

Department of Zoology and Ecology, University of Agricultural Sciences, H-2103 Gödöllő, Hungary
Research Institute for Plant Protection of Hungarian Academy of Sciences, H-1026,
Budapest, Hungary

**OBSERVATIONS ON THE VERTICAL DISTRIBUTION
OF *XIPHINEMA VUITTENEZI* (LONGIDORIDAE, NEMATODA)
IN AN APRICOT ORCHARD IN HUNGARY**

by

P. NAGY, G. BAKONYI and G. JENSER

Summary. Studies were undertaken on spatial and temporal distribution of *Xiphinema vuittenezi* in Hungary. Soil samples were collected during three subsequent vegetation periods, but no consistent differences were found in vertical distribution of the nematode in an apricot orchard near Budapest, down to 60 cm depth.

Dagger nematodes (genus *Xiphinema*, Cobb 1913), are economically important as parasites of fruit trees and grapevine, and as virus vectors in temperate areas. Surveys conducted to detect temporal and spatial trends in density of various *Xiphinema* species in different regions led to inconsistent conclusions. The vertical distribution of *Xiphinema* species in the soil is correlated with the availability of host roots and a suitable moisture regime although few investigations have been carried out to substantiate this general assumption (Taylor and Brown, 1997).

The density and spatial distribution of *Xiphinema vuittenezi* attracted less attention so far. Consequently, little is known about the influence of seasonal changes on the density and spatial distribution of this species. Data from Germany (Rüdel, 1975) show that in July the nematode is more abundant between 30-60 cm than in top 30 cm under deep rooting plants in a sandy loam-loamy area, but this pattern reverses by November, when higher abundance

values were observed in the top 20 cm of soil. Populations of this nematode rapidly declined between 20 and 40 cm, and just a few individuals occurred at the depth of 40-100 cm. Further, signs of vertical migration were found during 27 months of observation. These patterns were probably related to root distribution (Flegg, 1968). In Poland, under strawberry plantations *X. vuittenezi* was found to be the most abundant in the soil layer between 20-22 cm and, at an other location, between 40-42 cm (Szczygiel and Hasiór, 1972). However, the latter value was less convincing due to the low number of nematodes (13 in total) recovered from the given location.

In Hungary, similarly to other Central European countries (Liskova 1995), *X. vuittenezi* is one of the most common members of its genus (Sárospataki *et al.* 1968; Jenser 1985; Andrassy and Farkas 1988), where it is an important pest, especially in vineyards and orchards. During a general nematological survey on grapevine, little differences were observed in numbers of in-

dividuals between the 0-30 and 30-60 cm soil layers and in a young vineyard, *X. vuittenezi* appeared to be more abundant in the deeper level, while in older plantations more nematodes were recovered from the top 30 cm soil (Elekes and Vályi 1980).

Because the depth at which a particular nematode species is normally found has a bearing on the application of control measures, an investigation was undertaken to explore the vertical population distribution pattern of *X. vuittenezi* Luc, Lima, Weischer *et* Flegg in an apricot orchard.

Material and methods

Soil samples were taken in the apricot (*Prunus armeniaca* L.) orchard of Elvira Major, near the town of Érd (26 km Southwest of Budapest, Hungary). Trees were spaced at 5-6 m apart. The soil between the rows was cultivated and within the rows herbicide was applied to keep the area free from weeds. Thus, apricot roots were the only remarkable food source for nematodes in the study. The soil type was pseudomiceliar chernozem calcareous loam. On average, the soil layers from 0-60 cm had a pH_(KCl) of 6.8-7.2, a CaCO₃ content of 5-10%, and a humus content of 2.2%. Sampling occurred in 1979 (10 April, 5 June, 28 August, 2 October and 26 November), in 1980 (26 March, 22 July, 26 November) and in 1981 (30 March, 10 August, 2 November). Seven apricot trees were marked at the first time to be used consequently as sampling locations. Samples were taken around the trees, in a distance of approximately 1,5 m from the trunk (under the canopy). Thus, seven samples were taken on each of the eleven sampling days. The whole sampling area was about 7.000 square meter. The soil cores were divided into four layers: 0-15 cm, 15-30 cm, 30-45 cm and 45-60 cm.

Nematodes were extracted from 250 g sub-samples using modified Cobb's method (Flegg,

1967) after a treatment with sodium oxalate to disperse soil aggregates. Following extraction, fourth stage juveniles (J4) and females of *X. vuittenezi* were counted.

Density data were analysed by ANOVA (STATISTICA statistical software, Stat.Soft., Inc. Tulsa, 1995) to examine the effect of depth on population estimates. Time was regarded as a covariate factor in these analyses. Significance was tested at P<0.05 level. As null hypothesis, an even distribution of nematodes between the soil layers was considered.

Pearson's correlation coefficient was calculated to examine the possible correlation between the nematode densities of the different soil layers during the sampling period. Paired comparison of the density data in different soil layers at the eleven sampling occasions was performed. Significance was tested at p<0.01 level.

