

## Vineyard agro-ecosystem Heteroptera in the Mediterranean Region\*

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**ABSTRACT** Among the many Heteroptera known to be inhabitants of the vineyard agro-ecosystem, the Lygaeids *Nysius ericae* (Schilling), *N. senecionis* (Schilling), *Metopoplax ditomoides* (Costa), and the Mirids *Calocoris norvegicus* (Gmelin), *Lygus spinolai* (Meyer-Dür), *L. pratensis* (L.), *Capsodes sulcatus* (Fieber), and *Malacocoris chlorizans* (Panzer) appeared worthy of particular care. All these bugs occasionally dwell on the grapevine, on which they arrive from several usual host plants growing in the nearby uncultivated lands. We point out that the exclusively phytomyzous *L. spinolai* causes the the characteristic alterations known as "rissetta" (curling) of the grapevine leaves that has recently reappeared in Italy. We emphasize the qualities of the mainly zoomyzous *M. chlorizans* as an efficient predator of mites and leafhoppers.

**IZVLEČEK** STENICE VINOGRADNIH AGRO-EKOSISTEMOV MEDITERANSKE REGIJE Med mnogimi stenici, ki naseljujejo agro-ekosisteme vinogradov je treba posebej omeniti ligeide *Nysius ericae* (Schilling), *N. senecionis* (Schilling), *Metopoplax ditomoides* (Costa) in miride *Calocoris norvegicus* (Gmelin), *Lygus spinolai* (Meyer-Dür), *L. pratensis* (L.), *Capsodes sulcatus* (Fieber) in *Malacocoris chlorizans* (Panzer). Vse te vrste najdemo včasih na vinski trti, na katero pridejo z različnih hranilnih rastlin na neobdelanih sosednjih zemljiščih. Poudarjamo, da izključno rastlinososi *L. spinolai* povzroča značilne spremembe, kodravosti listov vinske trte, ki se je v zadnjem času ponovno pojavilo v Italiji. Vrsta *M. chlorizans* pa je učinkovit predator pršic in škržatkov.

### Introduction

Numerous species belonging to different Heteroptera families are reported to be noxious to the grapevine; a dozen of them live in the Palaearctic Region: the Lygaeidae *Nysius ericae* (Schilling), *N. senecionis* (Schilling), and *Camptotelus minutus* (Jakovlev), the Pyrrhocoridae *Pyrrhocoris apterus* (Linné), the Pentatomidae *Palomena prasina* (Linné), *P.*

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*viridissima* (Poda), *Eurydema oleraceum* (Linné), and *Crocistethus waltianus* (Fieber), the Cydnidae *Sehirus bicolor* (Linné), the Miridae *Lygus pratensis* (Linné), *L. spinolai* (Meyer-Dür), and *Capsodes sulcatus* (Fieber) (STELLWAAG, 1928).

In order to ascertain the presence and importance of these and other Heteroptera species, investigations were carried out in vineyards of the Mediterranean area, according to analogous researches that were recently effected on *Auchenorrhyncha* of the vineyard agro-ecosystem (VIDANO et al., 1987).

## Results

In the Mediterranean Region, 8 Heteroptera species inhabiting the vineyard agro-ecosystem appeared worthy of attention. Of these, 7 are exclusively phytomyzous and 1 is mainly zoomyzous. Basic results are summarized in table 1, which was prepared with both original data and critically considered reports of several authors. Moreover, morphological and ecological aspects as well as the connection with the grapevine are briefly given for each species.

*Nysius ericae* (Schilling). Adult 3,5 – 4,5 mm long, body basically grey in colour with two black longitudinal lines on the head and a black line on scutellum, legs yellow, abdomen ventrally yellow.

It dwells on wild plants, on which it remains unobserved. When the vegetation of its usual hosts dries up, it migrates onto green plants that may be severely damaged by it. It attacks crucifers, the tomato, potato, flax, strawberry, beet, and grapevines.

In the case of massive attacks, the grapevine may completely desiccate when it is very young, or have leaves and grapes dried up and the canes browned when it is older. Dangerous infestations were checked in the springs of 1982 and 1983 in southern Spain (DEL RIVERO & GARCIA MARI, 1983) and in summer 1985 in southern Italy (PENNACCHIO & MARULLO, 1986).

*Nysius senecionis* (Schilling). Adult 4,0 – 4,5 mm long, body light grey in colour, with three longitudinal red stripes on the head, antennae reddish, legs yellow, body ventral part brown with sides and posterior part yellow.

It usually lives on crucifers and composites (OTTEN, 1956).

