Micro-fogging at the SEMC:

The theory, practice, and results of
25 years with our heads in the clouds
…of pyrethroids

Zack Falin
Division of Entomology
KU Biodiversity Institute

“Micro-fogging”

The small-scale use of pyrethroid-based aerosol insecticides to collect arthropods from cryptic, structurally complex or otherwise inaccessible micro-habitats and substrates

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The small-scale use of pyrethroid-based aerosol insecticides to collect arthropods from cryptic, structurally complex or otherwise inaccessible micro-habitats and substrates

i.e.: “spray-n-suck”

“Micro-fogging”

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Pyrethroid insecticides

History of micro-fogging

Uses/results

Observations/opinions

“Micro-fogging”

Pyrethroid insecticides

History of micro-fogging

Uses~~/results~~

Observations/opinions

Pyrethrum vs pyrethrin vs pyrethroid

Pyrethrum vs pyrethrin vs pyrethroid

Pyrethrum cinerariifolium

Pyrethrum coccineum

Pyrethrum vs pyrethrin vs pyrethroid

~~*Pyrethrum*~~ *cinerariifolium*

Chrysanthemum

Tanacetum

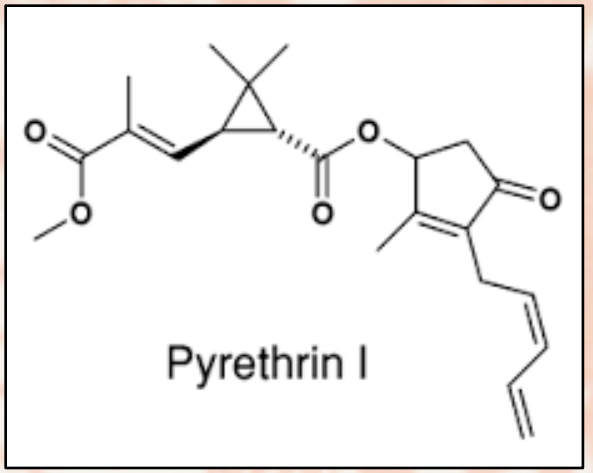
~~*Pyrethrum*~~ *coccineum*

Chrysanthemum

Tanacetum

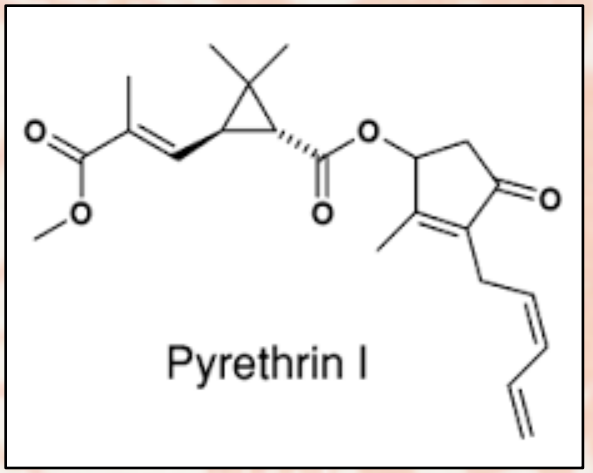
Pyrethrum vs pyrethrin vs pyrethroid

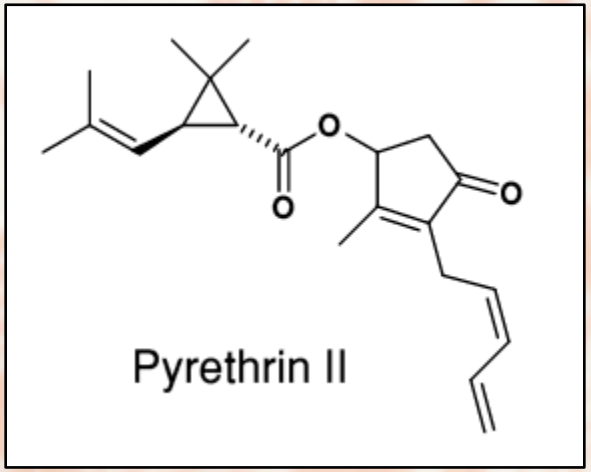
pyrethrin



Pyrethrum vs pyrethrin vs pyrethroid

pyrethrin(s)

