



**Giovedì 1 febbraio**

**CONVEGNO**

**I CAMBIAMENTI CLIMATICI  
E LA DIFESA DEL VIGNETO**

**FIERAGRICOLA, AREA CONVEGNI ENOVITIS**

**PAD. 4 (Macchine e attrezzature per la viticoltura)**

**ore 11:00**

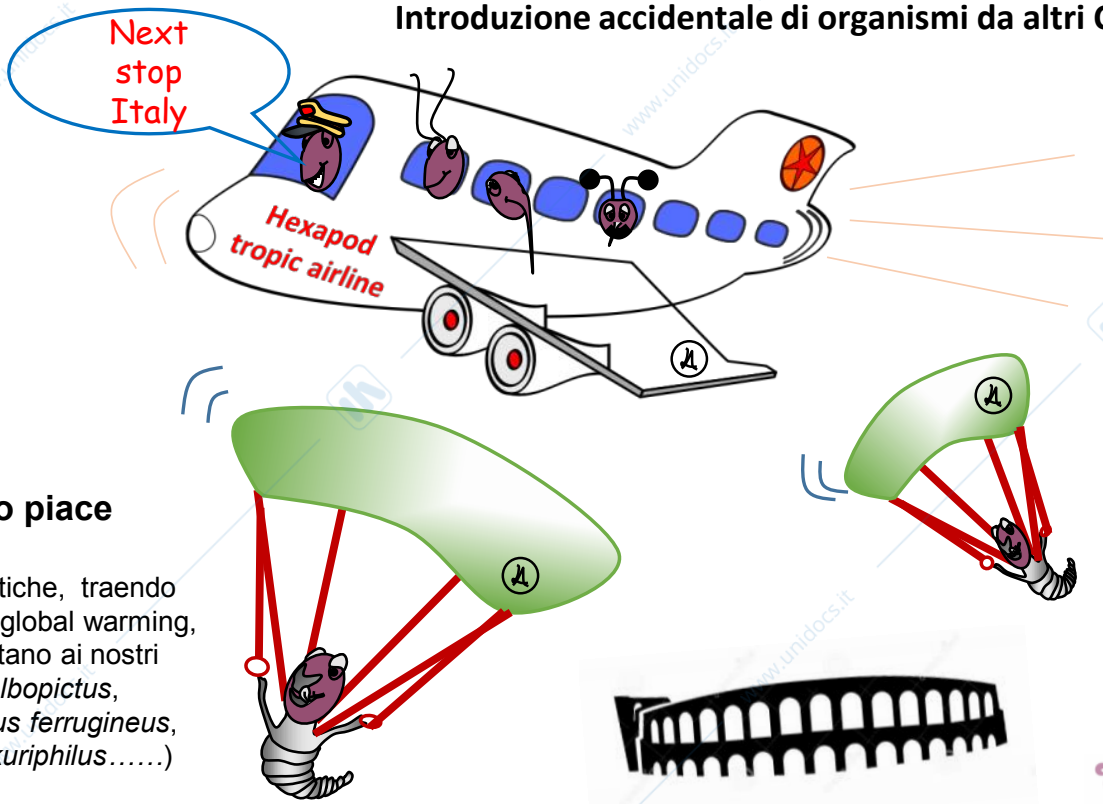
Il cambiamento climatico, con la variazione delle precipitazioni e della temperatura e gli eventi estremi più frequenti, potrà influenzare direttamente ed indirettamente diversi aspetti della viticoltura. Non tutti gli effetti saranno necessariamente negativi. Quello che è certo è che il viticoltore dovrà adattarsi ad un maggior grado di incertezza e maggior flessibilità nella gestione della protezione integrata della vite.

*Andrea Lucchi*

DISAAA-a Università di Pisa

*Nuove sfide nella difesa  
del vigneto dagli insetti  
dannosi*

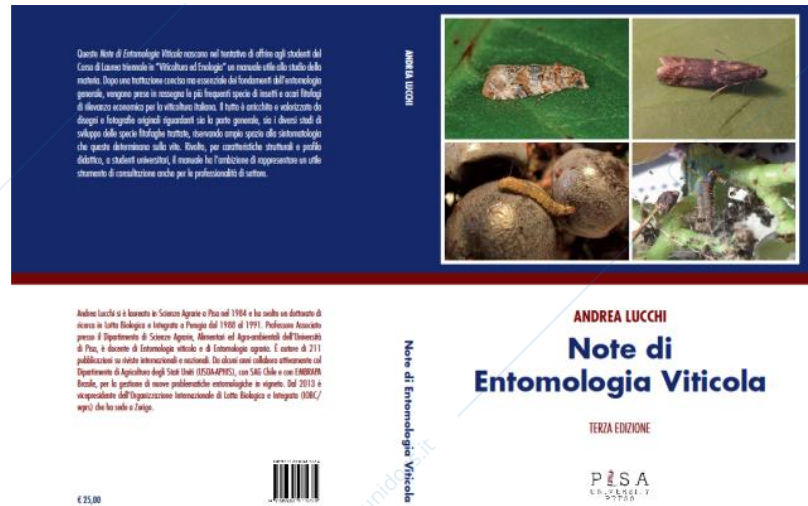
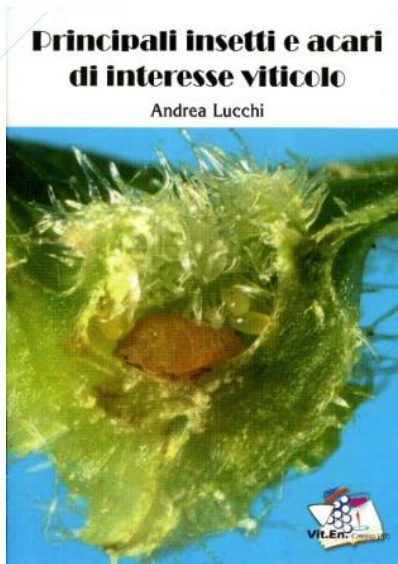
## Introduzione accidentale di organismi da altri Continenti



### A qualcuno piace caldo

Le specie esotiche, traendo vantaggio dal global warming, meglio si adattano ai nostri climi (*Aedes albopictus*, *Rhynchophorus ferrugineus*, *Dryocosmus kuriphilus*.....)

