

## IOBC/wprs Bulletin, Vol. 36, 2008

Working Group “Integrated Protection in Viticulture”, Proceedings of the Working Group meeting at Marsala (Sicily, Italy), 25-27 October, 2007. Edited by: Giuseppe Carlo Lozzia, Andrea Lucchi, Salvatore Ragusa Di Chiara & Haralabos Tsolakis. ISBN 978-92-9067-210-4 [xvi + 377 pp.].

Editorial .....	i-iii
List of Participants .....	v-xi
Contents.....	xiii-xvi

### Economic and structural aspects of vitiviniculture in Sicily

A. Ascianto, S. Bacarella ..... 1-18

**Abstract:** World wine market is among the most dynamic in the agro-food sector and in the last few years it has undergone deep changes concerning production, consumption and trade. The growing presence of new wine-producing countries and the reform of the vitivinicultural Common Market Organization (CMO) have strongly contributed to the changes occurred in this sector. Accounting for 49% of world wine supply, Italy, France and Spain are the three main wine producers in the world.

Italian situation is characterised by few wine-producing regions which altogether represent the major part of cultivated areas and wine production. In this scenario Sicily, according to 2004 ISTAT data, is the Italian region with the largest area destined to vineyards (over 135,000 hectares, correspondent to 17.6% of national grape area), followed by Puglia (14.3%) and Veneto (10%). In terms of wine production, Sicilian supply represents around 13% of national total, after Veneto (16.6%) and Puglia (14.3%).

Vitiviniculture is mainly concentrated in western part of Sicily with a prevalence of white on red wines, both of them mainly originated from autochthonous vines, although international varieties are also quite common.

At present, notwithstanding a general reduction of grapes yields in favour of quality, wine production in Sicily is still mainly represented by ordinary table wines and grape musts, so that this region is predominantly considered a raw material supplier to Italian and foreign industries. Both DCO and DOCG wines have a small incidence (around 3%) in terms of wine regional production, even though the former are quite well represented (21).

As to productive structure there are lots of “wine growers’ cooperatives”, which sell their production mainly for distillation or as loose wine in Northern Italy or abroad, with a consequent loss of value added. There is also a group of small and medium farms which, although they have started a process of wine quality improvement, run into difficulties when trying to find new markets for their product. In the end, there is a restricted number of leading farms, strongly oriented to product and process innovation and to marketing, and successful in placing their wines in a medium-high segment of national and international markets.

### “In Vitro” antagonism of a grapevine endophytic *Bacillus subtilis* strain towards “esca” fungi

A. Alfonzo, V. Ventorino, L. Torta, S. Burrmano, G. Moschetti ..... 19-24

**Abstract:** Preliminary investigations on grapevines (CV Catarratto) with symptoms of “esca” permitted to isolate only bacterial colonies, from black punctuations belonging to the genus *Bacillus*. Particularly, an isolate was Gram-positive with spore forming and, on the basis of the partial 16S rRNA sequence comparison, it showed a similarity of 99% with *Bacillus subtilis* subsp. *subtilis*. There are numerous reports on the antagonistic activity of the species towards several phytopathogenic microorganisms. For this reason the possible bacterial control against the “esca” fungi (*Phaeoacremonium aleophilum*, PAL; *Phaemoniella clamidospora*, PCH; *Fomitiporia mediterranea*, FOMED), was studied. The antagonistic activity was investigated *in vitro* by: a) direct method by dual-culture in Petri dishes containing malt extract agar; b) indirect method by adding to fungal growth media cultural filtrate or crude extract bacterial in different concentrations. The results showed that *B. subtilis* isolate has a powerful antagonistic effect

towards all fungal pathogens tested, reducing their growth until 80% (direct method). Moreover, the FOMED growth was reduced at least of 50% with indirect method, while the influence of this bacterial isolate on PCH and PAL growth by indirect method is in progress. As far as we know, this is the first study reporting *Bacillus* as “natural limiter” of “escape” fungi.

#### Efficacy of microorganisms and natural products against grapevine powdery mildew

*D. Angeli, L. Maines, C. Sicher, H.-A. Assaf, C. Longa, Y. Elad, V. Simeone, I. Pertot.....* 25-30

**Abstract:** Several alternatives to synthetic fungicides such as horticultural oils, salts, plant extracts and many potential BCAs have been evaluated in order to reduce the use of pesticides against *Erysiphe necator* on grapevine. Until present none of them is widely used in commercial vineyards. We tested new alternatives to chemicals against grapevine powdery mildew, possibly more effective than the existing ones. Among the tested experimental microorganisms a yeast, a bacterium and *Bacillus subtilis* (Serenade) showed effective and consistent suppression of *E. necator* under greenhouse controlled conditions. Among the non synthetic fungicides tested in the greenhouse, milk and milk derivatives, salts and a vegetable oil gave promising results in reducing the disease. In the vineyard, only salts had a high efficacy against powdery mildew. However, milk derivatives, vegetable oils and tested microbial agents significantly reduced powdery mildew infections.

#### Natural occurrence of *Ampelomyces* spp. as *E. necator* mycoparasite in the vineyards of Trentino Province (Northern Italy) and efficacy evaluation of *A. quisqualis* in integrated powdery mildew management

*D. Angeli, L. Maines, E. di Marino, Enzo Mescalchin, I. Pertot .....* 31-34

**Abstract:** Little is known on the natural occurrence of *Ampelomyces quisqualis* in Trentino Province (Northern Italy), where grapevine represents the second most important crop. The natural presence of wild strains of *Ampelomyces* spp. in the vineyards was assessed. Three-year monitoring of *Ampelomyces* spp. on *E. necator* grapevine in autumn shows a low natural presence of *Ampelomyces* spp. in the vineyards. Several local strains were isolated to be hopefully developed as commercial biocontrol agents. *Ampelomyces* spp. were found only on leaves, as mycelium parasitizing *E. necator* cleistothecia and as free conidia, both in conventionally treated and organic vineyards. Among the *Ampelomyces* spp. strains isolated from the vineyards, strains with atypical morphology were identified, differing from the commercial *A. quisqualis* strain (AQ10) in the conidia shape. The efficacy of strategies (AQ10 integrated with sulphur or chemicals) in suppressing *E. necator* was evaluated. Promising results were obtained when AQ10 was applied at the end of the season, showing no difference compared to sulphur.

#### VitiMeteoPlasmopara – a modern tool for integrated fungicide strategies [Abstract only]

*G. Bleyer, H.-H. Kassemeyer; O. Viret, W. Siegfried; R. Krause.....* 35-36

#### Grapevine infectious diseases in Sicily

*S. Burruano, G. Granata.....* 37-44

**Abstract:** *Erysiphe necator* and *Plasmopara viticola* are the most recurrent fungal pathogens in the Sicilian vineyards, but appropriate schedule treatments can achieve good control. Rainy summer and hailstorms play a leading role in provoking severe *Botrytis cinerea* infections, lower production and reduced grape must quality. Esca disease, *Nattrassia mangiferae*, *Phoma glomerata* with *Fusarium oxysporum* and *Cylindrocarpon destructans* produce alterations of the grapevine wood.

Bacterial necrosis of grapevine the causal agent identified as *Xylophilus ampelinus*, induces a progressive scion dieback.

Many infectious agents of grapevines, including phytoplasma and viruses, occur on both vine and table cultivars in Sicily. Grapevine yellow (Bois noir) mainly affects Inzolia and Chardonnay cultivars.

Grapevine fanleaf virus (GFLV), caused by a Nepovirus, presents two distinct syndromes depending on the different virus strains: infectious malformations and yellow mosaic. Grapevine leafroll GLRaV 1-3-4 Ampelovirus and GLRaV 2 Closterovirus are the most widely spread. Rugose wood complex occurs widely and includes: Rupestris stem pitting (GRSPaV); Kober stem grooving (GVA) and LN33 stem grooving (GBV). Grapevine fleck, latent in European grapevine varieties and in most American rootstocks, symptoms are expressed in *V. rupestris* is also widely distributed. Virus-like diseases observed in Sicily are: Enation disease and Vein necrosis.

#### Evaluation of grapevine resistance to downy and powdery mildew in a population segregating for *run1* and *rpv1* resistance genes.

A. Calonnec, L. Delière, P. Cartolaro, F. Delmotte, D. Forget, S. Wiedemann-Merdinoglu, D. Merdinoglu, C. Schneider ..... 45-52

**Abstract:** In this paper we present the behaviour of a population of vine segregating for several sources of resistance to powdery (PM) and downy mildews (DM). Resistance genes from *Muscadinia* and *Vitis* American species were introduced in a *Vitis vinifera* genetic background. Resistance to both pathogens was assessed in bioassays under controlled inoculations with two isolates for PM and three isolates for DM and in greenhouse or field experiments under natural infections. 19 out of 38 segregant genotypes were identified as totally resistant to PM on leaves and partially resistant to DM on both leaves and bunches. All these genotypes presented a level of damage satisfactory in an IPM context. There is no evidence to say that the resistance genes are expressed in bunches. However, the descriptors of resistance used in the bioassay, can be used to select with a good accuracy genotypes with an acceptable level of damage on bunches. The link between resistance to powdery mildew and downy mildew suggest that resistance in harvestable genotypes is coming from *Muscadinia* (*Rpv1* and *Run1*).

#### Detection of 16SrXII-A phytoplasma in insects collected in vineyards of South Italy

V. Cavalieri, V. D'Urso, L. Ferretti, C. Rapisarda..... 53-60

**Abstract:** Bois noir (BN) disease is a grapevine yellow associated to Stolbur phytoplasma, 16SrXII-A phylogenetic subgroup, which is responsible of severe crop losses in all grape growing areas in Italy. This phytoplasma is transmitted by the planthopper *Hyalostethus obsoletus* Signoret (Hemiptera Cixiidae), but the role of other Auchenorrhyncha species has been recently suspected.

