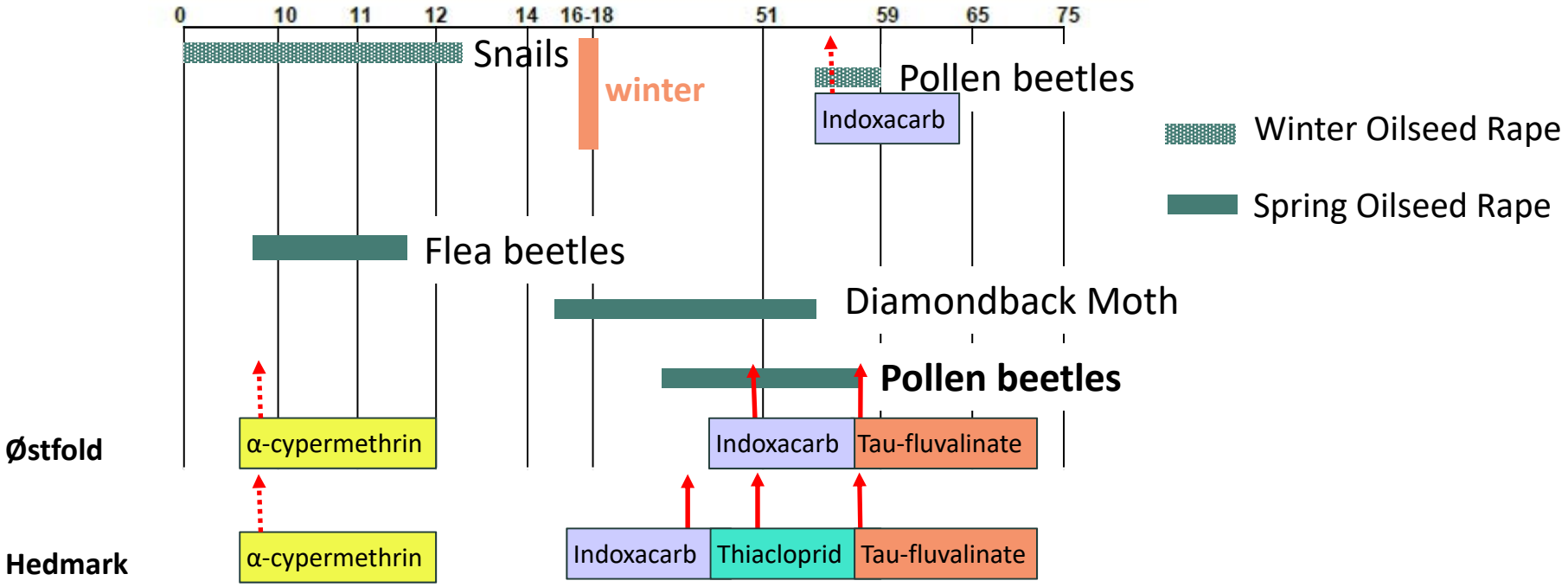

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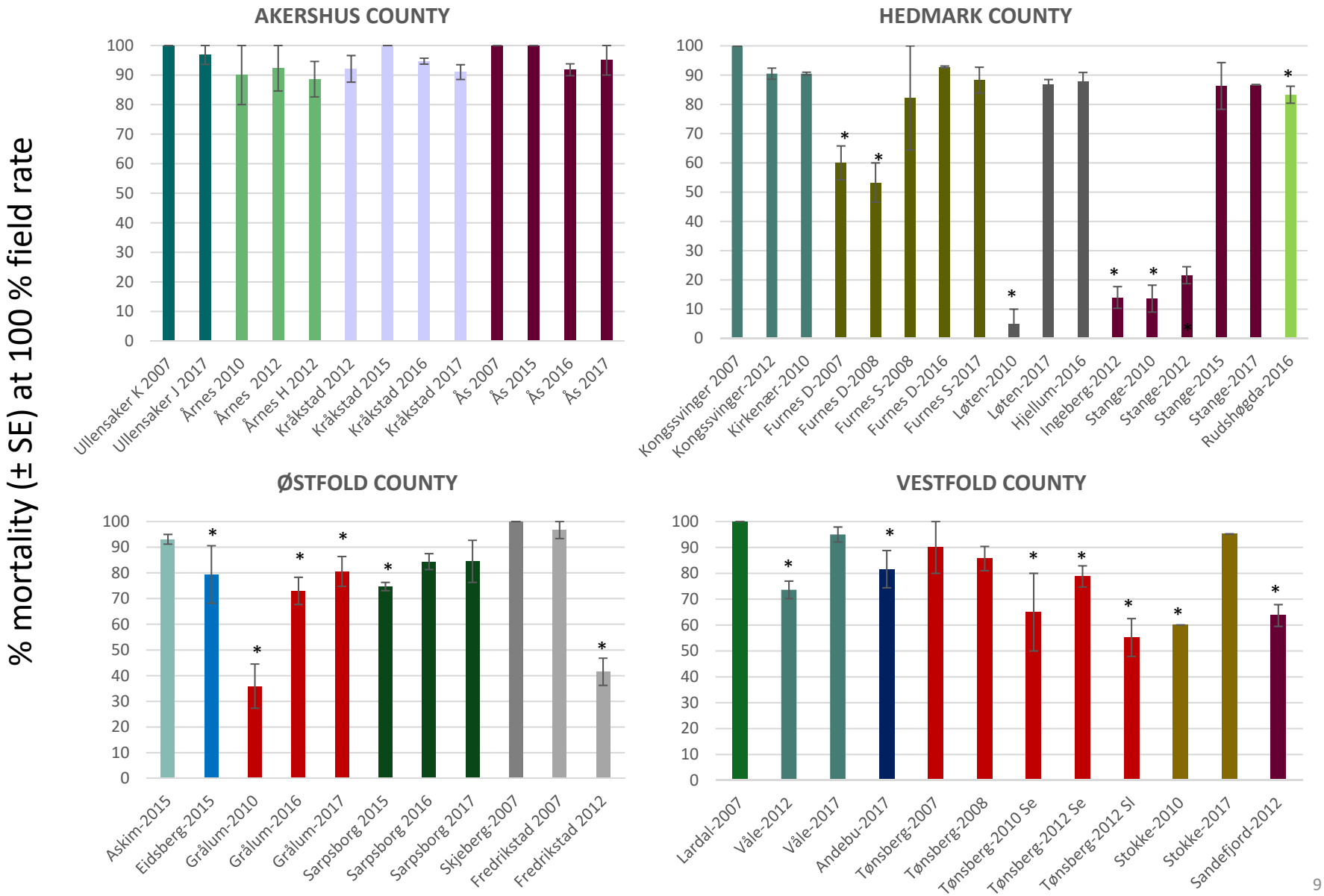
RESISTANCE MONITORING: POLLEN BEETLES

