# FLAVOCIDE®: A NOVEL INSECTICIDE FOR THE CONTROL OF URBAN PESTS

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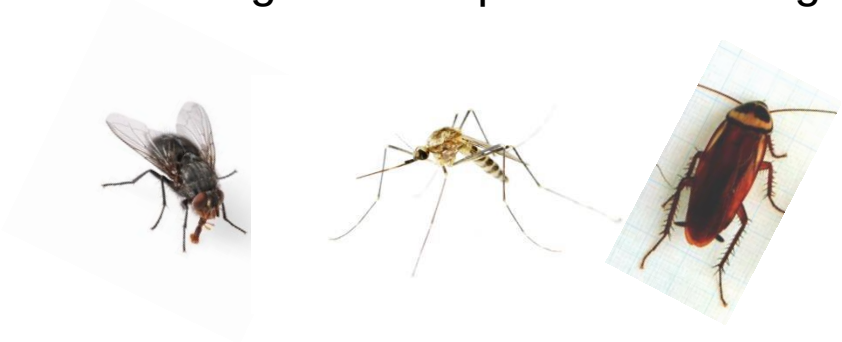
# INSECT RESEARCH LABORATORY - UTS

Evaluation of insecticides for the control of urban pests

Evaluation of repellents

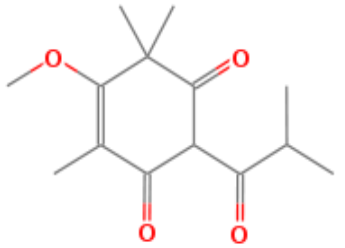
Management of pests in buildings



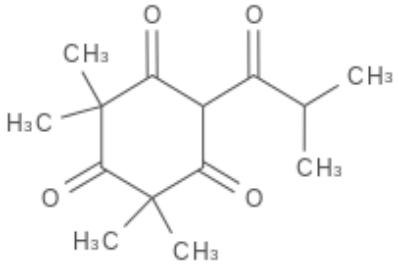
# FLAVESONE/FLAVOCIDE® - BIO-GENE TECHNOLOGY LTD

Initial β-triketones discovered from leaves of rare cultivar of *Eucalyptus cloeziana*

Natural compound tasmanone → Qcide®




Synthetic compound flavesone → Flavocide®




Unique Mechanism of Action

Strong patent portfolio surrounding β-triketone compounds for control of insects & other groups

# MATERIALS

**Insecticides**

Flavocide® 500EW (Active Constituent: 500g/l flavesone)

Permethrin 100EC (Active Constituent: 100g/l permethrin 25:75).

**Insects**

Dengue mosquito, *Aedes aegypti,* female adults 2-5 day old.

Brown house mosquito, *Culex quinquefasciatus ,* female adults 2-5 day old

House fly, *Musca domestica* mixed sex adults 2-5 day old.

Cat flea, *Ctenocephalides felis* mixed sex adults 1-5 d; 1st & 2nd instar larvae

# SMALL CHAMBER STUDIES ON FLYING INSECTS

Chambers 70cm x 70cm x 70cm.

20 insects per chamber x 5 replicates

One gram of diluted insecticide sprayed

Knockdown noted  to determine LD50 & LD90

24hour mortality recorded

# RESULTS

The Knockdown and Mortality of *Aedes aegypti*.

| Treatment and Rate | KD50 (seconds) | KD90 (seconds) | 24 hours mortality# (%) |
|---|---|---|---|
| Permethrin 2.5mg/ml | 352.8a | 510.0a | 100a |
| Flavesone 50mg/ml | 488.0b | 633.0b | 100a |
| Flavesone 25mg/ml | 570.2c | 788.0c | 100a |

*Treatments with the same letter do not differ significantly from each other

#There was no variation between replicates within the treatments hence a statistical analysis could not be performed.

The Knockdown and Mortality *Culex quinquefasciatus*.

| Treatment and rate | KD50 (seconds) | KD90 (seconds) | 24 hours mortality# (%) |
|---|---|---|---|
| Flavesone 50mg/ml | 1025.1a | 1431.4a | 100a |
| Permethrin 2.5mg/ml | 1284.1b | 1745.0b | 100a |
| Flavesone 25mg/ml | 1606.4c | 1932.9c | 100a |

*Treatments with the same letter do not differ significantly from each other.

#There was no variation between replicates within the treatments hence a statistical analysis could not be performed.

# RESIDUAL CONTACT STUDIES ON FLYING INSECTS

Glazed tiles sprayed with diluted insecticide -50ml/$m^2$

10 insects exposed to treated surface for 30 minutes

Insects removed to clean container after 30 minutes

Knockdown noted at 15 minutes, 2 hours. Mortality  24 hours

5 replicates of active treatments and untreated controls

# RESULTS

The Percentage Knockdown and Mortality of *Aedes aegypti*

| Treatment and Rate | The Percentage Knockdown and Mortality of Insects at Various Exposure Times | | |
|---|---|---|---|
| | 15 Minute Knockdown | 2 Hour Knockdown | 24 Hour Mortality |
| Flavesone 12.5 mg/ml | 100 | 100 | 100 |
| Flavesone 6.25 mg/ml | 100 | 100 | 100 |
| Permethrin 0.625 mg/ml | 94 | 100 | 100 |
| Control | 0 | 0 | 12 |