Ma il riscaldamento globale può favorire anche specie «nostrane» influenzandone il grado di dannosità



**In vigneto sono una cinquantina i fitofagi potenzialmente dannosi**

## Solo alcuni preoccupano costantemente i viticoltori



### Tigioletta della vite (*Lobesia botrana*)



Agricultural and Forest Entomology

Agricultural and Forest Entomology (2013), 18, 168–178

DOI: 10.1111/afe.1201

#### Global warming affects phenology and voltinism of *Lobesia botrana* in Spain

Daniel Martín-Vertedor, Juan J. Ferrero-García and Luis M. Torres-Vila

Servicio de Sanidad Vegetal, D.G. de Exploración Agraria y Calidad Alimentaria, Consejo de Agricultura y Desarrollo Rural, Junta de Extremadura, Avenida de Portugal s/n, 06000 Mérida, Badajoz, Spain

- Abstract**
- 1 Climate change is promoting alterations of a very diverse nature in the life cycle of an array of insect species, including changes in phenology and voltinism. In Spain, there is observational evidence that the moth *Lobesia botrana* (Dn. & Schiff. (Lep.: Tortricidae), a key vine pest that is usually bivoltine in Mediterranean latitudes, tends to advance spring emergence, displaying a partial fourth additional flight, a fact that is potentially attributable to global warming.
  - 2 To verify this hypothesis, local temperatures were correlated with *L. botrana* phenology in six vine-growing areas of southwestern Spain during the last two decades (1984–2006) by exploiting the database of flight curves obtained with sexual pheromone traps. The dates of second and third flight peaks of the moth were calculated for each area and year and then correlated with both time (years) and local temperature.
  - 3 The results obtained demonstrated a noteworthy trend towards local warming (as a result of global warming) in the last two decades, with mean increases in annual and spring temperatures of 0.9 and 3.0°C, respectively. Therefore, *L. botrana* phenology has significantly advanced by more than 12 days. Moreover, the phenological advance contributed to increased moth voltinism in 2006 by promoting a complete fourth additional flight, a fact that has never been reported previously to our knowledge in the Iberian Peninsula.
  - 4 The potential impact of an earlier phenology and increased voltinism in *L. botrana* is discussed from an agr-ecological perspective.

### Cocciniglia farinosa della vite (*Planococcus ficus*)



Journal of Applied Ecology 2008, 45, 524–536

doi: 10.1111/j.1365-2656.2007.01376.x

#### Prospective evaluation of the biological control of vine mealybug: refuge effects and climate

Andrew Paul Gutierrez<sup>1,2\*</sup>, Kent M. Daane<sup>1</sup>, Luigi Ponti<sup>1</sup>, Vaughn M. Walton<sup>1</sup> and C. Ken Ellis<sup>1</sup>

<sup>1</sup>Department of Environmental Science Policy and Management, College of Natural Resources, University of California, Berkeley, CA 94720-3114, USA; <sup>2</sup>Center for the Analysis of Sustainable Agricultural Systems (CASAS), Berkeley, CA 94707, USA; and <sup>3</sup>Department of Horticultural Sciences, Oregon State University, Corvallis, OR 97331-2304, USA

#### Summary

1. Vine mealybug *Planococcus ficus* is an invasive pest of vineyards in many areas of the world. In California, USA, it infests all plant substrates and has a spatial refuge from natural enemies under the bark and on roots. A temporal refuge is created when ants tend the mealybug, reduce the efficacy of natural enemies.
2. Biological control of vine mealybug is only partially successful and varies among California grape-growing regions. To improve control and help determine appropriate natural enemies for importation, the effects of weather on mealybug regulation by two parasitoids, *Aspilota parvifemur* and *Leptanastoeus abnormis*, and a coccinellid predator, *Cryptolaemus montrouzieri*, were examined across the ecological regions of California.
3. Weather-driven, physiologically based age mass structured demographic models of the mealybug and its natural enemies were parameterized using laboratory data and field observations. Temperature was used to define the thermal limits and development rates of each species, and resource supply/demand ratios were used to scale daily per capita growth, fecundity and survivorship rates from maximal values at optimal conditions.
4. The population dynamics of the mealybug and its natural enemies were simulated at 108 locations in California over a 10-year period using observed weather. The simulation data were mapped using a geographical information system (GIS) and analysed using linear multiple regression and marginal analysis.
5. The model predictions indicated that: (i) the parasitoid *A. parvifemur* has a larger impact on vine mealybug than either *L. abnormis* or *C. montrouzieri*; (ii) mealybug densities will be lowest in the hot desert regions of southern California and highest in the cooler areas of northern California; (iii) mealybug density increases with season length and the size of the combined spatial-temporal refuge; (iv) biological control of mealybug could be achieved by reducing the size of the spatial-temporal refuge.
6. Symbols and applications. Models, no matter how detailed, will always be incomplete, despite this, the complexity of tri-trophic systems can be modified and the effects of biotic factors and of weather separated. The predictions of our model coincided well with field observations on vine



Due insetti che «amano» il caldo

24.11.2009 EN Official Journal of the European Union L 309/71

## DIRECTIVES

## DIRECTIVE 2009/128/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 21 October 2009

establishing a framework for Community action to achieve the sustainable use of pesticides

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Economic and Social Committee<sup>(1)</sup>,Having regard to the opinion of the Committee of the Regions<sup>(2)</sup>,Acting in accordance with the procedure laid down in Article 251 of the Treaty<sup>(3)</sup>,