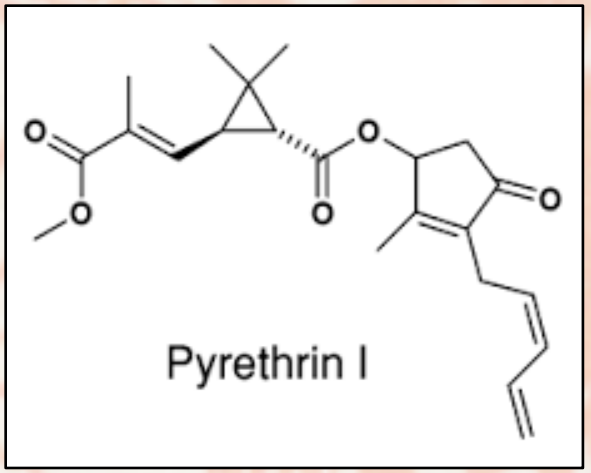


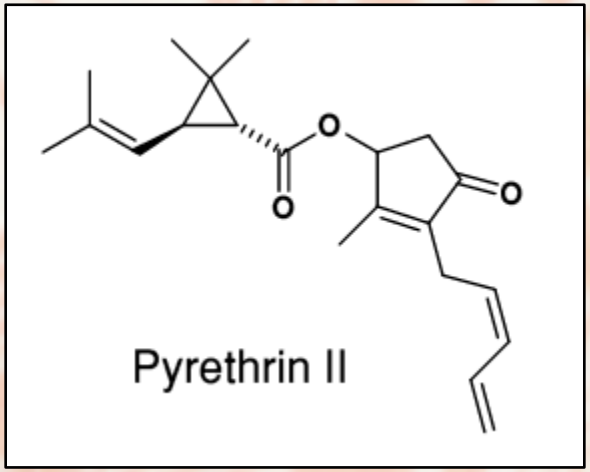


Pyrethrum vs pyrethrin vs pyrethroid

pyrethrin(s)

- high invert toxicity
- low vert toxicity
- high lability





Pyrethrum vs pyrethrin vs pyrethroid

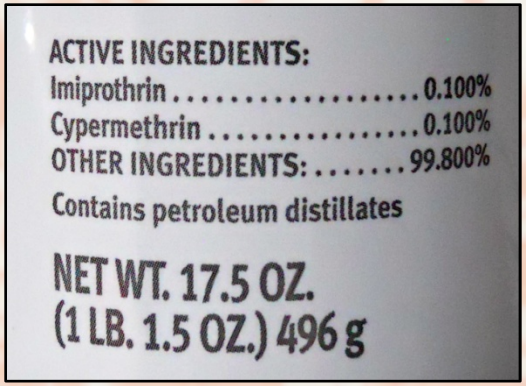
pyrethroid = synthetic pyrethrin

Pyrethrum vs pyrethrin vs pyrethroid

pyrethroid = synthetic pyrethrin

allethrin, bifenthrin, cyfluthrin, cypermethrin, cyphenothrin, deltamethrin, esfenvalerate, etofenprox, fenpropathrin, fenvalerate, flucythrinate, flumethrin, imiprothrin, λ-cyhalothrin, metofluthrin, permethrin, prallethrin, resmethrin, silafluofen, sumithrin, τ-fluvalinate, tefluthrin, etc. etc.

