Technical Information




APPLAUD®

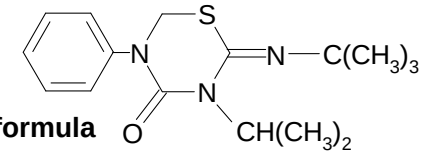
(Buprofezin, insecticide)

NIHON NOHYAKU CO., LTD.

Chemical and Physical Properties

Common name (ISO) : Buprofezin
Chemical name(IUPAC) : (*Z*)-2-*tert*-butylimino-3-isopropyl-5-phenyl-1,3,5-thiadiazinan-4-one
Appearance : White crystal (mp: 104.5-105.5℃)
Water solubility : 0.9 mg/L
Partition coefficient : Log Pow = 3.12 (25℃)
Vapor pressure : 9.4 x 10^{-6}mmHg (25℃)
Formulation : 25WP, 25SC, 40SC, 70WG, etc.

Structure formula



Toxicology (Technical)

Mammalian toxicity

Acute oral LD_{50} (Rat) : (male) 2,198 mg/kg
Acute dermal LD_{50} (Rat) : (male) >5,000 mg/kg
Skin irritation (Rabbit) : Non irritation
Eye irritation (Rabbit) : Mild and transient irritation
Mutagenicity: REC assay Negative
Ames test Negative

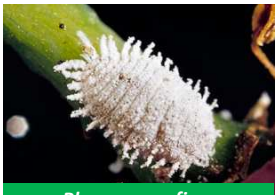
Ecotoxicity

Bluegill sunfish, LC_{50} (96hr) : >0.33 mg/L
Daphnia, EC_{50}(48hr) : >0.42 mg/L
Algae, ErC_{50}(0-72hr) : >0.40 mg/L

Control Spectrum

- Insecta
  - Thysanoptera — Thripidae (Thrips)
  - Hemiptera
    - Heteroptera — Pentatomidae (Stink bugs)
    - Homoptera
      - Diaspididae (Armored scales)
      - Pseudococcidae (Mealy bugs)
      - Cicadellidae (Leafhoppers)
      - Aleyrodidae (Whiteflies)
      - Delphacidae (Planthoppers)
      - Aphididae (Aphids)
  - Coleoptera — Chrysomelidae (Leaf beetles)
  - Lepidoptera — Noctuidae (Owlet moths)
- Arachnida — Acarina
  - Tetranychidae(Spider mites)
  - Tersonemidae (Tersonemid mite)

Note : Effective insects and mites

Scales	Mealy bugs	Leafhoppers	Whiteflies	Planthoppers
				
Pseudaulacaspis pentagona	*Pseudococcus comstocki*	*Nephotettix cincticeps*	*Trialeurodes vaporariorum*	*Nilaparvata lugens*
				
Aonidiella aurantii	*Planococcus ficus*	*Erythroneura variabilis*	*Bemisia tabaci*	*Sogatella furcifera*

