as a new tool for managing virus vectors and virus transmission in oilseed rape

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Oilseed rape is grown on 6% of arable land in Europe.

Important pests of OSR in EU: MELIAE, CEUTSS, PSYICH, DASYBR, BRCVBR, MYZUPE, TuYV, SCLESC and many others.

High scrutiny in EU pesticide registration makes farmers’ toolbox smaller and smaller...

Resistance issues and difficulties in control causes significant yield losses (growing).
Major resistance mechanisms in *Myzus persicae*

**Metabolic**
- **Esterase**: Carbamates (1A), Organophosphates (1B), Pyrethroids (3A)
- **Monooxigenase P450**: Neonicotinoids (4A)

**Target site**
- **MACE**: Pirimicarb and Triazamate (1A)
- **nAChR**: Neonicotinoids (4A)
- **kdr**: Pyrethroids (3A)
New insecticide discovered by and proprietary to Dow AgroSciences

Controls major sap-feeding insect pests
- Aphids, whiteflies, scales, mealybugs, leafhoppers
- Effective against insect pest populations resistant to other insecticides
- Valuable rotation partner with insecticides with other modes of action
- Systemic product
- Excellent knockdown and residual control via both contact and ingestion

Minimal impact on beneficial arthropods
Group 4
Nicotinic acetylcholine receptor (nAChR) competitive modulators

Sub-group 4A
Neonicotinoids
Acetamiprid
Clothianidin
Dinotefuran
Imidacloprid
Nitenpyram
Thiacloprid
Thiamethoxam

Sub-group 4B
Nicotine
Nicotine

Sub-group 4C
Sulfoximines
Sulfoxaflor

Sub-group 4D
Butenolides
Flupyradifurone

Sub-group 4E
Mesoionics
Triflumezopyrim

Sulfoximines: structural and metabolic differences

Sulfoximines: different interaction with nAChR and low risk of metabolic cross-resistance

• IRAC materials refer to Isoclast™ Active by its ISO common name (sulfoxaflor)
Resistance management

Resistance ratio: populations insect pests resistant to multiple insecticides
Isoclast: Lack of cross-resistance on pests resistant to multiple insecticides

Myzus persicae

- Deltamethrin: 60
- Pirimicarb: >60
- Imidacloprid: 17
- Isoclast: 0.4

(Rothamsted Research, UK)

Bemisia tabacci

- Deltamethrin: 815
- Profenofos: 189
- Imidacloprid: 800
- Isoclast: 2.8

(Rothamsted Research, UK)

Isoclast: “Valuable rotation partner with other chemistries”
**Turnip yellows virus acquisition experiments**

**AAP:** acquisition access period  
**IAP:** inoculation access period

1. Spray until run-off: 24 hours before assay
2. Aphids are transferred to TuYV-infected *Physalis* source plants
3. TuYV-infected *Physalis* source plants
4. Plants treated with Imidacloprid after the IAP
5. Evaluation: 4 weeks after assay by ELISA

Non-viruliferous *Myzus persicae*
### Turnip yellows virus acquisition trial results

<table>
<thead>
<tr>
<th>Insecticides</th>
<th>Concentration applied</th>
<th>Transmission rate (%)</th>
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</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td>51.67% (31/60) a</td>
</tr>
<tr>
<td>Isoclast</td>
<td>24 ppm ai</td>
<td>8.33% (5/60) b</td>
</tr>
<tr>
<td>Flonicamid</td>
<td>60 ppm ai</td>
<td>0% (0/60) c</td>
</tr>
<tr>
<td>Spirotetramat</td>
<td>75 ppm ai</td>
<td>58.33% (35/60) a</td>
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</tbody>
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- Isoclast and flonicamid were effective in reducing the acquisition of TuYV, not like spirotetramat.
(% Reduction in honeydew production vs untreated in an artificial feeding bioassay with *Myzus persicae* (DAS internal data)

Rapid cessation of feeding resulting a „knockdown effect”
8 channel DC-Amplifier / 8 h EPG recordings on MYZUPE feeding on *Physalis floridiana* plants.

- Duration of non-probing events was much longer than on the untreated control
- The duration of phloem-related activities was shorter (aphids have less probability to transmit phloem-restricted viruses)
- Aphids exposed to Isoclast significantly reduced their ingestion time (E2)
Control of *Brevicoryne brassicae* across 31 trials carried out in OSR and other brassica during 2008-2016 in AT, ES, FR, DE, GB, IT & PL (DAS internal data)
(%) Control of *Myzus persicae* across 13 trials carried out in OSR and other brassicas during 2008-2016 in FR, DE, GB, IT & RO (DAS internal data)
Conclusions

• Isoclast is a unique member of the sulfoximines class of chemistry (IRAC Group 4C), it controls aphids and other sap feeding pests resistant to other classes of chemistry.

• Isoclast has demonstrated high levels of aphid control (*Myzus persicae* and *Brevicoryne brassicae*) in many crops including oilseed rape as well as sufficient level of decreasing virus transmission.
Thank You for Your Attention

Questions?