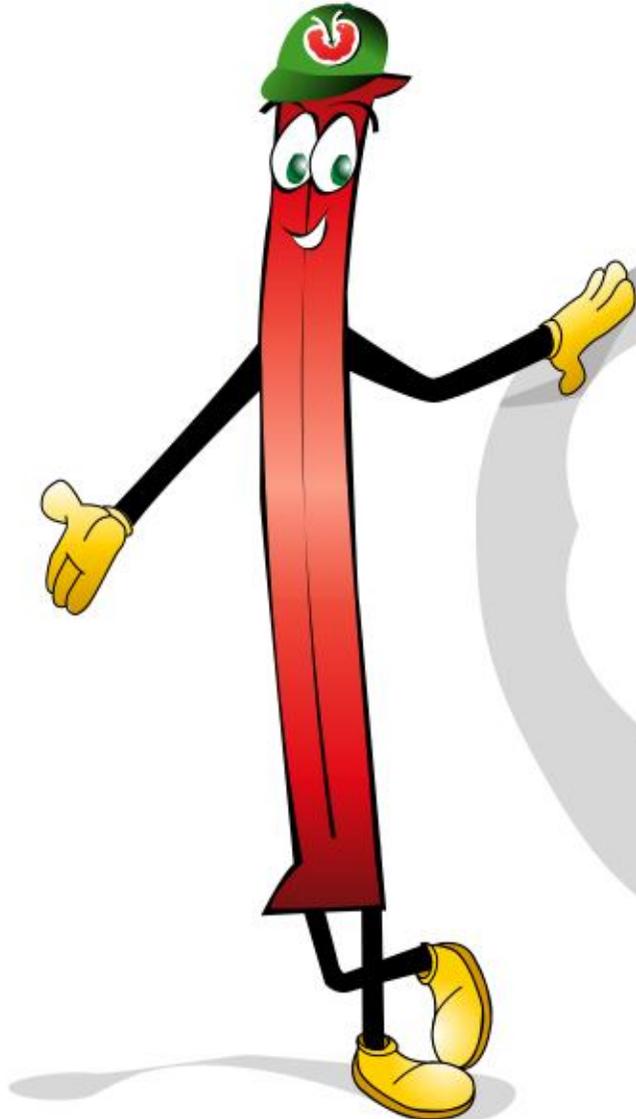


MATING DISRUPTION IN IPM

pheromones and beyond

by Vittorio Veronelli

ShirEtsu[®]
PHEROMONES



ABIM 2009

Lucerne 19-20 October





IPM in agriculture

**IPM is
a sustainable approach
to managing pests
by combining
biological, cultural, physical
and ultimately chemical tools
in a way that minimizes
economic, health and environmental risks**



Basis for IPM

PEST

Knowledge

Forecast

Tolerance

Prevention

Scouting

Thresholds

Actions plans



PHEROMONES MATING DISRUPTION

Lepidoptera sexual pheromones are the communication method used by each of these species to mate and reproduce. **Disruption** of this communication **prevents** their **reproduction** thus **reducing** the amount of fertile eggs laid and the related population of **damaging larvae**. MD is the basement of Lepidoptera pest control in today's fruits and vegetable crops in IPM and Organic productions.



SOUTH TYROL - APPLE CASE

Cydia pomonella (Codling moth CDM)

YEAR	number of scouted orchards	harvest damage % by CDM	% orchards below 1% damage	average additional spray
1994	421	0.5	86.7	1.5
1995	631	0.8	80.0	0.5
1996	91	0.5	92.3	0.6
1997	66	0.4	89.4	0.3
1998	156	0.9	76.9	0.5
1999	279	0.6	81.7	1.6
2000	187	0.3	92.0	0.7
2001	154	0.3	94.8	0.4
2002	184	0.7	85.8	0.6
2003	223	1.1	77.6	0.9
2004	252	0.8	85.0	0.6
2005	224	0.5	87.0	0.3
2006	155	0.4	85.0	0.3
2007	255	0.4	n.d.	n.d.
2008	256	0.18	n.d.	n.d.