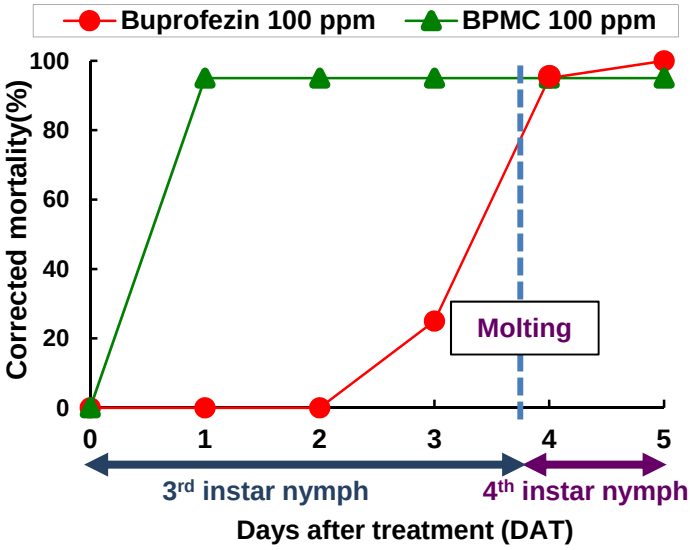
■ Mode of Action

Classified Group 16: Inhibitors of chitin biosynthesis, type 1 by IRAC*

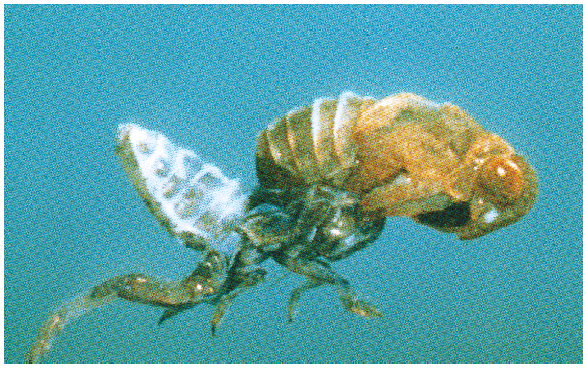
*Insecticide Resistance Action Committee

1. Direct action to nymphs by molting inhibition
2. Indirect action to adults by suppression of next generation
- **Young female adults can not lay eggs**
- **Female adults lay un-hatchable eggs**

■ Molting inhibition

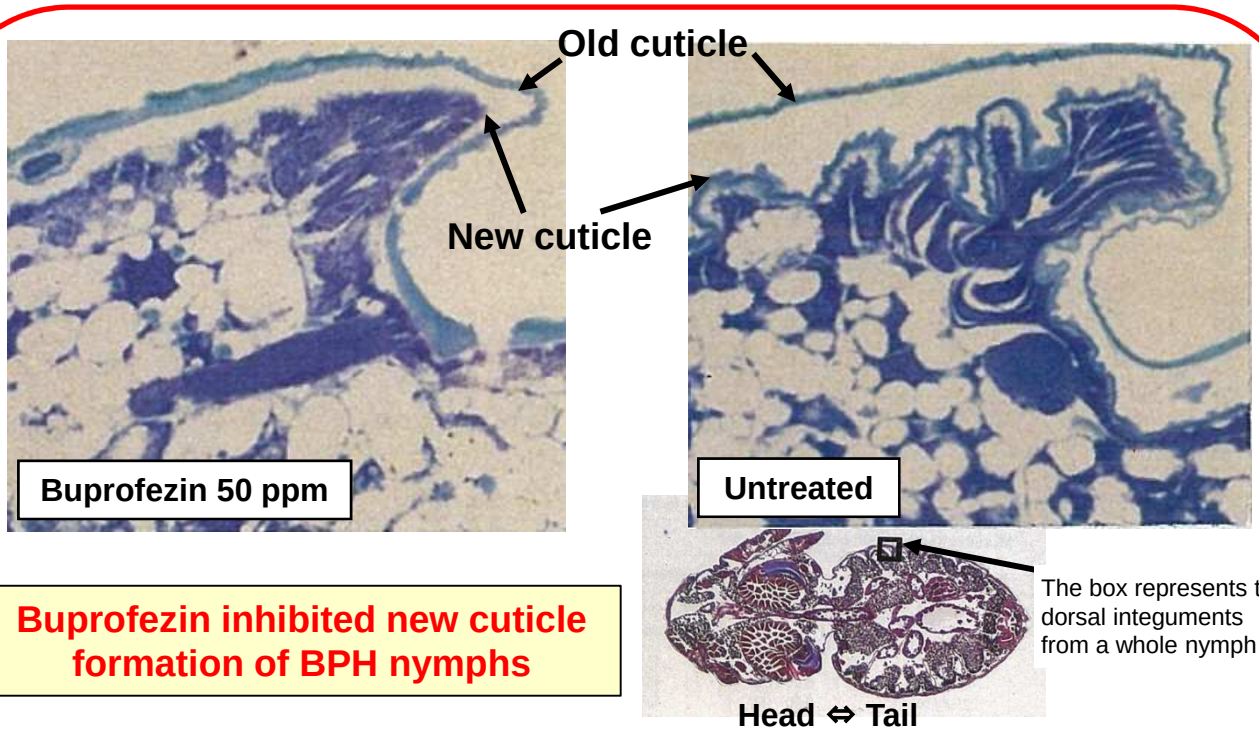


Cumulative mortality of 3rd instar nymphs of brown planthopper (BPH) treated with Buprofezin (1982, Nihon Nohyaku)



