Pymetrozine: An essential component of insect pest management in European oilseed rape production.

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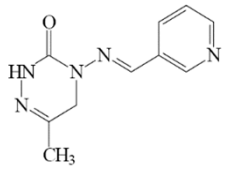
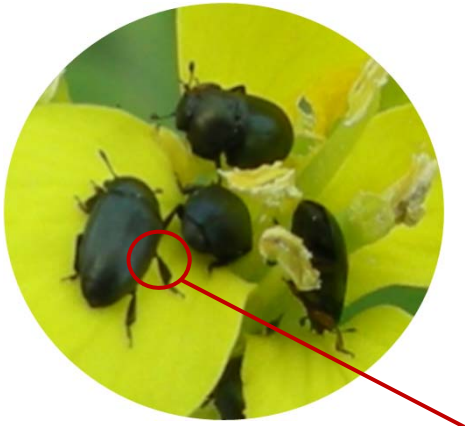
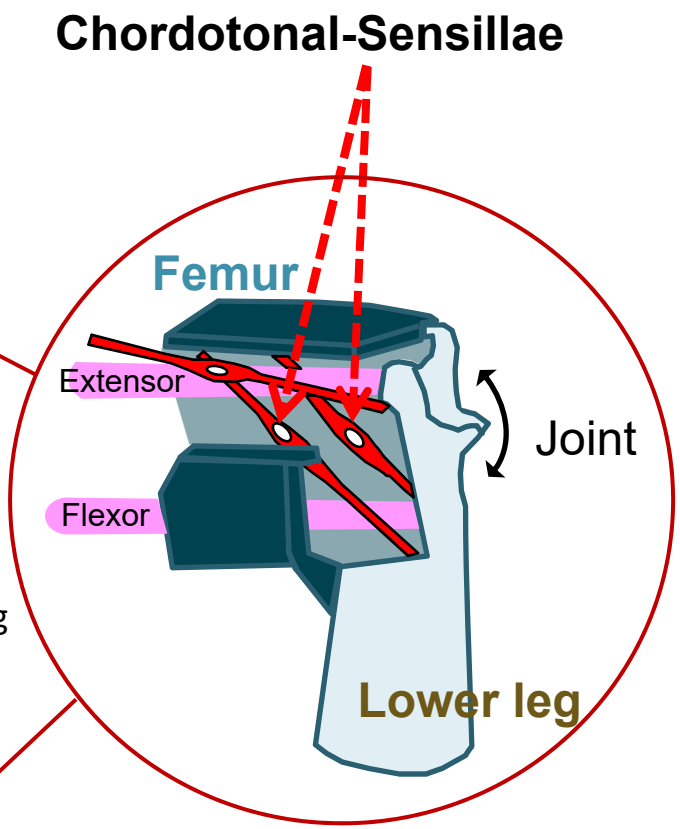
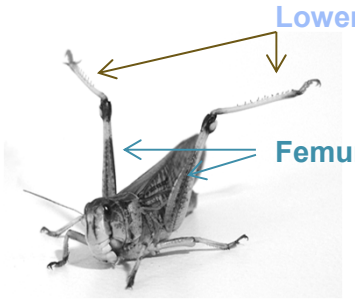
Code number	CGA 215944
Trade name	PLENUM
Formulation	50% WG
Common name	Pymetrozine
Chemical class	Pyridine azomethine
Mode of action	Chordotonal organ TRPV channel modulator
IRAC MoA code	9_B
Molecular structure	
Actvitiy	Contact Ingestion Systemic
Spectrum	Aphids Whitefly Planthoppers Mealybugs Beetles & Weevils
Other insecticides with same mode of action	Pyrifluquinazon Afidopyrafen



Pymetrozine works on the sensillae in the chordotonal organ and blocks the nerve impulse to the brain. This results in a constant stretching of the legs.





