# ON THE OCCURRENCE OF *XIPHINEMA INDEX* THORNE *ET* ALLEN IN GRAPEVINE AREAS OF THE HERAKLION PROVINCE, CRETE, GREECE

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**Summary.** The occurrence of the virus vector nematode *Xiphinema index* in grapevines of the province of Heraklion, Crete, based on soil samples examined during the last 15 years, is presented and compared with that of a survey conducted in 1988, when a replanting scheme for the control of grape aphis phylloxera had just started. The control measures that have been taken since then were found to be insufficient to eliminate or even reduce the distribution of the nematode, as its presence and severity and that of the *Grapevine fanleaf virus* it transmits has remained unchanged throughout this 23-year period.

**Keywords:** Distribution, *Grapevine fanleaf virus*, severity.

One of the most severe viral diseases of the grape crop is the *Grapevine fanleaf virus* (GFLV) (Andret-Link *et al*., 2004), which is transmitted by the ectoparasitic nematode *Xiphinema index* Thorne *et* Allen (Hewitt *et al*., 1958). The nematode is endemic in several grape production areas of Greece (Tzortzakakis *et al*., 2008). The province of Heraklion, Crete, is an important region for viticulture. In the late 1980s, a replanting scheme for the control of the aphis phylloxera (*Daktulosphaira vitifoliae* Fitch) began using American grape rootstocks onto which commercial grape cultivars were grafted. At that time, a survey of the occurrence of *Xiphinema* species revealed that *X. index* was present in 27% of the 130 sampled vineyards (Vovlas and Avgelis, 1988, Fig. 1). This was the first published extended survey on the presence of *Xiphinema* spp. in Greece, and suggested the need for phytosanitary regulations before replanting grapevine.

Since 1996, several soil samples, collected from grapevines established during the replanting exercise started in the late 1980s, have been brought to the Nematology Laboratory of the Plant Protection Institute of Heraklion, Crete, by farmers, to ascertain the presence of *X. index*. More samples were also collected by the nematologist of the same laboratory. All soil samples were processed to extract nematodes by the decanting and sieving method with a final separation from fine soil particles after migration through extraction dishes fitted with a 95 µm pore net (Brown and Boag, 1988).

*Xiphinema index* was found in 25 localities, in each being present in one or several samples, from different fields of the same area. These localities are mapped in Fig. 1. Comparing the present situation with that in 1988, it is obvious that the nematode distribution over the Heraklion province has remained unchanged over the last 23 years. However, this could be an underestimation of the real situation as the majority of the soil samples were collected by farmers, lacking specific experience in sampling the rhizosphere and visualization of possible nematode niches through symptoms of spreading GFLV.

In the last four years (2007-2011), of the 54 samples brought by farmers exclusively from Archanes (arrowed in Fig. 1), 50% contained the nematode. One sample originated from a grapevine which had been treated three years before with a systemic herbicide to destroy roots; despite the vine having been killed and the absence of sprouts, the sample still contained *X. index* although in low density (two females per kg of soil). Also, in 2010-2011, of the 27 samples coming from grapevines of Profitis Ilias (arrowed in Fig. 1), the nematode was detected in 30% of them. In that area a new replanting scheme had already begun and 30 samples were also provided from fields from which the grapevines had been uprooted 1-3 years before and that were now either in fallow or under cereal cultivation. In these fields also, *X. index* was found in 30% of the samples in densities ranging from 1 to 34 specimens per kg of soil.

The highest density of the nematode was recorded in one sample coming from a vine showing relatively good growth, and was c. 400 specimens per kg of soil. A few males were found in a couple of samples; these are extremely rare and not essential for reproduction (Luc and Cohn, 1982). Sufficient root pieces were rarely found within soil samples. When found, some of them were galled, but it could not be ascertained whether they were caused by the nematode feeding or not, as several phylloxera aphis specimens were also observed.

In many cases, severe symptoms of GFLV, vectored by the nematode, resulted in considerable reduction of