- **Cyhalothrin/technical grade (2007-2017)**
  - IRAC Method no. 011
  - Test vials from Syngenta and Bayer CropScience
- **Thiacloprid/Biscaya OD 240 (2010-2017)**
  - IRAC Method no. 021
  - Test vials from Bayer CropScience
- **Indoxacarb/Avaunt 150 EC (2012-2017)**
  - IRAC Method no. 027
  - Test vials from DuPont
- Pollen beetles from spring oilseed rape and spring turnip rape

POLLEN BEETLE SUSCEPTIBILITY TO λ-CYHALOTHRIN



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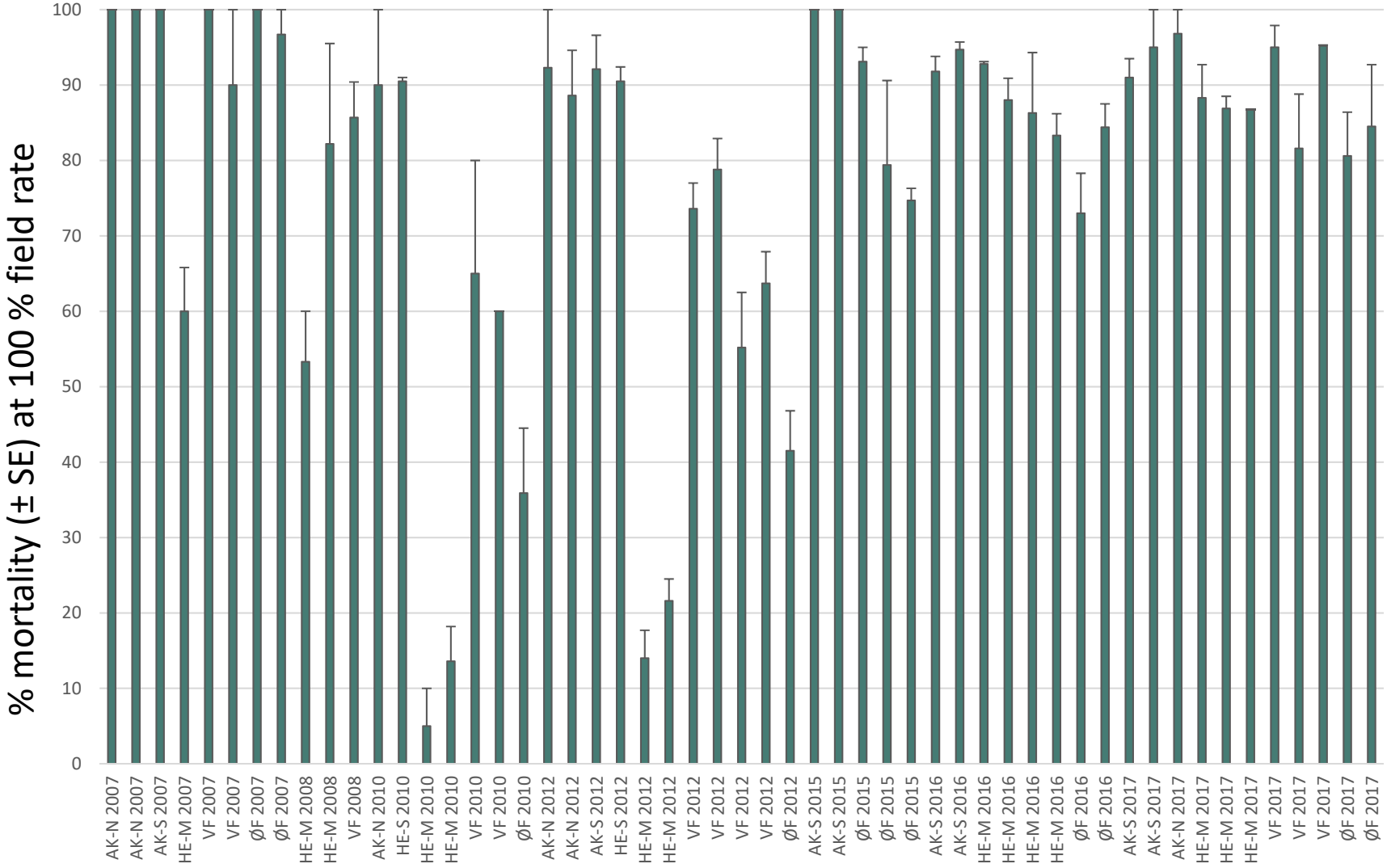