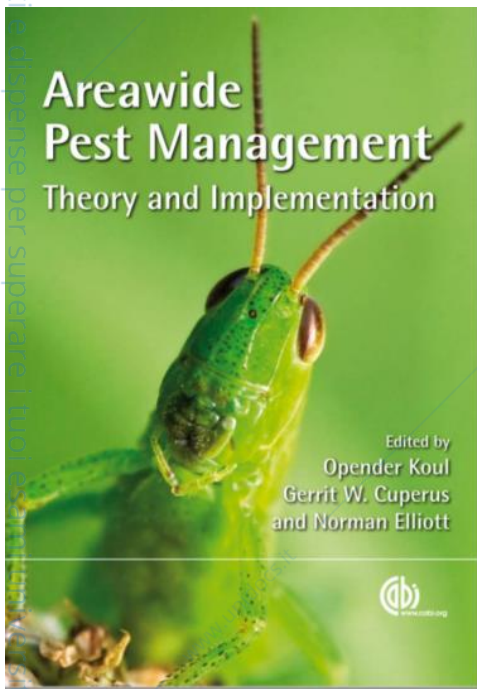
other related Community legislation, in particular Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds<sup>(4)</sup>, Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora<sup>(5)</sup>, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy<sup>(6)</sup>, Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin<sup>(7)</sup> and Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 on the placing of plant protection products on the market<sup>(8)</sup>. These measures should also not prejudice voluntary measures in the context of Regulations for Structural Funds or of Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD)<sup>(9)</sup>.

In Europa la **Direttiva 2009/128/CE** ha istituito un quadro per l'azione comunitaria ai fini dell'**utilizzo sostenibile dei prodotti fitosanitari**, sancendo l'obbligatorietà dell'adozione dell'IPM per gli Stati membri. In Italia, questa Direttiva è stata recepita con il Decreto Legislativo N. 150 del 2012 e infine **attuata mediante il Piano di Azione Nazionale (PAN)** per l'uso sostenibile dei prodotti fitosanitari (Decreto Interministeriale 22 gennaio 2014). In tal modo si è inteso "stabilire gli obiettivi, le misure, i tempi e gli indicatori per la riduzione dei rischi e degli impatti derivanti dall'utilizzo dei prodotti fitosanitari".

**Il PAN promuove la ricerca di alternative all'uso dei prodotti fitosanitari** e fornisce indicazioni per ridurre l'impatto di questi prodotti nelle aree agricole ed extra agricole.

Per le diverse filiere produttive, l'adozione dell'IPM nel controllo dei principali fitofagi dipende dall'esistenza di strumenti e mezzi alternativi agli insetticidi (**promotori di IPM**), che siano efficaci e, allo stesso tempo, economicamente accettabili.

Per la gestione di questi due fitofagi esistono oggi mezzi e metodi efficaci, alternativi agli insetticidi. Efficacia maggiore se applicati su aree vaste, a livello di comprensorio. **Gli insetti non conoscono CONFINI!!!**



Dagli  
insetticidi di  
sintesi ai  
**Feromoni**



Dagli  
insetticidi di  
sintesi agli  
**Agenti di  
Controllo  
Biologico**

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**Bolgheri (LI): un'esperienza condivisa**

Clima mite

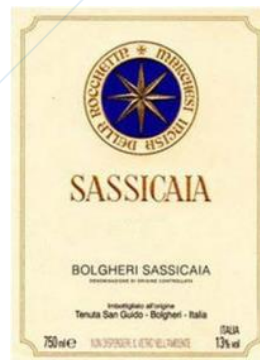
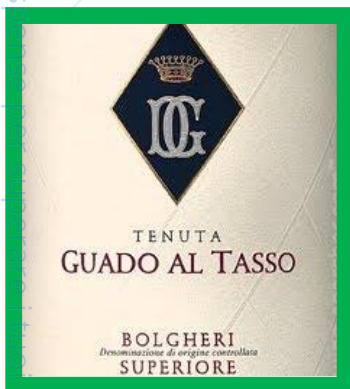
Precipitazioni: 400-800 mm/annui

Suoli: medio impasto e sabbiosi

Tra le aeree più prestigiose per la produzione di vini di qualità

(<http://www.wine-searcher.com/regions-bolgheri>)

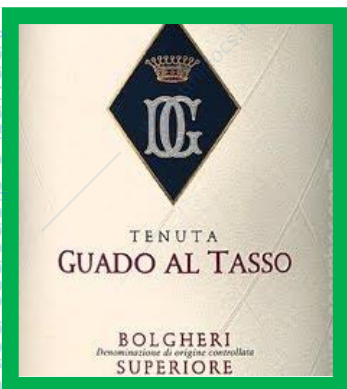
## CONDIZIONI AMBIENTALI



Principali problemi entomologici: Lobesia e Planococco

Da sempre: 2-3 insetticidi con IGRs o fosfororganici contro Lobesia e 1-2 contro il Planococco con insetticidi sistemici o con fosfororganici.

**Elevato valore dei vini, necessità di uve sane, timore nell'abbandonare la lotta insetticida**



**GUADO AL TASSO – ANTINORI (300 ha di vigneti)  
Forte interesse per possibili strategie non insetticide**

**Coinvolgimento dell'Università per un progetto condiviso nel controllo di Lobesia e Planococco**

**Primi passi  
Formazione e coinvolgimento**

- Incontri preliminari con tecnici aziendali e consulenti
- Conoscenza delle problematiche (vigneti maggiormente infestati, valutazione critica dei dati storici di monitoraggio.....)
- Coinvolgimento di tutti gli «attori» nel progetto con la formazione di un gruppo tecnico coordinato dall'Università
- Formazione (workshops, video, pieghevoli)