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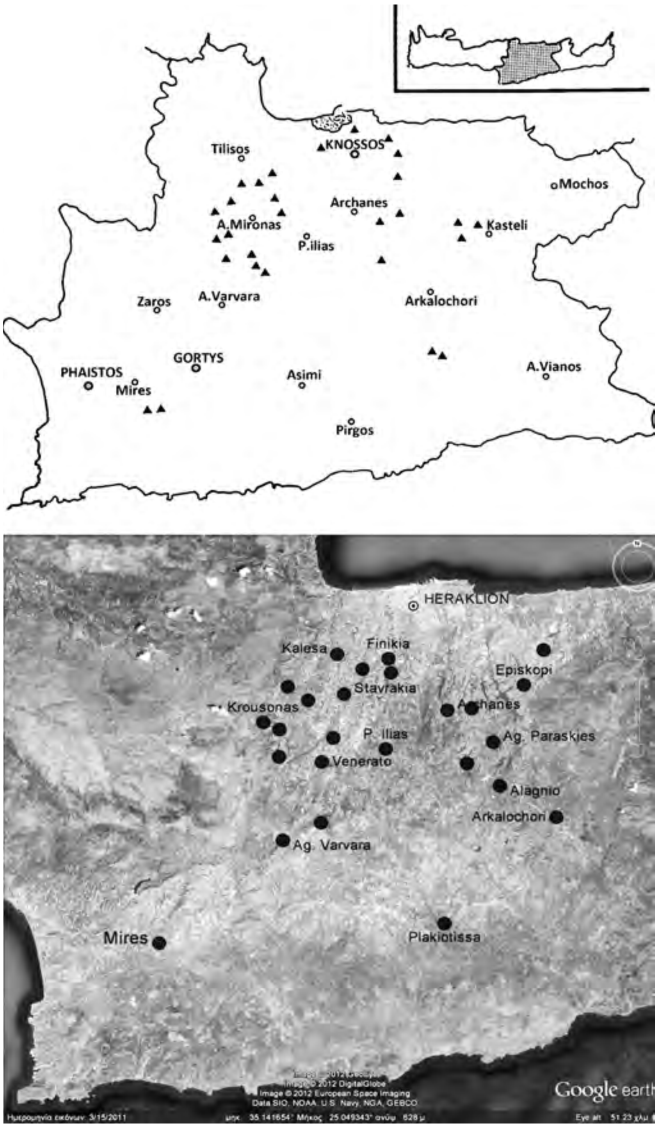


**Fig. 1.** Distribution of *Xiphinema index* (encircled areas), in grapevines of the province of Heraklion, Crete. Above: the triangles indicate the areas in which the nematode was found in a survey conducted in 1988 (Vovlas and Avgelis, 1988). Below: the dots indicate the areas where the nematode was found in samples examined during the period 1996-2011.

plant vigour and productivity (Fig. 2), thus making the crop unthrifty. Some of such vineyards were abandoned or uprooted when still less than 15 years old.

Control measures which have been undertaken for eliminating *X. index* in grapevines of the Heraklion province (incomplete root destruction of the old vineyards and short fallow periods 1-3 years) have been insufficient. Instead, control strategies aimed at eliminating the nematode before replanting infected areas, should consider longer fallowing periods (Lamberti, 1981; Raski *et al.*, 1983, Philis, 1994). For a competitive viticulture industry, further actions are necessary, especially with reference to sanitary selection, sanitation and certification of local cultivars (Walter and Martelli, 1998).

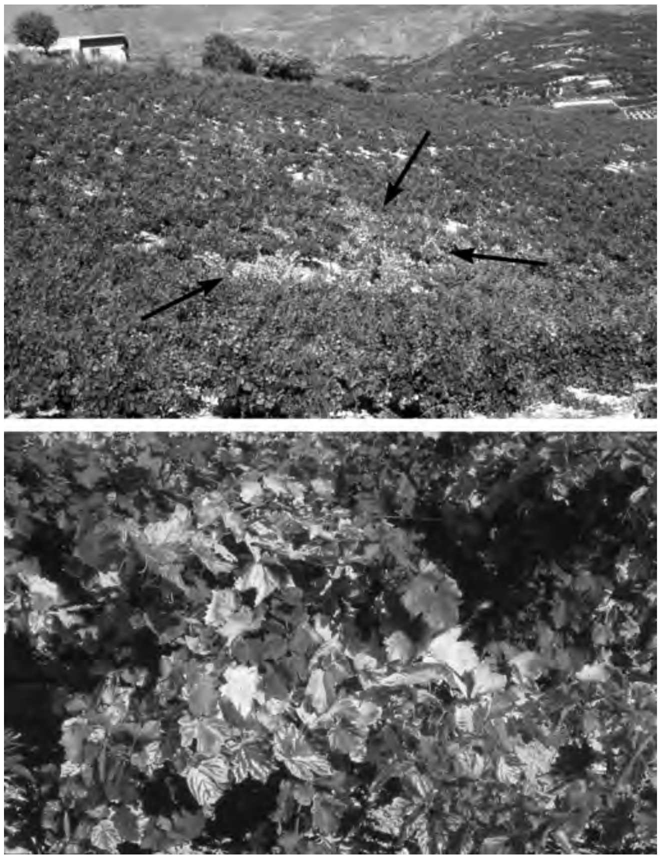

**Fig. 2.** A patch of vines (above) infected by GFLV, spread by the nematode *X. index* (below: close up of a severely infected vine).

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