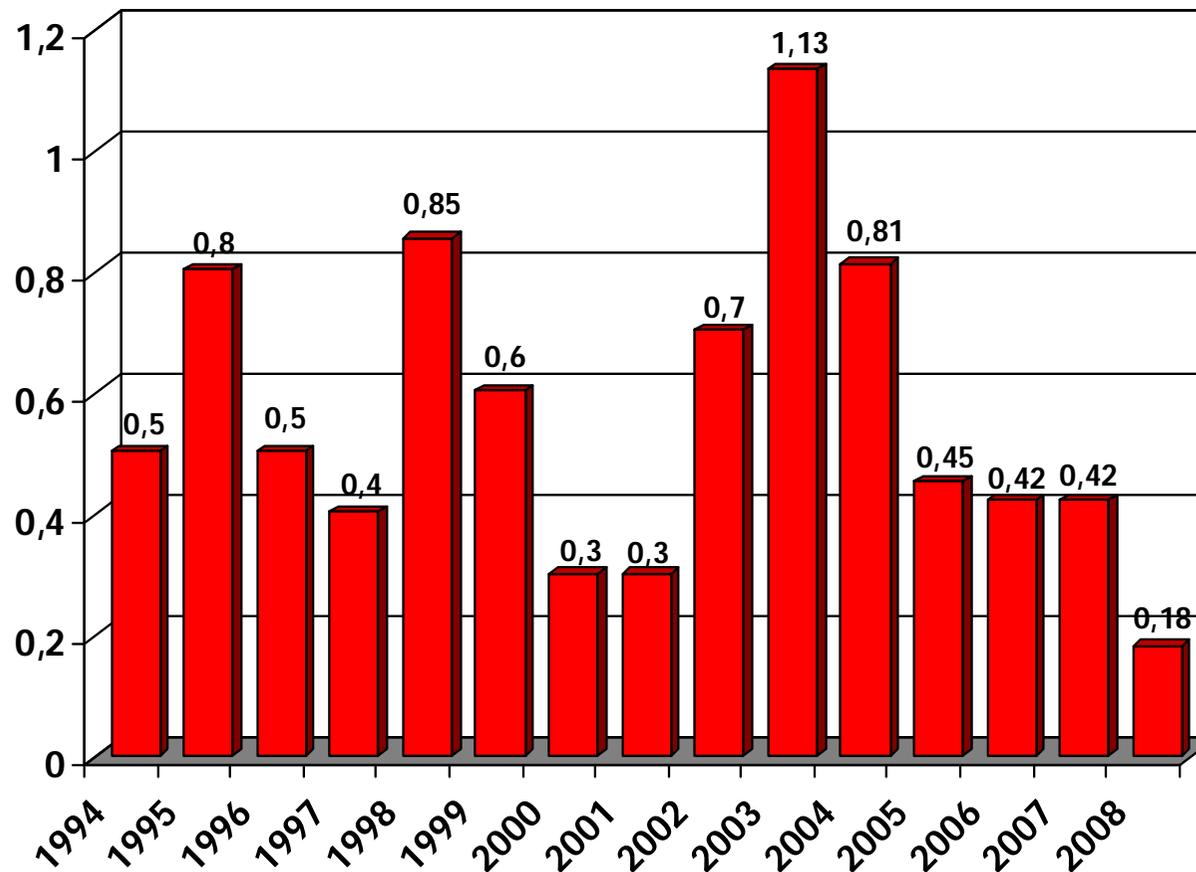
Source SBOW South Tyrol Advisory Service



SOUTH TYROL - APPLE CASE

Cydia pomonella (Codling moth CDM)