Studies on BN vectors have been carried out in Italy and results of surveys realised during 2004-2007 in several vineyards located in Southern Italian regions (Calabria and Sicily) are reported in this work. Auchenorrhyncha specimens have been collected by means of entomological net, sampling on grapevine canopy and also on weeds growing both along the grape rows and on the border of vineyards. Many species of Auchenorrhyncha were detected and data on their distribution and abundance are given in this paper. In particular, *Toya propinqua* Fieber (Delphacidae) and *Exitianus capicola* Stål. (Cicadellidae) showed to be the most frequent species in the investigated vineyards. Moreover, some of their specimens resulted at molecular analysis to be positive to the 16SrXII-A phytoplasma.

#### Tolerance of Tunisian Grapevine to *Uncinula necator*

S. Chebil, N. Zeghonda, N. Jallouli, S. Lasram, H. Zemni, A. Ghorbel and A. Mliki ..... 61-68

**Abstract:** Powdery mildew, caused by *Uncinula necator*, is the main fungus disease of grapevine in Tunisia. Chemical control, usually expensive, can be sometimes no efficient to protect fungus attack especially before veraison stage. Thus, looking for a new control method such as the cultivation of tolerant varieties, can lead to stop the epidemiological development of the disease in vineyard.

In this context, autochthonous grapevines have shown different responses to the powdery mildew in the Tunisian vineyard. Indeed, an assay has been realized testing the sensitivity of more than 30 Tunisian grapevine cultivars (*Vitis vinifera* L.) to the fungus *Uncinula necator*. After inoculation of young plants from each variety, we have noticed the appearance of the

symptoms on leaves. Some varieties such as “Rafraf-F” behave as tolerant to the disease and others such as “Razegui” seemed to be sensitive. In fact, with “Rafraf-F”, the symptoms took place 7 days later than with “Razegui”.

The total protein composition of control and infected leaves of “Rafraf-F” and “Razegui” cultivars was analyzed by two-dimensional electrophoresis. The corresponding patterns revealed the induction of new proteins as well as the repression of certain others proteins.

#### In semi-vivo antagonism of *Acremonium byssoides* towards *Plasmopara viticola*

G. Conigliaro, S. Lo Piccolo, L. Torta and S. Burruano ..... 69-72

**Abstract:** In previous laboratory tests the culture filtrates and the crude extracts obtained from *Acremonium byssoides* were shown to completely inhibit *Plasmopara viticola* sporangia germination. A study was thus undertaken in order to investigate on the possible inhibiting activity of the hyphomycete towards pathogenesis of the oomycete in grapevine.

*A. byssoides* was cultivated on malt-extract agar (MEA) to obtain pure colonies and on malt-extract broth (MEB) to obtain culture filtrate and crude extract.

Healthy leaves of grapevine were put in Petri dishes containing sporangia suspended in: deionized sterile water, malt-extract broth, dimethylsulfoxide (DMSO), culture filtrate, crude extract and a suspension of *A. byssoides* germinated conidia.

After 6 days from inoculations, the bioactivity of *A. byssoides* was evaluated on the basis of *P. viticola* evasion percentage.

The results show that the higher percentage of pathogen evasion occurred in leaves inoculated with sporangia suspended in distilled water, in MEB and in DMSO; lower values of pathogen evasion were noted when leaves were treated with culture filtrate and crude extract; no evasion occurred in presence of *A. byssoides* germinated conidia, showing either antibiotic or hyperparasitic activity.

#### Approach of the sociological factors influencing the vine growers commitment while apprehending the integrated production in the Aquitaine and Charentes area.

T. Coulon, F. Hugueniot, C. Compagnone ..... 73-79

**Abstract:** Approach of the sociological factors influencing the vine growers commitment while apprehending the integrated production in the Aquitaine and Charentes area. – In 2000 a network of reference farm is created in Aquitaine in order to specify the feasibility and the implementation conditions of the integrated production (IP) in vine growing.

At the end of 2003, we noticed that the farms started to rapidly progress towards the Integrated Production approach, but this progression had a tendency after a while to stagnate. The vine growers seem to be faced with difficulties, on certain technical points, which limited their progress to reach the goals set by the presented guidebook. In 2004, we then carried out a specific workstudy with the vine growers in order to better detect what we have called the “brakes” of the IP approach. The brake is defined as being the cause of the non achievement of an objective. The first step is to identify the “brakes”, directly drawn from the results of the technical diagnoses obtained over several years on the various farms, which makes it possible to point out the objectives which are not achieved. The creation of a dialogue with the farmers on the identified critical points then allows to describe and then explain this situation. In 2005, this study on the brakes is supplemented by a sociological approach in order to see how these factors can affect and condition the vine grower’s behaviours and choices. A semi structured interview on the practices is carried out at the vine growers’ place, and sociological questions are asked to them (age, training level...). Finally, the professional insertion in the environment of each surveyed vine grower is evaluated by a sociograms graph showing the links of the vine growers with their peers and their technical support. The crosschecking of these three levels of results (interview, sociograms and sociological datas) enabled us to identify “brakes” and “motivations” specific to the implementation of the IP recommendations. This study also allowed us to draw a typology of the vine growers which shows that the relational contexts have a real influence on the implementation of the IP practices.

Technical and economical validation of the integrated vine growing production approach on a network of reference farms in the Bordeaux and Cognac vineyards Evaluation 2000-2006

*T. Coulon, F. Hugueniot* ..... 81-86

**Abstract:** Technical and economical validation of the integrated vine growing production approach on a network of reference farms in the Bordeaux and Cognac vineyards Evaluation 2000-2006. – Two questions are asked concerning:

- The Integrated Production feasibility in vine growing. Is it technically and economically possible?
- The possibility to optimise a conversion of the traditional production systems into a Integrated Production system.

On a network of reference farms we observed how the vine growers adapt themselves and change their methods and practices. Carried out from 2000 to 2006, the work lead to the edition of an IP guidebook and a traceability of the vine growers actions, evaluated by a technical diagnosis specifically created for the study. By their varied schemes of production (size-designation of origin...), the selected farms present a wide range of configurations which fits the reality of the regional wine farms.

An estimation of the cost related to the Integrated Production practices was attempted, but methodological difficulties restrained it from the original objectives. Following the first evaluation of the vine growing methods, after realizing the problems and interacting with the technicians who followed the exploitation, all the vine growers had set objectives of improvement. Our observations made it possible to highlight well the progress achieved during one or two campaigns; all the farms progress. But this progression had a tendency after a while to stagnate. The vine growers seemed to be encounter technical difficulties on certain points which limit their progress to reach the goals set by the presented guidebook. Several types of difficulties came out. However, excepted in particular technical impossibilities clearly identified, the collected information does not seem to be able to justify the stagnation of the progression towards IP objectives noticed on the network. In most cases, technical tools (choices, alternatives...) are presented to the vine growers, validated, as well on the experimental level, that on a practical level on other vineyards. On the economical level, we have indicators, however imperfect, which allow us to think that the cost strictly specific to the IP approach, only have a small influence on the economical performances and on the attitude of the farmers. This observations lead us to aim our research on sociological factors, which could explain the behaviours and the choices of the vine growers. The results of this study constitute the subject of a specific communication.

Replacement of copper in organic viticulture: efficacy evaluation of new natural fungicides against downy mildew

*S. Dagostin, T. Formolo, I. Pertot*..... 87-90

**Abstract:** Downy mildew caused by the obligate biotrophic oomycete *Plasmopara viticola* (Berk. & Curt.) Berl. & de Toni is one of the most important and devastating grapevine diseases. So far its control in organic agriculture is mainly based on copper fungicide, but from 2006 copper use is limited by European Commission Regulation. From 2004 to 2007 our research focused on testing alternatives to replace copper in experimental field trials. We tested 29 different products divided in groups: new copper formulations, plant extracts, clay, biocontrol agents and other origins. In particular in the first three years good results were obtained with two new copper formulations, but one of them causes phytotoxicity. Among plant extracts two compounds allowed a good control of the disease both on leaves and clusters, and six compounds controlled the infection only on clusters. Biocontrol agents reduced symptoms on leaves or on clusters. Among products from other origins only three allowed a good control of disease on leaves and four of them control the disease on bunches. Clay shows an efficacy similar to copper either on leaves and or on cluster.

A multivariate analysis of combined effects of (micro)climate, vegetative and reproductive growth on grey mould incidence in grapevine

M. Fermaud, H. Valdés-Gómez, A. Calonnec, J. Roudet, C. Gary ..... 91-94

**Abstract:** Over three years (2004-06), a field experiment was carried out near Montpellier (southern France) to investigate the relationships between grey mould expression at harvest and some of the major factors affecting the disease development in vineyards, *i.e.* (micro)climate, fruit composition and vine vegetative and reproductive growth. By implementing irrigation and cover cropping practices, various levels of vine growth were generated and led to different levels of disease development. Disease incidence was correlated positively to key variables of vine vegetative growth: total leaf number, leaf dry matter, leaf layer number, leaf area per m of row, pruning mass and nitrogen accumulation. These relationships were established in the context of an interaction between (micro)climate and grapevine vegetative growth. In 2004, under conducive weather conditions, *B. cinerea* developed in all experimental plots. Favourable (micro)climatic variables were precipitation, duration of relative humidity > 90% in the canopy and low potential evapotranspiration. However, in 2005 and 2006, under dry summer conditions, disease developed only in the most vigorous vines which were both irrigated and fertilized. These vines showed a very high canopy growth associated with compact clusters and delayed fruit maturity.

Development of monitoring schedules for grape diseases at regional scale

E. Fulchin, M. Van Helden..... 95-99

**Abstract:** The ARD-VD is an association of wine growers, and both scientific and professional organisations. The association supports the implementation of integrated pest management and, in some demonstration vineyards, called “Vignobles de Référence®”, different monitoring schedules are put into place. In order to optimise pest management, surveillance is carried out on climatic conditions, phenological growth stages and epidemiological development of insect pests and diseases. However, working at the individual farm scale clearly has its limits, such monitoring systems are time and energy consuming, and difficult to implement by the wine grower alone. So the decision was taken to evolve towards a larger regional scale aiming at the creation of local monitoring networks. This approach should lead to sharing the individual data and operating expenses, and to hiring extension workers dedicated to monitoring. These expenses will be covered by improved pest control and savings in spraying obtained through the monitoring schedule.