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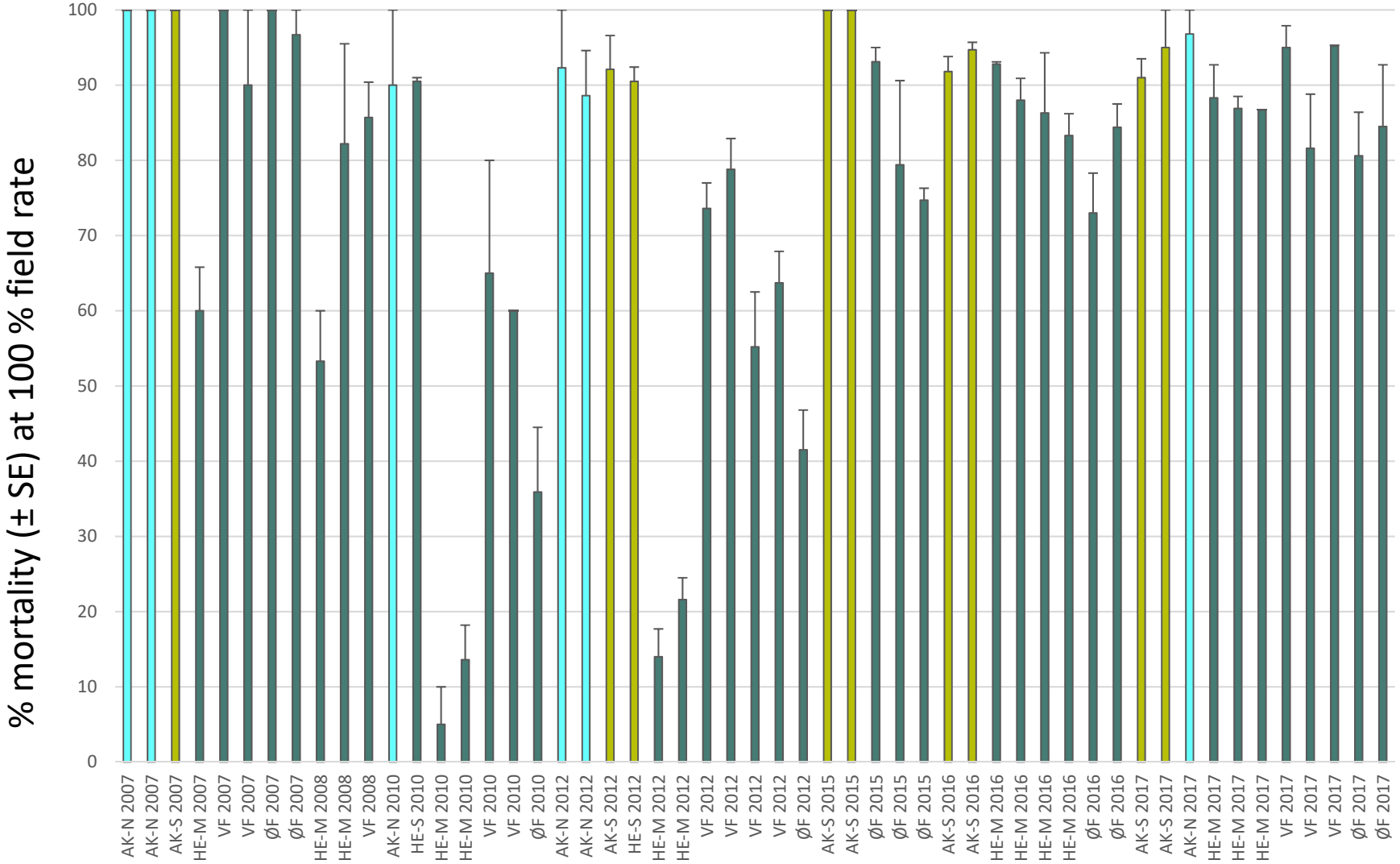