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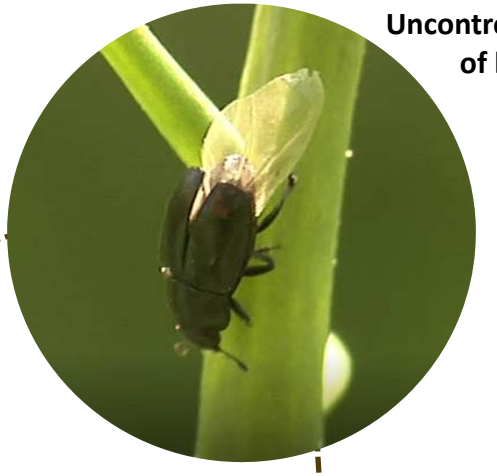
Pymetrozine symptomology

Normal behaviour

Beetle starts to lose control of legs
and starts intensive grooming behaviour



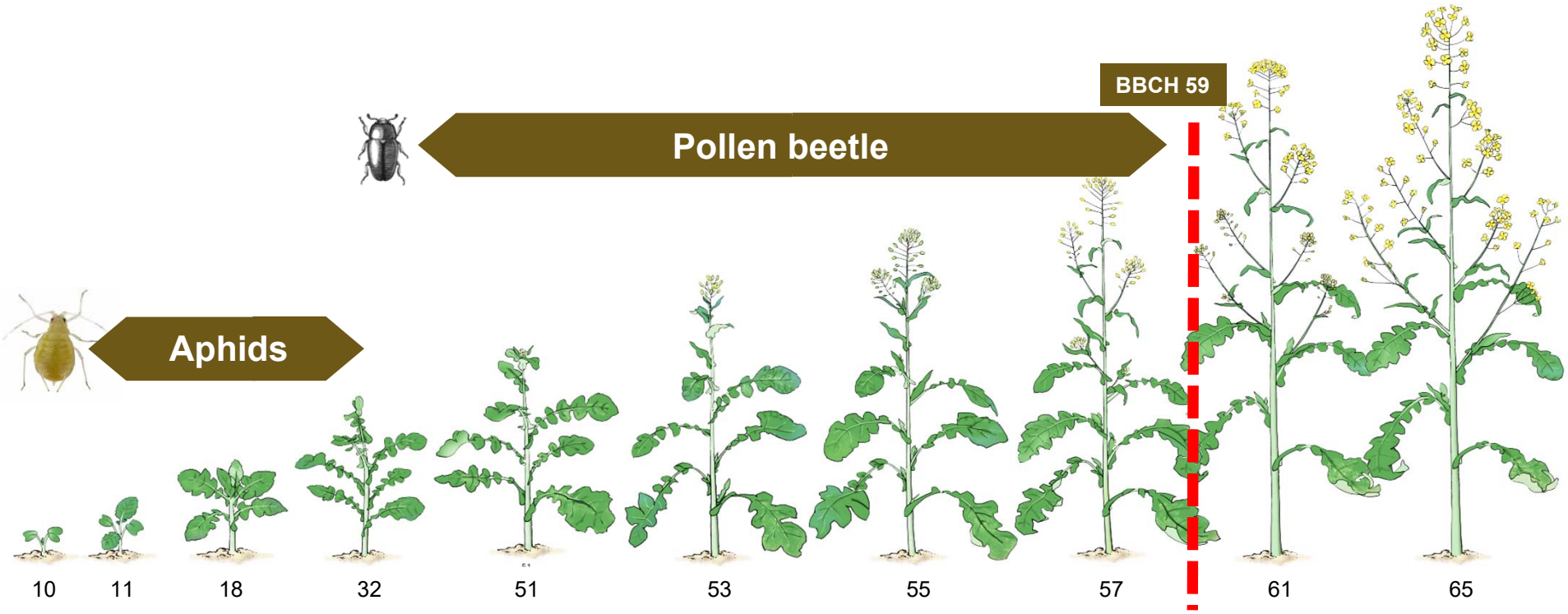
Uncontrolled extension
of hind legs.