Typical toxic symptom of Buprofezin on BPH nymphs

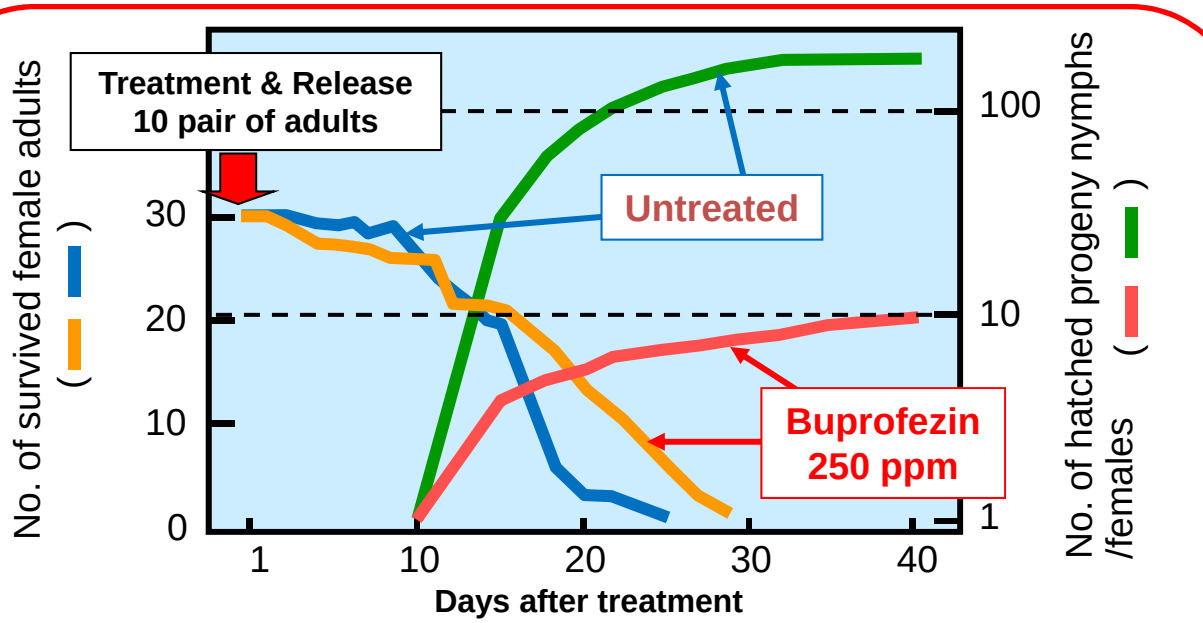
Buprofezin inhibited molting of BPH nymphs



Buprofezin inhibited new cuticle formation of BPH nymphs

Micrographs of dorsal integuments of *Nilaparvata lugens* nymphs treated with Buprofezin. 66hrs old of 4th instar nymphs (1989, Nihon Nohyaku)

■ Suppression of next generation



Effect on female adults and hatched nymphs of BPH (1982, Nihon Nohyaku)

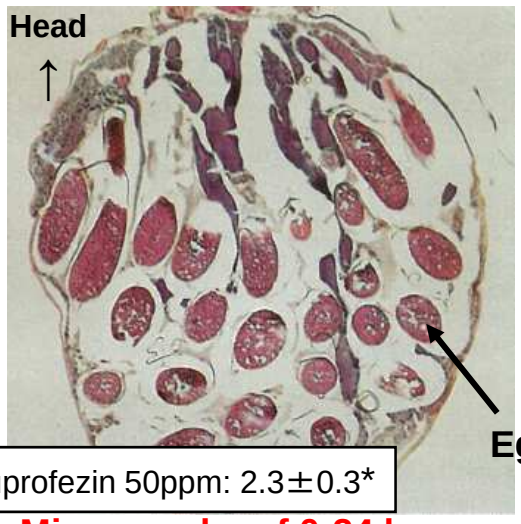
LC_{50} value of ovicidal and adulticidal activity: >250ppm