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## PROGETTO LOBESIA

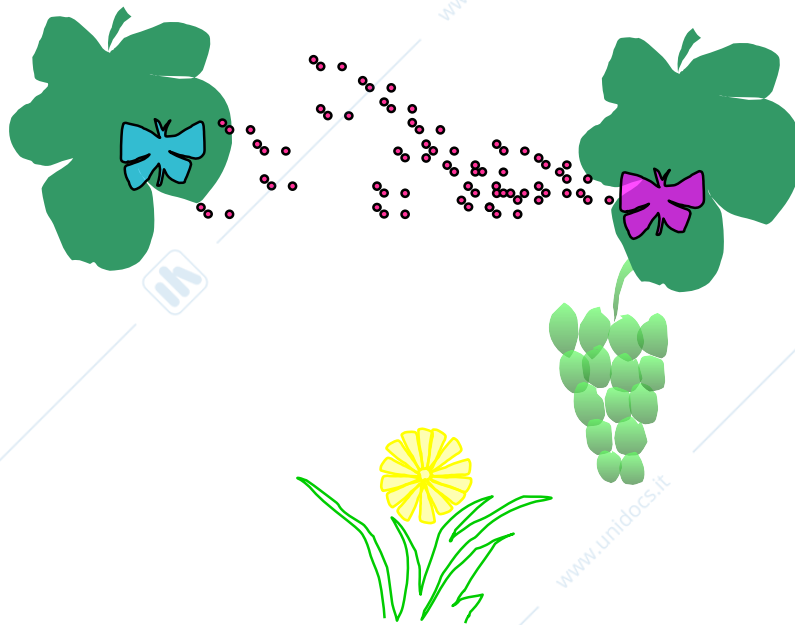
Su nostra proposta l'azienda applica la CS su 1/6 dell'intera superficie (50 ha) per poter confrontare i risultati con la strategia insetticida.

CS con erogatori ShinEtsu Isonet L applicati a fine marzo (500 per ha).

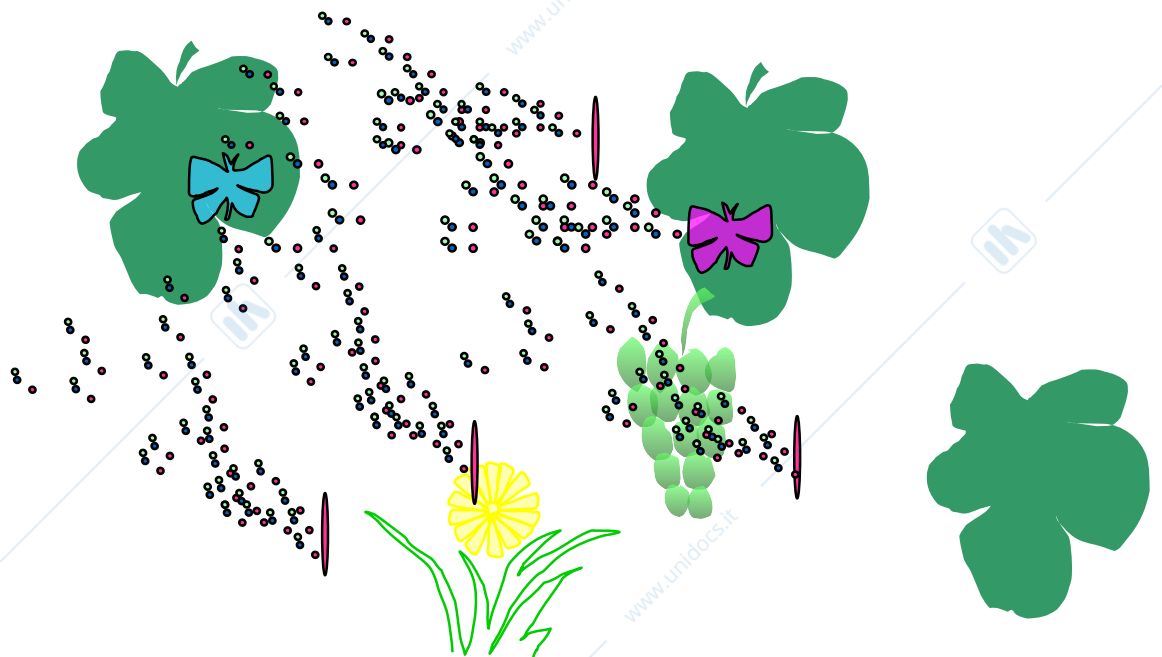


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## IL RICHIAMO SESSUALE NEI LEPIDOTTERI