Total loss of co-ordination
and balance

Beetle falls to the ground

Easy prey for
predators

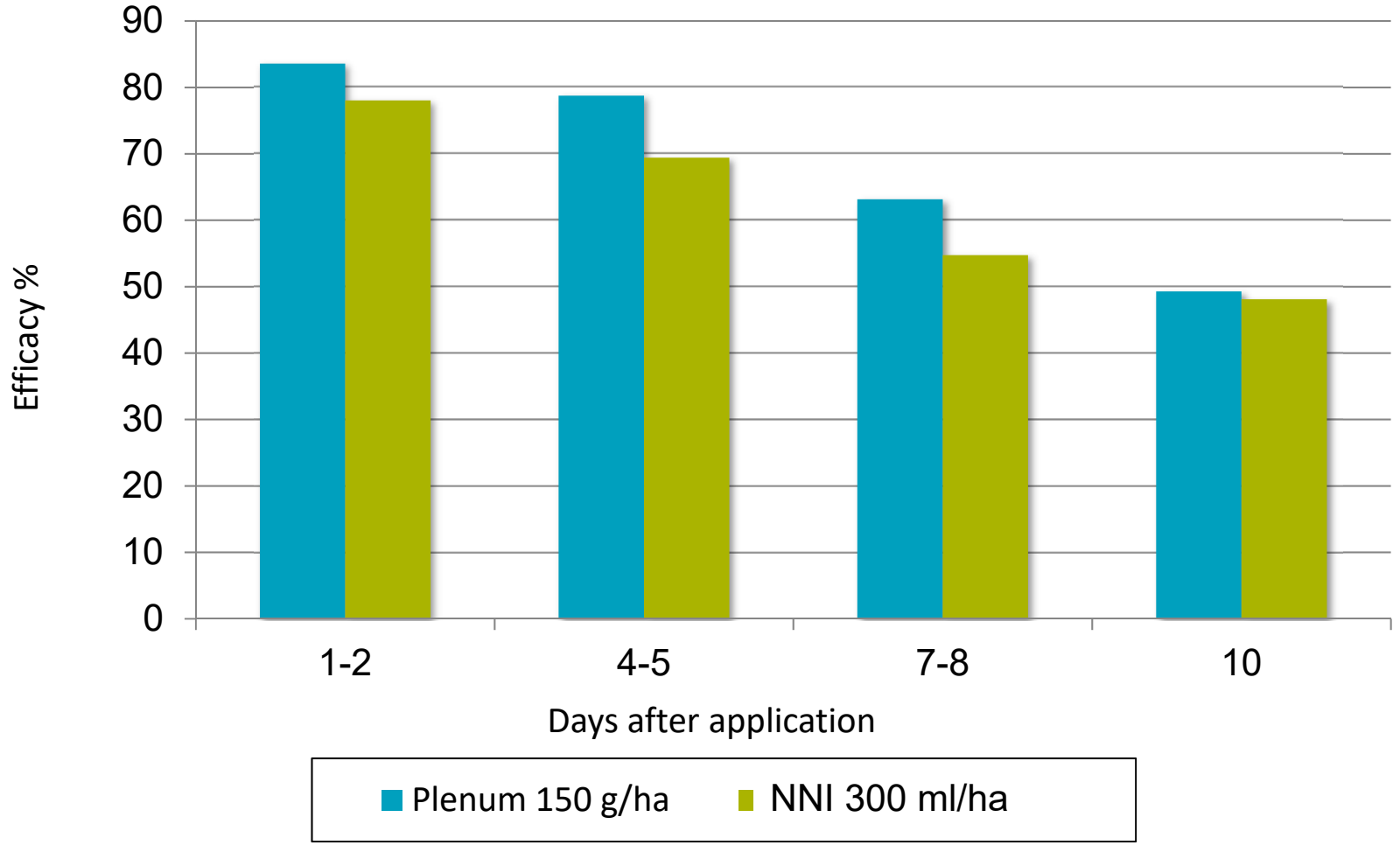
Pymetrozine Use in OSR



- Unique mode of action in oilseed rape.
- Rapid effects: stops feeding quickly .
- Reliable performance: shown to provide pest control under varible environmental conditions
  - Both high and low temperatures.

Efficacy against pollen beetle in winter OSR

n = 31 (DE, CH, FR, PL, CZ, DK)



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Resistance status of major OSR pests to registered insecticides modes of action.

