



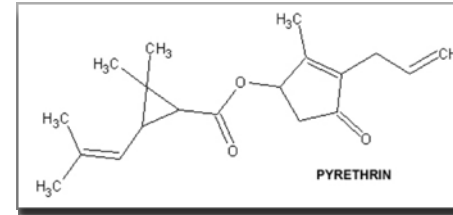
Science For A Better Life

Pest and Beneficial's Review

“is the toolbox half full, or half empty?”

Dave Holah

A synthetic chemists dream!



3 SODIUM CHANNEL MODULATORS

A PYRETHROIDS, PYRETHRINS

Acrinathrin, Allethrin, Bifenthrin, Bioallethrin, Bioallethrin S-cyclopentenyl, Bioresmethrin, Cycloprothrin, Cyfluthrin, Cyhalothrin, Cypermethrin, Cyphenothrin [(1R)-trans-isomers], Deltamethrin, Empenthrin [(EZ)- (1R)-isomers], Esfenvalerate, Etofenprox, Fenpropathrin, Fenvalerate, Flucythrinate, Flumethrin, Halfenprox, Kadathrin, Permethrin, Phenothrin [(1R)-trans- isomer], Prallethrin, Pyrethrins (pyrethrum), Resmethrin, Silafluofen, Tefluthrin, Tetramethrin, Tetramethrin [(1R)- isomers], Tralomethrin, Transfluthrin, alpha-Cypermethrin, beta-Cyfluthrin, beta-Cypermethrin, d-cis-trans Allethrin, d-trans Allethrin, gamma-Cyhalothrin, lambda-Cyhalothrin, tau-Fluvalinate, theta-Cypermethrin, zeta-Cypermethrin

1960s 1st generation pyrethroids developed

1974 onwards - 2nd generation of more persistent compounds - permethrin, cypermethrin and deltamethrin. **41 actives listed by IRAC**

Reg package - Ecotox **Pre-91/414/EEC (15 July 1991)**

Birds: 1 species acute oral LD50 with a.i.

Mammals: no requirement

Fish: 2 species acute LC50 (96h) with a.s. and formulation

Daphnia acute EC50 (48h) with a.s. and formulation

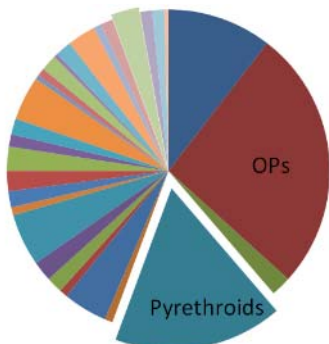
Algae 1 or 2 species EC50 (72h) with a.s. and formulation

Earthworm acute

Honey bees acute oral and contact LD50 with formulation

Soil micro organisms: C- and N-cycle with formulation

Rough estimate of total Ecotox costs 40 to 50 k€



Toolbox “half full”

Regulations and Guidance

Reminder- Directive 91/414 saw the loss of over 600 active substances.

Modern dossier – Section 6 Ecotoxicological Studies/ Detailed summary of the risk assessment

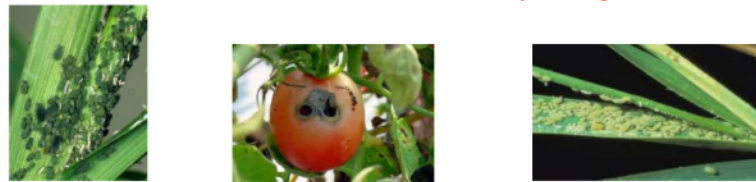
Nearly 100 data points - studies and risk assessments to the required guidance documents.

Peter Campbell (BCPC Conference) :

Impact of EFSA Scientific Opinion on Terrestrial Non-Target Arthropods

- Typical buffers of 5-10m will likely increase to 30-50m; A buffer of 1m (with 90% drift reduction nozzles) will increase to 10-20m
- Assuming a buffer size of 30-50 m in a square field:
 - 2 ha field ~ 50 % loss of cropped area
 - 20 ha field ~ 15 % loss of cropped area

Will make insecticides virtually unregistrable



Guidance of EFSA

Risk Assessment for Birds and Mammals



On request from EFSA, Question No EFSA-Q-2009-00223
First published on 17 December 2009

Implications for an IPM future?
New GDs pose a serious threat to re-registering many actives

Toolbox “half empty”



Recreational spraying – warnings from Antibiotic resistance



Hallmark £ 4- 5 per ha.
A 7-day course of amoxicillin costs the taxpayer £1.68*

Its cheap so stick it in the spray tank anyway (or down the mouth) and the patient will go away happy.