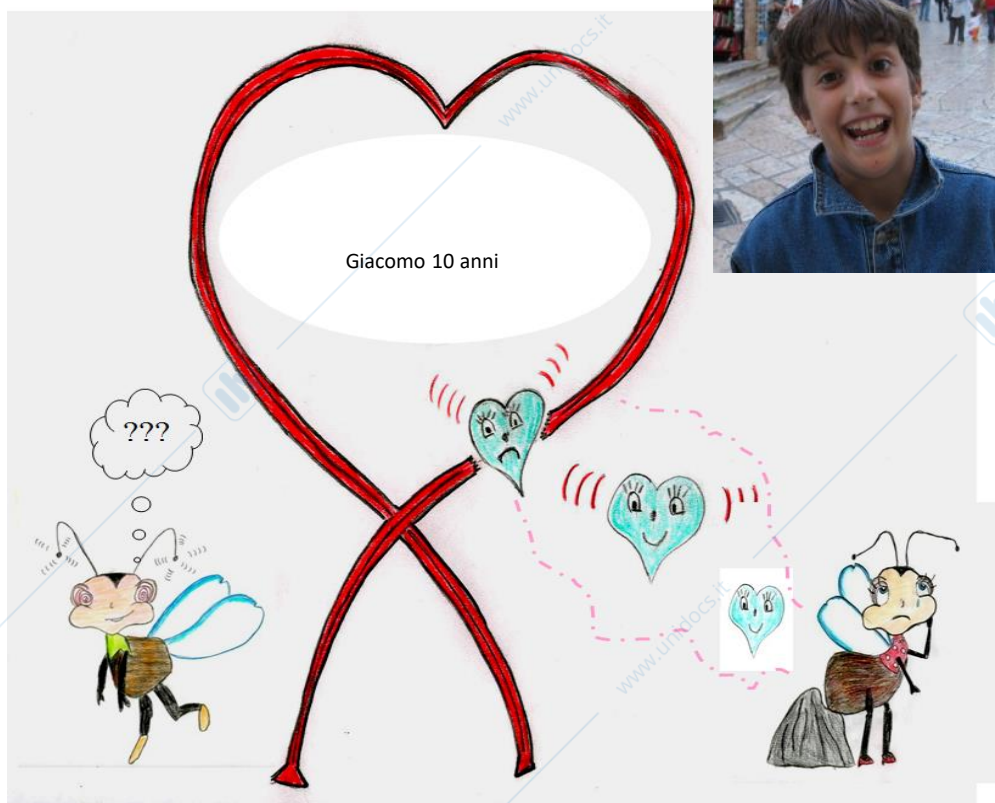
## IL METODO DELLA CONFUSIONE SESSUALE



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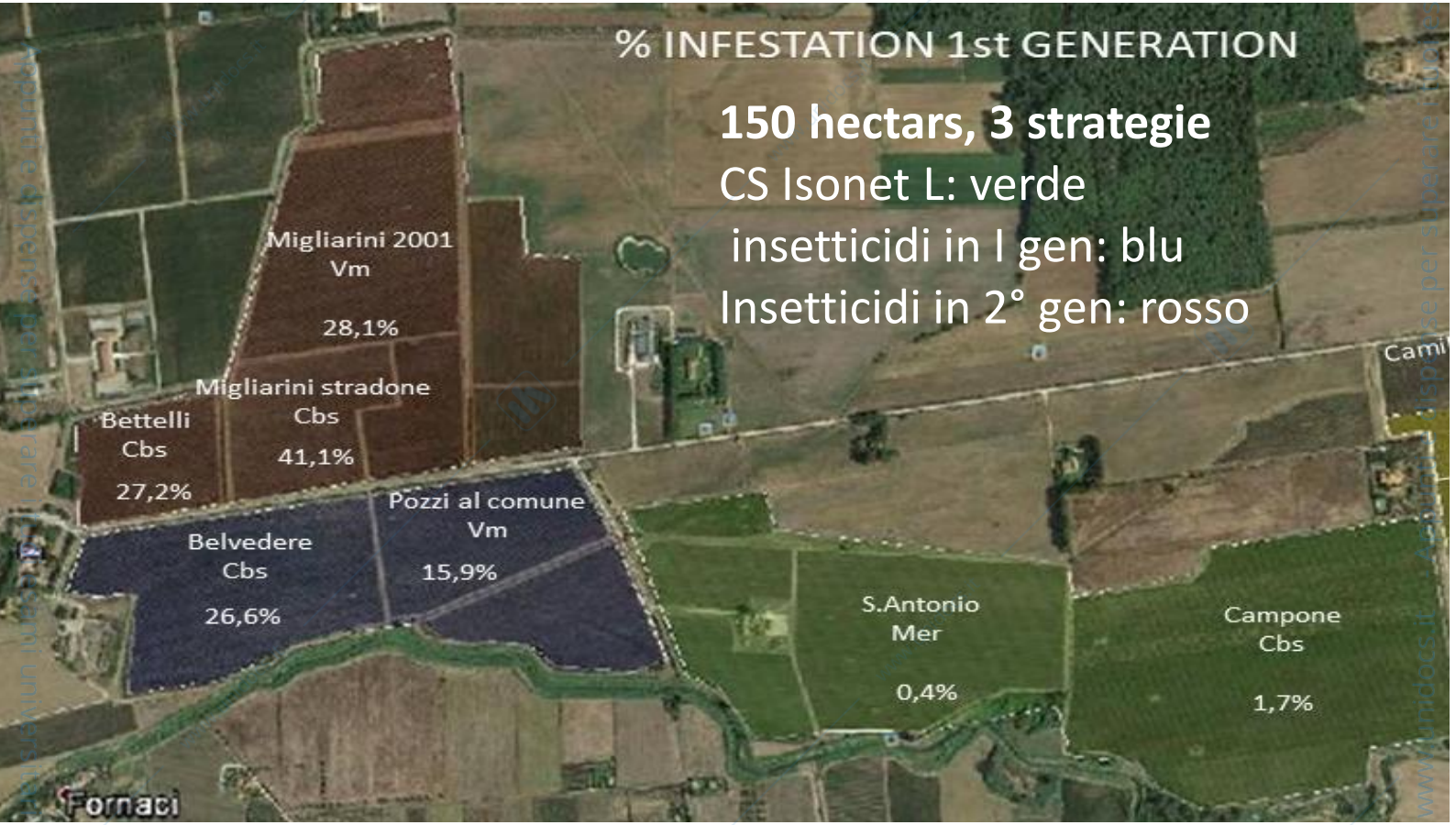