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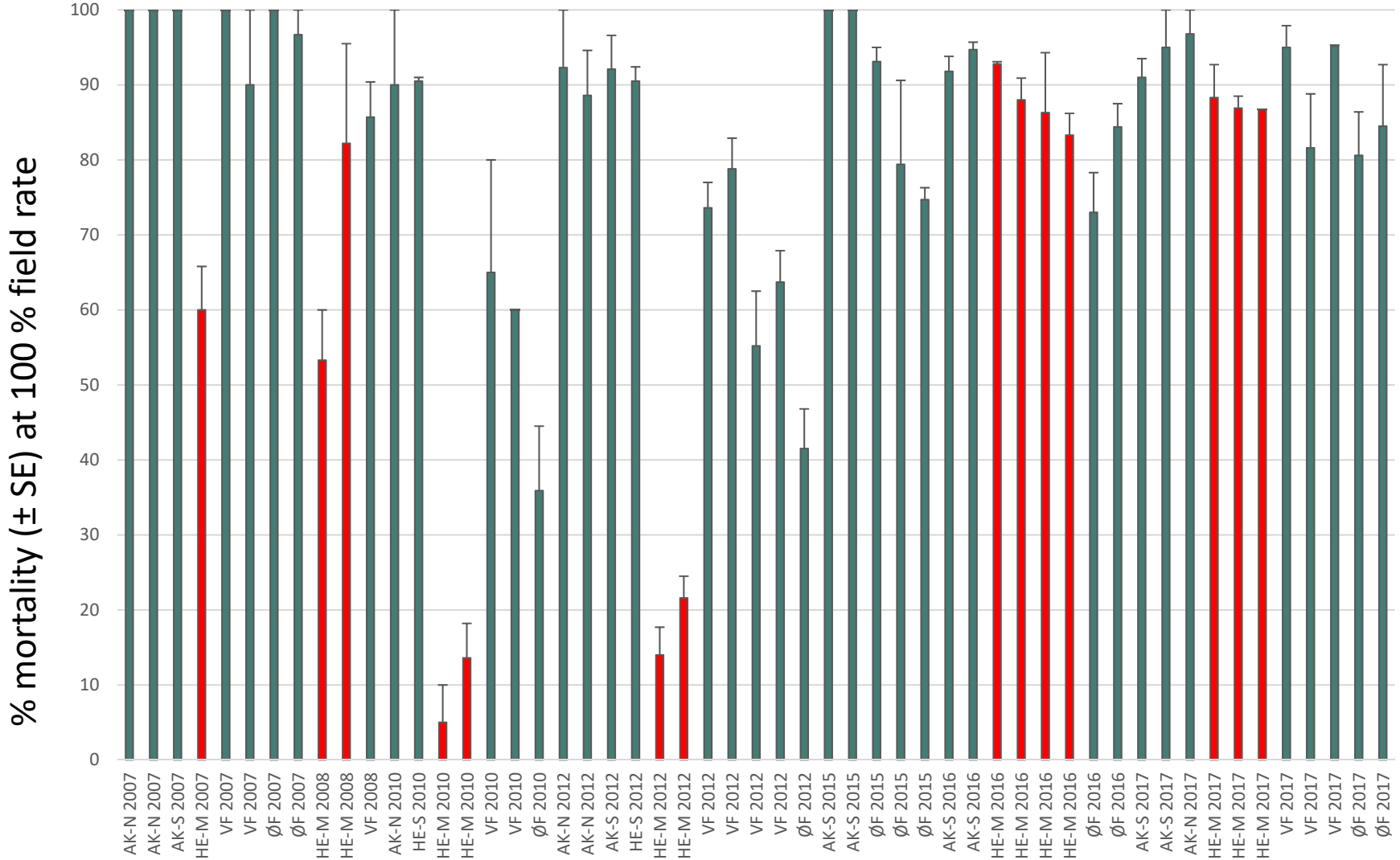
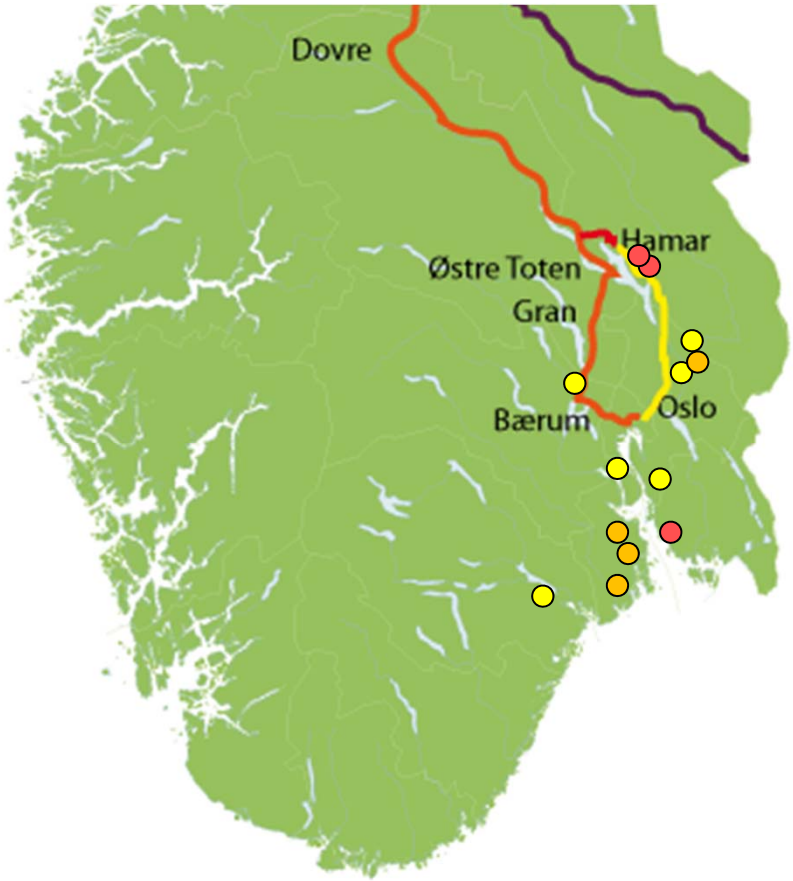


