

Leafhoppers and planthoppers vectors in Ligurian and Tuscan vineyards

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Abstract: Phytoplasmas vectors were investigated in 8 vineyards located in the area that runs the length of the coast from Southern Liguria (La Spezia district) to Centre Tuscany (Massa-Carrara, Lucca, Pisa and Livorno district). During the triennium 1998-2000 94 species of Auchenorrhyncha (Cixiidae, Cercopidae and Cicadellidae) have been identified. Among them 16 are known as potential disease vectors. The most important is *Scaphoideus titanus* Ball, vector of Flavescence Dorée “*sensu stricto*”, captured only in the Northern vineyards (La Spezia, Massa-Carrara and Lucca). Its life cycle, carried on in such districts, has been described. Other potential vectors of yellows diseases, collected in the mentioned vine growing areas, are *Hyalestes obsoletus* Signoret, *Anoplotettix fuscovenosus* (Ferrari), *Euscelis lineolatus* Brullé, *Psammotettix striatus* (L.), *Psammotettix alienus* (Dahlbom) *Macrostelus quadripunctulatus* (Kirschbaum), *Macrostelus laevis* (Ribaut) and *Neolaliturus fenestratus* (Herrich-Schäffer).

Key words: Phytoplasma, yellows diseases, vector, *Scaphoideus titanus*, life cycle.

Introduction

Since the second half of 80's several cases of grapevine yellows have occurred in Tuscany (Conti, 1986; Egger & Grasselli, 1988). Such diseases are often caused by different phytoplasmas carried by insects belonging to planthoppers and leafhoppers (Homoptera, Auchenorrhyncha). In particular two of them are really noteworthy: *Hyalestes obsoletus* Signoret, as vector of Bois Noir (Group 16SrXII-A), and *Scaphoideus titanus* Ball, as vector of Flavescence Dorée (Groups SrV-C e SrV-D). Since the former species lives on weeds and only occasionally feeds on vine leaves (Sforza & Boudon-Padieu, 1998), we focused our attention on *Scaphoideus titanus*, which is strictly ampelophagous (Vidano, 1964), so that its occurrence is more than worrying for the Italian viticulture.

The presence of this vector was recorded for the first time in Liguria in 1964 by Vidano (1964) while the first case of FD in Veneto was signalled in 1973 (Belli *et al.* 1973). After hardly a decade Northern Italy vineyards were largely affected by FD, also because of the presence of *Scaphoideus titanus* all over the Po Valley.

On the contrary, the record of this species is very recent in Tuscany (Santini & Lucchi, 1998), confirming a worrying trend of such a vector to expand to the Southern Italian countries. It follows that it is really important describing the life cycle carried on by *Scaphoideus titanus* in this new area of propagation in order to set up an adapted strategy of control. As a matter of fact, there is a lack of studies on leafhoppers and planthoppers of the coastal Tuscany, except the observations reported by Vidano *et al.* (1987).

For all these reasons, the investigation on the occurrence and distribution of Auchenorrhyncha has been the first aim of the present study, in order to delineate an exact profile of the situation along the coastal Tuscany, pointing out all the species accused, or suspected, to be vectors.

Materials and methods

Investigations have been carried out in the triennium 1998-2000, in 8 vineyards along the Tuscan and Ligurian coast, from La Spezia (Manarola and Corniglia localities) to Livorno district (Cecina), passing through Massa-Carrara (Bonascola and Battilana), Lucca (Strettoia) and Pisa (Crespina and Peccioli) districts. Observations have been made during the grapevine vegetative phase, since April to October.

Monitoring was undertaken weekly both by replacing three yellow sticky traps for each locality and by direct field surveys, based on net sweepings and on counting of *Scaphoideus titanus* nymphs present on 50 leaves.

Identification of the species caught on sticky traps was made by observing male genitalia with stereoscopic microscope.

Results and discussion

As a whole, 94 different species, belonging to Cixiidae, Cercopidae and Cicadellidae families have been identified. Among them 15 are known, nowadays, as potential vectors of phytoplasmas plant diseases (Tab. 1), in particular *Scaphoideus titanus*, recorded in the Northern vine growing areas of La Spezia, Massa-Carrara e Lucca, and *Hyalestes obsoletus*, on the contrary collected all over the localities.

It is noteworthy that, except the vineyard of Strettoia, the others, where *Scaphoideus titanus* occurred, were affected by yellows diseases not determined by molecular survey yet. As for Livorno and Pisa districts, neither yellows diseases nor any specimens of this leafhoppers have been recorded, whereas *Hyalestes obsoletus* was found. However during the triennium few captures of this Cixiidae have been reported for each vineyard, that is consistent with the scarce ampelophilia usually attributed to this species, which rather prefers living on weeds.

More than important is the occurrence of *Scaphoideus titanus*, species strictly ampelophagous, the monitoring having allowed the description of its life cycle in the mentioned area (Fig. 1). First of all it is quite interesting the wide gradual eggs hatching period, which occurred since mid May up to July. This data suggest the necessity of maintaining a constant warning state on vineyards until the last segment of season, since hatchings occur until August.

