

Recovery phenomena in grapevines affected by grapevine yellows in Friuli Venezia Giulia

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Abstract

During 2004-2006 research was carried out in 19 vineyards to assess the occurrence of recovery in plants affected by grapevine yellows (GYs, i.e. “flavescence dorée” and “bois noir”). Irrespective of GY type, 50% of symptomatic grapevines showed recovery the following year and 70% after two years. In about one third of the grapevines which had recovered symptoms reappeared the following year. Grapevines cv. Chardonnay were more susceptible to and more seriously affected by GYs than those of cv. Merlot and this was also associated with a lower propensity for recovery. Varietal differences in recovery capability are important for establishing GY control strategies.

Key words: Grapevine yellows, phytoplasma, recovery, cultivar susceptibility.

Introduction

“Flavescence dorée” (FD) and “bois noir” (BN) are two grapevine yellows (GYs) which cause severe damage in European vineyards.

In North East Italy recovery occurs in symptomatic grapevines affected by both BN and FD (Osler *et al.*, 1993; Mutton *et al.*, 2002; Osler *et al.*, 2002; Pavan *et al.*, 2005). A different varietal propensity for recovery was observed in FD affected vines (Caudwell, 1990; Posenato *et al.*, 1996; Pavan *et al.*, 1997). These differences are important in establishing advantages in the eradication of the symptomatic grapevines (Osler *et al.*, 2002).

The aim of this research was to increase knowledge regarding the recovery in GY affected vineyards in north east Italy.

Materials and methods

In the period 2004-2006 a study was carried out in 19 vineyards of Friuli Venezia Giulia. In all the vineyards a plot of grapevine cv Merlot was studied and in two of these vineyards a plot of cv Chardonnay was also observed. A map of each of the vineyards to be studied was made to record symptomatic grapevines year by year. Grapevines which had recovered were assessed from the second year. A damage rating was assigned to each symptomatic grapevine: 1 = normal yield (100%), 2 = partial yield (on average 50%), 3 = without yield (0%).

The Chi-square test and Wilcoxon Rank Sum test were used to compare proportion and ordinal data (damage ratings) respectively.

In each vineyard during 2004-2006 at least 5 symptomatic grapevines were sampled and tested for the presence of FD and BN causal agents using nested-PCR assays.

Results and discussion

Among the Merlot grapevine samples tested during 2004-2006 at least 4 sample per vineyard resulted positive to the presence of FD or BN phytoplasmas. In some vineyards a clear prevalence of FD or BN was observed, whereas in others both GYs were detected (figure 1). On Chardonnay grapevines only the FD phytoplasma was found.

The following year, independently of which GY was prevalent in the vineyard, more than 50% of the symptomatic Merlot grapevines, sampled in the 19 mapped vineyards, appeared to be in recovery (figure 1). Two years after the beginning of the survey more than 70% of symptomatic Merlot grapevines did not show symptoms (figure 2). In about 10% of those grapevines, which had appeared to be in recovery in 2005, symptoms reappeared in 2006.

When taking into consideration only those grapevines with known GY, around 50% of grapevines (for both the GYs) did not show symptoms the year after positive PCR analysis and there were no significant differences

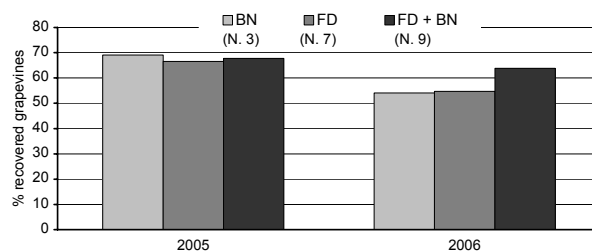


Figure 1. Average percentage of Merlot grapevines, symptomatic in 2004 or 2005, that appeared to be in recovery the following year. The grapevines were grouped in relation to the GY detected in the vineyard where they were grown. N. = number of vineyards in each group.