Antibiotic resistance is one of the greatest dangers to our health. Dame Sally Davies, the UK Chief Medical Officer, has described the threat as “catastrophic”. **It could lead to people dying from ordinary infections, and routine operations such as hip replacements becoming deadly due to the risk of infection.**

By safely reducing the number of antibiotics prescribed inappropriately we can combat antibiotic resistance.

Or - By reducing the number of plant protection products prescribed inappropriately we can combat resistance.



Implications for an IPM future

Orange blossom wheat midge



A well worked IPM example
 Cultural/variety
 Thresholds
 Insecticides

Recommended Insecticides :
 Lambda-cyhalothrin, beta-cyfluthrin, Thiacloprid
But for how long?

Orange wheat blossom midge

Information Sheet 53
 Summer 2016
AHDB
 CEREALS & OILSEEDS

Latest information

- There are a number of winter wheat varieties resistant to OWM.
- Natural enemies provide a useful level of control.
- Pheromone traps provide the earliest warning of midge activity.
- There are three active substances approved to reduce damage caused by OWM.
- The effective window for treatment is narrow.

Action

- Grow resistant varieties where suitable.
- Use pheromone traps to monitor activity.
- If thresholds are exceeded, treat crops as quickly as possible.
- When control is necessary, prioritise seed crops and premium crops, ie milling.

Always read product labels, consider your local conditions and consult a professional agronomist, if necessary.

Importance

Two wheat blossom midge species occur in the UK, orange wheat blossom midge (*Sitobion avenae*) and yellow wheat blossom midge (*Contarinia tritici*). Orange wheat blossom midge (OWBM) is usually the most significant and economically important species.

Wheat blossom midge larvae feed on the developing seeds, causing small, shrivelled grains with poor germination. Damage to the outer layer of the grain (pericarp) allows water to enter, resulting in sprouting in the air and facilitating secondary attack by fungi causing fusarium and septoria. This affects both the yield and quality of grain harvested.

Life cycle

Midges usually fly when air temperature exceeds 15°C but flight has been observed down to 10°C, especially within crop canopies.

Male midges fly to seek a mate on the first evening after hatching. Mated females then fly on the next five suitable evenings. They lay most eggs on their first evening of flight.

Females fly in low light conditions, so, on sunny days, they fly later in the evening than on dull, overcast days. Only female midges fly between fields and only when conditions are still. On windy days, they lay eggs on ears sheltered within crops.

Eggs are laid inside the forests of emerging wheat ears. Crops at GS53-59 are vulnerable. Depending on temperature, larvae hatch within 4-10 days.

After hatching, larvae crawl down to the developing grain and begin to feed. They secrete enzymes that break down cell walls and convert starch back to sugar. Larvae hatching after flowering do not develop properly and cause little damage.

Adults

Orange wheat blossom midge survives in the soil, as larvae made cocoons, for two years or more. They pose a major threat for up to four years.

Larvae emerge and move to the soil surface.

If soil is warm (over 13°C) and moist - usually after heavy rainfall - larvae pupate. If conditions are unsuitable, larvae return to cocoon stage.

Larvae feed on developing grain for about two weeks before dropping to the ground. When conditions are suitable, usually after rain has moistened the soil surface, they burrow into soil and hibernates as larvae within cocoons.

The Future?

- IPM may need a chemical input – threshold triggered.
- Insecticides present many “regulatory challenges”.
- Over use, irresponsible use - cheap generic products.
- Increased resistance – ie CSFB and pyrethroids.
- Seed breeders role
 - What resistant traits can be developed?
- Need to identify gaps in IPM recommendations.
 - What ai’s likely to be lost?
 - Encourage EAMUs etc.
- **A potentially empty tool box.**



Science For A Better Life

Thank you!