If its wild host plants are eliminated, e. g. after ploughing, it may infest young grapevines, on which it pierces all the green parts, making leaves and tender canes dry up. The damage was evident in full summer (DALMASSO, 1912).

*Metopoplax ditomoides* (Costa). Adult 3,5 – 4,0 mm long, body black in colour with 2nd segment, tibiae and tarsi ochreous, hemelytra hazel in colour, spotted with brown in the posterior part of the corium and along the veins. Median lobe of the frons spatulated.

It is very common on *Matricaria chamomilla* L. and some other herbaceous plants.

In southern Italy it resulted in incidental harm to grapevines with heavy infestations, followed by desiccation of shoots (SILVESTRI, 1939).

*Calocoris norvegicus* (Gmelin). Adult 7,0 8,0 mm long, body yellow greenish in colour with two black evident spots on the pronotum.

It dwells on various herbaceous and woody plants, both wild and cultivated, on which it pierces and sucks from gemmae, flower buds and leaves causing desiccations, deformations, and wrinklins. Its damages are reported for the potato, tomato, bean, cauliflower, sugar beet, rye, barley, hemp, and fruit trees.

On grapevines it could have helped to cause leaf-curling or "rissetta" (PAOLI, 1924), an ampelopathy mainly due to *L. spinolai* (VIDANO et al., 1989).

*Lygus pratensis* (Linné). Adult 5,8 7,3 mm long, body variable from pale green to yellowish to dark brown in colour, with black spots more marked on the pronotum, base of the scutellum, and basal part of the hemelytrae. Female generally lighter and more greyish.

Its usual hosts are many herbaceous and woody plants, from fodder to vegetable plants, from flowers to fruit trees and to grasses. Its piercing may cause the desiccation of young shoots, the deformation of flowers, and the rolling up and atrophy of leaves.

Concerning the grapevine, it was considered responsible of remarkable leaf alterations (FULMEK, 1916) that have been wrongly emphasized so far. Actually, such an ampelopathy is caused by *L. spinolai*.

*L. spinolai* (Meyer-Dür). Adult 5,4 6,0 mm long, body green yellowish in colour, with distal membrane of hemelytrae darkened and tibiae of hind legs with brownish setae.

It usually lives on wild host plants, such as *Rumex*, *Achillea*, *Verbascum*, *Spirea*, *Convolvulus* (FULMEK, 1931), *Filipendula*, *Tanacetum* (WAGNER & WEBER, 1964), *Humulus lupulus* L., *Urtica dioica* L., *Clematis vitalba* L., *Rubus caesius* L., *Artemisia vulgaris* L. (VIDANO et al., 1989).

From wild host plants it may pass onto grapevines, on which it sometimes causes quite serious damage, provoking the so called "rissetta". Actually, its piercing of buds prevents the normal development of leaves, which show numerous perforations caused by the necroses following the emission of saliva into the punctures. With the expansion of the leaf blade these necroses become lacerations. The piercings also prevent the growth of canes that remain stunted and with short internodes, and the setting of flowers. In particular the grapevine plants in the outer part of vineyards near uncultivated bushy lands, hedges and thickets are involved. In the latest years, particularly heavy attacks were reported in Switzerland (CACCIA et al., 1988) and northern Italy (GREMO & PINNA, 1988; VIDANO et al., 1989).

Table 1. Most significant Heteroptera found in vineyards of the Mediterranean region.

Species	Host plants	Behaviour	Palearct. chorology
<b>Lygaeidae</b>			
<i>Nysius ericae</i> (Schilling)	<i>Beta</i> , Cruciferae, <i>Fragaria</i> , Rosaceae, <i>Linum</i> , <i>Solanum</i>	phytomizous	Europe, Asia N Africa,
<i>Nysius senecionis</i> (Schilling)	<i>Diplotaxis</i> , <i>Calluna</i> , <i>Erigeron</i> , <i>Chrysanthemum</i> , <i>Senecio</i> , <i>Achillea</i> , <i>Anthemis</i>	phytomyzous	Europe, N Africa, SW Asia
<i>Metopoplax ditomoides</i> (Costa)	<i>Matricaria</i> , herbaceous plants	phytomyzous	Middle and S Europe N Africa, SW Asia
<b>Miridae</b>			
<i>Calocoris norvegicus</i> (Gmelin)	<i>Cannabis</i> , <i>Beta</i> , Cruciferae, <i>Phaseolus</i> , <i>Solanum</i> , and several other wild and cultivated plants	phytomyzous	Europe, N Africa, SW Asia
<i>Lygus pratensis</i> (Linné)	Cruciferae, <i>Hibiscus</i> , <i>Foeniculum</i> , <i>Solanum</i> , <i>Verbascum</i> , <i>Sesamum</i> , <i>Matricaria</i> , <i>Chrysanthemum</i> , <i>Artemisia</i> , <i>Taraxacum</i> , <i>Sorghum</i> , <i>Zea</i> , and several other wild and cultivated plants	phytomyzous	Europe, N Africa,
<i>Lygus spinolai</i> (Meyer-Duer)	<i>Humulus</i> , <i>Urtica</i> , <i>Rumex</i> , <i>Clematis</i> , <i>Filipendula</i> , <i>Spiraea</i> , <i>Rubus</i> , <i>Convolvulus</i> , <i>Verbascum</i> , <i>Achillea</i> , <i>Tanacetum</i> , <i>Artemisia</i>	phytomyzous	N and Middle Europe
<i>Capsodes sulcatus</i> (Fieber)	<i>Chenopodium</i> , <i>Rubus</i> , <i>Anthyllis</i> , <i>Senecio</i>	phytomyzous	W Europe
<i>Malacocoris chlorizans</i> (Panzer)	<i>Salix</i> , <i>Alnus</i> , <i>Corylus</i> , <i>Malus</i>	zoo- & phytom.	Europe, N Africa