Usually, in a “Vignoble de Référence®”, our monitoring system combines a weather station, ‘indicator plants’ for primary contaminations of mildew, and several untreated small plots, focussing on the more sensitive sites. Transposing this protocol from farm scale to regional scale leads to various questions. In such a network the optimal density of measuring points must be adapted to the surface and topography of the region. This allows differentiating the main zones of differing sensitivity to pests and diseases and leads to adapt spraying locally.

To obtain some answers and to scientifically validate a monitoring system at this regional scale, a study was carried out this year. We monitored climate (four weather stations available), phenological growth stages, epidemiological development of mildew (ten sites with untreated microplots) and pest insects (40 traps) at the scale of the Buzet wine region.

This study revealed that one person is necessary to monitor approximately one thousand hectares (for both insects and diseases). Vigour and microclimate (soil, topography; landscape...) seem the main factors for sensitivity. Focussing the monitoring on ‘fairly’ to ‘very sensitive’ sites appeared the best choice, and the number of monitored sites (ten for diseases, 40 for insects in that region) seemed to be quite well adapted. On the other hand, the number of weather stations was clearly insufficient. We estimate that one weather station is needed per approximately ten square kilometres.

Control of Blackrot (*Guignardia bidwellii*) on the hybrid *vitis* cultivar Isabella

C. Gessler, F. Foiada, M. Jermini, I. Pertot ..... 101-105

**Abstract:** Blackrot caused by *Guignardia bidwellii* is causing damages in recuperated vineyards in southern Switzerland planted with the cultivar Isabella. The source of inoculum is attributed

to abandoned vineyards. A 5 year experiment was made to test and confirm minimal necessary fungicide application and timing to control Blackrot. Two to three well timed sprays with an appropriate fungicide are sufficient to control fully the disease. Timing should be before rain events leading to prolonged leaf wetness during the time period between flowering and six week afterwards. Heavy and prolonged rains up to 4 weeks after flowering may also favor infection by *Plasmopara viticola* on Isabella especially if a heavy load of primary inoculum can be expected. We recommend therefore to use fungicides or fungicide combinations with an effect on both pathogens.

Sloping ice from the wings of airplanes – A potential cause for locally limited *Plasmopara viticola* primary infections? [Abstract only]

G. K. Hill ..... 106

Flavescence dorée and *Scaphoideus titanus*: Distribution and control in Switzerland

M. Jermini, M. Gusberti, L. Schaub, C. Linder, P. Gugerli, S. Schärer, P. Kehrli, L. Colombi, S. Bellion, S. Emery..... 107-111

**Abstract:** In 1967, *Scaphoideus titanus*, the vector of the flavescence dorée, was found for the first time in Switzerland. Two decades latter, this leafhopper has colonised all wine-growing areas of the Ticino. In 2004, the first case of flavescence dorée arose in the south of the Ticino. In the following two years, the disease spread to two other winegrowing areas of the Ticino, this probably due to human activities. Today, flavescence dorée is still restricted to the Ticino but its vector *S. titanus* is also found along the Lake of Geneva as a national monitoring programme revealed in 2006. Since flavescence dorée is a quarantine disease, control measures are mandatory. The only way to control the disease is the application of insecticides against its vectors. The mandatory insecticide control is based on a first application of buprofezin at the appearance of the third larval stadium followed by a second treatment two weeks later. Over the past three years, this control strategy was very effective. In organic viticulture, Parexan N (pyrethrum + sesame oil) is the only insecticide showing a satisfactory control of *S. titanus*. We recommend three applications of Parexan N at an interval of 10 days with the first application targeting hatching leafhoppers. In conclusion, the mandatory as well as the recommended organic control strategy are both effective and maintain *S. titanus* population at low level.

Effect of late season sprays against *Botrytis* on quality of the wines

W. K. Kast, O. Schmidt, K. Bleyer..... 113-116

**Abstract:** Field experiments with separate vinification of 3 replicates in field were carried out to check the effect on wine quality and flavour. Wines were produced from grapes that were sprayed twice (before bunch closure, veraison) with *Botrytis* fungicides (Teldor: Fenhexamid and Switch: Cyprodinil and Fludioxonil) with an efficacy of 70%. They had less off-flavours than untreated but more slightly mouldy off-flavours than grapes treated only once (before bunch closure) with an efficacy of 55%. Late (veraison) treatments seem to favour the development of non-*Botrytis* rot diseases (*Penicillium*-rot). Only the treatment before bunch closure had a positive effect on the flavour of the wines.

Water-glass (SiO<sub>2</sub>), an excellent, mostly overseen tool in fruit-rot control

W. K. Kast, K. Bleyer, R. Fox..... 117-120

**Abstract:** Results of field experiments and practical experiences to check the effect of silica gel (water-glass, SiO<sub>2</sub>) on *Botrytis*-rot were presented. Water-glass has an effect on *Botrytis* and sour-rot comparable to *Botrytis*-fungicide sprays. It is mainly effective against *Botrytis* infections occurring during the ripening period directly thru the berry-surface. This type of infections occurs during warm and rainy periods with very long wetness. Water-glass is less effective if the rotting is mainly caused because of pressure in compact clusters. This type of infections is a consequence of intensive berry growth forced by irrigation or rainfall. Problems may occur, if water-glass is used in mixtures with other pesticides. The application should preferably be carried out separately or by use of the double fluid application technique.

Bois noir, a severe outbreak of stolbur type A in Southern Germany - disease abundance and treatments against disease-causing agents and vectors

W. K. Kast, M. Stark-Urnau, K. Bleyer ..... 121-125

**Abstract:** After 6 grapevines had been proved stolbur-positive in 2003, the Bois noir disease in grapevine caused by stolbur-phytoplasma spread over the complete region Württemberg in the years 2004 – 2006. Especially vineyards with steep slopes and vineyard walls were affected. Here, more than 70 % of the vines showed symptoms of grapevine yellows disease (Bois noir). The severe outbreak of this disease was caused by a subtype of *Hyalesthes obsoletus* which is specialized in feeding on stinging nettles (*Urtica dioica*) and which requires higher temperatures than the native race. This subtype very effectively transmits stolbur type A. Stolbur type A is more dangerous for vines than type B and causes considerable damage on the varieties Lemberger (Syn. Blaufraenkisch), Rhine-Riesling and Mueller-Thurgau. Both, the eradication of stinging nettles in the vineyards in autumn and the preservation of stinging nettles during the flight of *Hyalesthes obsoletus* in summer gave effective control of the disease. Infected vines of susceptible varieties should be cut 10 cm above ground immediately after observation of symptoms on leaves and grapes to keep the vines alive.

Bois noir disease of the grapevine in Alsace: field transmission, observations made on symptomatology and reduction of transmission risk by the vector *Hyalesthes obsoletus*  
Signoret

P. Kuntzmann, E. Bogen, C. Renel ..... 127-136

**Abstract:** We present some results and discuss the way to reduce the transmission risk of stolbur isolate type I as defined by Maixner, by the vector *Hyalesthes obsoletus* in order to reduce frequency and/or severity of bois noir disease in Alsace vineyards.

Time of treatment and selection of fungicides importance in control of Phomopsis cane and leaf spot disease of grapevine

N. Latinovic, P. Vuksa, Z. Vucinic, J. Latinovic ..... 137-143

**Abstract:** Control of Phomopsis cane and leaf spot disease of grapevine (*Phomopsis viticola* Sacc.) in Montenegro represents a great problem, especially after withdrawing DNOC products from the market. Because of that there was a need to find out other adequate solutions in control of the disease. At the same time, it was of great importance to establish time of treatment correctly. During 2002 and 2003 the trial was set up in order to examine biological efficacy of fungicides that were applied in dormant period and at the beginning of the vegetation. In winter dormant period DNOC and copper oxychloride were applied, while at the beginning of vegetation fungicides based on azoxystrobin, benomyl, dithianon, fenarimol, folpet, mancozeb, prochloraz and triadimefon were used. Treatments at the beginning of vegetation were performed in two variants with two treatments each. In the first variant treatment was done in time of buds opening (BBCH 03/05) and when the shoots were around 10 cm long (BBCH 13). In the second variant first treatment was conducted when the shoots were around 10 cm long (BBCH 13), and second treatment when the shoots were around 50 cm long (BBCH 53). Results of the study showed that there are differences between applied fungicides, but time of treatment have a crucial role in attaining high efficacy. All applied fungicides have had better efficacy when they are applied in winter period together with the applications at the beginning of vegetation and in the growth stage of shoots length of around 10 cm. It is also noted that the time of treatment was more important in part of the trial where copper oxychloride was applied for winter treatment, while the differences in efficacy were smaller if DNOC was applied. Folpet, mancozeb and dithianon showed the highest efficacy, followed by azoxystrobin and benomyl. Efficacy of triadimefon was weaker than the previous mentioned while prochloraz and fenarimol expressed the lowest efficacy of all fungicides applied.

An expert-based crop protection decision strategy against grapevine's powdery and downy mildews epidemics: Part 1) formalization

B. Leger, P. Cartolaro, L. Delière, L. Delbac, M. Clerjeau, O. Naud ..... 145-153

**Abstract:** A formal model was built in the discrete event paradigm for dynamic systems 1) to test the feasibility of the spraying decision strategy "GrapeMilDeWS", 2) to facilitate its transfer and usability, 3) to build a simulator that would allow testing climatic scenarios and scalability of the solution at the estate level. The knowledge elicitation process was made incrementally with the 4 designers of GrapeMilDeWS. The elicitation method uses the graphical language of Statecharts as a mediation tool between the experts and the knowledge engineer. Besides graphics, Statecharts are also a mathematically formal language. We present here the design principles that guided the experts in their design, how these principles have been formalized, the knowledge elicitation methodology that we set up and the questions that arouse from questioning formally the spraying strategy.