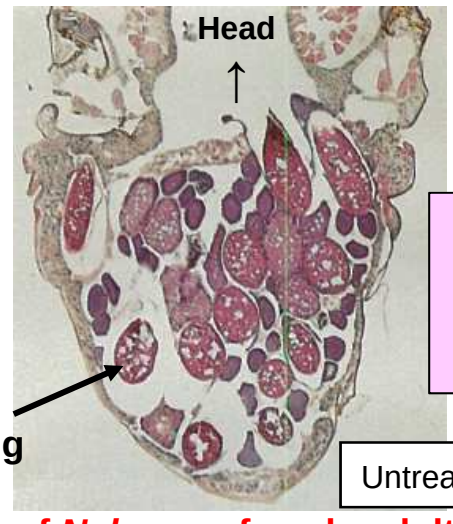
Effect on Female Adult of White peach scale, -Laboratory Test-

Treatment	Rate (ppm)	No. of female adult tested	No. of female adult survived (19DAT)	Next generation (50DAT) No. of offspring	Next generation (50DAT) % of efficacy
Buprofezin	250	287	214 (11.9)*	**5**	**99.8**
	125	195	152 (7.9)*	**9**	**99.4**
	63	347	273 (7.0)*	599	81.9
	31	267	206 (8.8)*	962	59.6
Methidathion	400	247	1 (99.5)*	0	100
Untreated	-	299	253 (84.6)**	2668	-