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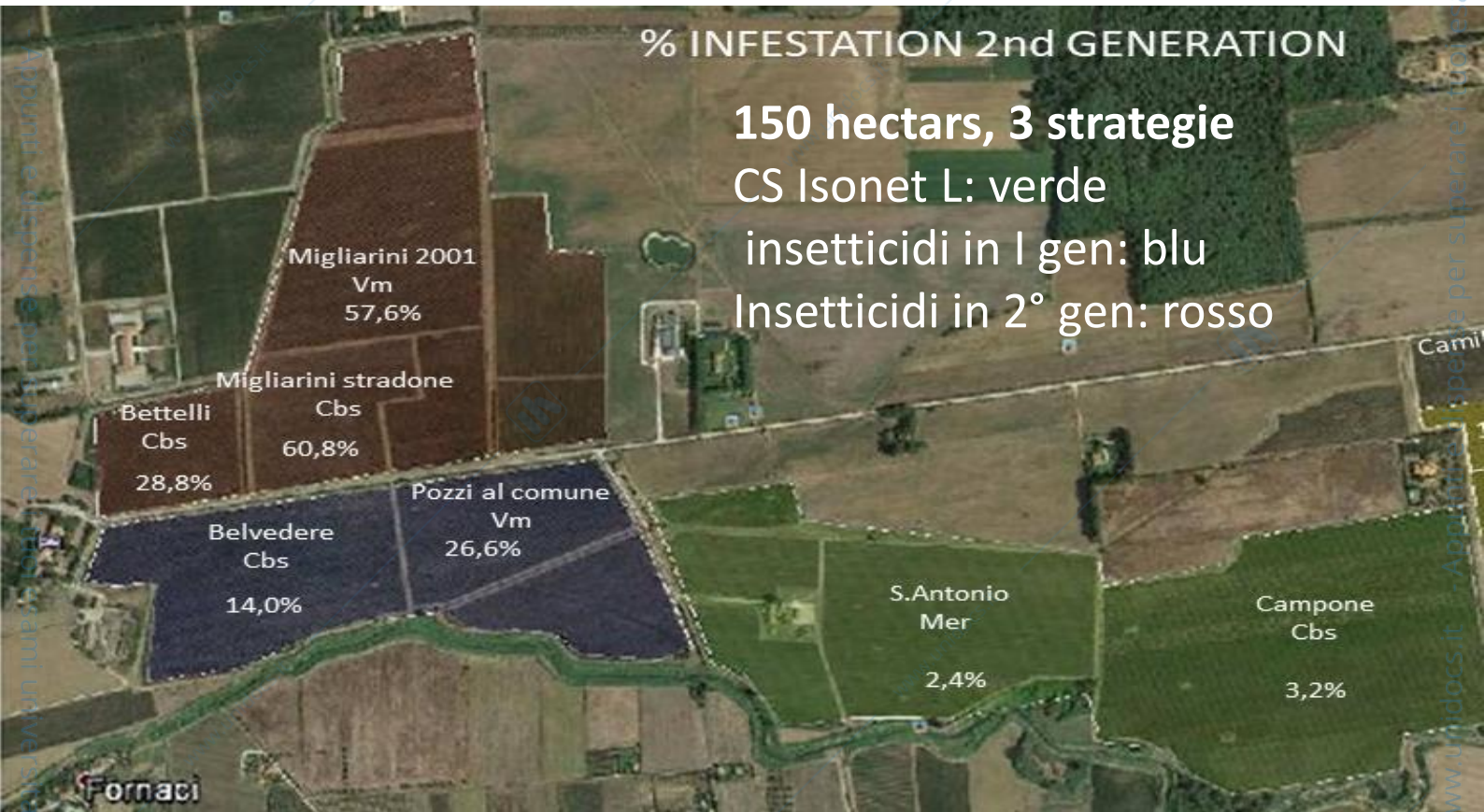
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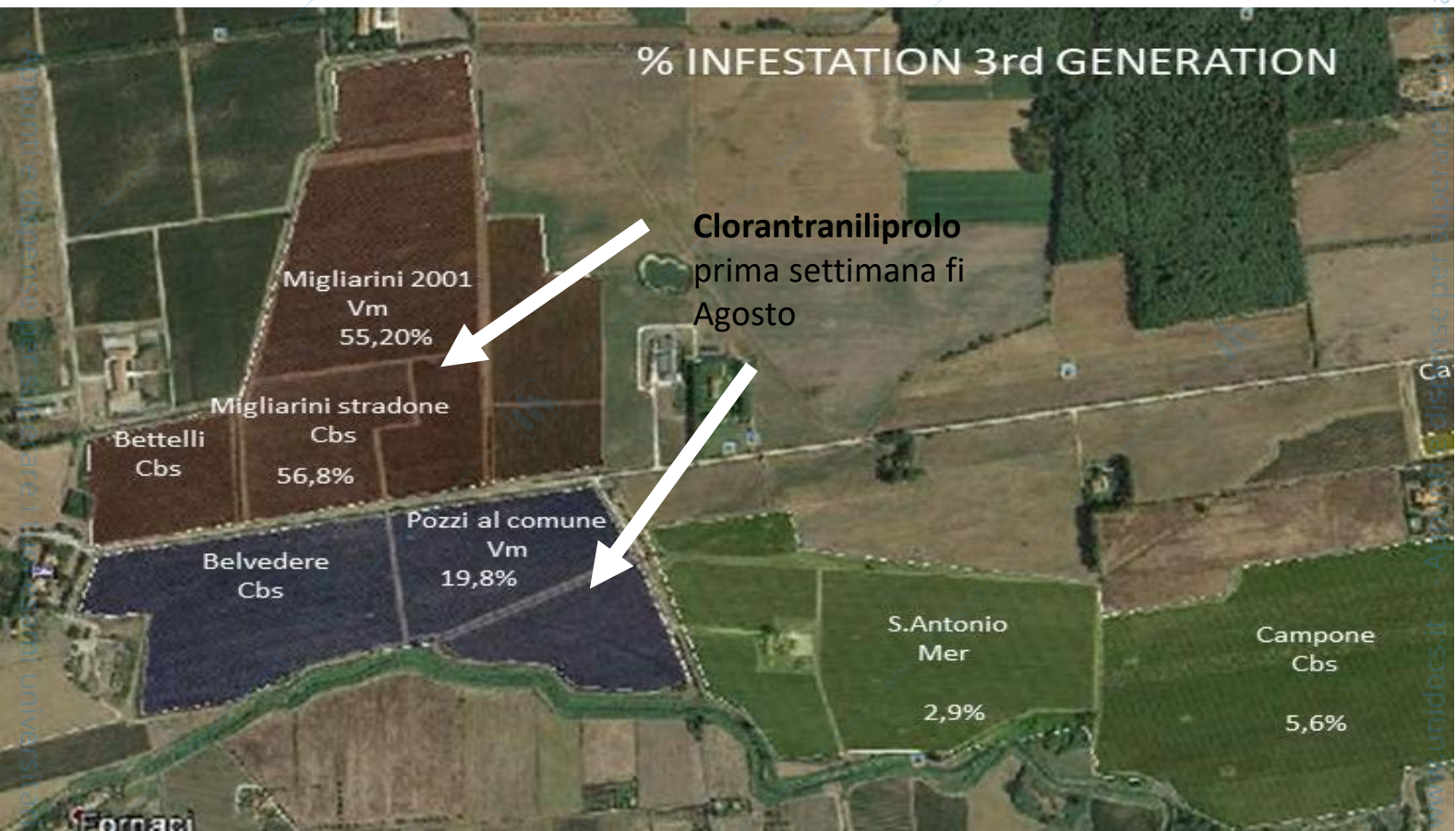
IL METODO DELLA CONFUSIONE SESSUALE