Detection of endophytic bacteria in leaves of *Vitis vinifera* by using Fluorescence *in situ* Hybridization (FISH)

S. Lo Piccolo, G. Conigliaro, D. Ercolini, L. Torta, S. Burruano and G. Moschetti ..... 155-159

**Abstract:** Previous investigation on five cultivars of healthy Sicilian grapevine allowed the isolation of endophytic bacteria belonging to *Bacillus* genus from different organs (bud, leaf, stalk and shoot).

The aim of this work was to use fluorescence *in situ* hybridization (FISH) experiments in healthy and damaged leaf tissues of *Vitis vinifera* to visualize and localize bacteria associated with plant materials. The leaves were cleared to minimize the autofluorescence of the plant fragments. The use of fluorescently labelled bacterial probe Eub338 in FISH experiments on discoloured grapevine leaf disks allowed the estimation of the spatial distribution of different bacterial colonies. At the same time, one cleared disk each foliar sample was minced on Plate Count Agar to detect cultivable endophytic bacteria.

The combined microscopic approach showed a differential location of microbial colonies within the leaf tissues examined. Particularly, the bacterial colonies were found in the veins, cells, hairs, intercellular spaces and more in the cut edges of leaf disk. Several bacterial species were isolated from leaf tissue.

The high presence of microbial colonies in leaf tissue suggests a potential use of these endophytic bacteria as plant growth promoting and sources of resistance against pathogenic agents, such as fungi.

Further studies are required to understand the role of bacterial endophytes in plant-microbe interactions. Besides, the DGGE (Denaturing Gradient Gel Electrophoresis) analysis from foliar disks will be carried out to detect uncultivable endophytic bacterial populations.

Biodiversity in the grapevine: rhizosphere arthropods and mycorrhizal fungi

A. Martorana, L. Torta, G. Lo Verde, E. Ragusa, S. Burruano and S. Ragusa ..... 161-165

**Abstract:** A study was carried out on rhizosphere of grapevine (*Vitis vinifera* L.), in order to know the AM fungi populations and arthropods associated with grapevine roots. One vineyard in Palermo in state of neglect and two vineyards in Alcamo (Trapani), one organically managed and one traditionally managed, were investigated. Three samples of soil and three samples of roots were collected from each locality in spring, summer and autumn 2007. The index of root mycorrhization (IM = percentage of fungal colonization/cm of root), the whole population of both AM fungi (n° of spores/g of soil) and arthropods (n° arthropods/kg of soil), were evaluated using Phillips and Haymann's technique, Jenkins' methodology, both opportunely modified, and by the Berlese-Tullgren's extractor, respectively.

Our preliminary results seem to confirm the variability of both AM fungi population and arthropods in the investigated grapevine rhizosphere. Further studies will be carried out to evaluate the possible interaction between AM fungi and arthropodofauna in rhizosphere of grapevine.

### Early detection of selection for resistance in *Plasmopara viticola* populations treated with organically based fungicides

C. L. Matasci, D. Gobbin, H.-J. Schärer, C. Stutz, L. Tamm, C. Gessler ..... 167-174

**Abstract:** *Plasmopara viticola* is considered one of the most important grape pathogens worldwide and shows a high risk of resistance development to fungicides. In organic viticulture copper treatments represent nowadays the unique valid control measure against this pathogen. However, the permitted amounts of copper allowed in agriculture are reduced stepwise in Switzerland and Europe. The European project REPCO aims to contribute to the replacement of copper fungicides in organic agriculture by studying and developing new organically based fungicides. We applied a high throughput method based on neutral specific SSR markers for early detection of selection toward resistance in *P. viticola* natural populations treated with organically based fungicides. Treated and untreated populations shared a comparable number of genotypes, a high percentage of single genotypes, a low occurrence of clones derived from the most frequent genotype and high genetic diversity. We concluded that selection pressure was not exerted on downy mildew populations by Agat-25k, Chitoplant, Novosil, Sonata, Tri-40, Yukka Extrakt, Timorex, Sonata/Chitoplant/KBV 99-01, Mycosin/Stulln-S/Kocide DF, and the control product Kocide DF, but could not be completely excluded for the organically based fungicide Tecnobiol and Aliette, the latter used in the experiment as control product.

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

**Formatiert:** Einzug: Links: 1 cm, Zeilenabstand: einfach, Abstand zwischen asiatischem und westlichem Text anpassen, Abstand zwischen asiatischem Text und Zahlen anpassen

**Formatiert:** Schriftart: (Standard) Times New Roman, 11 pt, Englisch (USA)

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

**Formatiert:** Schriftart: (Standard) Times New Roman, 11 pt, Englisch (USA)

**Formatiert:** Schriftart: (Standard) Times New Roman, 11 pt, Englisch (USA)

**Formatiert:** Schriftart: (Standard) Times New Roman, 11 pt, Englisch (USA)

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

**Formatiert:** Schriftart: (Standard) Times New Roman, 11 pt, Englisch (USA)

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

**Formatiert:** Schriftart: (Standard) Times New Roman, 11 pt, Englisch (USA)

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

**Formatiert:** Schriftart: (Standard) Times New Roman, 11 pt, Englisch (USA)

**Formatiert:** Schriftart: (Standard) Times New Roman, 11 pt, Englisch (USA)

**Formatiert:** Schriftart: 11 pt, Englisch (USA)

### Incidence and development of Esca disease in Trentino Province (Northern Italy)

L. Michelin, C. Pellegrini, I. Pertot ..... 175-180

**Abstract:** Since ancient times Esca represents a problematic disease, which affects grape almost worldwide. This disorder, caused by three main pathogens (*Phaeoemoniella chlamydospora*, *Phaeoacremonium aleophilum* and *Fomitiporia mediterranea*), can have a chronic or acute evolution. In the chronic phase we observe growth reduction of canes and shoots and typical yellowing and necrotic spotting of leaves; in the acute phase a fast dieback (apoplexy) happens. Causes and epidemiological aspects of Esca are not yet fully understood. This work, which is part of a national research project coordinated by University of Firenze (MESVIT), presents a three-year (2005-2007) monitoring in Trentino Province (Northern Italy). The aims of this study were to assess the incidence of esca in the Province; to study the development of symptoms in vineyards during the summer and to verify the presence of airborne spores of *P. chlamydospora* (*Pch*) and *P. aleophilum* (*Pal*) in infected vineyards and to determine the conditions of their release. In this Province during the monitored period the disease incidence (symptomatic plants in each year) was low and stable. The number of plants showing symptoms at least in one year of the survey was very slowly increasing. Differences in incidence were found between cultivars and age of the plants. The cultivar and weather conditions during summer can influence the development of disease symptoms in the same season. In three experimental vineyards the release of spores was seldom recorded; this fact, combined with the low incidence and slow increase of the disease, implies that the spores of three pathogens have probably a modest role in the spread of disease under Trentino's conditions.

### Preliminary studies on "esca" disease in Sicilian vineyards

V. Mondello, G. Conigliaro, A. Alfonzo, V. Ferraro, L. Torta, S. Burruano ..... 181-187

**Abstract:** Observations on the epidemiology of the "esca" disease and on fungi associated with xylematic symptoms were carried out for two years in two Sicilian vineyards with different cultivars (Insolia, Catarratto, Italia). The incidence of plant showing "esca" symptoms, similar in both investigated localities, increased during summer; at the same time sporadic grapevines with apoplexy were noted in July. Moreover a bit difference seems emerge regarding severity of disease among the cultivars. *P. chlamydospora* (*Pch*) was associated with all internal symptoms; *Phaeoacremonium aleophilum* (*Pal*) was only isolated from pink wood, while, *Fomitiporia punctata* (*Fomed*) was especially isolated from white rot.

These results, while confirming the etiological plurality of "esca" in Sicily, show also two vascular fungi (*Pch* and *Pal*) and one wood decaying (*Fomed*) as responsible of the disease.

#### Coptimizer”: a decision support system to reduce copper in organic viticulture

*D. Prodorutti, A. Pellegrini, S. Simon, Y. Gafni, T. Kuflik, A. Frizzi, I. Pertot ..... 189-192*

**Abstract:** “Coptimizer” is a web-based decision support system (DSS), which can help growers and to optimize copper treatments against downy mildew on grapevine. The system assists the user in optimizing dosage and timing of the treatments and calculates the amount of copper applied in each treatment in a specific vineyard. It monitors the accumulated quantity of copper used during the season, giving a warning when the grower is close to a pre-defined threshold. In 2007 the DSS prototype was tested in two locations in northern Italy (Trentino Province where two vineyards were treated with copper according to the system’s recommendations. During the growing season the incidence of the disease was monitored and compared to untreated and weekly treated plots (standard practice). Coptimizer’s recommendations allowed a good control of downy mildew while reducing significantly the amount of copper applied per hectare compared to the standard practice.

#### Impact de l'estimation des pluies par radarsur la representation spatiale de la modelisation du risque d'epidemie de mildiou sur le vignoble de Bordeaux

*M. Raynal, C. Debord, K. Griaud, S. Strizyk, D. Boisgontier, J. Congnard, D. Grimal .. 193-201*

**Abstract:** Le vignoble bordelais, particulièrement soumis aux conditions océaniques et aux risques cryptogamiques qui en découlent, contribue pour une part significative à la consommation nationale d'intrants phytosanitaires. Ces pratiques sont aussi bien néfastes pour l'environnement que pour l'image du produit et les finances du viticulteur !

Dans l'objectif de maîtriser ces intrants, l'IFV s'est très tôt intéressé aux outils de modélisation tels que les modèles Potentiels Systèmes de S. Strizyk. L'amélioration de ces outils se heurte aujourd'hui à l'imprécision des variables climatiques et notamment à l'approximation de la pluviométrie.