Chemical subgroup	IRAC MoA	A.I. Examples	Pollen Beetle (*Meligethes aeneus*)	Rape Stem Weevil (*Ceutorhynchus napi*)	Cabbage seed weevil (*C.assimilis/Obstrictus*)	Cabbage Stem Weevil (*C.pallidactylus*)	Rape winter stem weevil (*C.picitarsis*)	Cabbage stem flea beetle (Psylliodes chrysocephala)	Brassica pod midge (*Dasineura brassicae*)	Green peach aphid (Myzus persicae)
Pyrethroids	3A	L-cyhalothrin Deltamethin Cyfluthrin								
Pyrethroids	3A	Tau-fluvalinate Bifenthrin Etofenprox								
Organophosphates	1B	Chlorpyrifos Phosmet								
Neonicotinoids	4A	Thiacloprid Acetamiprid Thiamethoxam								
Pyridine azomethine	9B	Pymetrozine								
Oxadiazines	22A	Indoxacarb								
Carbamates	1A	Pirimicarb								

Green = No known cases of resistance, Yellow = localised shifts in sensitivity or localised resistance hotspots
Orange = Resistance reported in several regions with significant impact on pest control, Red = widespread resistance.

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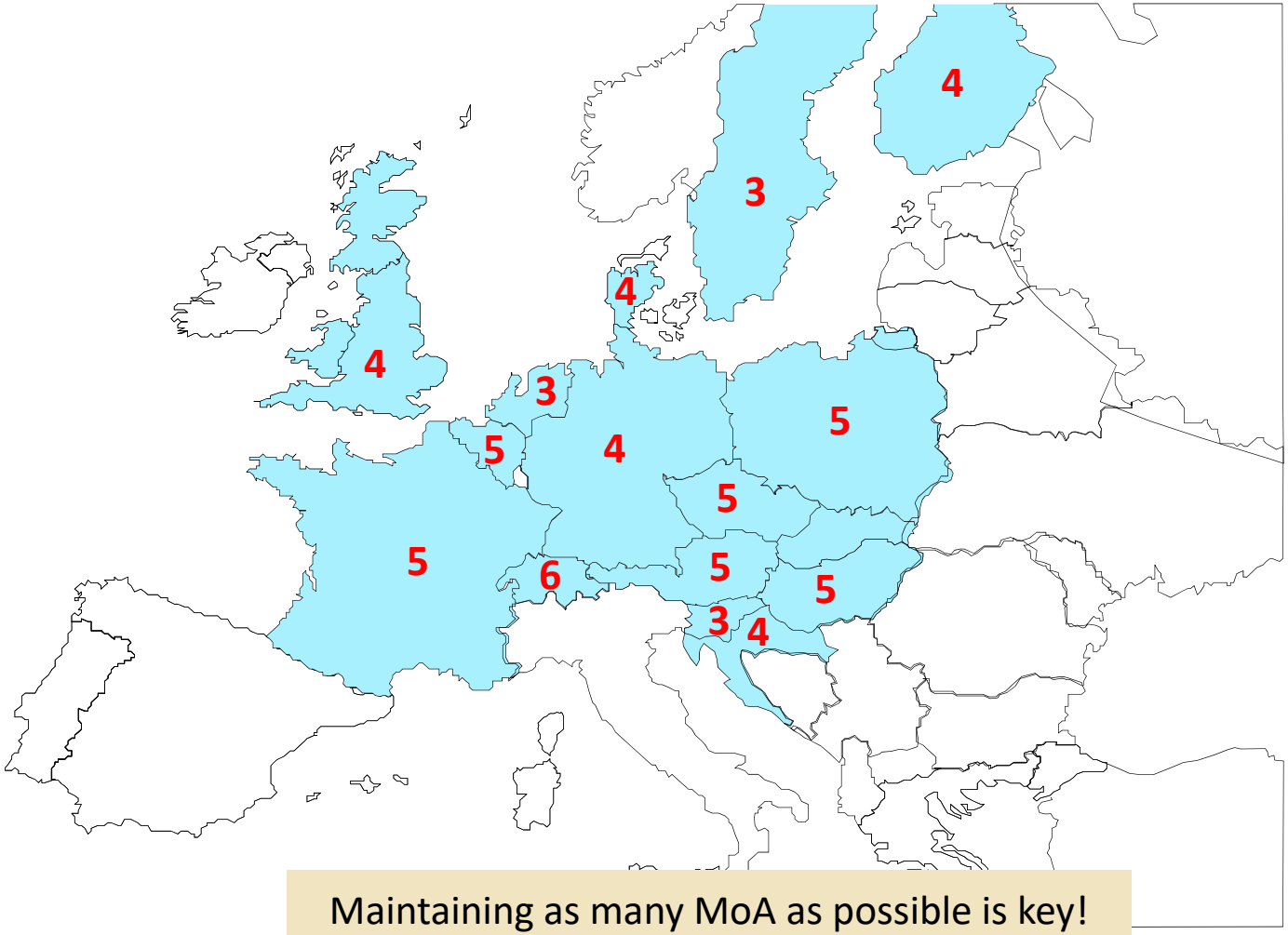
MoA's available across important OSR producing region for controlling pollen beetles - Today