PERCENTAGE OF CDM DAMAGED APPLES IN MERAN MD ORCHARDS 1994-2008



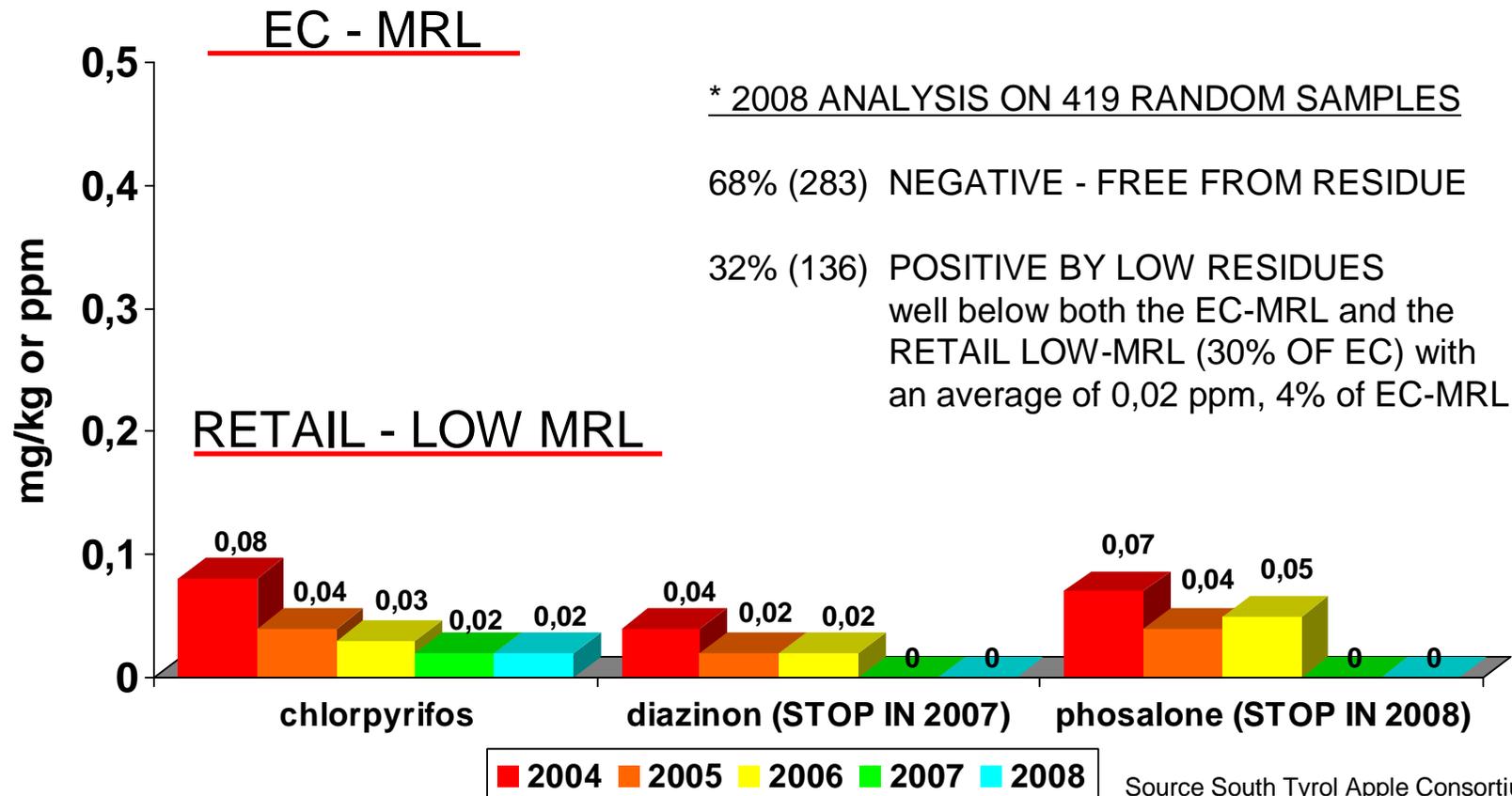
Source SBOW South Tyrol Advisory Service



SOUTH TYROL - APPLE CASE

Cydia pomonella

AVERAGE RESIDUE LEVELS OF CHEMICAL INSECTICIDES IN POSITIVE SAMPLES*





SOUTH TYROL - APPLE CASE

SOME INDICATION FROM APPLE IPM GUIDELINES

BY GROWERS ASSOCIATION AND ADVISORY SERVICE

Integrated Fruit Production (IFP) according to IOBC definition is the economical production of high quality fruit obtained applying production methods economically safer, minimizing all unwanted side effects and the use of synthetic chemical products to increase environmental and human health safety.

...