Afin de remédier à cet état de fait, l'IFV a testé, au cours de la campagne 2007, le produit Antilope de Météo France qui s'appuie sur la technologie RADAR et qui fournit une donnée pluviométrique tous les kilomètres.

L'évaluation strictement météorologique du produit Antilope montre que ces données ont tendance à sur-estimer les faibles précipitations et, à l'inverse, à sous-estimer les fortes précipitations. Néanmoins, Antilope met en évidence certaines cellules pluvieuses, non perçues par les stations météorologiques au sol, et pouvant être à l'origine de certaines contaminations.

L'utilisation d'Antilope dans le modèle Potentiel Système mildiou version 2007 ne donne pas de meilleurs résultats que la méthode de référence actuelle. Néanmoins, Antilope paraît apporter une précision supérieure dans la représentativité spatiale des épidémies et reste, de ce fait, un facteur de progrès, structurant pour la démarche de modélisation.

#### Powdery mildew of grape on leaves – is it a problem?

*Z. Tirtza, R. Moshe ..... 203-206*

**Abstract:** Powdery mildew of grapes, caused by *Uncinula necator*, is widespread in all grape growing areas of the world and attacks all green parts of the vine. The greatest damage is caused when the fungus develops early in the growing season and covers the inflorescence or small berries just after fruit set. Because of the possible high loss, growers focus on taking good control measures against the fungus starting soon after bud burst. New research on the etiology of the disease and its interaction with the vine at different phenological stages showed that the berries are very susceptible until they reach about pea size; at that point they develop ontogenic resistance. This finding, combined with the goal of minimizing pesticide usage, led to a reduction in the number of sprays, concentrating on the early vine phenological stages – from 5-20 cm. shoot length until the berries reach pea size. In the last few years, in some of the vineyards in Israel high levels of powdery mildew developed on grape leaves. Most of these vineyards were harvested late in the season, in October-November; this means that the leaves were covered with mycelium long before the harvest. The objectives of the present work are to find out whether fruit quality is reduced by the disease that develop on the leaves, whether leaf PM affects the organoleptic properties of the juice and to test whether high disease level on the

leaves at the end of the season affects the disease incidence in the following year. The present report will focus on the effect of different spraying tactics on disease severity and the effect of the diseased leaves on juice quality and harvest parameters. Two types of experiments were set up, each in two vineyards; in the "early" experiment we tested the effect of the mode of spraying (covering the whole canopy Vs concentrating in the cluster zone) and that of an additional spray after "pea size stage" on disease development on the leaves. In the "late" experiment vines were sprayed with a commercial sprayer till the beginning of verizon when the experiment was set up, and were then sprayed with either Sulphur or Timorex – a tea tree oil based product – to suppress disease development on the leaves. Disease assessment on the leaves close to harvest time showed the importance of spraying the canopy at the early stages of the season. 2006 results showed that although the last spray was applied in mid June, three months before the disease assessment in mid September, 71.3% of the leaves in the "cluster zone treatment" had mycelium of *U. necator* (average severity – 12.6% of the leaf area) as compared to six percent of the leaves (0.23% severity) in vines that were completely covered with spray. In the "late experiment" – both Sulphur and Timorex gold were effective in suppressing the disease (seven and six percent of the leaf area covered with PM as compared to 30% in the untreated control). No effect was detected on sugar accumulation, pH or TA in either experiment. We got the same results in 2007 and they are presented in this article.

#### Competitive colonisation of *Penicillium expansum* and *Botrytis cinerea* on grapes

R. Walter, M. Harms, H. Buchenauer ..... 207-214

**Abstract:** Laboratory investigations on the colonisation of wounded berries (var. Riesling) demonstrated, that *Penicillium expansum* and *Botrytis cinerea* reached strongest disease severities and similar colonisation rates between 20°C and 25°C. Inoculation of a conidial mixture of *B. cinerea* and *P. expansum* on wounded berry skin first led to a colonisation of different parts of the berry until its surface was completely covered. With longer incubation time *P. expansum* was able to overgrow *B. cinerea* at each temperature tested (15°C, 20°C, 25°C, 30°C). *P. expansum* was not able to infect berries with intact berry skin whereas *B. cinerea* penetrated the skin layers of Pinot blanc without visible wounds. Secondary infections caused by *P. expansum* could be observed after the infection of *B. cinerea* through the berry skin, that clarified the role of *B. cinerea* as a wound causing pathogen.

The treatment of wounded berries with botryticides (Boscalid, Cyprodinil + Fludioxonil, Fenhexamid) in the laboratory in most cases led to a reduction of *B. cinerea*. *P. expansum* was hardly affected by the compounds tested. On berries inoculated with a conidial mixture of both fungi, *P. expansum* profited from the fungicide application and inhibition of *B. cinerea*. In the field the results of the laboratory studies could only partly be confirmed. In the vineyard the fungicide treatments reduced *B. cinerea* while *P. expansum* was not able to take benefit from the inhibition of *B. cinerea*. The analysis of the data from different field trials showed a positive correlation between the disease severities of blue and grey mold. The correlation implicated, that an inhibition of *B. cinerea* was not resulting in a higher infection rate of in general and that both pathogens prefer similar conditions for their development. In conclusion best reduction of both pathogens was detected with cultivation methods that led to a reduction of wounds, the most important infection pathway of both pathogens. For example horizontal bunch dividing decreased the disease severity of both pathogens significantly. The effect of this kind of yield regulation was associated by the loosening of the bunch structure and thereby a reduced number of wounds.

#### Characteristics of wine and table grapevine hybrids tested for cultivation in Trentino (northern Italy)

L. Zulini, A. Vecchione, L. Antonelli, M. Stefanini ..... 215-219

**Abstract:** All traditional European grapevine varieties (*Vitis vinifera* L.) are susceptible to the most destructive fungal diseases (downy mildew, powdery mildew and grey mould), while most interspecific varieties are more or less resistant toward fungal diseases, particularly towards mildews. Resistant hybrid vines have the potential to strongly reduce the application of plant

protection compounds, leading a substantial and effective contribution for the protection of the environment. Despite of these evidences, in many viticultural areas the cultivation of hybrid varieties is still prohibited for the production of high quality wines. Thus, most of the countries involved in the breeding of new interspecific varieties in the last 20-30 years are located in northern parts of the grapevine production area, causing a lack of data about the use of new hybrids for warmer climate. In this work a field trial was carried out beginning from 2004, in Rovereto (province of Trento), with the aim to enlarge the knowledge of the agronomical characteristics of twenty-five hybrid vines bred in different countries. We evaluated fungus-resistance, yield quantity and quality (soluble solids, titratable acidity and pH) of the varieties. After four years of observation, 50% of the varieties showed good resistance against downy mildew (<5% of both leaf and bunch infected area). High levels of resistance were showed also against powdery mildew and grey rot. Most varieties revealed satisfactory adaptability characteristics regarding yield and fruit quality. We conclude that varieties Regent, Seyval blanc, Bianca, Nero and Palatina could be suitable for cultivation in our areas with good quality of grapes both for table and for wine production.

**The impact of spiders (Araneae) on *Lobesia botrana* (Denis & Schiffermüller) population density**

*R. Addante, S. Di Gioia, C. Calculli, A. Pollice..... 221-231*

**Abstract:** The role of spiders in regulating phytophagous pest populations is very difficult to investigate in open fields. In 2001 we began to observe the activity of these predators upon grapevine moth, and we continued this study in 2006-2007 with research to quantify their impact on the key pest of vineyards in Southern Italy, i.e. *Lobesia botrana* (Denis & Schiffermüller) (Lepidoptera Tortricidae). The research was realized in an experimental screenhouse vineyard completely covered by one single piece of insect-proof net. The screenhouse was subdivided into two isolated equal parts by a vertical net. The experiment consisted in collecting the spiders from each vine of one half of the vineyard and transferring them into the second half, then evaluating the variation of population density both of *L. botrana* and spiders over the seasons. In order to evaluate the spider population density, we randomly selected three plots in each half vineyard; each plot consisting of 10 cv Italia vines. Spiders were collected weekly from each vine of the plot using an entomological umbrella. From bloom to harvest, grapevine moth infestation was assessed by collecting one inflorescence or one cluster per vine and counting the numbers of infested berries and live larvae. Grapevine moth adults were collected weekly using sex pheromone traps and then counted. The regular transfer of spiders from one half of the vineyard to the other caused a noticeable variation in their density. The total number of spiders in the enriched vineyard was about double that in the depleted vineyard in 2006, and more than four times the number in 2007. As a consequence of spider enrichment in the release plot, the grapevine moth adults diminished, reaching the lowest density in the second year of study, when the number of adults trapped was less than one half of the number trapped in the plot where spiders were removed. The usefulness of spider activity in limiting *L. botrana* adults was not followed by a similar effect on phytophagous larvae, mainly because predators have poor possibilities of reaching the endophytic larvae of *L. botrana* carpophagous generations.

**Olfactory responses of *Eupoecilia ambiguella* (Hübner) (Lepidoptera Tortricidae) females to volatiles from grapevine\***

*G. Anfora, M. Tasin, A.-C. Bäckmann, E. Leonardelli, A. De Cristofaro, A. Lucchi, C. Ioriatti ..... 233-236*

**Abstract:** The activity of volatiles compounds emitted by a highly susceptible grape variety (Chardonnay) was assessed in a dual choice oviposition test on *Eupoecilia ambiguella* (Hübner) (Lepidoptera Tortricidae) behaviour, in which females could choose by using only olfactory cues. Volatiles released by the grape clusters were collected through headspace technique. Electrophysiological analyses of the volatiles released by the grapes were conducted for the identification of antennally active compounds, supposed to be involved in the host plant and

oviposition site selection by females. Results revealed the impact of the grape odour on total oviposition highlighting a major role played by olfactory cues in driving females to the oviposition site. GC-EAD analyses of the headspace collections detected several active compounds on antennae of *E. ambiguella* mated females.

