DANISH FIELD TRIALS 2000-18

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DANISH FIELD TRIALS 2000-2018

Focus is on general trends in the use of insecticides on major crops: yield, pests, trials, "major pest events".

Not a statistical meta-analysis, but a subjective reading based on the questions:

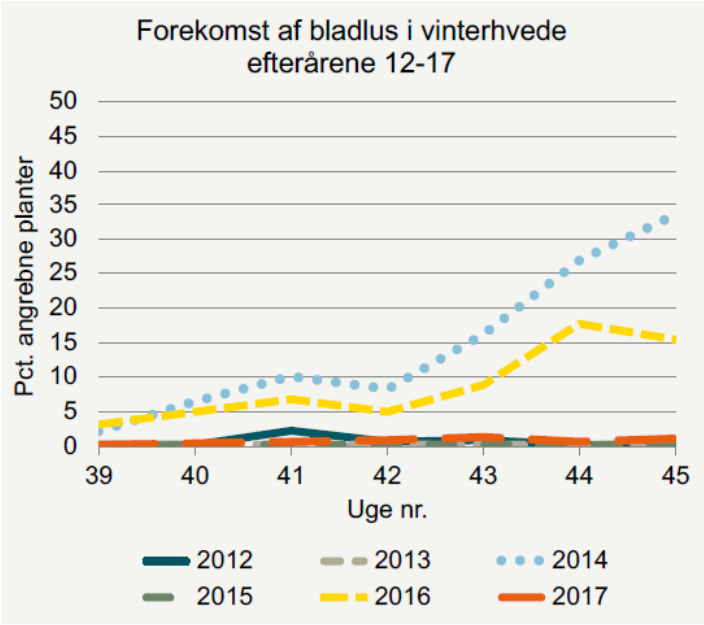
a) is it worthwhile using insecticides?

b) is there emerging resistance?

WINTER WHEAT (1)

- Cereal aphids: Bird cherry-oat aphid (*Rhopalosiphum padi*), English grain aphid (*Sitobion avenae*), Rose-grain aphid (*Metopolophium dirhodum*)
- Most years weak/moderate aphid infestations in the summer. Three years had heavy, but late infestations.
- In autumns 2011, 2014 and 2016, a significant number of grain aphids were found.
- The strongest infestation ever was observed in the autmun 2014 and was followed by the strongest attack of barley yellow dwarf virus.
- Several years with trials with Karate, Mavrik, Pirimor (reduced doses and treatment threshold): Only increase in yield in cases with high aphid infestation.

***Sitobion avenae* transmit barley yellow dwarf virus.**



Percentage infested plants

Fra Oversigt over Landsforsøge 2018, p. 85.

WINTER WHEAT (2)

- Pheromon monitoring of wheat fly (*Contarinia tritici*) and orange wheat blossom midge (*Sitodiplosis mosellana*): Control experiments gives yield increase when applied early.
- Cereal leaf beetle (*Oulema melanopus*), frit flies (O*scinella frit*) and the ground beetle (*Zabrus tenebrioides*) are occasional pests.
- Reports on potential control problems in aphids in 2009. Pontential case of resistance.

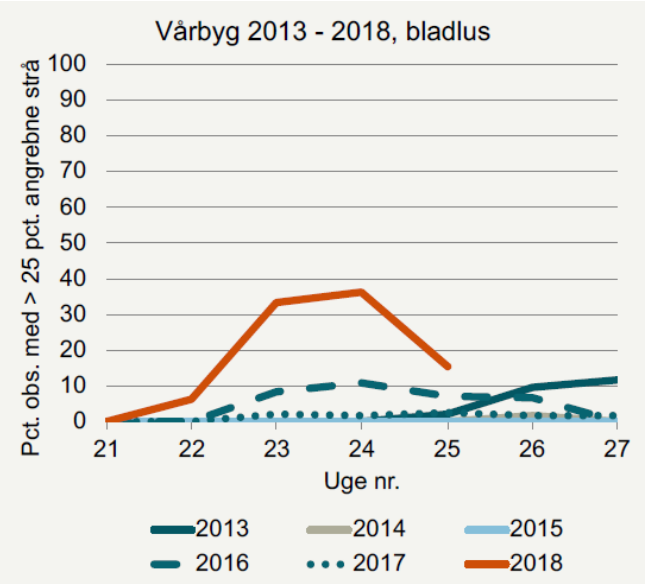
WINTER BARLEY (FROM 2012) & OAT

- In autumns 2012-13, 2015, 2017 there were relatively weak infestations of grain aphids in winter barley. Only in a few fields there were many aphids.
- In autumns 2011, 2014 and 2016, a significant number of aphids were found.
- Experiments with seed treatments was stopped due to lack of aphids.

- Mostly aphids and cereal leaf beetle infestations has been low in oat – only a few years show moderate levels of insect pests. (the problem is cystnematode; crop rotation).