The Percentage Knockdown and Mortality of *Culex*

| Treatment and Rate | The Percentage Knockdown and Mortality of Insects at Various Exposure Times | | |
|---|---|---|---|
| | 15 Minute Knockdown | 2 Hour Knockdown | 24 Hour Mortality |
| Flavesone 50 mg/ml | 100 | 100 | 100 |
| Flavesone 25 mg/ml | 100 | 100 | 100 |
| Permethrin 2.5 mg/ml | 100 | 100 | 100 |
| Control | 0 | 0 | 4 |

The Percentage Knockdown and Mortality of *Musca domestica*

| Treatment and Rate | The Percentage Knockdown & Mortality of Insects at Various Exposure Times | | |
|---|---|---|---|
| | 15 minute Knockdown | 2 Hour Knockdown | 24 Hour Mortality |
| Flavesone 200 mg/ml | 100a | 100a | 100a |
| Flavesone 100 mg/ml | 100a | 100a | 100a |
| Permethrin 2.5 mg/ml | 70a | 92a | 72a |
| Control | 0 | 0 | 4 |

Treatments with the same letter do not differ significantly from each other.

# RESIDUAL CONTACT STUDIES ON CAT FLEA

Insecticide treatments applied to:

32mm diameter nylon carpet discs
32mm cotton fabric discs - 100ml/$m^2$

Carpet discs were placed in separate plastic vials - 10 adult fleas added

Fabric discs were placed in separate plastic vials - 10 flea larvae added

Mortality noted at 24 hours

3 replicates of active treatments and untreated controls

# RESULTS

The Mortality of *Ctenocephalides felis* Adults and Larvae after 24 Hours Exposure

| Treatment and Rate | Flea Mortality After 24 Hours Exposure (n=10) | |
|---|---|---|
| | Adults | Larvae |
| Flavesone 23.8mg/ml | 100 | 100 |
| Flavesone 62.5mg/ml | 100 | 100 |
| Permethrin 2.5mg/ml | 100 | 100 |
| Control | 0 | 0 |

# FIELD STUDIES

Cairns North Queensland

Repellency using human subjects

Principal mosquito species

- *Verrallina carmenti*
- *Verrallina lineata*
- *Ochlerotatus vigilax*

# INSECTICIDES AND APPLICATION

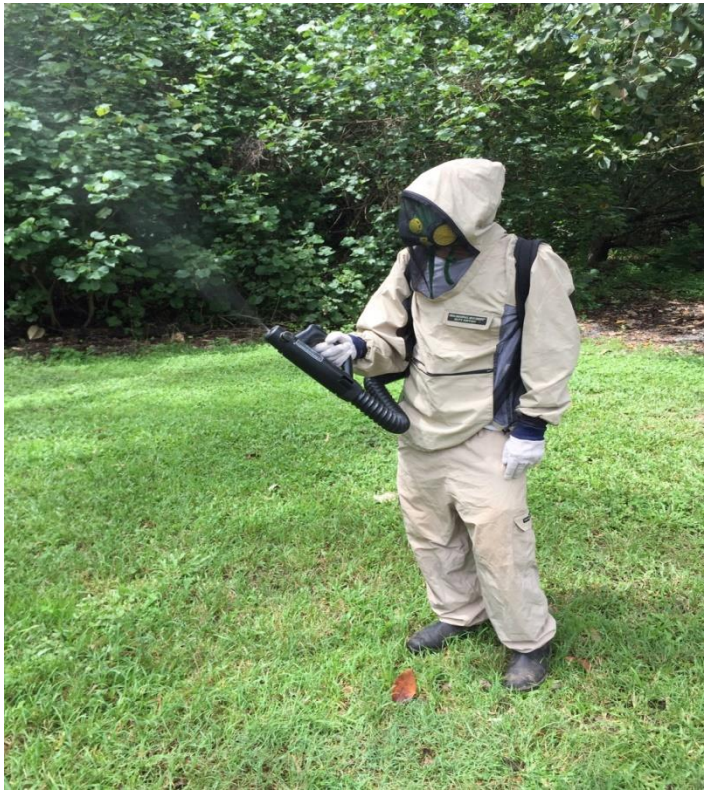
Flavocide® 500EW - 25 and 50mg/l

Py-Bo Natural Pyrethrum - 4mg/ml

Backpack ULV Cold fogger

Sprayed at 5 litres per hectare

Four replicates per treatment and untreated control



# FIELD STUDY – REPELLENCY

Human test subjects to assess repellency

Study duration 1 hour

Counts of mosquito landings in 5 minutes

Pre-treatment, 15, 30 and 60 minutes post-treatment

# FIELD STUDY RESULTS - REPELLENCY

| Time After Application (Minutes) | The Average Percentage Reduction of Mosquito Landings | | |
|---|---|---|---|
| | Flavocide 50mg/ml | Flavocide 25mg/ml | Py Bo 4mg/ml |
| 15 | 82.3 | 79.5 | 96.5 |
| 30 | 85.5 | 83.0 | 97.8 |
| 60 | 95.0 | 76.8 | 95.0 |

# CONCLUSION

- Flavocide active against mosquitoes, cat flea, house fly
- Knockdown & residual action in lab and field vs. mosquito
- Higher rates required compared with permethrin in lab and pyrethrum in field
- Flavocide slower acting but provides high level of mortality in lab and good repellency in field
- Unique mode of action would support resistance management

# FUTURE WORK

- More field testing vs. other mosquito species
- Lab testing vs. SP/OP resistant mosquito strains
- Formulation development to improve residual activity
- Combination treatments to improve knockdown
- Investigate potential synergy with other classes of chemistry
- Other urban pests to be targeted e.g. cockroaches, ants

# ACKNOWLEDGEMENTS

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# FURTHER INFORMATION


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