- **Check and identify accurately both damaging and beneficial insect and organisms**
- **Increase tolerance thresholds by accurate risks evaluation**
- **Exclude products dangerous to beneficials, use only selective products**
- **Reduce the use of chemical plant protection products**

...

Field control and scouting

every orchard must be checked at least 3 times per year for presence of diseases and damaging insects and at least one time for beneficial insects. For each hectare of orchard the grower must spend at least 12 hours per year in scouting and control. Notes of these controls must be recorded in the farm field book.

...

Professional training and updating

Persons in charge for orchards must join each year at least 2 hours of IPM lectures per hectare of orchard surface.

When orchards exceeds 10 ha in surface they must join specific courses for 20 hours per year.

Notes of these lectures must be recorded in the farm field book.

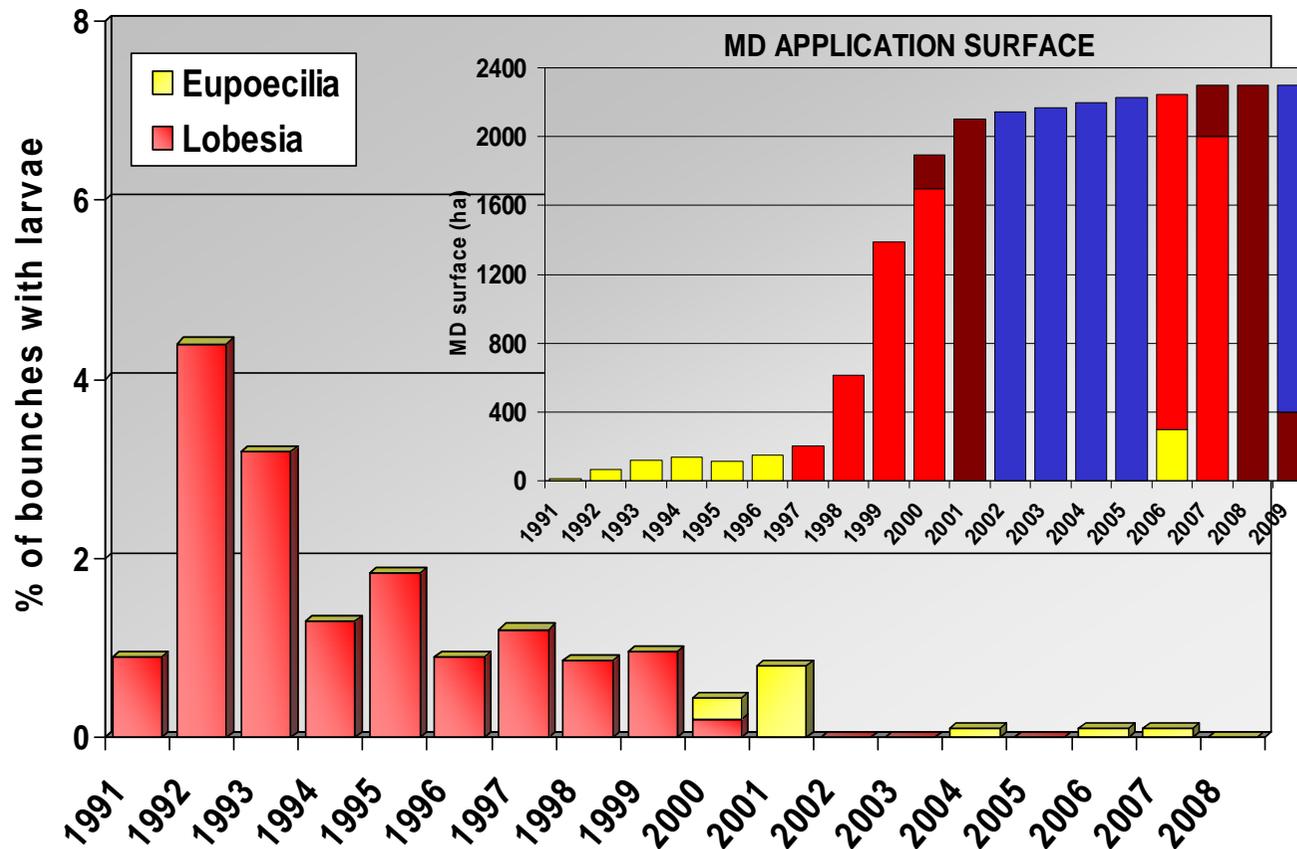
Source AGRIOS and SBOW South Tyrol



TRENTINO - GRAPE CASE

Lobesia botrana & *Eupoecilia ambiguella*