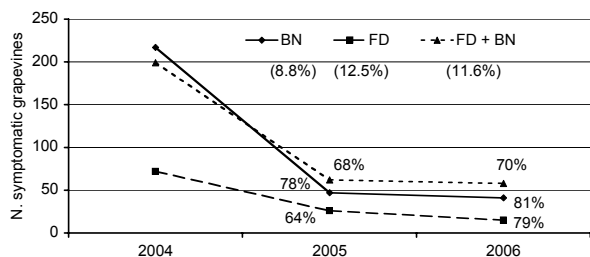


Figure 2. Number of Merlot grapevines, belonging to vineyards with different incidence of the two GYs, which, after displaying symptoms in 2004, continued to be symptomatic in the two successive years. The percentages of grapevines in recovery (near the markers) and the percentages of recovered grapevines which displayed symptoms after two years (below the legend) are reported.

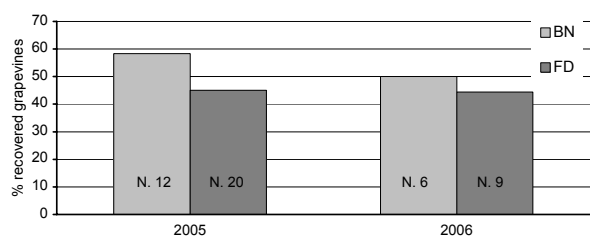


Figure 3. Percentage of Merlot grapevines affected by BN or FD and symptomatic in 2004 or 2005 which did not show symptoms the following year. N. = number of the sampled grapevines.

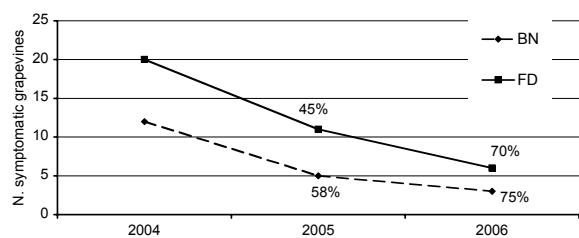


Figure 4. Number of Merlot grapevines, which tested positive for FD or BN in 2004, that were symptomatic in the two following years. The percentages of recovered grapevines are also shown near the markers.

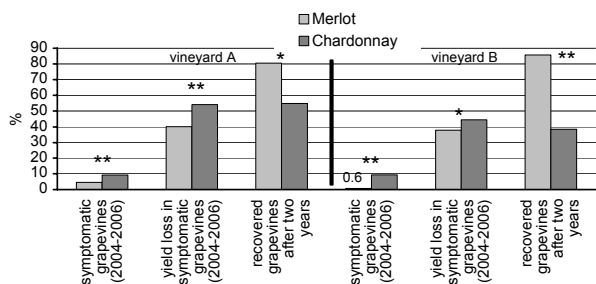


Figure 5. Comparison between two different cultivars grown in the same vineyards.

between year and type of GY (figure 3). After two years about 70% of the symptomatic grapevines appeared healthy (figure 4). One grapevine per GY, which had appeared to be in recovery after one year (2005), showed symptoms again in 2006. In 2005 four recovered grapevines tested negative for GYs.

In the two vineyards where both Chardonnay and Merlot were studied, the percentages of symptomatic grapevines and of yield losses in symptomatic grapevines were higher for Chardonnay than for Merlot (figure 5). After two years the percentage of recovered grapevines was higher for Merlot than for Chardonnay. In vineyard A two out of 32 Chardonnay grapevines, after two years of severe symptoms, did not sprout the next year.

For the cultivar Merlot the propensity for recovery is not influenced by the type of GY. In the majority of cases this is not apparent because symptoms did not re-occur the year following remission. When Merlot and Chardonnay are compared, recovery results are higher for the cultivar that is less susceptible and sensitive to GY. These varietal differences in recovery capability are important for establishing GY control strategies.

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