No. of MoA's today in average: 3-5

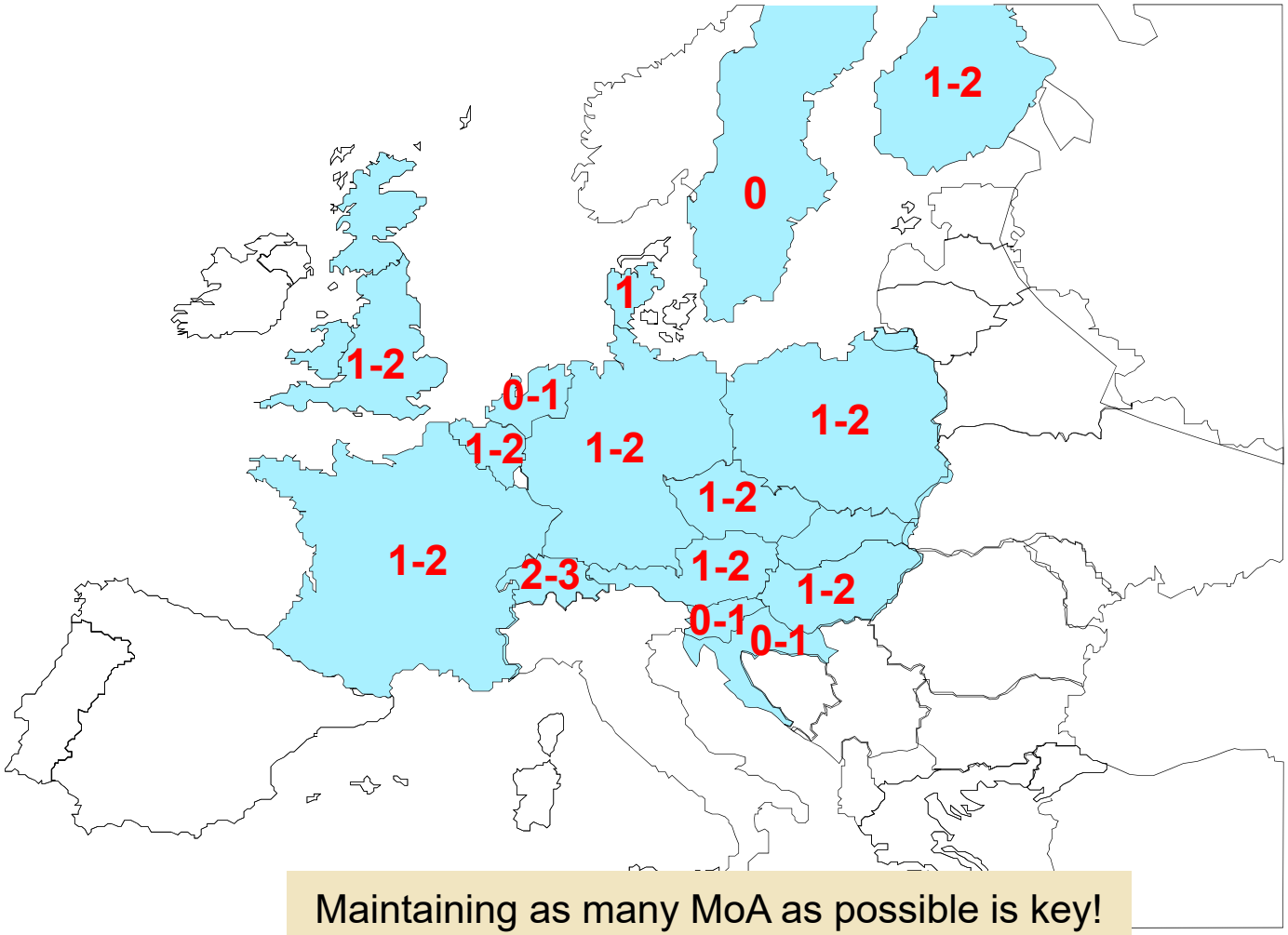
- **Pyrethroides**
- **Neonicotinoides**
- **Organophosphates**
- **Pymetrozine**
- **Indoxacarb**
- **Spinosad (CH only)**

Maintaining as many MoA as possible is key!