λ-CYHALOTHRIN

Resistance level (IRAC)

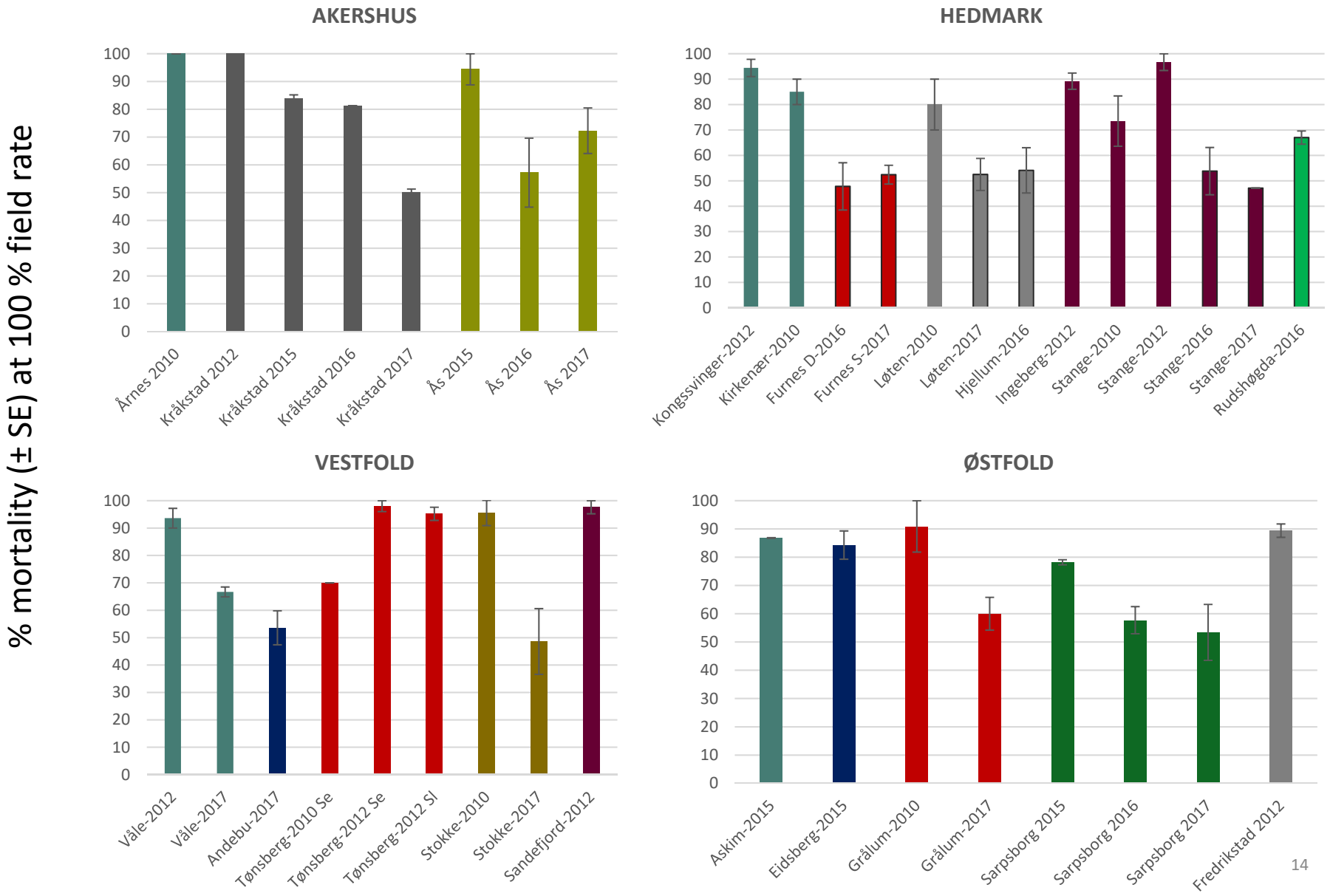
- Highly resistant (5)
- Resistant (4)
- Moderately resistant (3)
- Susceptible (2)
- Highly susceptible (1)