Results and discussion

Results of ANOVA showed that the density of nematodes did not differ significantly between soil layers during the sampling period (P=0.61). It means that there was no stratification regarding the density of the nematodes. Similar results were found, when carrying out the analysis for each of the eleven sampling days. No significant differences were detected in nematode density between the soil layers.

Apparent relation was found between the time depending trends of nematode density at the different soil layers. A graphic interpretation of the results showed clear coincidence of the population fluctuations (Fig. 1). Statistically significant correlation (P<0.01) was, however, found only between the nematode density of the 30-45 cm and 45-60 cm soil layers.

From the results it can be concluded, that the soil layers did not affect the numbers of *X. vuittenezi* recovered in the samples. Thus this species can be considered to have a more or less even distribution throughout the upper 60

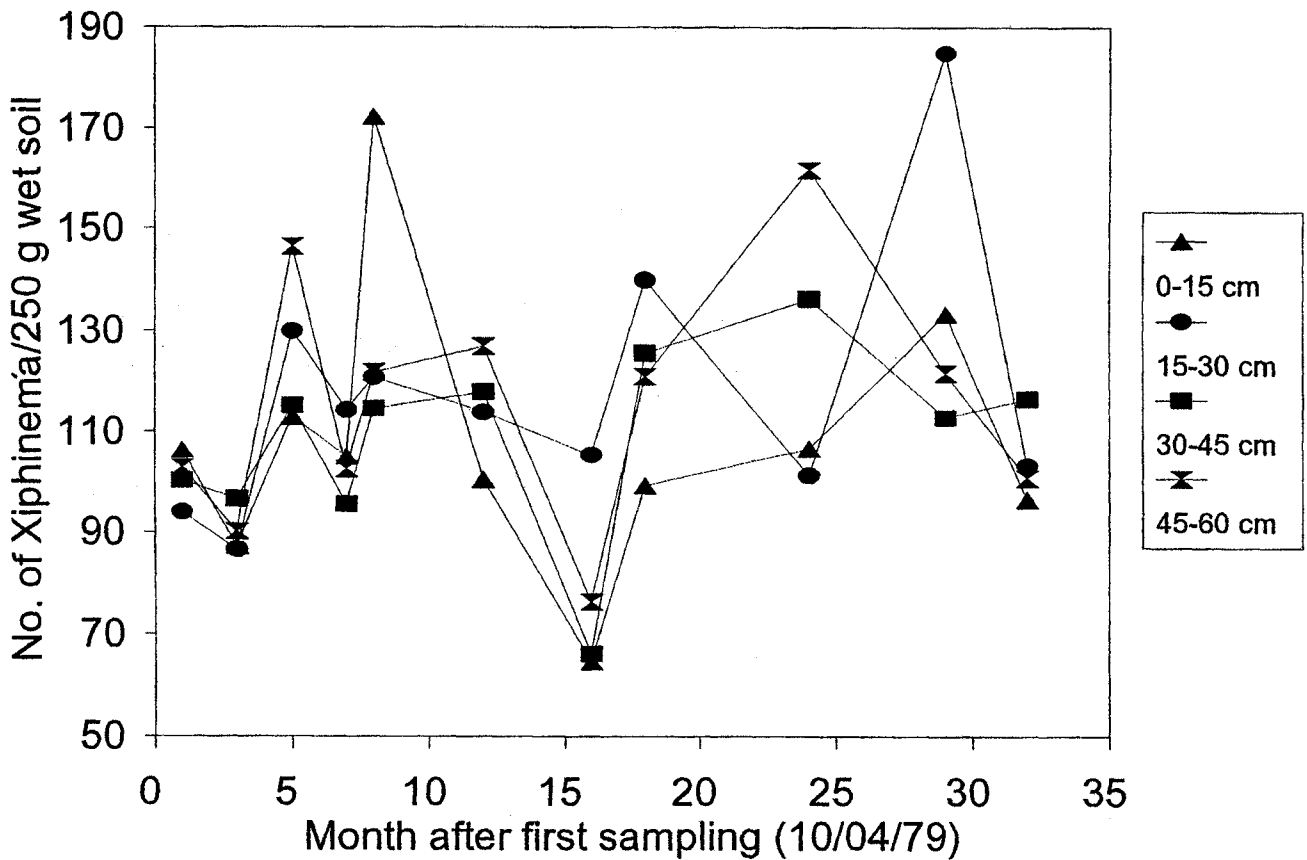


Fig. 1 - Population density of *Xiphinema vuittenezi* in an apricot orchard in Hungary.

cm of soil. In this way, the present study confirms those previous findings (Elekes and Vályi, 1980) where no pattern in vertical distribution was found down to 60 cm depth in a vineyard. On the other hand, it contradicts other reports (Flegg, 1968; Szczygiel and Hasiór, 1972; Rüdél, 1975), where *X. vuittenezi* specimens were found to be more abundant at a certain soil depth. These findings clearly indicate the need for further comparative studies to discover the vertical distribution of *X. vuittenezi* in different plantations.

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