#### Comparison of two methods for the agrochemicals side effect evaluation on Phytoseiid mites in vineyards.

*M. Baldessari, R. Maines, G. Angeli* ..... 237-243

**Abstract:** Two assessment techniques, washing method and direct counting, were compared for estimating population size of the phytoseiids *Amblyseius andersoni* and *Kampimodromus aberrans* in vineyard. Applying the two techniques, trials on side effects of insecticides and estimation of phytoseiids on different grape variety were performed. Results show that washing method provide an efficient estimation of phytoseiid population and it was comparable with the direct counting, both with high and low population density. The mites were easily washed off and well preserved for classification. Moreover, washing method allow to reduce at least 70% the assessment time spent in laboratory and so could be considered the better way to handle an extensive evaluation programme on side effects of agrochemicals on Phytoseiids that inhabit the vineyards. Concerning the selectivity levels of the tested insecticides, Actara, Cascade, Confidor and Calypso resulted slightly harmful according the IOBC evaluation classes, compared to the higher toxicity of reference Trebon. High differences concerning Phytoseiid populations checked comparing three grape cultivars should be opportunely considered in planning side-effects field studies on grape varieties.

#### Olfactory cells responding to the main pheromone component and plant volatiles in *Lobesia botrana* (Den. & Schiff.): possible effects on monitoring systems

*A. De Cristofaro, S. Vitagliano, G. Anfora, G.S. Germinara, M. Tasin, A. Lucchi, C.*

*Ioriatti, G. Rotundo* ..... 245-249

**Abstract:** During the last years electrophysiological and behavioural studies have been carried out in order to establish the role of plant volatile compounds in the host-finding process and oviposition site selection by *L. botrana*. In previous papers, it has been shown that several compounds are able to stimulate the antennae of both sexes (virgin and mated) of the moth. Results of wind-tunnel studies showed that olfactory cues are greatly involved in the location of host plant and oviposition site. Since olfactory cells sensitive to pheromone components and plant volatiles have been recently found in various insect species, in the present study we applied a single cell recording (SCR) technique (surface contact) to find out olfactory neurons stimulated by the two categories of compounds. The differential saturation electroantennographic technique (DS-EAG) was employed to evaluate the possible decrease of the antennal sensitivity to a plant volatile when the antenna is continuously exposed to E7Z9-12:Ac and, alternatively, to E7Z9-12:Ac when a plant compound is supplied. A large variety of cellular types emerged, from the specific (relatively to the tested compounds) to the highly generalist ones. DS-EAG results showed that cells responding to E7Z9-12:Ac and at least to one plant volatile are widely represented in *L. botrana* and diverse substances induce a different reduction of the antennal sensitivity to E7Z9-12:Ac. The finding of these cells supports the observations reported by various authors about the ability of plant compounds to enhance or reduce the biological activity of a pheromone component. These “peripheral interferences” in odour perception need to be evaluated when setting up new blends for monitoring purposes.

#### Notes on the distribution and the phenology of *Erasmoneura vulnerata* (Fitch) (Homoptera: Cicadellidae) in North-Eastern Italy

*C. Duso, R. Moret, G. Marchegiani, A. Pozzebon* ..... 251-254

**Abstract:** The nearctic leafhopper *Erasmoneura vulnerata* (Fitch) was recorded for the first time on grapes in Europe (Italy, Veneto region) in 2004. Since then, it has been detected in four regions in North-eastern Italy. The phenology of this pest in North-eastern Italy was investigated in three subsequent years on unsprayed *Vitis labrusca* vines. Overwintered adults

colonised vines in spring. Nymphs occurred from late May to late October. *E. vulnerata* densities increased progressively in mid and late summer. *E. vulnerata* was rare in commercial vineyards probably because of pesticide use.

#### Effects of irrigation on *Empoasca vitis* populations

*D. Fornasiero, F. M. Buzzetti, A. Pozzebon, C. Duso* ..... 255-258

**Abstract:** The effect of irrigation on the incidence of pests was investigated in two vineyards located in north-eastern Italy in 2006. Irrigation was performed 2-3 times during the experimental season by a micro-spray system. The leafhopper *Empoasca vitis* Götthe was the most frequent pest in the two vineyards. Its seasonal abundance was monitored by examining leaf samples. *Empoasca vitis* population densities were affected by irrigation, and higher levels of this pest were recorded on irrigated vines in particular.

#### Simulation of *Lobesia-botrana*-egg-laying for autecological and insecticide studies

*C. Hoffmann* ..... 259-265

**Abstract:** The rearing facilities of *Lobesia botrana* were modified in a way that moths laid their eggs on polyethylene sticks which were used for repeated and continuous artificial egg infestations of grapes in vineyards. In the context of a randomized insecticide field trial in a Riesling vineyard in the German vinegrowing region Mosel, inoculations were carried out up to three times a week during the vegetation period. Thus a constant egg laying of the Grapevine Moth was simulated. The infestation level varied considerably within the season. During a period of dry and hot weather between June and July of 2006 we found the highest levels of successful inoculations. The development of *Lobesia botrana* was not effective during the cool-wet periods before and after June and July. In this way survival of *Lobesia botrana* in the field underlies a high coincidence factor. For one insecticide the effective period was surprisingly long. Three insecticides showed different efficacy between the period of the first and the second generation of the *Lobesia botrana* field population. A possible reason for this is the changing architecture of the clusters during the season, as the second insecticide treatment was conducted after grape closure.

#### Seasonal abundance and distribution of *Planococcus ficus* on grape vine in Sardinia

*A. Lentini, G. Serra, S. Ortu, G. Delrio* ..... 267-272

**Abstract:** During 2006-2007, the seasonal spatial distribution of *Planococcus ficus* throughout the vine was studied in a "Tendone system" trained vineyard, situated in the North of Sardinia (Italy). Male flights were monitored by pheromone-baited traps, whereas eggs, crawlers, nymphs and females abundance was estimated by counting on trunk, canes, spurs, leaves and bunches. Vine mealybug developed throughout all the year in cryptic location under the bark of trunk and arms, overwintering principally as fecundated female, or eggs in ovisacs. In April, the majority of crawlers were found under the bark and, after bud break, also around the base of new shoots. Females of this generation were detected in June, and crawlers of the second generation moved toward basal leaves. Females of this generation peaked at the end of July, and the crawlers of the third generation colonised grape bunches in late July-August. The maximum female density was recorded in October and, after the leaf quality deterioration, the majority of mealybugs moved back under the bark. Males were captured by pheromone traps from May to December and their population density showed three peaks in June, late July and September-October, when the highest female density was recorded.

#### Impact of the erineum mite *Colomerus vitis* on Muscat

*C. Linder, M. Jermini, V. Zufferey* ..... 273-277

**Abstract:** The erineum mite *Colomerus vitis* (Pagenstecher) is widespread in Swiss vineyards. Because damages of *C. vitis* are rarely serious, its pest status is still unclear. Even if acaricides are only occasionally applied these products are nonetheless moderately toxic to predatory mites. For a better understanding of the impact of erineum mites on vine, harmfulness of *C. vitis* has been studied from 2005 to 2007. We compared the effect of mites on plant damage, gas

exchange, photosynthesis and plant growth on Muscat. In May 2006, the month of the most severe mite infestation, about 3% of leaves showed more than 60% damaged leaf area. Nevertheless, mites had almost no effect on transpiration rates measured. Photosynthesis and stomatal conductance rates slightly decreased on heavily infested leaves but the chlorophyll index was unaffected. The presence of mites had also no effect on shoot growth and foliation. Overall, plant damage was neither correlated with overwintering mite population nor plant damage in the previous year. In conclusion, the impact of *C. vitis* on photosynthesis is negligible and acaricide treatment can be abandoned at moderate pest infestation levels as observed in this study.

#### Ecological infrastructures in a vineyard of Western Sicily

*Lo Genco A., Fucarino A. and Lo Pinto M. .... 279-281*

**Abstract.** Cultural methods such as excessive use of fertilizers, pesticides and monocultures have decreased agrobiodiversity and created more favourable conditions to increase insect pests and diseases levels in agroecosystems. Monoculture is a concentrated resource for specialized pests, which increases the attraction and accumulation of these species, the time they spend in the system and their reproductive success. Furthermore, expansion of monocultures has decreased abundance and activity of natural enemies due to removal of food sources (i.e. nectar, pollen and often honeydew), refuges and hibernation sites. Some researchers have proposed to increase agro-biodiversity by creating an appropriate ecological infrastructure within and around the agro-ecosystem to favour the abundance and effectiveness of natural enemies. The maintenance and management of ecological infrastructures, or ecological compensation areas (ECAs), on rural farms is considered crucial in enhancing functional biodiversity for pest suppression (Boller *et al.*, 2004). In autumn 2006, we start cooperating with a young winery ([www.funaro.it](http://www.funaro.it)) located in Marsala area. In order to enhance biodiversity we have introduced ecological infrastructures in 2 hectares vineyard of Merlot variety. We have planted several plants of bramble (*Rubus* spp.), oregano (*Origanum vulgare* L.), rosemary (*Rosmarinus officinalis* L.), wild rose (*Rosa canina* L.), oak (*Quercus pubescens* Willdenow) all around Merlot vineyard. These plants should provide refuges, hibernation sites, alternate host animals, prey for the juvenile stage of predators, resources for a successful immigration and reproduction of natural enemies of key pest in viticulture. The role of ecological infrastructures in vineyard is still not well understood and their use to manage vineyard pests is a controversial practice. This work aims to study the possible effects of ecological infrastructure on arthropod associated to a vineyard.