SPRING BARLEY

- Approx. every second year widespread strong aphid infestations were reported in spring barley.
- Only in two years significant infestations with cereal lef beetles were reported in spring barley.
- Trials with Karate, Mavrik, Pirimor, Fastac in spring barley (reduced doses and treatment threshold): mostly small increase in yield; with heavy infestations yield increases are significant.

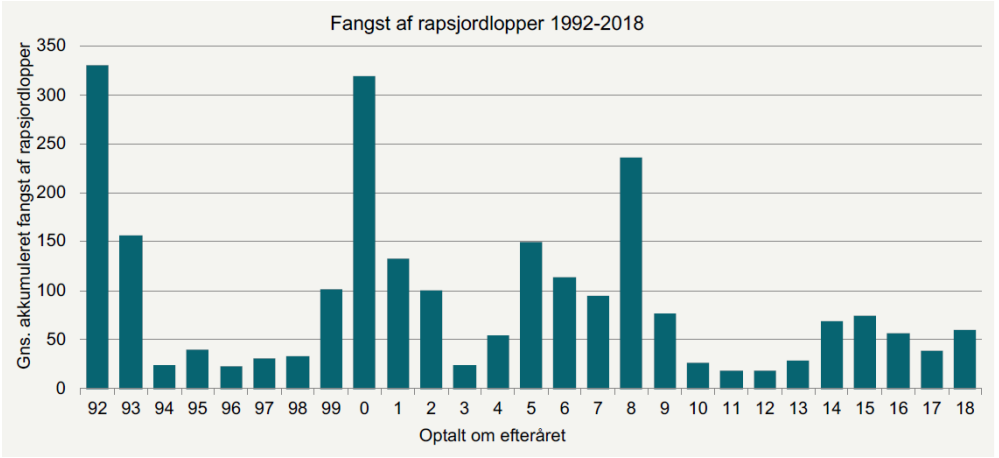


Percentage observations with >25% infested straws

Fra Oversigt over Landsforsøge 2018, p. 110.

WINTER OIL SEED RAPE (1)

- Pollen beetle (*Brassicogethes aeneus*), cabbage stem flea beetle (*Psylliodes chrysocephala*), cabbage seed pod weevil (*Ceuthorrynchus obstrictus*), cabbage stem weevil (*Ceutorhynchus pallidactylus*), Brassica pod midge (*Dasyneura brassicae*).
- Neonic seed treatments against CSFB showed only low yield increases and PYR treatments increased yield further.
- In 2014 (after seed treatment) need for further control was observed in 45% of fields.
- In 2018 (no seed treatment) need for further control was observed in 35% of fields.
- Awareness on potential PYR resistance in CSFB.

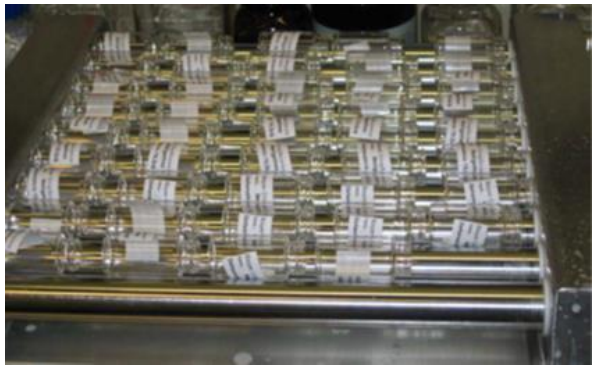


FIGUR 3. Akkumuleret fangst af rapsjordlopper i efterårene 1992 til 2017 til og med uge 41 (omregnet til fangster i de store gule fangbakker (825 cm²)).

From Oversigt over Landsforsøge 2018, p. 161.

WINTER OIL SEED RAPE (2)

- Trials against pollen beetles (Mavrik, Karate, Fastac, Biscaya, Avaunt, Plenum): a lot of variation in yields, significant increases are achieved, but not always, mostly due to low infestation or the compesating power of rape seed plants.
- Pollen beetle PYR resistance is present, but few highly resistant populations.
- Multiple MOAs was available (~~Avaunt~~, ~~Plenum~~).
- A max-control trial with 4 treatments against pollen beetles, cabbage seed pod weevils and brassica pod midges did not give increased yields.
- Trials in 2018 with pyrethroid against the cabbage stem weevil gave yield increase (insignificant).
- Trials in 2018 with several insecticides against pod weevils and midges did not give yield increases.

