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Hyalesthes obsoletus, a vector of stolbur phytoplasma: current situation in South Moravia, Czech Republic

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Abstract

A survey for the presence of *Hyalestes obsoletus* Signoret in 2010 confirmed a dramatic increase in number of captured individuals at observed localities in agriculturally important areas in southern Moravia, Czech Republic. Population density from the end of June to the middle of July, varies with locality. A preferred host plant *Urtica dioica* L. was present. Average percentage of stolbur phytoplasma positive *H. obsoletus* specimens varied from 31 to 59%.

Key words: weeds, *Urtica dioica* L., insect vectors, Hemiptera.

Introduction

During the recent years, the insect vector of stolbur phytoplasmas *Hyalesthes obsoletus* Signoret caught the attention of many researchers in connection with the study of phytoplasma infections of grapevines, i.e. with the local outbreak of bois noir (BN) disease (Sforza *et al*., 1998), or the spread of grapevine yellows (VK) (Weber and Maixner, 1998).

H. obsoletus presence could be connected with local epidemics of stolbur disease in solanaceous plants as they play an important role in spreading stolbur phytoplasma in main natural reservoirs, *Urtica dioica* L. and *Convolvus arvensis* L. (Alma and Tedeschi, 2010).

The preliminary results of our study focused on the occurrence and infectivity of *H. obsoletus* Signoret in three agriculturally important localities.

Materials and methods

Three localities from an agriculturally important area in the Czech Republic were chosen for the monitoring the stolbur phytoplasma vector. They were two bois noir infected vineyards, Březí and Perná localities, and one horticulture locality Lednice, where there are tomato and pepper plantations with high incidences stolbur phytoplasma.

H. obsoletus populations were surveyed from June 2008 to August 2010 using sweep nets ca every 10 days (depending on the weather) on bindweeds and stinging nettles. In each locality the weeds were swept 150 times. The spectrum of potential phytoplasma vectors was identified.

Infectivity of *H. obsoletus* individuals was analysed by the phytoplasma-specific PCR. The extracts of total DNA from single psyllid individuals were obtained using a commercial kit (Wizard Genomic DNA Purification Kit, Promega, USA). The detection of phytoplasmas in single individuals of *H. obsoletus* Signoret was performed using nested-PCR with universal P1/P7 primer pair followed by R16F2/R2 pair (Deng and Hiruki, 1991; Gundersen and Lee, 1996; Lee *et al.*, 1993; Schneider *et al*., 1995) derived from 16S rDNA. Identification of phytoplasmas was done in subsequent RFLP analyses using *Alu*I, *Mse*I, and *Rsa*I according to Lee *et al.* (1998).

Results

In the vineyard in Březí, where nettles are rarely found, only 18 specimens were captured. The percentage of stolbur phytoplasma-positive specimens varied from 0% to 67%, with average 31%. The maximum number of *H. obsoletus* individuals was noted at the end of June (figure 1A).

In the vineyard in Perná, 90 *H. obsoletus* were captured, all on the nettle. The occurrence culminated at the end of the first helf of August. The percentage of stolbur phytoplasma-positive specimens varied from 29% to 50%, with average 39% (figure 1B).

Sporadic occurrence of a few individuals of *H. obsoletus* was noted only at Lednice during the period 2008-2009. The situation changed completely in 2010 when the number of captured individuals dramatically increased. In this year a total of 556 individuals was captured, mostly on nettles. The occurrence culminated during the second half of July. The percentage of stolbur phytoplasma-positive specimens varied from 21% to 86%, with average 59% (figure 1C).

In all the phytoplasma positive individuals only stolbur phytoplasma presence was identified by PCR/RFLP analyses.

During the year 2010 a total of 6,450 individuals of bugs, leafhoppers, planthoppers and psyllids were collected. Other potential stolbur vectors, such as *Aphrodes bicinctus* (Schrank), *Euscelidius variegates* Zachvatkin, *Euscelis incisus* (Kirschbaum), *Lygus rugulipennis* Poppius, *Psammotettix alienus* (Dahlbom), *Psammotettix confinis* (Dahlbom), and *Reptalus panzeri* (Löw) were caught, too. A molecular analyses of the individuals and the evaluation of their infectivity are in preparation.

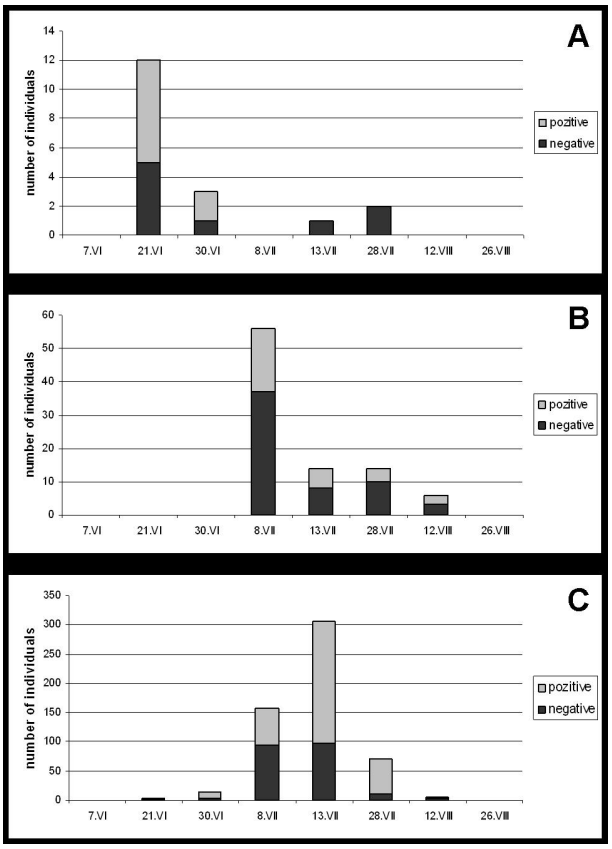

Figure 1. Population dynamics and infectivity of *H. obsoletus* in (A) Březí, (B) Perná, (C) Lednice localities.

Discussion

The planthopper *H. obsoletus* is the main vector of 'bois noir' phytoplasma (stolbur) (Weber and Maixner, 1998; Forte *et al*., 2010). It prefers herbaceous plant hosts *C. arvensis* and *U. dioica*; other reported hosts such as *Calystegium sepium* (L.) R. BR., *Lamium orvala* L., *Lavandula* sp., and *Vitex aguns-castus* L. were described (Alma and Tedeschi, 2010; Kessler *et al.*, 2011) are of minor importance in Czech Republic.

Population dynamics recorded on the localities studied in Czech Republic are similar to those of *H. obsoletus* in European countries and areas with the similar climate conditions. A comparable vector dynamics described Forte *et al*. (2010), a culmination delayed a few days was noted in North-Eastern Italy (Lessio *et al.*, 2007).

Infestation level of *H. obsoletus* varied from 31 to 59% which is comparable to vector activity detected in the Mosel Valley in Germany, where ca 30% of planthoppers were stolbur positive (Weber and Maixner, 1998).

Results presented in this study represent the first mass occurrence of *H. obsoletus* Signoret in the Czech Republic from the 1950's.

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