ON THE ABILITY OF *HYALESTHES OBSOLETUS* (HEMIPTERA : CIXIIDAE) TO TRANSMIT A GRAPEVINE YELLOWS PHYTOPLASMA IN FRANCE

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Bois noir (BN) is a grapevine yellows (GY) disease causing serious loss to grapevine (*Vitis vinifera* L.) production in many European and Mediterranean countries : France, Germany, Italy, Spain, Israel (Caudwell, 1961) (Battle et *al.*, 1995) (Gärtel, 1965) (Daire et *al.*, 1993).The disease is considered to be caused by a non-cultivable phytoplasma (previously mycoplasma-like-organism), classified in the aster yellows group (Schneider et *al.*, 1993). This phytoplasma is closely related or similar to the phytoplasma causing stolbur disease in Solanaceous crops. BN symptoms are irregular ripering of stems, with development of black pustules in longitudinal rows on the green bark, yellowing and rolling of the leaves, shrivellered berries and a general decline of the stock. Several *V. vinifera* varieties are susceptible to BN. Diagnosis is obtained through characterization of the phytoplasma by PCR (Daire et *al.*, 1993).

Until now, the vectors of BN was unknown in France. Studies on a GY occurring in Germany, called Vergilbungskrankheit, which pathogen is closely related to stolbur phytoplasma (SP), have shown the vector role of the planthopper *Hyalesthes obsoletus* (Hemiptera : Cixiidae) (Maixner, 1994). In 1995 and 1996 in vineyards and fallow lands in the South of France, we captured, identified and counted several thousand specimens of Hemiptera. Trapping methods were sweep net, D-vac aspirator and yellow traps. Three thousand of these insects were tested by PCR amplification in order to detect the presence of a SP. The results revealed the presence of a SP in 25% of the population of tested *H. obsoletus* (adults and nymphs) (Sforza et *al.*, 1996a). This monovoltine species was trapped at adult stage from June to August in vineyards and surroundings (see figure 1). Nymphs of *H.obsoletus* are blind until the 3rd instar, tiny, whitish with a post abdomen wax area and could have a gregarious activity on roots. Radicicolous nymphs were found from November to June on bindweed (*Convolovulus sp.*) and hoary cress *(Lepidium draba* L.) (Sforza et *al.*, 1996b).These host plants exhibited yellows symptoms and PCR amplification revealed presence of SP. A healthy rearing of *H.obsoletus* is being conducted in controlled conditions (23°C, 16-h photoperiod, 80% RH).

Trials of transmission during two years have permitted to confirm the vector role of *H. obsoletus* in the spread of BN (see table 1). Adults trapped in the field were put to feed by group of 10-15 on healthy plants, and left until they died. Survival of *H. obsoletus* on grape was no more of 7 days for some individuals, but 80% of all specimens died after 3 days. Some experiments of transmission were carried out with two different plants in the same pot, grape and bindweed, grape and periwinkle (*Catharanthus roseus* L.), grape and lavender (*Lavendula angustifolia* Mill.), grape and *Datura stramonium* L. ; percentages of infected grapes were higher in these experiments, respectively 25%, 38%, 60% and 100%, than when grapevine was alone, 14%. These results show that transmission of the phytoplasma by *H.* obsoletus is more effective with the presence of an alternative host. With the confirmation of the vector role of *H. obsoletus* in the spread of BN in France, the epidemiology of BN, with a vector living mainly on other plant species than grapevine, contrasts with the spread conditions of Flavescence dorée, another GY transmitted by an ampelophagous and monovoltine leafhopper species.

	N° of infected grapevines/ N° of inoculated grapevines	N° of infected periwinkles/ N° of inoculated periwinkles	N° of infected datura/ N° of inoculated datura
1995	7/34 (20%)	1/2 (50%)	-
1996	20/62 (32)	14/33 (42%)	3/4 (75)

Table 1: Experimental transmissions of SP by *H. obsoletus* in 1995 and 1996 on grapevine, periwinkle and datura

In order to determine the periods of inoculation of grape, bait-plants of different species (grapevine, datura and periwinkle), were installed over successive two-week periods from May to October, both in vineyards and fallow lands. Out of the 453 bait-plants, 17 were naturally infected by a SP in 1996. As shown on figure 1,

inoculation was obtained on bait plants from beginning of June to the end of July, a period corresponding to the adult activity of *H. obsoletus.* The latter was determined by the number of specimens trapped by D-vac aspirator for 5 min., at two-weekly periods over the summer. All bait-plants with symptoms were SP infected.

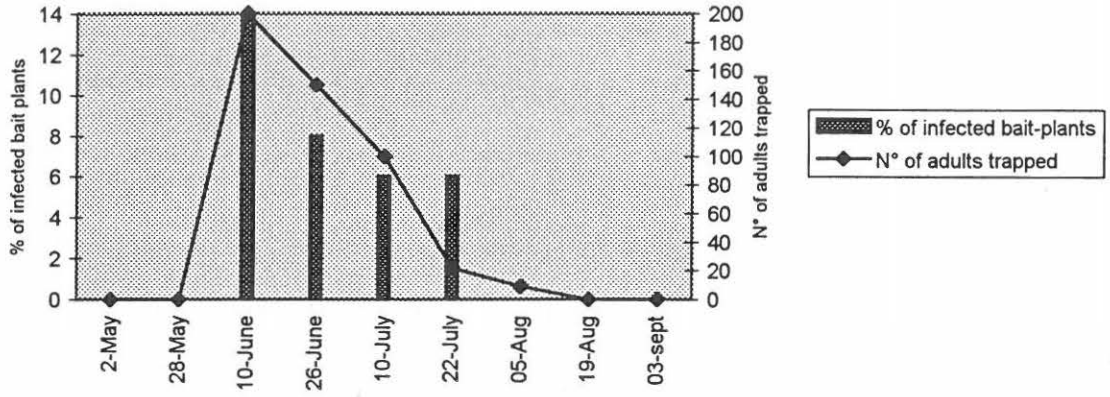

Figure 1: Comparison between percentages of infected bait plants and number of *H. obsoletus* trapped in south of France (1996) - each date represents day of trapping and day when bait plants were deposited in fields for two weeks.

Our results suggest that *H. obsoletus* species has an important role in the spread of BN in vineyards of South of France. However, we cannot rule out a vector role for any other Hemiptera species. We have shown in 1995, that leafhoppers (*Euscelis lineolatus* Brullé, *Mocydia crocea* H-S.) could be infected by a SP but always at a low rate. No transmission was effective with these species (Sforza et *al.*, 1996a).
Study of biology of *H.obsoletus* can explain some features of epidemiology of Bois noir. However, other trials are conducted on acquisition and transmission ability of nymphs and adult.

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