* Percent of corrected mortality, ** Percent of survival

1987, Nihon Nohyaku



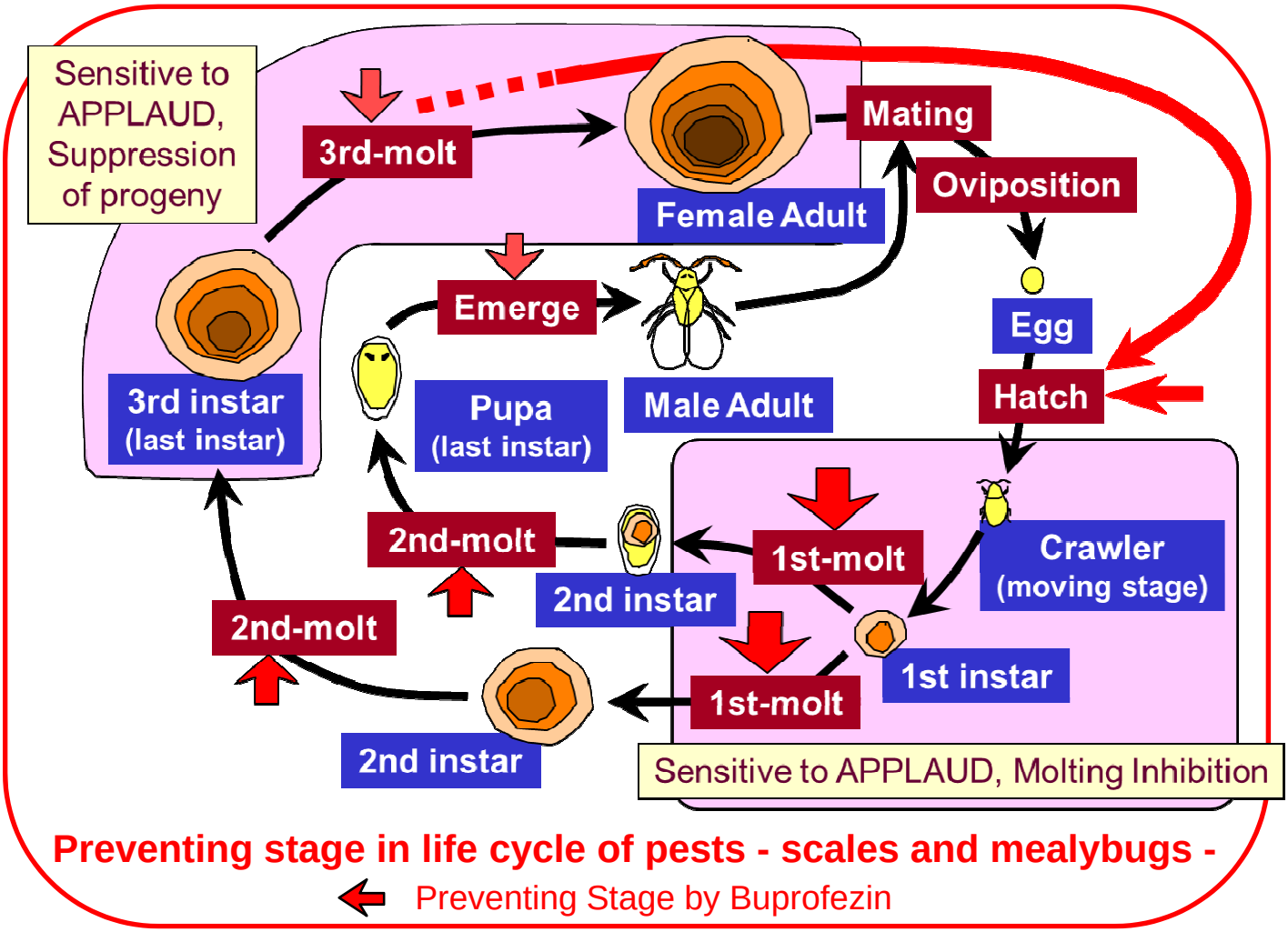


Treated female adults can carry eggs but can not lay eggs.

Micrographs of 0-24 hour age of *N. lugens* female adult abdomen and oviposition treated with Buprofezin (1987, Nihon Nohyaku)

*: Number of laid eggs / female (mean±SE)

■ Preventing stage in life cycle of pests



Preventing stage in life cycle of pests - scales and mealybugs -

← Preventing Stage by Buprofezin

■ Safe for Non-target organisms

Predators:

Predacious spider, *Lycosa pseudoannulata*	: No effect at 2,000 ppm
Predacious mite, *Phytoseiulus persimilis*	: No effect at 500 ppm
Euseius stipulatus	: No effect at 500 ppm
Predacious pond skater, *Microvelia atrolineata*	: No effect at 750 g a.i./ha
Predacious wasp, *Cyrtorhinus lividipennis*	: No effect at 250 ppm

Parasites:

Parasitic wasp, *Paracentrobia andoi*	: No effect at 250 ppm
Ephedrus japonicus	: No effect at 1,000 ppm
Encarsia formosa	: No effect at 250 ppm
Cales noacki	: No effect at 250 ppm
Aphytis lingnanensis	: No effect at 500 ppm
Industrial insects: *Apis mellifera* (Honeybee)	: No direct effect at 2,000 ppm
Bombyx mori (Silkworm)	: No direct effect at 2,000 ppm


