

Research Note

***Xylotrechus arvicola* (Olivier)
(Coleoptera, Cerambycidae), a new
impacting pest on Spanish vineyards**

R. OCETE¹⁾, M. A. LÓPEZ¹⁾, C. PRENDES²⁾, C. D. LORENZO²⁾,
J. L. GONZÁLEZ-ANDÚJAR³⁾ and M. LARA⁴⁾

¹⁾Laboratorio de Entomología Aplicada, Universidad de Sevilla,
Sevilla, Spain

²⁾U.D.I. de Fitopatología, Universidad de La Laguna, La Laguna
(Tenerife), Spain

³⁾Departamento de Protección de Cultivos, Instituto de
Agricultura Sostenible (CSIC), Córdoba, Spain

⁴⁾C.I.F.A. Rancho de la Merced, Jerez de La Frontera (Cádiz),
Spain

Summary: Infestation caused by *Xylotrechus arvicola* (Olivier) (Coleoptera, Cerambycidae) is becoming a new sanitary problem in some Spanish vine-producing areas. Symptoms caused by the pest, the identification of 7 associated wood fungal species living in galleries excavated by larvae, some data about the evolution of the infestation during 8 years in the same plot and the different levels of susceptibility exhibited by three grape varieties are presented in this paper.

Key words: associated wood fungi, infestation, Spanish vineyards, symptoms, *Xylotrechus arvicola*.

Introduction: *Xylotrechus arvicola* (Olivier) (Coleoptera, Cerambycidae) has a holomediterranean distribution area. In Spain, it was found preferably in the northern part (VIVES 1984).

Larvae belonging to this polyphagous species have a conical-shaped trunk with very well marked pseudopoda and a whitish colour (Figure). In all cases, several roundish exits for adults, about 4 mm in diameter, are visible on the trunk of the host plant.

The coleopteran was refereed as a pest in La Rioja Denomination of Origin vineyards on vines which are more than 15 years old. The highest level of damage was found in cv. Tempranillo, the most representative red grapevine variety in Spain, especially in vineyards located near river bank forests with *Populus nigra* L., which are a reservoir for this insect (OCETE and DEL TÍO 1996). Later, the pest was also found in other Denominations of Origin, such as Ribera del Duero, Cigales and Rueda (Castilla y León region), Valdepeñas and La Mancha (Castilla-La Mancha region) (OCETE and LÓPEZ, 1999) and recently in Navarra.

According to PELÁEZ *et al.* (2001), the incidence of this pest is influenced by the pruning system, the age and the variety of the vine.

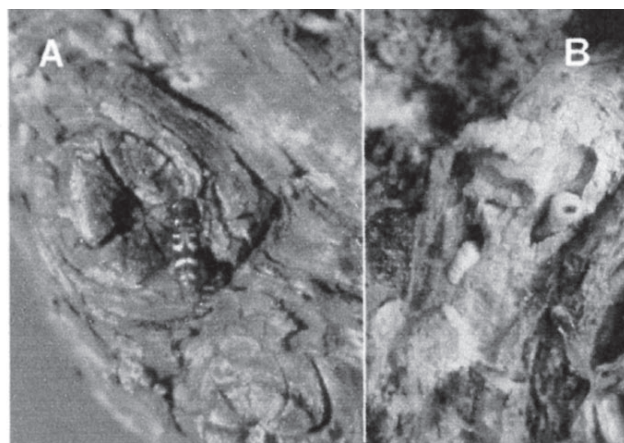


Figure: A: Imago of *X. arvicola* on a vine trunk; B: larvae.

During the pruning period (Dec. 2001 to Feb. 2002) the number of affected vines increased distinctly in the cited regions, underlining the necessity to find solutions. The aim of this paper is to describe the direct and indirect damages caused by the pest in vineyards.

Material and Methods: Monitoring of the evolution of infestation caused by the pest was carried out during pruning time in 1994, 1999 and 2002, and complementary symptoms appeared on shoots in June, in a plot named Cerrado de la Arena (Cuzcurrita de Río Tirón, La Rioja).

This dry farming vineyard (1.5 ha) is 33 years old and is planted with cv. Tempranillo; the training system is called 'candelabra'. The average percentage of infestation was registered annually on 200 vines situated along the two main diagonals of the plot.

A second approach to study the susceptibility of different varieties to the pest under the same conditions of cultivation and to investigate a possible association between the presence of larvae and wood fungal species was carried out in 2001–2002 in a vineyard called Castillo de Ciruela (Ciudad Real). This vineyard has 3 varieties, different ages of plants and a serious infestation in cv. Cabernet Sauvignon.

In this second vineyard, the training system is an espalier; a fertigation system is used. The area planted with Cabernet Sauvignon was 20.8 ha; that of Macabeo 8.4 ha and that of Airén 25.6 ha. The age of plants was between 7 and 22 years. During pruning 200 vines were sampled at random in each plot following the main diagonal line. Each arm was sectioned to observe galleries excavated by larvae and symptoms caused by fungal infection around them to calculate the percentages of infestation and fungi-pest associations in the three varieties.

