Norbarag

5th Nordic-Baltic Resistance Action Group

Tallinn, Estonia, 30-31 January 2013

Norbarag

Nordic; Finland, Sweden, Norway, Denmark

Baltic; Estonia, Latvia, Lithuania.

- **Pesticide resistance; fungicide, herbicide, insecticide**

- **Scientist from research institutes**
- **Officials involved in pesticide efficacy evaluation**
- **Representatives from agrochemical companies**

Norbarag subgroup insecticides

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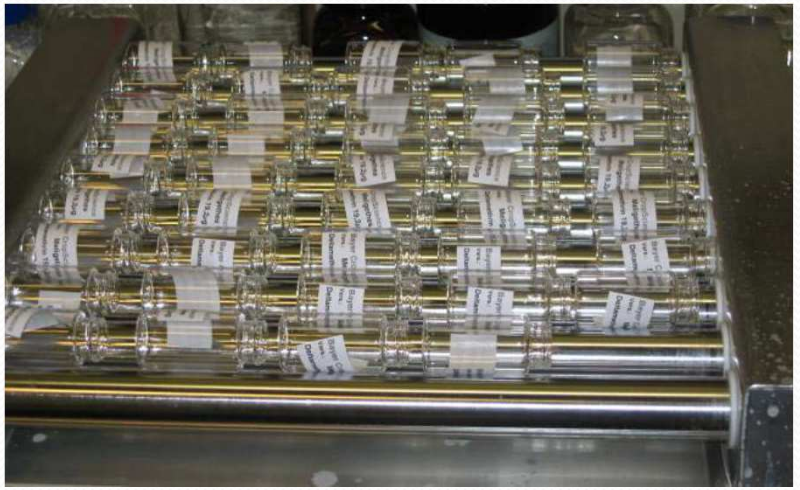
Subgroup insecticides

- Pollen beetles; resistance ….
- Other pest in rape seed.
- Resistance in thrips (greenhouse)
- Examples of resistance in houseflies and other pests.

Pollen beetles

- Pollen Beetles Resistance test of:
  - indoxacarb
  - thiacloprid
  - tau-fluvalinat
  - lambda-cyhalothrin
- Field tests of thiacloprid, tau-fluvalinat and lambda-cyhalothrin.



Pyrethroid resistance

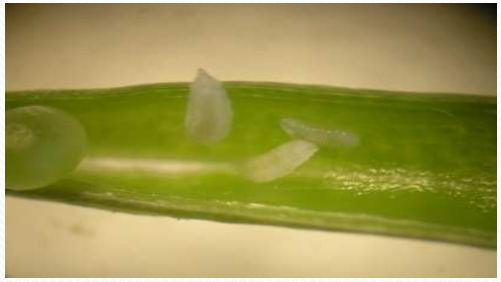
- Widespread resistance to lambda-cyhalothrin in Nordic and Baltic countries.
- Pollen Beetles are mostly susceptible to tau-fluvalinat.
- Pollen beetles are susceptible to indoxacarb and thiacloprid.
- Most countries have 3-4 MoA's available in 2013; pyrethroid, neonicotinoid, indoxacarb, pymetrozine.

Other pest in rape seed.

- Shoot insects
- Stem insects
- Pod insects
- Bud and flower insects

Cabbage flea beetle
Phyllotreta spp.

Ceutorhynchus spp.



Pod midge
Dasineura brassicae

Pollen beetle
Meligethes aeneus

Ilze Apenite, Dr. agr.

Latvian Plant Protection Research Centre, Riga, Latvia

Norbarag; Insecticide Resistance

<u>Resistance established.</u>

- Pyrethroid resistance in **pollen beetle** (*Meligethes aeneus*).
- Spinosad resistance in the w**estern flower thrips** (*Frankliniella occidentalis*) in Denmark.
- Resistance in **greenhouse whitefly,** (*Trialeurodes vaporariorum)* in Finland.

<u>Potentially resistance problems.</u>

- Pyrethroid resistance in s**ilver fir woolly aphid** *(Dreyfusia nordmanniana)* in Christmas tree *(Abies nordmanniana)* production.
- Pyrethroid resistance in s**trawberry blossom weevil** (*Anthonomus rubi*).
- Pyrethroid resistance in green peach aphid (*Myzus persicae*), bird cherry-oat aphid(*Rhopalosiphum padi*) and grain aphid (*Sitobion avenae*)

Norbarag – future focus

- Communication of MoA!!!
- Will farmers begin to use other insectides against pollen beetles?
- Differences in resistance profiles of pyrethroids.
- Efficacy/resistance of new products.
- Neonicotinoids and bees.
- Emerging resistance problems.
- Emerging pests.