#### Arthropods as biological soil quality indicators in a vineyard under different soil management

*G. Lo Verde, V. Palermo, A. Santoro, L. Gristina .... 283-288*

**Abstract:** The impact from anthropogenic sources on the soil environment is almost exclusively assessed for chemicals, although other factors like covers crops and tillage practices have an important impact as well. Thus, the farming system as a whole should be evaluated according to its environmental benefits and impacts. A research was carried out in a vineyard located in south-west of Sicily in which five different soil managements were applied: conventional tillage, durum wheat cover crop, faba bean cover crop, permanent meadow (lolium 60% and berseem 40%) and permanent meadow (lolium 40% and berseem 60%). Faba bean and durum wheat cover crops were managed using two different incorporation techniques. Three soil samples were collected for each treatment, every two months. Arthropods were extracted with a Berlese-Tullgren funnel and identified at Order level. QBS index (Soil Biological Quality index), arthropods abundance and Shannon diversity index were considered to analyze the differences among the studied plots, UPGMA distances among the cover crop systems were clustered. In plots with different cover crop incorporation technique arthropods abundance showed an inverse trend in comparison with the diversity index, lower in plots in which plowing was applied. The similarity cluster analysis emphasized the incidence of the cover crop species, both in purity and as prevalent species in mixed treatments, whereas QBS and the nitrates availability seem to be influenced by the management system more than by the cover crops.

#### Organizational traits for the grapevine moth control in Tuscany (Italy)

A. Lucchi, E. Pozzolini, L. Santini & B. Bagnoli ..... 289-293

**Abstract:** In Tuscany, in the last few years, there has been a growing interest for the adoption of pheromone mating disruption (MD) in the control of the grapevine moth *Lobesia botrana* (Den. & Schiff.). In 2007 the method has been applied on about 500 hectares with Isonet L (CBC/Shin-Etsu) dispensers in 27 estates of the provinces of Pisa, Livorno, Grosseto, Siena and Firenze. Most of the estates were applying MD for the first time. To help farmers in assessing the method efficacy a small technical team was formed, involving in the project some students of the Course "Viticulture and Enology" of the Agriculture Faculty (Pisa University). The team has been deeply involved in managing the method application and directly assessing MD efficacy in most of the farms along the three generations of the grapevine moth.

In this paper are shortly highlighted the key points that enabled the method to attain good results in most vineyards and the loop holes that could compromise the MD success if not taken into account.

#### Mating disruption technique vs *Lobesia botrana* (Denis & Schiffermüller) (Tortricidae):

3 years of experience in vineyards of Abruzzo (Italy)

A. Mazzocchetti, A. Zinni ..... 295-300

**Abstract:** Since 2004 ARSSA is conducting a large scale trial (about 330 ha) with the application of mating disruption technique for the control of *L. botrana*. First three years results were positive on the whole in spite of the agronomical (cultivar, soil, etc.) and environmental (microclimate, wind, slope, etc.) variability typical of this grape growing area. Best results were achieved in large fields (>10 ha) with espalier training system or, anyhow, on training system lower than overhead. A correct dispensers application (number/ha and timing of application) was an important factor for the success of this method. Organic grape growing showed a favourable condition for the mating disruption technique thanks to a good agro-ecosystem equilibrium (greater abundance of predators and parasitoids). Some critical situations emerged in sloping vineyards and/or in presence of high pest populations but, at the end, mating disruption gave positive results with a generalized reduction of insect pest infestations in comparison with conventional treated ones. In view of a rational approach of plant protection in vineyards, that seems to be nowadays more and more complex, mating disruption could represent, also in Abruzzo, an interesting alternative to traditional techniques for an adequate protection from infestation of *L. botrana*, offering, at the same time, the respect of the environment, the protection of the consumer health without penalizing farmer income.

#### Daily "chores" of the Nearctic leafhopper *Scaphoideus titanus* Ball (Hemiptera Cicadellidae)

V. Mazzoni, M. Virant Doberlet, L. Santini and A. Lucchi ..... 301-303

**Abstract:** In this paper we describe several daily chores performed by males and females of *S. titanus*, recorded with a laser vibrometer and a video camera. Among the activities carried out by the leafhopper during the 24 hours, some are strictly associated with reproduction (calling signal, courtship phrase and disturbance noise of the male and pulses of the female) while others are not closely related to mating (grooming, brochosome production and anointing, male aggressiveness and jumping).

#### Olfactory stimuli involved in host plant detection of *Scaphoideus titanus* Ball nymphs

V. Mazzoni, G. Anfora, F. Trona, A. Lucchi, C. Ioriatti ..... 305-307

**Abstract:** The responses of *S. titanus* nymphs to volatiles emitted by grapevine tissues (leaves and apical shoots) were studied. In first instance, behavioural tests were conducted with a self-made vertical glass Y olfactometer. Most nymphs showed significant preference for plant tissues over the blank control. Then, electroantennography experiments showed a response of the insect to plant odours. Headspace collections were made from fresh apical shoots with leaves and concentrated extracts were analyzed by coupled gas chromatography and mass

spectrometry (GC–MS). The volatile fraction collected allowed the identification of several substances characterising the emission pattern released by the feeding sites of *S. titanus*.

Comparison between downy mildew fungicides in a vineyard of the Avellino province (Campania South Italy) and their influence on the population of Phytoseiid mites (Parasitiformes, Phytoseiidae).

*M. Nicòtina, G. C. Capone*..... 309-319

**Abstract:** Numerous studies have shown that the treatment of anti downy mildew (control) with copper based products, widely used in viticulture, are one of the causes of high levels of contamination in the soil. However, in the ecosystem of the vineyard, copper based products have always proved (very) efficient against (anti) downy mildew and are, in fact, the only products authorized for biological production in viticulture.

For three consecutive years (2005, 2006 and 2007) experiments have been carried out in a vineyard located in Montefredane at 350 meters above sea level on a soil of medium consistency where a 24 year cultivar Fiano of Avellino is grown. The experiment puts in evidence the differences of copper content in the cultivated soil of the vineyard and the soil in the immediate surroundings.

The objective of the test was to sample the selectivity of some low dosage copper or copper based products on Phytoseiid mites. At the same time these results were compared with the effects of products organic of synthesis commonly used in viticulture. Furthermore, the effectiveness of the active substances in controlling the downy mildew was tested.

The higher presence of Phytoseiids in the vineyard were *Kampimodromus aberrans* (Oudemans). None of the plots revealed total eradication of the Phytoseiids from the vineyard even if the products tested showed different degrees of selectivity as well as different levels of control of the downy mildew. As regards downy mildew control the most efficacious plots were those treated with Cu-oxychloride and Zoxamide + Cu-oxychloride.

Population dynamics of grapevine moths reflect weather conditions over the past decade

*D. Pasquier, P.-J. Charmillot, P. Kehrli*..... 321-323

**Abstract:** The two grapevine moths *Eupoecilia ambiguella* and *Lobesia botrana* are the most important pest insects in Swiss vineyards. As a result of their different climatic preferences, the distribution and proportion of these two moths varies gradually in space and time. Only 25 % of pest attacks were caused by *E. ambiguella* in 1996, the start of this long-term survey. But its importance increased steadily, hitting a peak of 97 % of damage caused in the end of 2001. After 2003, the hottest summer ever recorded, *E. ambiguella* was hardly detectable in Western Switzerland and even today its relative frequency is low. In this paper we aim to identify factors that explain the population dynamics of the two grapevine moths. The most important factor seems to be the population size of the previous generation, followed by climatic factors such as humidity and temperature that explain growth conditions during larval development. Besides, wind and the length of the flight period have a significant effect on the magnitude of insect flight. In conclusion, the population dynamic of grapevine moths is strongly affected by climatic factors and extreme weather conditions such as droughts. A profound knowledge of grapevine moths' population dynamics is indispensable for the success of sophisticated and environmental friendly insect pest management schemes such as mating disruption.

Effects of grape downy mildew on interactions between fungicides and predatory mites on grapevines

*A. Pozzebon, C. Duso and P. Tirello*..... 325-329

**Abstract:** The biological control of phytophagous mites based on phytoseiid mites is a valuable alternative to chemical control. The success of bio-control strategies is favoured by agricultural practices that enhance predatory mites' habitats, and by the choice of selective pesticides. Generalist phytoseiids can persist in the absence of herbivore mites by exploiting alternative food resources that include Grape downy mildew (GDM) mycelium and spores. We evaluated

the effect of GDM on the interactions between fungicides and phytoseiids with a long term perspective.

#### Soil Pest Management with Herbicides?

*Peter Schwappach*..... 331-336

**Abstract:** The herbicides glyphosate and triclopyr as well as four different application methods have been tested in a healthy vineyard planted with cv. Mueller-Thurgau near Wuerzburg in the Franconian wine growing region.

The following applications techniques were compared: a. injection of herbicide inside of the stem, b. placing the herbicide at the cross-cut of the stem, c. superficial application along the stem and d. spraying at the leaves. Both the two agents and the four application methods showed significant differences.

After five years almost every treated replication did show neither leaves nor shoots. Although there were still some plants with vital, active roots at the end of the trial. While it was best to inject glyphosate, triclopyr showed best results with total necrotizing of roots when painted on the surface of the stem. Also the effect of killing the roots was much faster with triclopyr including both small and structural roots. Over all triclopyr led to better and faster results compared to glyphosate. Also, triclopyr is preferred by the method of application, because it is much easier painting the herbicide along the stem or placing it at the stem-cut.

#### Spatio-temporal distribution of *Lobesia botrana* (Denis & Schiffermüller) male population in a central Italy agro-ecosystem

*A. Sciarretta, A. Zinni, A. Mazzocchetti, P. Trematerra* ..... 337-342

**Abstract:** The spatial analysis of the pheromone trap catches of European grapevine moth *Lobesia botrana* (Denis & Schiffermüller) males was undertaken in Abruzzo, region situated in central Italy, during years 2005 and 2006. In the study area, vineyards are the most spread cultivation, surrounded by hedgerows, small woodlots and alternated with cereal and olive groves.

