

RESISTANCE RISK OVERVIEW DENMARK

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DANISH INSECTICIDES (IRAC)

Insecticide	IRAC	Cereal	Oil seed rape	Potato	Sugar-beet	Peas, beans	Vegetable	Ornam. (F)	Fruit/berries	Greenhouse
Pirimicarb	1A	X	X	X	X	X	X	X	X	X
Lambda-cyhalothrin	3A	X	X	X	X	X	X	X	X	X
Pyrethrin							X	X	X	X
Taufluvalinat		X	X	X		X	X			
Tefluthrin					X					
Acetamiprid	4A			X				X	X	X
Flupyradifuron	4D									X
Spinosad	5A									X
Abamectin	6A									X
Pyriproxyfen	7C									X
Buprofezin	16									X
Indoxacarb	22A		X				X	X	X	X
Spirotetramat	23A						X	X	X	X
Cyantraniliprole	28									X
Flonicamid	29	X		X	X			X	X	X

DANISH INSECTICIDES (OTHER)

Insecticide	Potato	Vegetable	Ornam. (F)	Fruit/berries	Greenhouse
Azadirachtin	X			X	X
Fatty acids C7-C20					X
Maltodextrin					X
Paraffin oil	X			X	
Terpenoid blend (Chenopodium)					X
Biologicals:					
Bacillus thuringiensis		X			X
Beauveria bassiana					X
Granulosis virus				X	
Lecanicillium muscarium					X
Metarhizium anisopliae			X	X	X



Unlikely to cause resistance development due to alternative mode of action

OVERALL RESISTANCE RISK

Minor use and **minor crops** has no or low resistance risk.
If resistance apperar in this context it will be imported.

Most pest are **occasional pest** – and will never be selected repeatetly for a long period in multiple successive generation.

- Aphids (F)
- Beetles (F)
- Lepidoptera (F)
- White flies and thrips (G)



APHIDS

Cereal aphids: Bird cherry-oat aphid (*Rhopalosiphum padi*), **English grain aphid** (*Sitobion avenae*), Rose-grain aphid (*Metopolophium dirhodum*)

- Awareness on potential PYR resistance in grain aphid.

Potato and sugar beet aphids: **Green peach aphid** (*Myzus persicae*), glasshouse-potato aphid (*Aulocorthum solani*), Bean aphid (*Aphis fabae*).

- Widespread PYR resistance and some carbamate resistance in Europe in green peach aphid.

- **In most crops three MOA are available against aphids.**
- ***Myzus persicae* is potentially a resistance problem.**



BETLES

Winter oil seed rape: Pollen beetle (*Brassicogethes aeneus*), cabbage stem flea beetle (*Psylliodes chrysocephala*), cabbage seed pod weevil (*Ceuthorrhynchus obstrictus*), cabbage stem weevil (*Ceutorhynchus pallidactylus*).

- PYR resistance in pollen beetle.
- Awareness on potential PYR resistance in *Psylliodes* CSFB.

Potato: Colorado potato beetle (*Leptinotarsa decemlineata*)

- Resistance could be imported by migrating beetles.

White clover: White clover seed weevil (*Apion fulvipes*), clover leaf weevil (*Hypera nigrirostris*), clover head weevil (*Hypera meles*).

- Awareness on potential PYR resistance in clover head weevil.



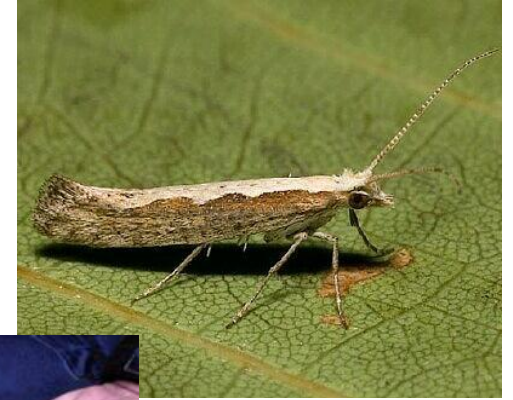
LEPIDOPTERA

Cruciferous crops: *Pieris* ssp. (large and small cabbage white), *Plutella xylostella* (diamondback moth).

- Early migration of *Plutella* and potentially increased overwintering.
- Widespread resistance to multiple MoA in *Plutella*.

Fruit and berries: *Cydia pomonella* and many different species.

Maize: *Ostrinia nubilalis* (European corn borer).



GREENHOUSE PESTS

Resistance can be imported by immigration of pests by live plant material shipment.

- White flies: *Trialeurodes vaporariorum*, *Bemisia tabaci*
- Thrips: *Thrips tabaci*, *Thrips palmi*, *Frankliniella occidentalis*
- Aphid species: *Myzus persicae*, *Aphis gossypii*, *Macrosiphum euphorbiae*, *Aulacorthum solani*, *Aphis fabae*.
- Scale insects and mealy bugs:

Awareness on potential resistance in all pests, multiple MoA available to avoid or break resistance.



DANISH ACARICIDES

Acaricides registered in DK against spider mites in greenhouses:

- Abamectin and milbemectin (IRAC 6A)
- Hexythiazox (IRAC 10A)
- Bifenazate (IRAC 25A)
- Fatty acids C7-C20
- Maltodextrin
- Paraffin oil
- Terpenoid blend



**Unlikely to develop
resistance in Denmark**

**Resistant mites could be
imported**



Additionally predators can be released to control spider mites.



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