MD APPLICATION AND HARVEST DAMAGE IN MEZZOCORONA VINEYARDS

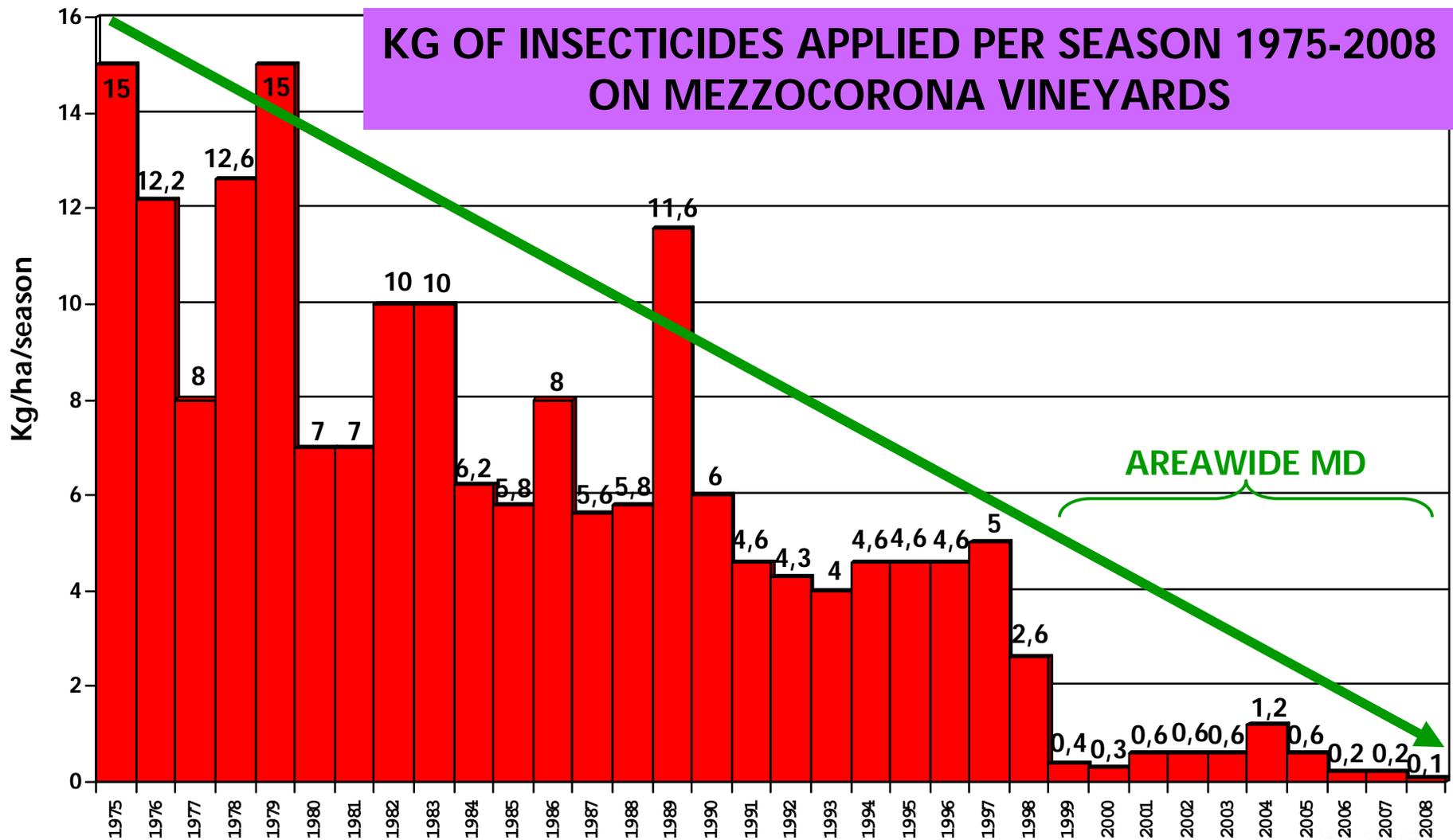


Source MEZZACORONA WINERY and S. MICHELE INSTITUTE



TRENTINO - GRAPE CASE

Lobesia botrana & Eupoecilia ambiguella

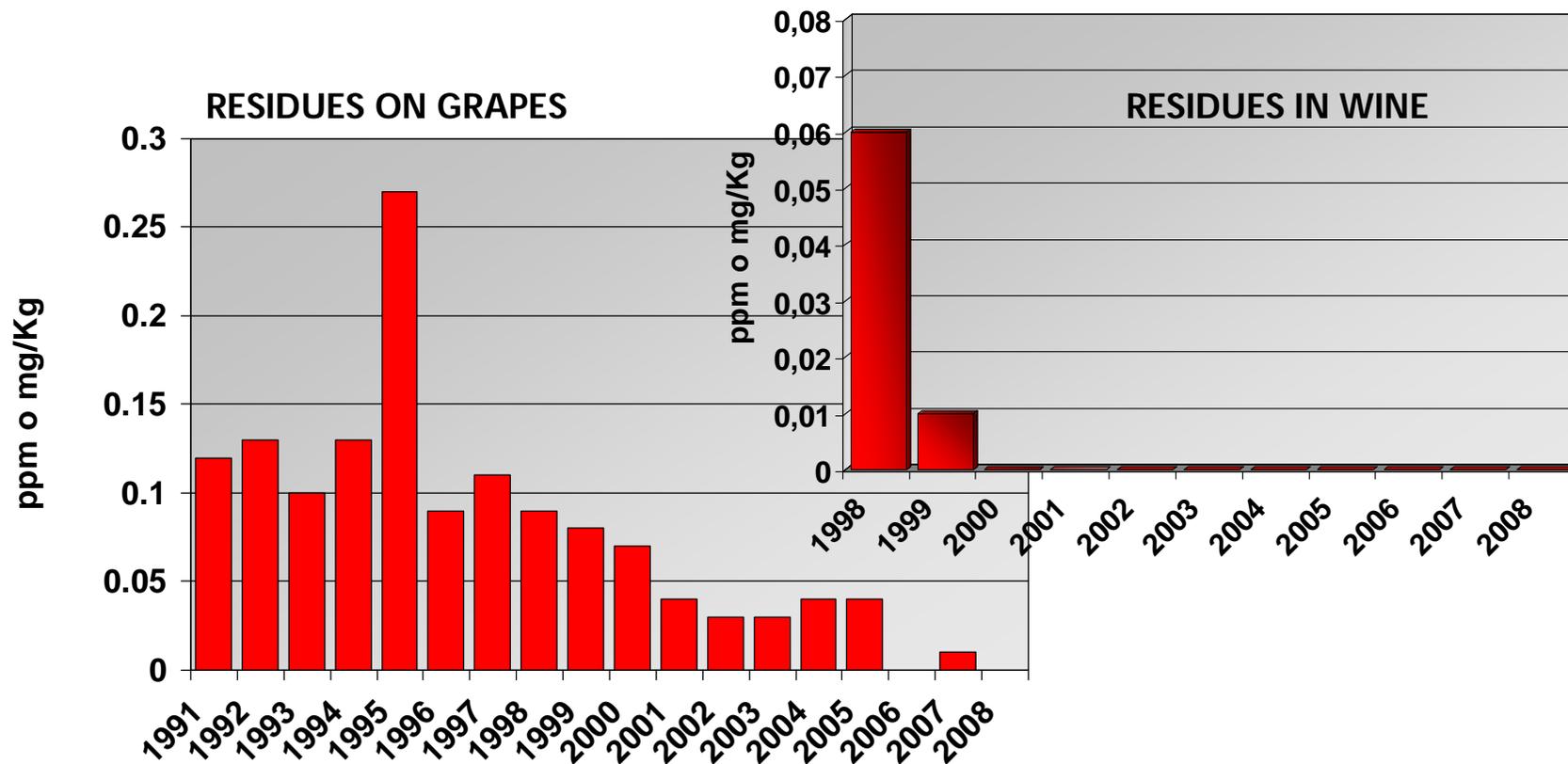




TRENTINO - GRAPE CASE

Lobesia botrana & Eupoecilia ambiguella

RESIDUES ON GRAPES AND IN WINE



Source MEZZACORONA WINERY



MD WORLDWIDE (2008)





MD BEYOND PHEROMONES

Lepidoptera sexual pheromones are the communication method used by each of these species to mate and reproduce.