Predacious spider

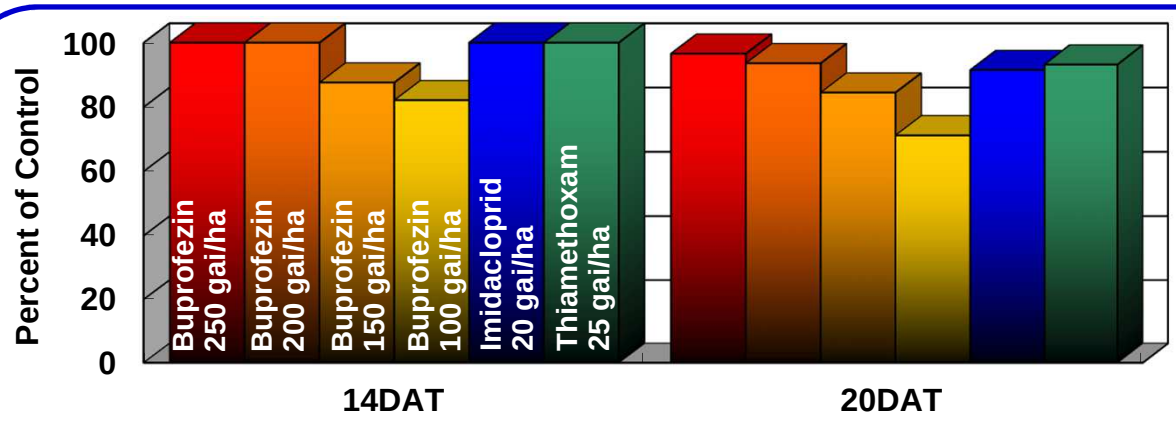

Predacious mite


Parasitic wasp


Honeybee

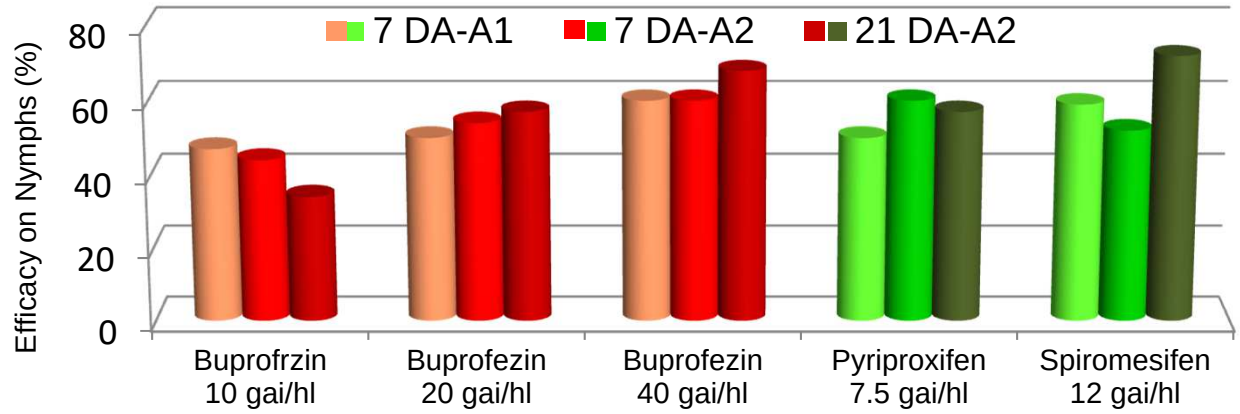

Silkworm

Field trials



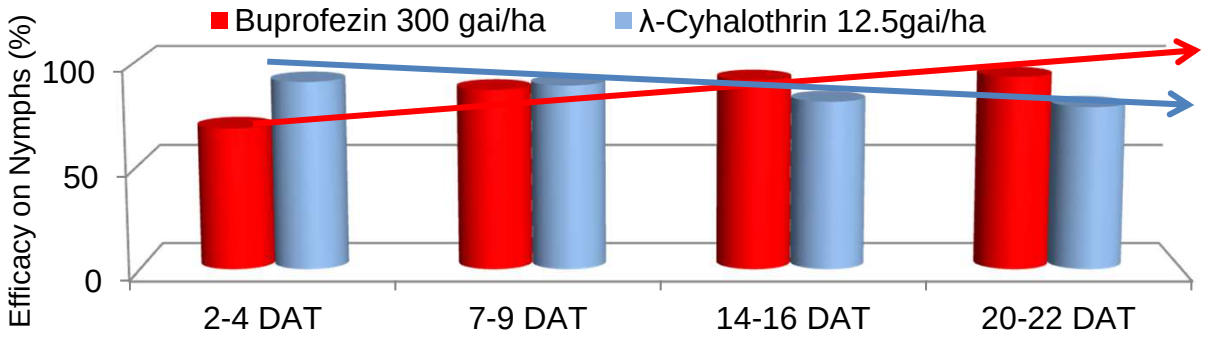
Brown Planthoppers on Paddy Rice

Rajahmundry, Andhra Pradesh, India. Application: September 9, 2004. Spray volume: 400L/ha