2012

2017

POLLEN BEETLE SUSCEPTIBILITY TO BISCAYA OD 240



POLLEN BEETLE SUSCEPTIBILITY TO BISCAYA OD 240

BISCAYA OD 240 (THIACLOPRID)

Susceptibility data 2012

Mean values for 9 field strains, 2012	n	LC_{50} ng AI/ cm^2	95 % FI	LC_{95} ng AI / cm^2	95 % FI	Slope ± SE
	307 ± 5	0,042	0,027 – 0,062	1,090	0,579 – 2,901	1,14 ± 0,07

Mortality at discriminating concentrations, 25 and 100 % of recommended field rate (mean of collected strains)

Year	No. of sites	Counties	Rate (µg AI/cm^2)		
			0.029	0.144	0.720
2012	9	AK, HE, VF	65 ± 15	95 ± 5	99 ± 2
2017	10	AK, HE, VF, ØF	42 ± 18	56 ± 13	70 ± 14
Expected mortality (IRAC Method no. 021)			50 ± 10	93 ± 6	98 ± 3

AVAUNT 150 EC (INDOXACARB)

Susceptibility data 2012

Mean values for 7 field strains, 2012	n	LC_{50} ng AI/ cm^2	95 % FI	LC_{95} ng AI / cm^2	95 % FI	Slope ± SE
	348 ± 30	34.3 ± 3.2	29.0 – 39.3	82.9 ± 6.0	68.5 – 111.4	4.65 ± 0.54

Mortality at 25 and 100 % of recommended field rate (mean of collected strains)

Year	No. of sites	Counties	Rate (ng AI/cm^2)	
			63.75	255
2012	7	HE, VF	83 ± 15	100 ± 0
2017	10	AK, HE, VF, ØF	100 ± 1	100 ± 0
Expected mortality (IRAC Method no. 027)			> 90	> 90

TOWARDS IPM IN SPRING OILSEED CROPS IN NORWAY

Project: BRAKORN (2015-2019)
Aim in WP3: Reduced crop losses from pests and diseases. Pests with focus on:

Pollen beetles
Brassicogethes/*Meligethes* spp.

Flea beetles
Phyllotreta spp.

FLEA BEETLE SPECIES COMPLEX, SPRING OILSEED RAPE IN NORWAY

Akershus county, Ås (first evaluated in 2016)

Large Striped Flea Beetle

Foto: argoatlas.ru

Small Striped Flea Beetle

Foto: argoatlas.ru

Striped Flea Beetle

Foto: argoatlas.ru

%	*Phyllotreta nemorum*	*P. undulata*	*P. striolata*
Ås	3	73	24

MELIGETHES SPECIES COMPLEX IN NORWAY

Akershus/Østfold counties, 2015:

Foto: colpolon.biol.uni.wroc.pl

Foto: LechBorowiec

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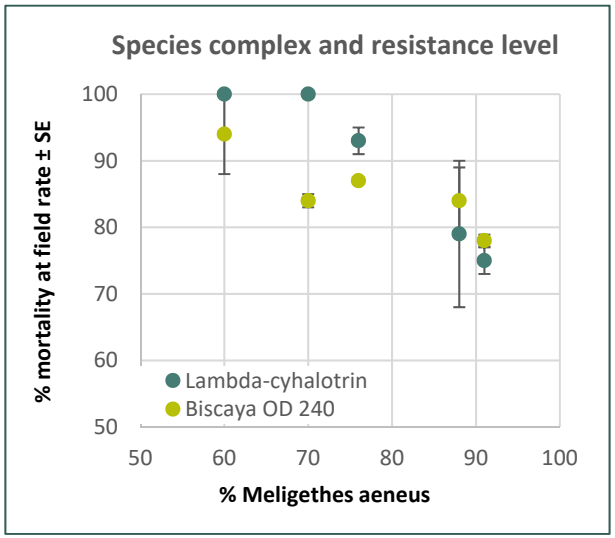
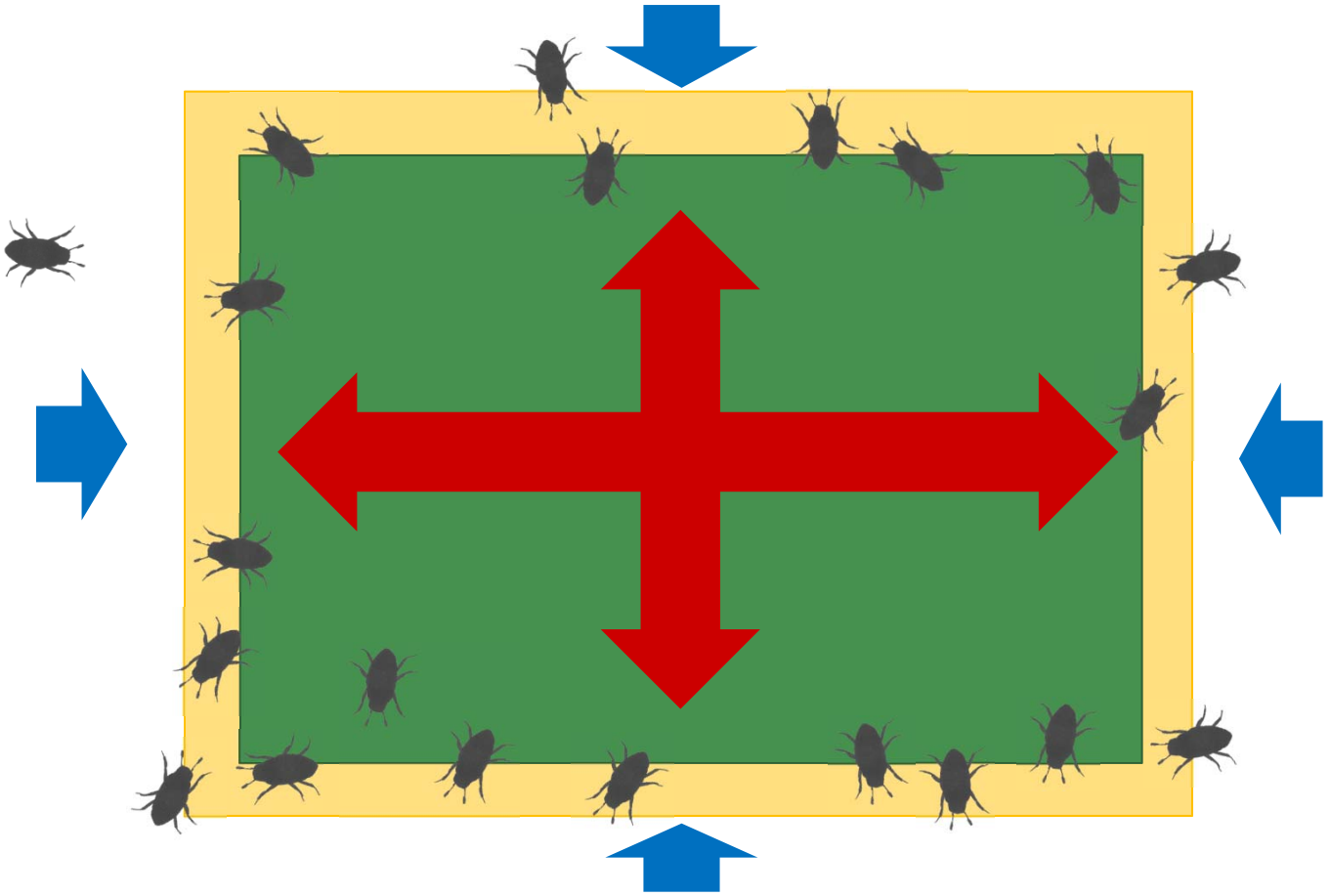


%	*M. aeneus*	*M. coeruleivirens*	*M. subaeneus*	*M.subrugosus*	*M. viridescens*
Askim	76	11	4	0	10
Ås	60	16	1	0	23
Kråkstad	70	15	3	2	10
Rakkestad	88	8	0	0	4
Sarpsborg	91	5	4	0	1