The highest nymphs peak occurred between June and July, in this way to be considered the most dangerous period. Furthermore it was still possible to catch few young stages underneath vine leaves at the end of August. Nymphs are held the main responsible for phytoplasmas transmission and for this reason are the first objective to fight by control strategies.

Their highest occurrence were recorded during the second half of June, when prevailed 4th and 5th immature stages. First adults were recorded at the beginning of June and reached their highest peaks of captures between July and August. Last records were made in October.

As regards other vectors caught, only *Anoplotettix fuscovenosus* is referable to grapevine, as species occasionally ampelophagous, accused to transmit, at least under laboratory conditions, yellows phytoplasmas to *Vitis vinifera* (Alma, 1995). Anyway few specimens of such a vector have been recorded in the course of the study.

Other species able to feed on vine, such as the cercopid *Philaenus spumarius* and the cicadellid *Cicadella viridis*, both suspected to transmit yellows diseases, have been found. As a matter of fact, they are known as vectors of the Pierce disease in Northern America (Vidano, 1965; Arzone, 1972).

Table 1. List of Auchenorrhyncha, collected in the investigated area and known as potential vectors of plant diseases.

Species	Locality							
	Corniglia	Manarola	Battilana	Bonascola	Strettoia	Crespina	Peccioli	Cecina
1 <i>Anoplotettix fuscovenosus</i> (Ferr.)	X	X	X	X	X	X	X	X
2 <i>Cicadella viridis</i> (L.)	X	X	X	X		X	X	X
3 <i>Euscelis incisus</i> (Kbm.)						X	X	
4 <i>Euscelis lineolatus</i> Brullé	X	X		X		X		
5 <i>Fieberiella florii</i> (Stål)						X	X	
6 <i>Hyalestes obsoletus</i> Signoret	X	X	X	X	X	X	X	X
7 <i>Macropsis fuscula</i> (Zett.)				X	X	X		
8 <i>Macrosteles laevis</i> (Rib.)	X	X	X	X	X		X	
9 <i>Macrosteles quadripunctulatus</i> (Kbm.)		X		X	X		X	
10 <i>Nealiturus fenestratus</i> (H.-S.)					X	X	X	X
11 <i>Nealiturus haematoceps</i> (M.& R.)								X
12 <i>Philaenus spumarius</i> (L.)	X	X	X	X	X	X	X	X
13 <i>Psammotettix alienus</i> (Dahlb.)						X		X
14 <i>Psammotettix striatus</i> (L.)	X	X		X		X	X	X
15 <i>Scaphoideus titanus</i> Ball	X	X	X	X	X			

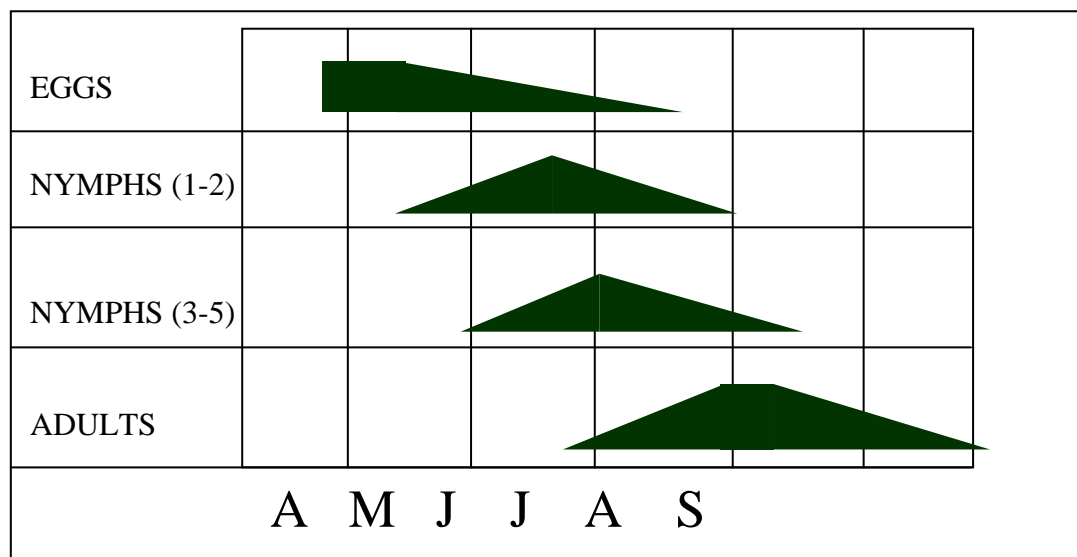


Fig. 1. Life cycle of *Scaphoideus titanus* Ball in Northern Tuscany

Moreover, further 11 vector species were identified. They usually occur on the weeds in the vineyards and in its surrounding. Though they haven't been proved as vine vectors yet, there are several hypothesis on their possible role in the transmission of such diseases to grapevine.

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