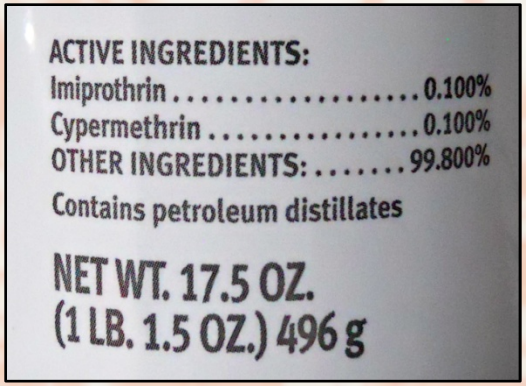
Pyrethrum vs pyrethrin vs pyrethroid



Pyrethrum vs pyrethrin vs pyrethroid

cypermethrin $LD_{50} \approx 1$ mcg/g roaches

Periplaneta americana ≈ 1.5 g



Pyrethrum vs pyrethrin vs pyrethroid

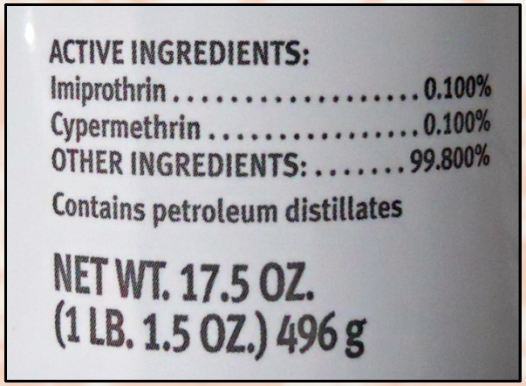
cypermethrin LD_{50} ≈ 1 mcg/g roaches

Periplaneta americana ≈ 1.5 g

496 g x 0.002 = 0.992 g = 992,000 mcg

992,000 mcg / (1 mcg/g x 1.5 g) = 661,333

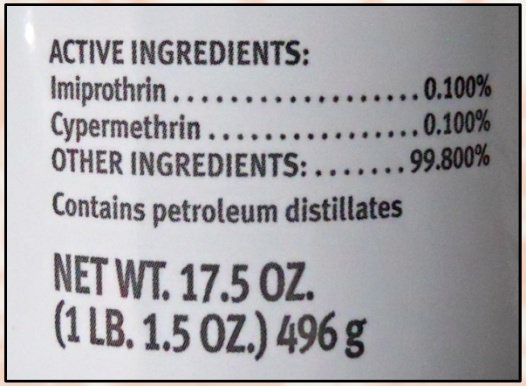
661,300 x 0.5 **= 330,666 dead roaches!**



Pyrethrum vs pyrethrin vs pyrethroid

cypermethrin $LD_{50} \approx 250$ mg/kg mammals

Zack Falin ≈ 80 kg



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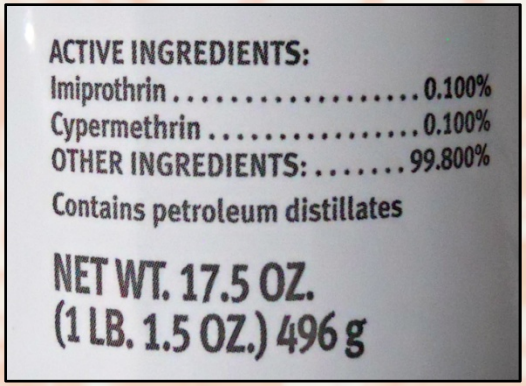
80 kg x 250 mg/kg = 20,000 mg = 20 g

20 g / 0.992 g/can = 20.1 cans

20.1 cans x 0.7 l/can **= 14.07 liters of RAID!**



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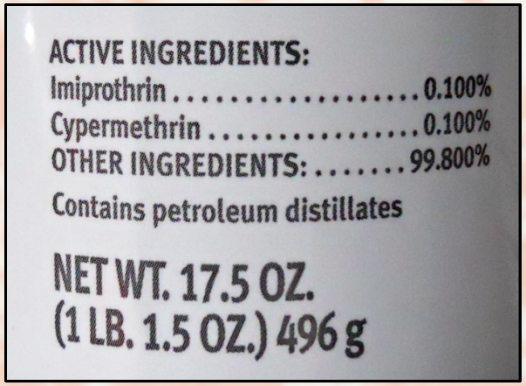
[in reality, the other 99.8% is likely more toxic]



Pyrethrum vs pyrethrin vs pyrethroid

cypermethrin $LC_{50} \approx 82$ mcg/l trout

ACTIVE INGREDIENTS:
Imiprothrin 0.100%
Cypermethrin 0.100%
OTHER INGREDIENTS: 99.800%
Contains petroleum distillates