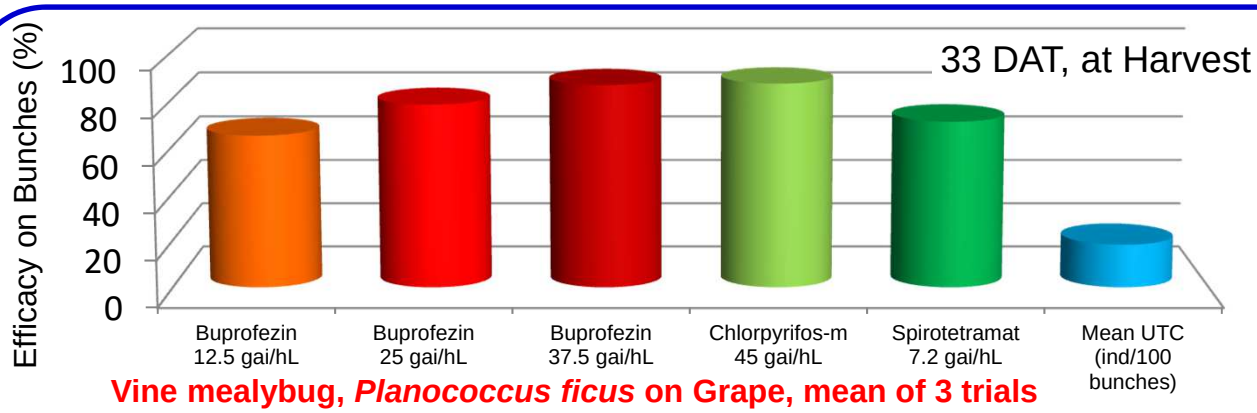
Whiteflies, *Bemisia tabaci* on Cucumber

Mazarrón, MU, Spain. Application: Aug. 13 (A1) & Sept. 2 (A2), 2013. Spray volume: 800L/ha.



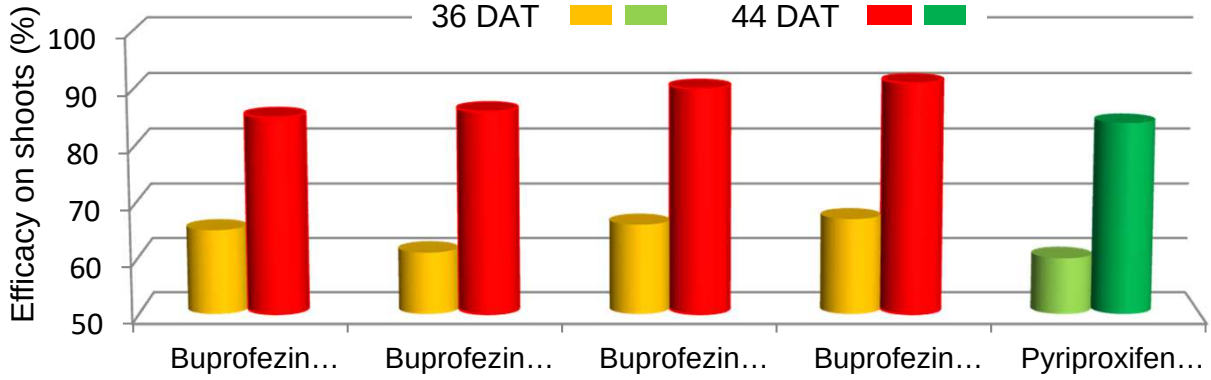
Grape leafhoppers, *Empoasca vitis* on Grape, mean of 5 trials

Trials were conducted in Spain, France, Italy, Greece, in 2009-2011. Spray volume: 500-800L/ha.