Pollen beetle: MoA situation & outlook in Europe

MoA groups registered	availability in countries - today	Outlook
Pyrethroids (3A)	Everywhere	Restistance selection increasing (not all SPI's similar affected) : UNDER THREAT
Neonicotinoids (4A)	Everywhere (almost)	Regulatory pressure high: COMPLETE BAN?
Pyridine azomethine derivates: Pymetrozine (9B)	Everywhere	Regulatory pressure: UNCERTAIN
Oxadiazines: Indoxacarb (22A)	Mostly available (not in HR, SL, SE, NL)	Remains ?
Organophosphates (1B)	BE, FR, AT, PL, CZ, HR, HU, CH (not in DK, GB, DE, SL, NL, SE)	Regulatory pressure high Further PHASE OUT?
Spinosyns: Spinosad (5)	CH only (not in EU)	Potential in other countries ?
New / alternative MoA	Regulatory reuquirements often compromise registrability success chance or effectiveness	

MoA's available across important OSR producing region for controlling pollen beetles – Future ?



- ~~Pyrethroids~~
  - Pyrethroids not affected by resistance or reduced rates (Except DK, SE)
- ~~Neonicotinoids~~
- ~~Organophosphates~~
- ~~Pymetrozine~~
- Indoxacarb
- Spinosad (CH only)

Maintaining as many MoA as possible is key!

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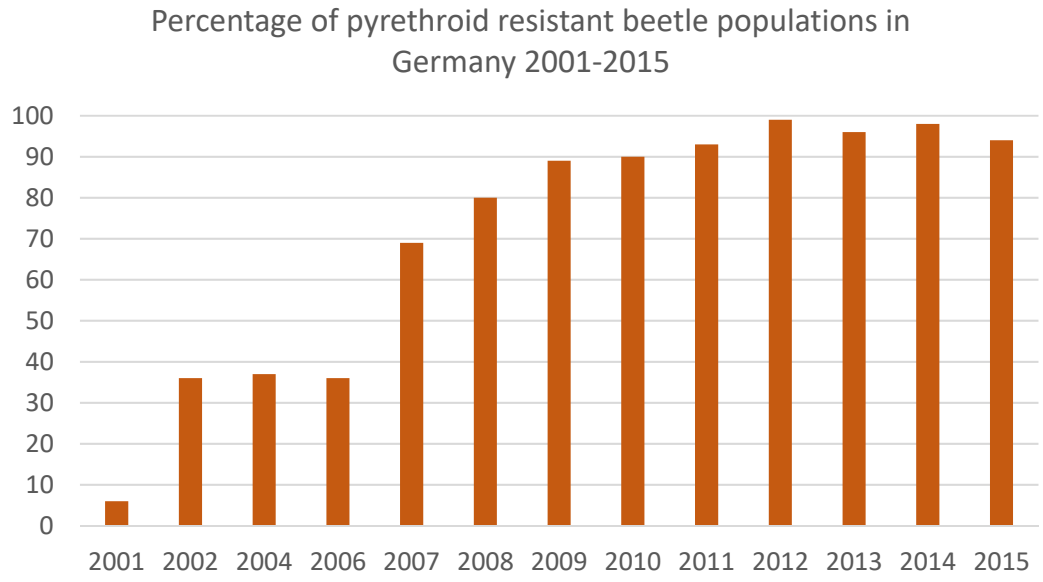
Maintaining diversity of modes of action & learning lessons from the past.



2001-2006 based on Syngenta data, 2007-2015 IRAC data*

- The lack of available alternatives and repetitive over use of pyrethroids is one of the key factors in the evolution of pyrethroid resistant oilseed rape pests.
- Response from industry has been to register alternative modes of action from their existing portfolio of products.
- However many of those alternatives are under threat from regulatory challenge.
- Discovery, development and registration of new active substances (especially new MoA) extremely challenging, particularly in Europe – Don't expect unlimited supply !
- Critical to maintain diversity of modes of action and implement resistance management in practice in order to prevent or delay resistance and repeat events of the past.

* www.irac-online-org

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