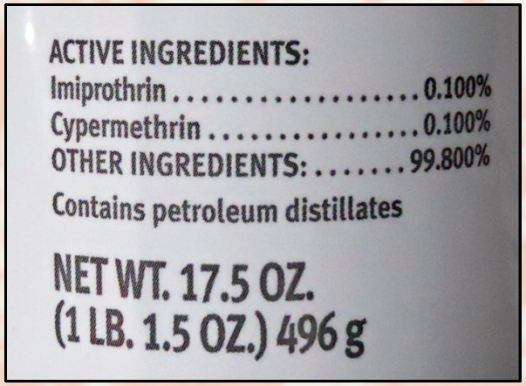
NET WT. 17.5 OZ.
(1 LB. 1.5 OZ.) 496 g

Pyrethrum vs pyrethrin vs pyrethroid

cypermethrin $LC_{50} \approx 82$ mcg/l trout

\+ 100 trout +

= 50 dead trout



Pyrethrum vs pyrethrin vs pyrethroid

"Toxicity Take-homes"

pyrethroids and lentic habitats don't mix

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low toxicity ≠ no toxicity

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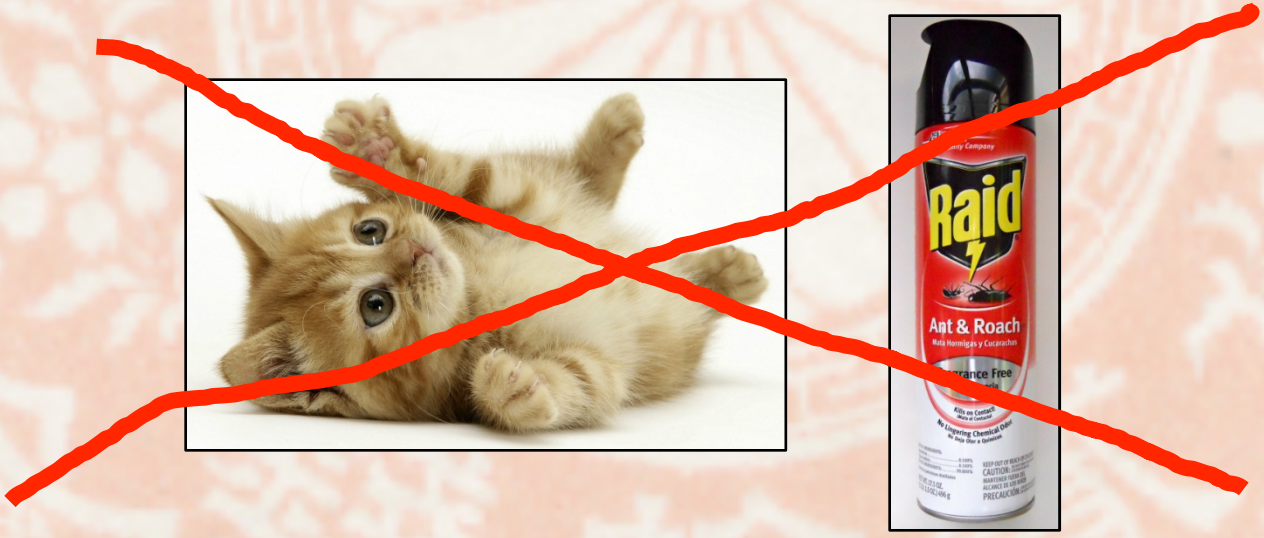

History of micro-fogging

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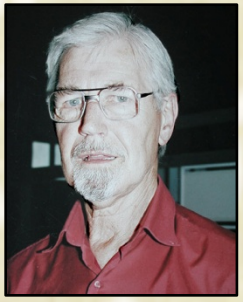

G. Kuschel

Kuschel, G. 1990. Beetles in a suburban environment: a New Zealand case study. The identity and status of Coleoptera in the natural and modified habitats of Lynfield, Auckland (1974-1989). DSIR Plant Protection Report 3: 118 pp.

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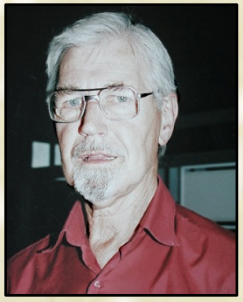

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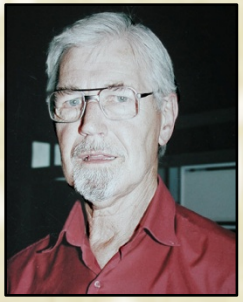

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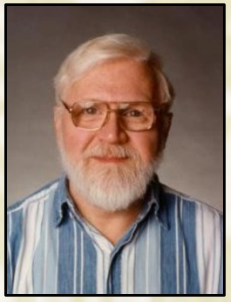