EvoPPM

Evolution-proof Pest Management

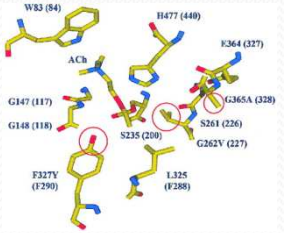
Microevolution of Pesticide Resistance

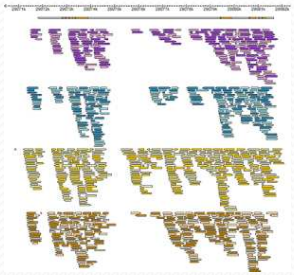
Aarhus University Agroecology & Bayer CropScience

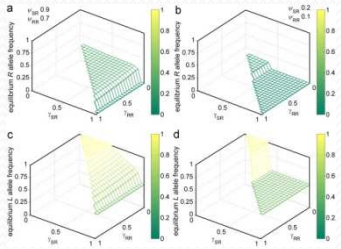
Rothamsted Research, University of Warwich and ADAS Crop Pathology

Evolution-proof Pest Management

- We will integrate **ecological** and **evolutionary principles** to predict long-term responses of pest populations to changing pest management, agricultural environment and climate.
- Expand our basic knowledge of the **genetic variation of pest organisms** to assess the potential for adaptation
- We will use molecular tools, e.g. transcriptome analysis, to **follow the microevolutionary process of resistance development** in field, semi-field and laboratory experiments and identify the effect if **major and minor resistance genes** on the **fitness** of resistant and susceptible phenotypes.







Beetle pests on *Brassica*

***Meligethes aeneus* (pollen beetle), *Ceutorhynchus pallidactylus* (cabbage stem weevil), *C. obstrictus* (seedpod weevil).**

- **Neonicotionoid and pyrethroid resistance of rapeseed beetles; fitness and transcriptome changes in response to selection with insecticides.** (*(PhD1, PhD2, Michael Kristensen, Ralf Nauen, Martin Williamson)*
- ***Research objectives*: Elucidate how genetic variation is transformed into major or minor resistance phenotypes and determine fitness cost of these.**

Silky bent grass

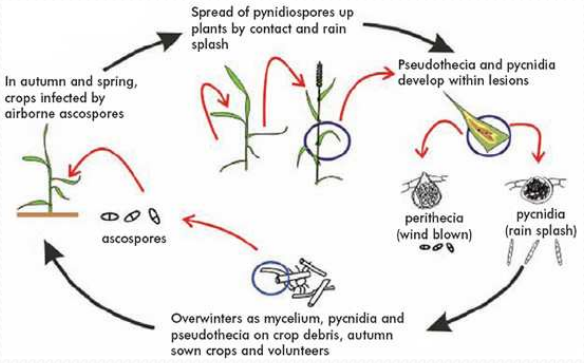
- **Genetic variation and fitness in silky bent grass populations collected 1) in fields with known resistance to ALS inhibitors and neighboring fields with no documented resistance and 2) in plants from seeds collected over a 20 year period.** *(PhD3, Postdoc 1, Solvejg K Mathiassen, Per Kudsk, Michael Kristensen, Paul Neve)*

- ***Research objectives*: Determine the correlation between the frequency of minor and major resistance genes and fitness of silky bent grass populations and provide information on the occurrence of resistance genes and cropping/ herbicide history of the field.**

Septoria leaf blotch

- **Variation in fungicide sensitivity in populations of *Mycosphaerella graminicola* collected from different fields and cultivars** *(PhD4, Lise Nistrup Jørgensen, Annemarie Fejer Justesen, Bart Fraaije, Neil Pavely)*

- ***Research objectives:*** **To determine how resistance develop during the season and elucidate how genetic variation is transformed into new major or minor resistance phenotypes.**



Management strategies

- **Management strategies. Develop models and identify key parameters for the control with pesticides.** *(PostDoc 2, Niels Holst, Per Kudsk, Michael Kristensen, Lise Nistrup Jorgensen, Paul Neve).*

- ***Research objectives:*** **To combine management, genetic variation and fitness data in models to predict and prevent resistance development.**

Thank you