*Capsodes sulcatus* (Fieber). Adult 6,0 - 7,0 mm long, body brown in colour with yellow spots and stripes, thorax reddish brown, scutellum with orange yellow spot or stripe, legs brown and yellow, elytrae blackish grey with light yellow stripe on outer side and two orange yellow spots at the distal extremity of the body. Female micropterous.

It lives on herbaceous plants in rather arid zones.

Serious damage on the grapevine were reported in some parts of France where it was called "La grisette de la vigne" (the small grey bug of the grapevine). In spring larvae and adults pierce the bunches both on the stalks and on the buds ready to flower and cause the abortion of single grapes or desiccation of the whole bunch (MAYET, 1890). This species is named "cimice della vite" (grapevine bug) in Italy (DELLA BEFFA, 1961), where, however, its damages are not known so far.

*Malacocoris chlorizans* (Panzer). Adult 3,2 - 3,7 mm long, body whitish in colour, with a thin and whitish pubescence, head small and globular, first segment of the antennae with a black longitudinal line, hemelytrae transparent with emerald green spots, transparent membrane with part of veins and apical part of cells green.

It lives on deciduous broadleaved trees infested by phytophagous mites (GEIER & BAGGIOLINI, 1952; FOSCHI & CARLOTTI, 1957).

On the grapevine it is particularly active not only against *Panonychus ulmi* (Koch), *Tetranychus urticae* Koch, and *Eotetranychus carpini vitis* (Oudemans) but also against the leafhoppers *Empoasca vitis* (Goethe), *Zygina rhamni* Ferrari, and *Scaphoideus titanus* Ball (unpublished data). Its effectiveness as a mite predator appeared to be considerable in all developmental stages, from egg to adult, especially in small vineyards surrounded by other cultivations and not sprayed with acaricides and insecticides. It behaves as a plant sucker in the absence of mites (CARLE, 1965) and leafhoppers. Since it can do so, it manages to continue its development and conveniently survives in periods of lack of prey. *M. chlorizans* plays a remarkable role in controlling phytomyzous populations on the grapevine while, as an occasional plant sucker, it does not cause any alterations.

### Conclusions and discussion

The species of occasional ampelophagous Heteroptera are numerous but of little, local and desultory interest. Considering that they depend on particular ecosystems near the involved vineyards, it is necessary to keep in mind that some of them are favoured by the kind of cultivation and by the consequent ecological conditions of the same vineyards (VIDANO, 1988). Their geographic distribution does not fit with that of the grapevine, which actually results in marginal involvement only.

The authors that worked on the grapevine Heteroptera recorded also

other species, such as *C. minutus*, *P. apterus*, *P. prasina*, *P. viridissima*, *E. oleraceum*, *C. waltianus*, and *S. bicolor* (STELLWAAG, 1928). On this occasion, these species have not been considered because, according to our research, they are not to be regarded as ampelophagous. The above observations are valid only for the Palaearctic Region. Having to extend the survey to other viticolous territories, it is necessary not to forget the Coreidae *Leptocoris trivittatus* Say, the Pentatomidae *Murgantia histrionica* Hahn, and the Miridae *Lygus invitus* Say of the Nearctic Region, the Lygeidae *Nysius vinitor* Bergroth of the Australian Region, the Coreidae *Anoplocnemis phasianus* Fabricius and the Pentatomidae *Scutellera perplexa* Stoll of the Indian Region (STELLWAAG, 1928).

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