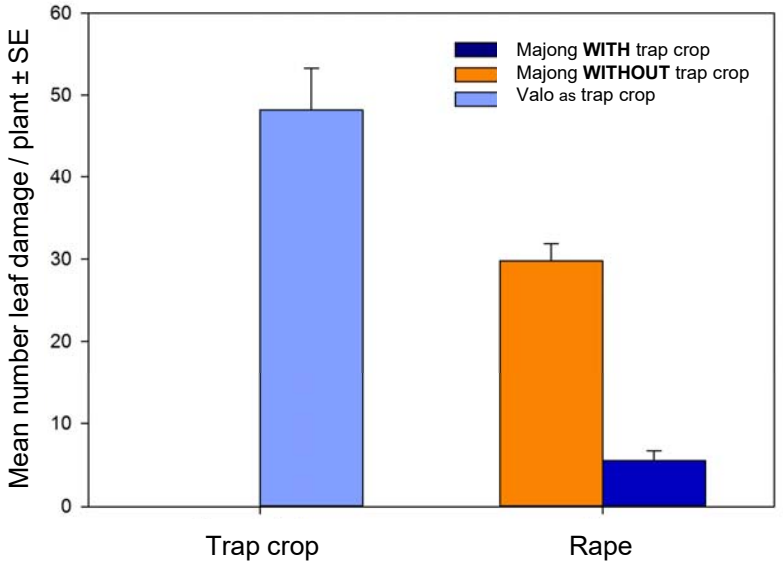
TRAP CROPS

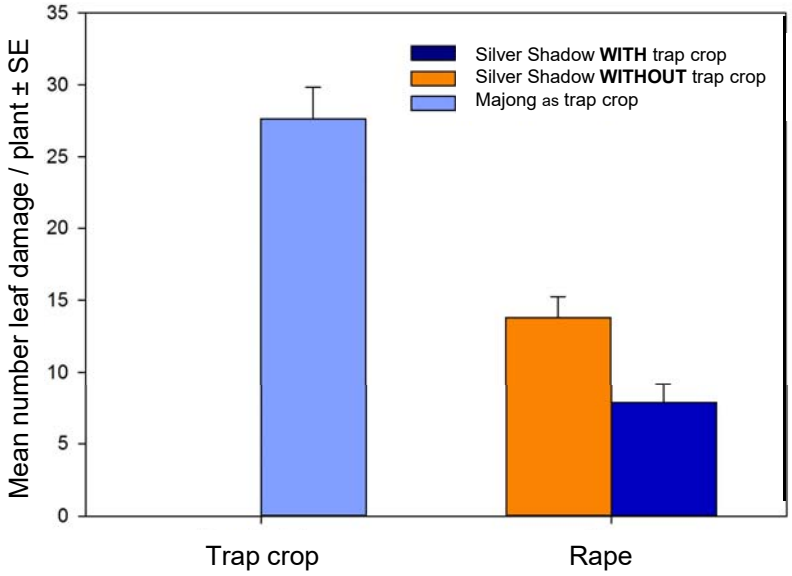
Trap plants with attractive colour and odour along the field edge lure pests away from the main crop



FIELD 2016

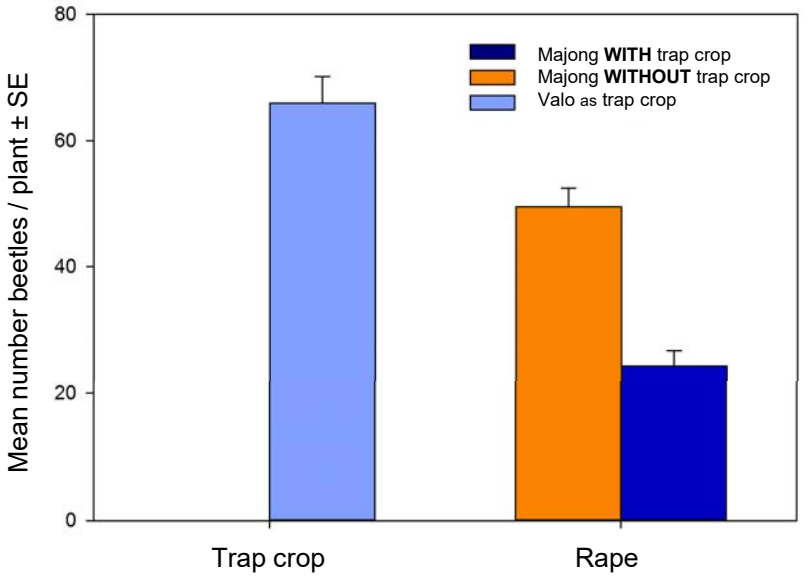
Flea beetles, *Phyllotreta* spp.

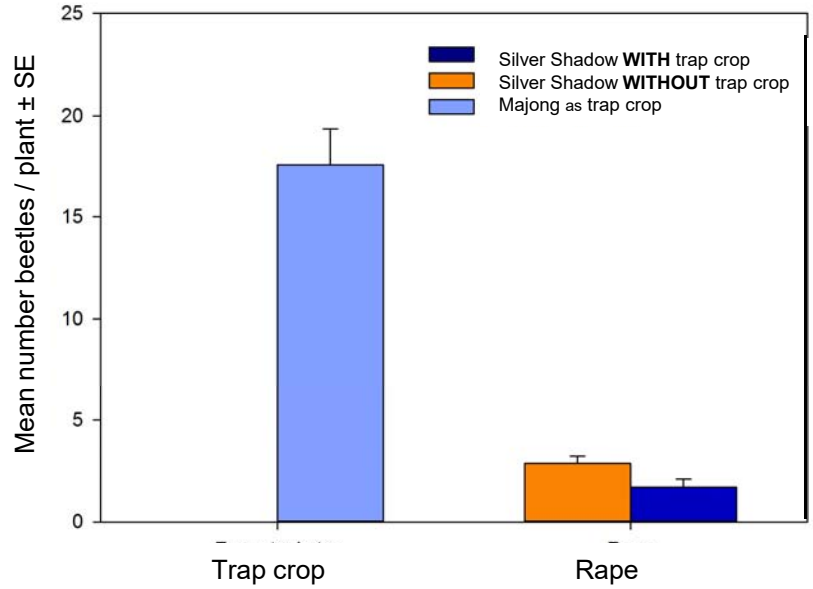




FIELD 2016

Pollen beetles,
Brassicogethes/*Meligethes* spp.





SUMMARY

- Pyrethroid resistance in **pollen beetles** stabilized or partly reversed? Reduced susceptibility towards thiacloprid of concern. Indoxacarb is effective, also against pollen beetles with reduced sensitivity to pyrethroids and thiacloprid
- Resistance in **flea beetles** not investigated
- Development of alternative control methods and anti-resistance strategies important to avoid more serious resistance problems
- Trap crops with summer turnip rape promising control method for **flea and pollen beetles** in spring oilseed rape
  - Treatment threshold exceeded less often
  - Pests on trap crop must be effectively controlled at the right time to avoid immigration and damage in the main crop
- Occurrence of species complex of **flea beetles** and **pollen beetles** in spring oilseed crops: Effect of insecticides, resistance dynamics and IPM-strategies?

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Thank you for your attention!