Homoptera leafhoppers and planthoppers instead use sounds as communication method for the same mating purpose.

Researchers already identified the species specific language of *Scaphoideus titanus* the FD vector for which tons of insecticides were sprayed on vines in these few years.



MD BEYOND PHEROMONES



Scaphoideus titanus communicate by means of sound vibrational signals that provide information of identity and position.

The mating always requires to be preceded by a complex courtship ritual, consisting of a sound vibrational duet between male and female.

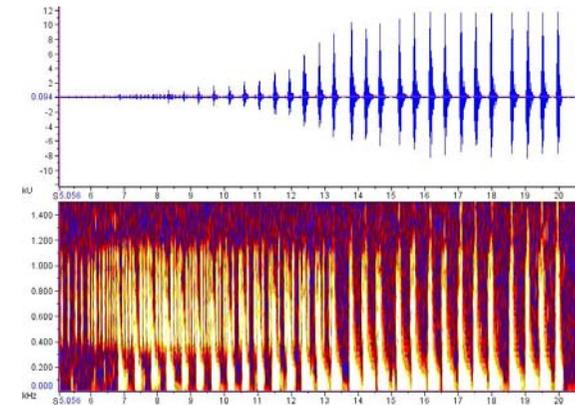
The key to prevent their mating is the interruption of the sound vibrational sexual communication by transmitting suitable disrupting signals.



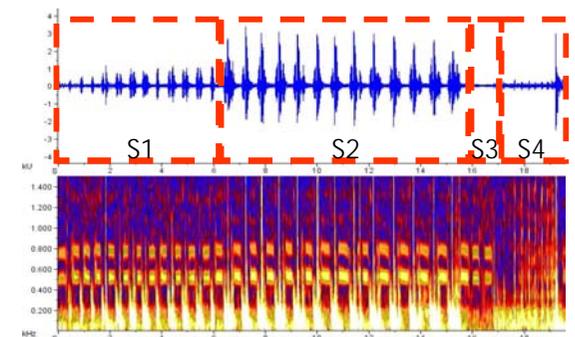
MD BEYOND PHEROMONES



MALE CALLING SONG



COURTSHIP SONG / MATING DUET



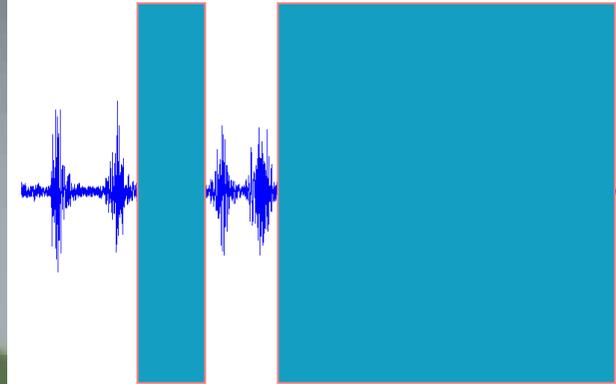
Reproductive strategy of the Nearctic leafhopper *Scaphoideus titanus* Ball (Hemiptera: Cicadellidae) V.
Mazzoni, J. Presern, A. Lucchi & M. Virant-Doberlet – Bulletin of Entomological Research 2009



MD BEYOND PHEROMONES



RIVALRY DISTURBANCE NOISE



Disruption of reproductive behaviour of *Scaphoideus titanus* by playback of vibrational signals
V. Mazzoni, A. Lucchi, A. Cokl, J. Presern, & M. Virant-Doberlet – Entomologia Experimentalis et Applicata 2009

Thank you for your attention !

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