The main purpose of the study was to investigate the spatio-temporal dynamics of pest, inside and outside vineyards and to evaluate the effect of the landscape elements on pest distribution. The activity of *L. botrana* adult males was monitored weekly using 40 sticky traps, baited with 1 mg of pheromone (*E,Z*)-7,9-dodecadienyl acetate. Geostatistical methods were used to characterize the spatial distribution of European grapevine moth. For the annual sum of catches and single flights, models fit from variogram analyses were used to interpolate insect catches by means of the kriging algorithm and contour maps were obtained.

Our results showed that the presence of *L. botrana* was not limited to vineyards, particularly at the beginning of the season, when most of the males were cached inside olive groves.

The adult distribution in the experimental area changed during the season: contour maps showed that hot spots of the I flight were positioned inside olive groves, during the II and the III flight they concentrated in vineyards. *L. botrana* males were observed also in uncultivated fields, but never as hot spot. Large proportion of European grapevine moth adults is in zones usually uncovered by pest management programs. In the area under study, the olive plant must be seen as the main reservoir of adult population outside vineyards.

In many parts of central and southern Italy, vineyards and olive groves are two of the most spread cultivations and are frequently neighbouring. In these areas, *L. botrana* can disperse in the landscape and adults move between contiguous crops. In such a context, during monitoring and control operations, it is highly recommended to consider the whole landscape, with particular attention to olive crops.

#### Lutte biologique contre les cochenilles farineuses *Heliococcus bohemicus* Sulc et

*Phenacoccus aceris* (Signoret) au moyen de lâchers de *Chrysoperla lucasina* (Lacroix)

*G. Sentenac, T. Pham, A. Salaun, J. Souvignet* ..... 343-349

**Résumé:** Les stratégies mises à la disposition des viticulteurs pour lutter contre les cochenilles farineuses, reposent sur l'emploi d'insecticides neurotoxiques. En l'absence d'alternative, nous

nous proposons, en conditions de plein champ, d'évaluer l'activité biologique du prédateur *Chrysoperla lucasina* à l'égard d'une population de Pseudococcidae composée d' *Heliococcus bohemicus* et de *Phenacoccus aceris*. Pour se faire un dispositif comprenant sept répétitions a été suivi tout au long de la campagne 2005, en l'absence de traitement et de différence statistiquement significative entre modalité, ce dernier a été validé.

Nous avons constaté l'efficacité des deux lâchers de 15 *C. lucasina* (vieille L1/jeune L2) par cep, réalisés au printemps 2006 sur les formes hivernantes d' *H. bohemicus* et de *P. aceris* en reprise d'activité. La régulation opérée sur la génération 2005 de cochenilles farineuses, se répercute sur la génération 2006 au sein de laquelle les différences entre « lâcher » et « témoin » sont encore significatives. Les populations dans la modalité « témoin » ont doublé entre le 12 septembre 2005 et le 18 septembre 2006, à cette date l'efficacité des « lâchers » est de 83%.

#### Volatiles from grape drive the oviposition of *Lobesia botrana* at short distance

M. Tasin, G. Anfora, A.-C. Bäckman, C. Ioriatti, A. De Cristofaro, E. Pozzolini, E.

Leonardelli and A. Lucchi ..... 351-353

**Abstract:** Females of phytophagous moths use multisensory modalities to select oviposition sites. In laboratory experiments we examined the effect of olfaction on the oviposition behaviour of the grapevine moth *Lobesia botrana*, a pest of grapevine. In a dual choice oviposition test where insects could choose only using volatile and visual cues, females did not discriminate between the odours released by green bunches of two different varieties (Trebiano and Sangiovese). Chemical and electrophysiological analysis of bunch odours showed only quantitative differences which did not account for a variety preference in oviposition in our experimental conditions. An artificial odour of the antennally active compounds was subsequently used in further oviposition tests. Females deposited their eggs onto the substrate holding the mimic with a dose-response pattern. Results of this work showed that volatiles released by green bunches as well as synthetic blends mimicking the bunch odour bouquet provided a signal for oviposition at a short range for grapevine moth females.

#### Grapevine Pests in Sicily

H. Tsolakis, E. Ragusa ..... 355-361

**Abstract:** More than twenty phytophagous species are reported associated with Sicilian vineyards. Only a quarter of them have to be considered of economic importance.

Among moths, the grapevine moth *Lobesia botrana* (Denis & Schiffermüller) is certainly the most frequent species. It is considered the key pest on both table and wine grapes, while the incidence of the grape berry moth *Eupoecilia ambiguella* (Hübner) is scarce and linked to particular biotopes. Three to four flights are reported for the grapevine moth from February-March to October-November, while no data are available for the grape berry moth. Damages caused by *L. botrana* are strictly linked to the climatic trends during the summer period, to the microclimatic conditions in the island biotopes, as well as to the micro climate created by the canopy, or to the different grape-clusters of the various cultivars.

The cicadellid *Jacobiasca lybica* (Bergevin) was reported for the first time in 1962, but it is considered an old inhabitant of Sicilian vineyards. Until 1990s it was present mainly on the western part of the island and it was considered of no economic importance for the autochthonous cultivars. Today the cicadellid is distributed on the whole island and often causes severe damages especially on allochthonous cultivars.

The mealybug *Planococcus ficus* (Signoret) has to be considered a serious problem in Sicilian vineyards as in the past two decades an increase of infestations was registered, particularly on new plantings. No data are available up to now on the biology of the species in Sicily, while its presence causes serious concerns for both damages to yields and virus transmission.

*Calepitrimerus vitis* (Nalepa), recorded in Sicily at the beginning of the XX century, is now considered another emergent problem in Sicilian vineyards, on both autochthonous and allochthonous cultivars, especially on newly planted vineyards.

#### Incidence of grapevine moth *Lobesia botrana* (Den. & Schiff.) on occurrence of ochratoxin A in grapes

H. Tsolakis, O. Corona, A. S. Pulizzi, F. Grippi, V. Mondello ..... 363-368

**Abstract:** observations were carried out in an organic vineyard (cv malvasia di candia), at salemi (sicily), during 2006-2007, in order to verify the influence of grapevine moth *lobesia botrana* (den. & schif.) on presence of ochratoxin a (ota) in bunches at harvest time. a percentage of 12.98% of bunches were attacked by grape moth during 2006, while 8.65% of them were infected by grey mould and sour bunch rot (5.77% and 2.88% respectively). analyses carried out on 12.98% infested bunches, showed a level of 20 µg/kg of ota, while on intact samples 0.04 µg/kg of toxin was registered.

During 2007, infestation of bunches by grape moth was very low (2.05%), due to the particular climatic conditions, and no infections by grey mould and sour bunch rot were registered at harvest time. analyses on 2.05% infested bunches by *l. botrana* showed a presence of 0.055 µg/kg of ota, while no detectable presence of toxin was registered on intact bunches (<0.014 µg/kg). two *aspergillus* species were recorded in 2007: the most representative was *aspergillus fumaricus* wehm (86%) which is not considered the producer of ota, while 14% was *aspergillus fonsecaeus* (thom & raper) considered as the probably producer of the toxin.

#### Landscape characteristics influencing pest populations in viticulture

M. Van Helden, G. Pain, J. Pithon..... 369-373

**Abstract.** Landscape-scale characteristics can influence pest insects directly, for instance by providing hibernation sites or by creating barriers for migration. We developed a new insect trap (Tri-Δnglué® trap), able to monitor the adult flight periods of all major vine insect pests. Pest insect distribution was sampled at the landscape scale over three years in four French wine growing regions ranging from 60-200 km<sup>2</sup> (Pessac-Léognan, Buzet, Sauternes, Saumur-Champigny ). Between 40 and 80 vineyard plots were monitored in each region.

The spatial distributions of the insects varied little between years. *Lobesia botrana* and *Scaphoideus titanus*) had clustered distributions at this scale but spatial structure was less pronounced for *Empoasca vitis* and *Eupoecilia ambiguella*.

A geographical information system was used to describe and quantify land cover characteristics at a variety of local and landscape scales, using buffers of increasing diameter (250 to 1000m). Insect abundance was significantly correlated with a number of both local and landscape-scale land cover variables. The two most abundant pest species, *L. botrana* and *E. vitis*, showed very dissimilar distributions. *L. botrana* was more abundant in large continuous monocultures while *E. vitis* was more abundant in heterogeneous landscapes including woodlands.

The strength of these correlations increased with increasing buffer size, up to 750 m, revealing that population levels are indeed influenced by landscape characteristics at this scale. Longer term, landscape-scale monitoring will be continued to try to determine how landscape configuration may influence pest insect movements, so as to better explain underlying mechanisms.

Tri-Δnglué trap networks like this one are being adopted by professional organisations, for example to monitor *Scaphoideus titanus*, vector of the quarantine disease 'flavescence dorée' in areas under imposed sprayings

#### Occurrence and spread of *Scaphoideus titanus* in Austria

N. Zeisner..... 375-377

**Abstract:** Grapevine yellows are widespread in many viticultural areas of the world. Flavescence dorée (FD) is one of them. It causes crop losses, a decrease in the lifespan of grapevines and finally the death of the affected plant. FD is transmitted specifically by the cicadellid leafhopper *Scaphoideus titanus*. This species was first introduced to Southern France in the 1950s from North America and it is now expanding its range to the north. In the summer of 2004 the first *S. titanus*-specimen reached the vineyards around Bad Radkersburg near the Slovenian border in Styria. Since then the Austrian Agency for Health and Food Safety carried out

intense monitoring surveys with yellow sticky traps in selected Austrian vineyards along the Hungarian and Slovenian border. During the last 3 years, in the middle of August, north-westerly winds brought hundreds of specimen of *S. titanus* over the border to Austria by passive spread along the valleys of rivers from Balkan States. Further inland the abundance of the vector was much lower. The results of the monitoring surveys show, that the distribution of this vector in Austria is limited to a restricted area in southern Styria and so far the distribution of *S. titanus* does not present a phytosanitary problem.