Augusto 50 anni









**Cocciniglia farinosa della vite (*Planococcus ficus*)**



**La cocciniglia farinosa trasmette due virus della vite di R. Credi, F. Terlizzi C. Lanzoni, L. Martini, S. Borsari, E. Pasqualini**

La ricerca ha confermato la capacità di *Planococcus ficus* di veicolare il virus dell'accartocciamento fogliare (GLRaV-3) e del legno riccio (GVA)

**L'Informatore Agrario, 33/2010**

## PROGETTO PLANOCOCCO

Rilascio dell'Encirtide *Anagyrus* sp. near *pseudococci*, in Maggio (1,000 individui per ha su un totale di **3.5 ha**) e il Coccinellide *Cryptolaemus montrouzieri* (500 per ha su un totale di **4 ha**) in June and/or July.

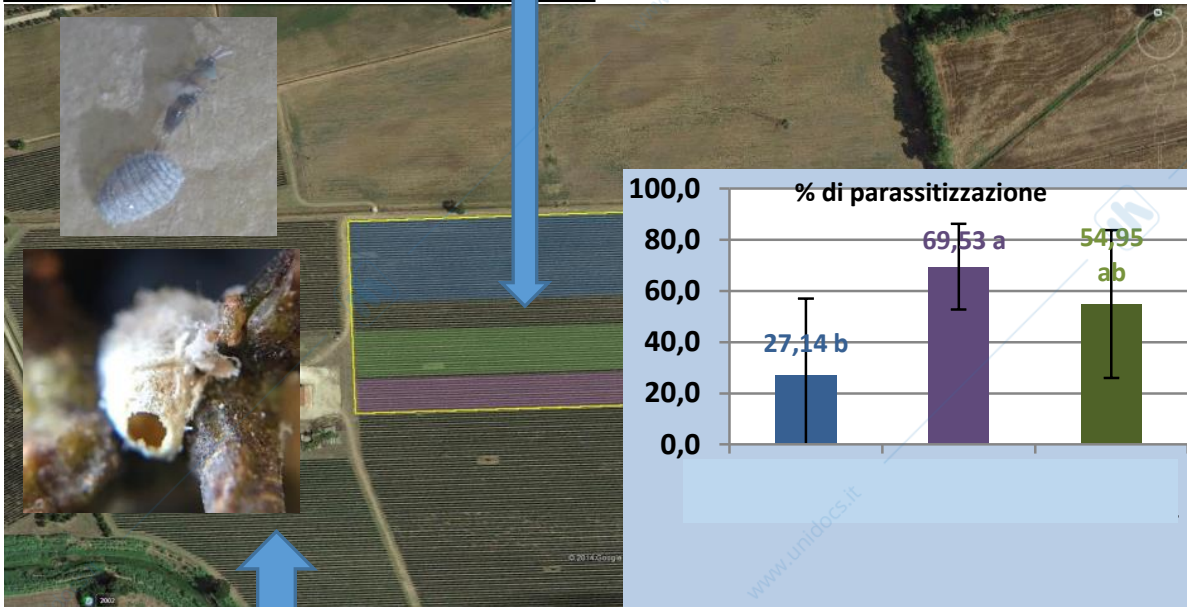


A titolo dimostrativo: video posto su YOU TUBE  
(<https://www.youtube.com/watch?v=ILa2ZawSBHc>)

Biological control of *Planococcus ficus*  
with  
*Anagyrus sp. near pseudococci*  
and  
*Cryptolaemus montrouzieri*

(Copyright by Department of Agriculture, Food and Environment (DAFE)  
University of Pisa © All rights reserved © 2017)

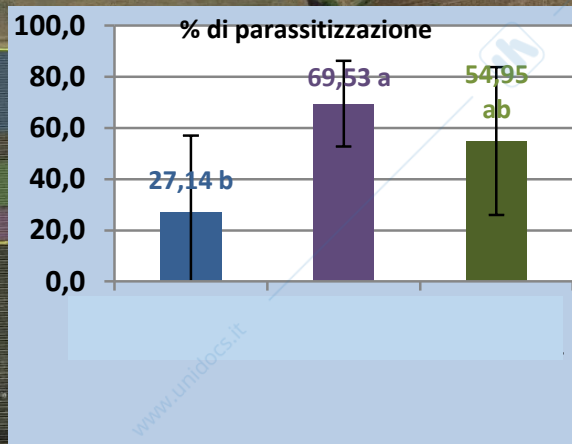
500 adulti di *Anagyrus* sp. near *pseudococci*



1000 adulti di *Anagyrus* sp. near *pseudococci*

**Guado al Tasso**

**Controllo in vendemmia su 600 grappoli**



**Bolgheri 2016:** CS x Lobesia e BCAs x Planococco, applicati rispettivamente su **600 ha** e **300 ha**, con risultati molto soddisfacenti.