A. Newton

M. Thayer

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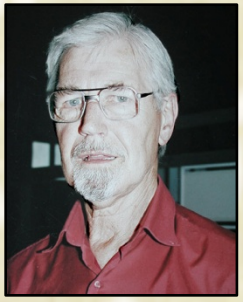

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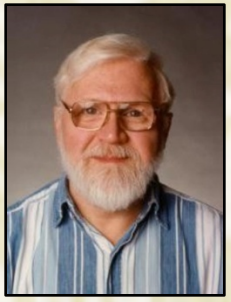

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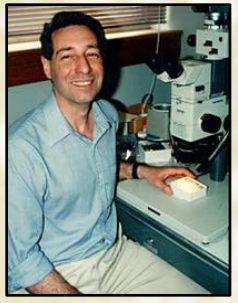

J.S. Ashe

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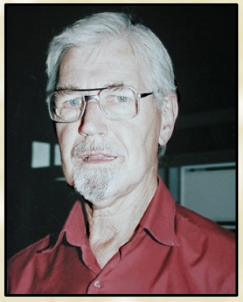

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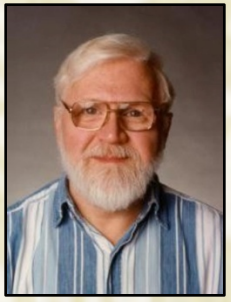

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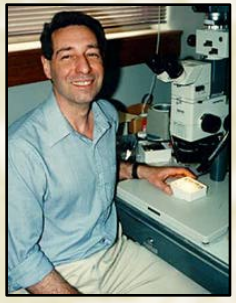

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Y. Truly

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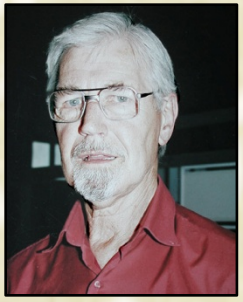

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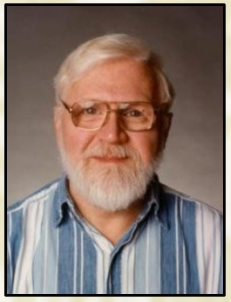

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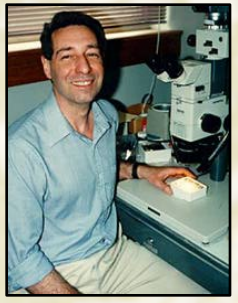

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2014

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RAID® at the SEMC: uses & results

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700 collecting events

16 countries

25 years

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37,000+ specimens

RAID® at the SEMC: uses ~~& results~~

700 collecting events

16 countries

25 years

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RAID® at the SEMC: uses

"classic" scenario

RAID® at the SEMC: uses

"classic" scenario

splintered trees

RAID® at the SEMC: uses

"classic" scenario

splintered trees

hollow trees

RAID® at the SEMC: uses

"classic" scenario

splintered trees

hollow trees

tree bark/boles

RAID® at the SEMC: uses

"classic" scenario

splintered trees

hollow trees

tree bark/boles

"difficult" plants

RAID® at the SEMC: uses

"classic" scenario

splintered trees

hollow trees

tree bark/boles

"difficult" plants

root masses

RAID® at the SEMC: uses

"lazy berlese"

scenario

RAID® at the SEMC: uses

"lazy berlese"

scenario

shorelines

RAID® at the SEMC: uses

"lazy berlese"
scenario

shorelines
damp substrates

RAID® at the SEMC: uses

"lazy berlese"
scenario

shorelines
damp substrates
submerged debris

RAID® at the SEMC: uses

"lazy berlese"
scenario

shorelines
damp substrates
submerged debris

RAID® at the SEMC: uses

"lazy berlese"
scenario

shorelines
damp substrates
submerged debris
flood debris

RAID® at the SEMC: uses

"slow man's net" scenario

RAID® at the SEMC: uses

"slow man's net" scenario

vegetation

RAID® at the SEMC: uses

"slow man's net"

scenario

vegetation

treefall litter

Parting observations and opinions

Formulation? Meh. Unscented? Yeah!

Parting observations and opinions

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Use a heavy-weight sheet & don't forget your machete

Parting observations and opinions

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Be discrete

Parting observations and opinions

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Think before you spray

Parting observations and opinions

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Be discrete

Think before you spray

Keep at it

The End !