Vine mealybug, *Planococcus ficus* on Grape, mean of 3 trials

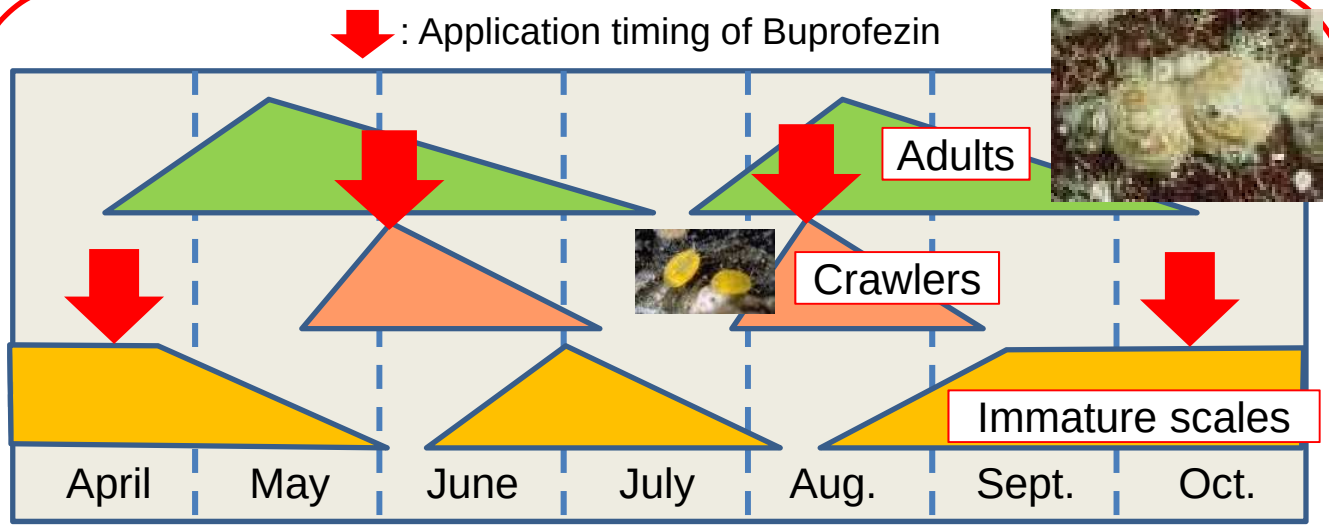
Messini & Kavala, Greece in 2012. Application: beginning of August Spray volume: 1000L/ha.



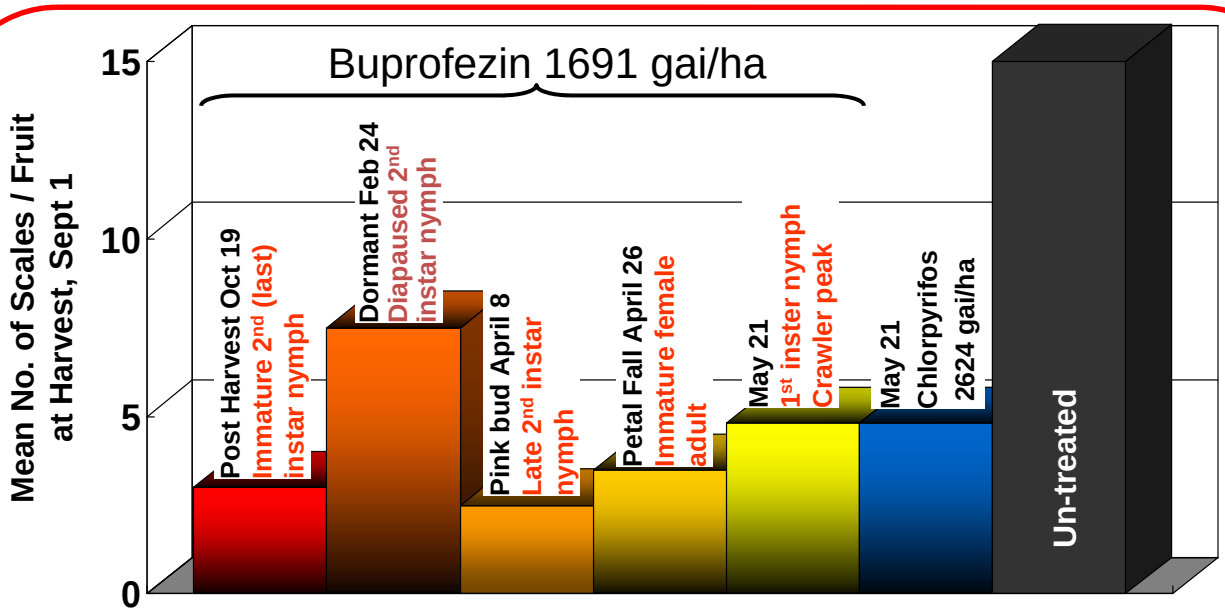
San Jose scale, *Quadraspidiotus perniciosus* on Apples

Campania, Italy, 2013. Application April 4. Spray volume: 1500L/ha

■ Application timing



Scale life history and Application timing of Buprofezin in temperate area



Comparison of effects by different application timings against San Jose scale on apples

Eltopia, Washington, USA, 2010. Application Oct 19, 2009 ~ May 21, 2010. Spray volume: 935 L/ha.

Applaud is effective not only for crawlers but also for immature females.

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