Le strategie adottate avevano contenuto la dannosità dei due insetti nei vigneti interessati. La riduzione della quantità di insetticidi utilizzati per il controllo dei due insetti era percepito come dagli operatori del settore come un importante traguardo.

Nel **2017** altre importanti aziende entrano nel progetto applicando feromoni e BCAs rispettivamente su 1000 e 600 ha.

Nel **2018** parteciperanno al programma le aziende di Guado al Tasso (Antinori), Cà Marcanda (Gaja), Ornellaia (Frescobaldi), Castello di Bolgheri.

Il progetto è stato presentato a 2 incontri dell' EIP-Agri Focus group in Portogallo e in Romania dal titolo «Malattie e Artropodi dannosi in viticoltura» e fatto circolare tra gli Stati Membri come un'esperienza pilota con il titolo «sharing needs and knowledge promotes IPM».



## Diseases and pests in viticulture

How can we increase resilience of grape vines to pests and diseases and support the productivity of the sector in sustainable ways?

This Focus Group is ongoing.

Tasks:

**FG Wine**  
 Andrea Lucchi – DISAIAA-a University of Pisa  
 andrea.lucchi@unipi.it



**The key-pests of grapevine**

**Lobesia botrana**



**Pteronococcus ficus**



**Region / Area:**  
Tuscany - Italy



**GEOGRAPHICAL CONDITIONS:**

**Climate:** Mild climate with medium-high rainfall (400-800 mm per year on average)

**Terrain/Soil:** Mostly sandy soil.

**CASE DESCRIPTION:**  
 In 2014 a well-known and large Winery in Tuscany (Guido di Tasso - Antinori Agricola, 300 hectares in Bolgheri, province of Livorno) asked for help in the control of Lobesia botrana and Pteronococcus ficus. Insecticide strategies (3 sprays per year against Lobesia with IGRs, 2 per year against Pteronococcus with systemic or neurotoxic insecticides) were not effective and the manager was willing to test alternative strategies.

**MANAGEMENT STRATEGY AS A WHOLE:**  
 For Lobesia control the farm used to apply at least three insecticides with IGRs. For Pteronococcus the strategy included 2 insecticide sprays with Spirothrin and/or with Chitrygrifos.


In both cases efficacy at harvest was limited and not satisfactory. The farm contracted Pisa University in order to have its support.

**SPECIFIC PEST / DISEASE MANAGEMENT STRATEGY:**  
 Our proposal for 2014 was to apply mating disruption (MD) against Lobesia and biocontrol agents (BCAs) against Pteronococcus, starting from one sixth (50 hectares) of the whole farm surface (300 hectares), in order to be able to compare obtained results with the conventional strategy. In that year results were really positive: no spray against Lobesia was needed in MD areas with very good results at harvest, whereas 2 interventions in the conventional areas were implemented with limited efficacy. Good efficacy was obtained in the control of Pteronococcus too. We released the parasitoid wasp Anagrus sp. near pseudococci in May (1,000 individuals per hectare) and the predator ladybird Cryptoblabes morosus (about 500 individuals x hectare) in June-July in 2015 and 2016 this strategy has been applied on all the available farm surface (300 hectares) with good results, so that other local small and big wineries joined the project. In 2016 MD against Lobesia and BCAs against Pteronococcus were applied on 600 hectares in that area, with satisfactory results in terms of efficacy. The substantial decrease in the amount of insecticides due to MD and BCAs use was perceived as the first major step forward that improved the public perception that wine was produced with high environmental safety standards. The action plan drastically reduced insect populations, so that other farms joined the project in 2017 and the area managed in IPM further risen (BCAs and MD on about 1,200 ha).

**KEYS OF SUCCESS / FAILURE:**  
 Vineyards were relatively young, well managed, plain and large. Growers and technicians were trained and open to new experiences. The University's support was crucial in providing assistance and training (see video at: <https://www.youtube.com/watch?v=RLz2Zaw5Bhc>)

**WHAT WAS THE ECONOMIC IMPACT?**  
 Less input of insecticides, cost of new control products affordable, training of farmers, involvement of new wineries, adoption of sustainable strategies with an Agro-ecologic approach.

**WHY IS THIS NOT A COMMON SITUATION?**  
 Because high-quality Wineries (also large and famous Wineries) do not trust to use new control strategies without the support of Universities or other Research Centers involved in applied entomology.



**Cryptoblabes morosus**



**Anagrus sp. near pseudococci**



**Pteronococcus**

This poster was presented at the first meeting of the EIP-AGRI Focus Group 'Diseases and pests in viticulture' - Oct. 2016

## RAGIONI DEL SUCCESSO

Condivisione del problema: l'efficacia non soddisfacente degli insetticidi unita ad una accresciuta sensibilità per strategie sostenibili ha spinto i produttori a chiedere un aiuto all'Università;

Esistenza di sistemi di controllo efficaci alternativi agli insetticidi: feromoni e BCAs

Ottime condizioni agronomiche: i vigneti erano relativamente giovani, piani e condotti con razocinio. Gli imprenditori e i tecnici aziendali erano preparati e aperti all'innovazione.

## Take home message

- **Risultati positivi nel controllo dei tre insetti bersaglio;**
- **Riduzione considerevole della quantità di insetticidi di sintesi utilizzati;**
- **Costituzione di un allevamento di insetti utili in vigneto con probabili effetti positivi negli anni a seguire anche per le altre aziende del comprensorio;**
- **Contributo alla cooperazione e all'aggregazione tra le aziende, con condivisione:**
  - **di problematiche comuni**
  - **delle strategie adottate**
  - **dei risultati raggiunti**
- **Esperienza pilota apprezzata a livello comunitario**

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