Data were analyzed by a 2x2 contingency table (ZAR 1974) in order to establish the presence or absence of association between fungi and pest infestation. The null hypothesis, no association, was tested using a χ^2 test with Yates' factor of correction. The force of the association was established according the Jaccard's coefficient (JANSON and VERGELIUS 1981).

To identify the pathogenic fungi around the walls of the galleries excavated by larvae, small fragments of wood were placed in Petri dishes on a PDA medium containing 0.5 mg·l⁻¹ with an addition of 0.5 mg/l of chloranphenicol. Identifica-

tion of the species was based on criteria proposed by FARR *et al.* (1989).

Results and Discussion: In the plot situated in La Rioja, the percentage of affected vines increased 5-fold in the last 8 years and at the present is 81 %.

In the case of La Mancha, results indicate that cv. Cabernet Sauvignon (13 years old, recently introduced into this region) has the highest infestation rate, *i.e.* more than 90 %, indicating its high susceptibility to the insect. This variety is followed by Macabeo with 27.5 % infestation rate. It is interesting to note that the infestation rate of Airén, the traditional variety of the region for centuries (DE HERRERA 1513), is only about 10 %, despite the fact that Airén vines are the oldest vines in the cited vineyard.

The present results reveal the existence of an association between the action of larvae and fungal infection for the three varieties tested. The degree of association is highest for cv. Cabernet Sauvignon and lowest for Airén, according to Jaccard's coefficient values.

The fungal species isolated and identified from the limits of the galleries can be classified in two groups, according to the sequence of infection (HEWITT 1988):

Primary fungi: *Alternaria alternata* (Fries) Keissler, *Cladosporium oxysporum* Berkeley and Curtis, *Lasiodiplodia theobromae* (Patoulliard) Griffon and Maublanc, *Phomopsis viticola* (Saccardo) Saccardo, *Ulocladium atrum* Preuss.

Secondary fungi: *Cephalotrichum stomonitis* (Persson) Link and Fries, *Fusarium oxysporum* Schlechtendahl.

All these pathogenic fungi are present in pruning wounds and during about 2 years use the constant sapping action of the larvae to penetrate into the trunk. Clear evidence for this was obtained for cv. Cabernet Sauvignon by statistical analysis.

In most of the cases, the formation of galleries starts in the cited cuts which are, at least, two years old. First larval instar begins to excavate the medulla. Due to this, a preventive cultural technique is to eliminate these rests during pruning.

The complementary destruction by coleopteran and fungal diseases progressively weaken the affected vine, as indicated by drastically reduction of yield and premature death. During the dying period, shoots are without vigor, they look quite similar to those infected by the Eutypa dyeback complex.

To eliminate the sources of infestation and infection it is necessary to cut back the trunk of vines to enable regrowth and to cover the wounds with sealing paste.

It is necessary to study the biology of this insect, which until now was not considered a pest of vineyards. In addition, the causes of the rapid spread of this sanitary problem must be investigated in order to design strategies of control according to the postulates of Integrated Grape Production.

We want to thank Dr. R. PÁJARO for a critical review of the manuscript.

- DE HERRERA, A.; 1513: (reedition 1645): *Agricultura General*. Imp. de Carlos Sánchez, Madrid.
- FARR, D. F.; BILLS, G. F.; CHAMURIS, G. P. and ROSSMAN, A. Y.; 1989: Fungi on plants and plant products in the United States. APS Press.
- HEWITT, W.B.; 1990: Berry Rots and Raisin Molds. In: PEARSON and GOHEEN (Eds.): Compendium of Grape Diseases, 26-28. The American Phytopathological Society, St. Paul, Minnesota.
- JANSON, S. and VEGELIUS, J.; 1981: Measures of ecological association. *Oecologia* **49**, 371-376.
- OCETE, R.; DEL TÍO, R.; 1996: Presencia del perforador *Xylotrechus arvicola* (Olivier) (Coleoptera, Cerambycidae) en viñedos de la Rioja Alta. *Bol. San. Veg. Plagas* **22** (1), 199-202.
- OCETE, R.; LÓPEZ, M. A.; 1999: Principales insectos xilófagos de los viñedos de la Rioja Alta y Alavesa. *Viticultura y Enología Profesional* **62**, 24-30.
- PELÁEZ, H. J.; MARAÑA, R.; URBEZ, J. R. and BARRIGÓN, J. M.; 2001: *Xylotrechus arvicola* (Olivier, 1795) (Coleoptera, Cerambycidae). Presencia en los viñedos de Castilla y León. IV Congreso Ibérico de Ciencias Hortícolas, Cáceres.
- VIVES, E.; 1984: Cerambycidos de la Península Ibérica y de las Islas Baleares. *Treballs del Museu de Zoologia*. 2. Ajuntament de Barcelona, Barcelona.
- ZAR, J. H.; 1974: *Biostatistical analysis*. Prentice-Hall, New York.