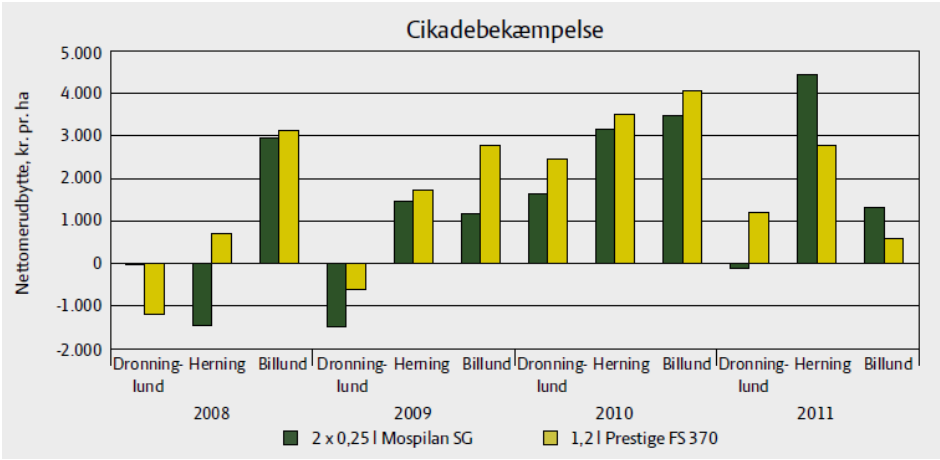


PEA

- Pea aphid (*Acyrthosiphon pisum*), thrips *(Thrips angusticeps*, *Kakothrips pisivorus)*, weevils *Sitona* spp., Pea moth (*Cydia nigricana*)
- In 2002 and 2013, there was relatively heavy infestations with pea aphids in several fields.
- Development followed 2000-07 by pheromone traps. *Cydia* is not a major pests and the yield is rarely reduced.
- The area with peas is relative low. Pest management in forage peas is not recommended. Management in peas for human consumption can be necessary to ensure quality.
- Options for control; PYR and carbamate (only aphids).
- Resistance development unlikely.

POTATOES

- Plant bug (Lygocoris pabulinus), potato leafhoppers (*Empoasca spp.*), aphids (*Aulocorthum solani, Myzus persicae, ++),* turnip moth *(Agrotis segetum)*, Colorado potato beetle (*Leptinotarsa decemlineata*)
- Neonic seed potato and spray treatments are very efficent against leafhoppers (the major pest) and other early pests.
- Both gives significant yield increases.
- Experiments to control aphids with pyrethroid spray usually causes increasing aphid populations (resistance and/or resurrection).
- Virus transmission cannot be stopped by controlling aphids. Yield increase are achieved with late spraying of starch potatoes.
- Probably PYR resistance in the green peach aphid.



Fra Oversigt over Landsforsøge 2011, p. 315.

SUGAR BEETS

- Bean aphid (*Aphis fabae*), beet fly (*Pegomya hyscyami*), green peach aphid (*Myzus persicae*), pygmy mangold beetle (*Atomaria linearis*), cabbage thrips (*Thrips angusticeps*), and soil dwelling pests.
- Neonic seed treatment is very effective for most pests during spring.
- Generally pest infestation is low and it is difficult to achieve yield increases in trials.; with heavy pest infestations significant yield increases are achieved.
- Late pests infestations on leaves can be solved by spraying, whereas soil pests decrease yield.
- The green peach aphid transmits 'virus yellows'. Yield reduction is estimated to be10-20%.
- Probably PYR resistance in the green peach aphid.
- The green peach aphid migrates from south (overwinter as well).

Multiple soil dwelling pests: silver Y moth, beet leafhoppers, leafmining flies, springtails, blister beetles, and millipedes.

MAIZE (begins 2010)

- The european cornborer (*Ostrinia nubilalis*) was observed for the first time in 2010.
- A few fields with cornborer infestation were obsered in DK and Sweden in 2011-12.
- Pheromone traps (~20 fields) didn't catch cornborer in 2011-14; except traps close to know infestations.
- From 2014 the pest is established in DK.
- New pheromone traps (~22 fields) deployed from 2015 catch an annually increasing number of cornborers at many sites.
- Generally few infestations in DK. Insecticides not available, ~~Steward~~.
- German field trials have shown up to 30% yield loss with heavy infestations.
- Heavy infestations of aphids reported in some years (In 2018, dispensate was given to use Karate).

CONCLUSION

- ✓ In cereals mostly aphids, cereal leaf beetle and other pest infestations has been low – only a few years show heavy aphid infestations.
- ✓ In cereals insecticides are available (few MOA), and are important until virus-resistant barley cultivars are available and for heavy infestations.
- ✓ In winter oil seed rape control and resistance management of pollen beetle is challenge by few MOAs (pyrethroids and thiacloprid).
- ✓ In winter oil seed rape control of other pests are challenged by one MOA (PYR).
- ✓ In potato mostly two MOA are available against many pests.
- ✓ In sugar beet, neonics seed treatment (dispensate) solves early problems.
- ✓ In many crops two MOA are available against aphids.
- ✓ *Myzus persicae* is potentially a problem; caused by resistance.

Is it worthwhile using insecticides? YES!

Is there emerging resistance? YES, but few!