AGRONOMICAL AND ENOLOGICAL PERFORMANCES OF HEAT-TREATED VS. GFLV-INFECTED "GEWÜRZTRAMINER" CLONES IN TRENTINO (N.EAST ITALY)

U. Malossini*, L. Zulini, S. Moser, G. Versini, S. Carlin, G. Nicolini, P.L. Bianchedi, A.D. Serra

Istituto Agrario di San Michele all'Adige - IASMAA, via Mach 1, 38010 San Michele all'Adige (TN), Italy
(*) tel. ++39 0461 615384. fax ++39 0461 650959. umberto.malossini@iasma.it

Introduction

Grapevine fanleaf virus (GFLV) is the most widespread nepovirus involved in the grapevine degeneration. The genetic variability within a cultivar is the basis of clonal distinction, but the virus infections may have great practical implication on phenotypical variability. The clonal selection carried out at IASMAA confirmed interesting differences, as for agronomical performances and analytical and sensorial profiles of wines, among "Gewürztraminer" clones (Malossini et al., 2002). Only a few clones (both healthy and affected by viruses) showed always varietal typicality. It was confirmed that the profile of bound forms of certain aroma compounds (e.g. geraniol and linalool) well discriminated the *aromatic* and *neutral* genotypes. The present study upgrades a previous communication (Malossini et al., 2003) and deals with the differences in agronomical and oenological performances between GFLV-infected (MP) and heat-treated healty (HT) progenies of two "Gewürztraminer" clones.

Materials and methods

In 1997, the originally GFLV-infected clones 920 and 921, respectively *aromatic* and *neutral*, were heat-treated according to *in vitro* thermo-therapy. Daughter vines of both the original (MP) and heat treated (HT) clones were tested by ELISA for GFLV and others viruses using commercial kits (Agritest, Valenzano-Bari, Italy). *Ex-vitro* MP and HT materials were green-grafted onto GLFV-free rootstocks (Kober 5BB, S.O.4). Three experimental vineyards were planted: one on the plain (year 2002, 210 m a.s.l., Guyot, San Michele a/A) and two on the hill (year 2002, 250 m a.s.l., simple pergola trained, Faedo), with at least of 10 plants for each MP and HT clone in each vineyard. ELISA tests were carried out on original (MP) and heat-treated (HT) vines in eight years (1998-2005). In 4 years (2002-2005), leaves from MP and HT plants were sampled at veraison and at harvest. Fresh weight and length of blades and petioles were measured. Bud fertility was measured in the three vineyards in 3 years (2003-2005). At harvest (2002-2005) grape yield and juice composition (Brix degree, total acidity and pH) after grape crushing, short skin-contact, pectolitic enzyme addition and overnight cool-settling of the juice were recorded for each plot. Free and bound (as aglycons) monoterpene aroma compounds have been quantified in the juice at June 2005, after frozen storage, by HRGC-MS according to bibliography (Versini et al., 1988).

Results and discussion

On the basis of 751 samples ELISA-tested, all the HT progeny of the two clones proved to be GLFV-free, while all (No. 39) MP samples confirmed to be infected.
HT vines had significantly longer petiols (mean value HT: 79 mm; MP: : 67 mm, $p>0.000$) and blade veins (mean value HT: 90 mm; MP: : 84 mm, $p>0.000$). **(Figg. 1-2).**
GLFV elimination induced a strong modification of vine production and bunch characteristics **(Table 1)**
In particular, significant increases were measured for bud fertility, both real and potential, and grape yield *per* vine due to the higher average weight of bunch, berry and stem. On the contrary, HT vines had a significantly lesser number of total buds *per* plant and *per* shoot, as a consequence of internode's lengthening. No significant differences were measured for the parameters related with plant vigour (Ravaz's Index, wood yield) and for the basic qualitative characteristics of the juices.
In the light of the available data, a certain and significant change in the aroma composition due to sanitation was not observed, while the difference among clones was confirmed (**Table 2)**
In conclusion, GFLV elimination from "Gewürztraminer" clones grown in a cool climate area resulted in lengthening of shoots and leaves, and increasing of fertility and yield. This happened without penalization in the quality characteristics of juices.

Acknowledgements:
Rubinigg, P. Bragagna and R. Moscon are acknowledged for the technical support

Fig. 1: lenght of leaf (at veraison)

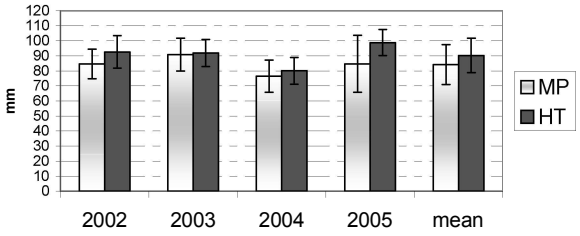
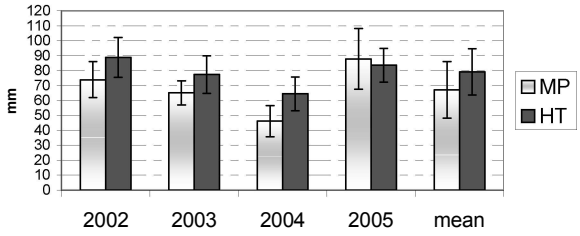


Fig. 2: lenght of petiol (at veraison)



Figg. 1 and 2: measures of leaves sampled on GLFV-infected vines (MP) in comparison with these on GLFV-free vines (HT) of two Gewürztraminer clones. (Vineyard on plain, Guyot, S.Michele a/A).

Table 1. Mean values ± std. dev. of some vine's and bunch's characteristics of two Gewuerztraminer clones (3 years:2003/2005 - 3 vineyards): MP (+GLFV) vs HT (GLFV-free)

Vine	**MP**	**HT**	statistic significance
No. of buds / shoot	13,6 ± 3,2	12,4 ± 2,8	* *
No. of flower cluster [A]	20,7 ± 12,9	21,0 ± 13,0	n.s.
No. of total buds [B]	20,8 ± 9,1	18,2 ± 9,1	*
No. of break buds [C]	15,7 ± 7,4	14,1 ± 6,9	n.s.
real fertility [A/B]	0,99 ± 0,37	1,16 ± 0,37	* *
potential fertility [A/C]	1,27 ± 0,38	1,44 ± 0,37	* *
bud burst (%)	75,9 ± 12,5	79,6 ± 12,9	*
grape yield (Kg) [1^]	1,50 ± 0,87	2,99 ± 1,68	* *
weight cluster (g)	73 ± 15	116 ± 25	* * *
wood yield (Kg) [2^]	0,43 ± 0,22	0,57 ± 0,29	n.s.
index of Ravaz [1^/2^]	6,1 ± 4,1	6,3 ± 2,4	n.s.
Bunch			
weight of bunch (g)	86,4 ± 14,1	134,2 ± 27,3	* * *
weight of berry (g)	1,21 ± 0,18	1,36 ± 0,19	*
weight of stem (g)	4,8 ± 1,2	6,3 ± 1,4	* *
% stem/ cluster (g / g)	5,6 ± 1,5	4,8 ± 1,1	n.s.
% must/ cluster (mL / g)	57,4 ± 9,6	63,0 ± 10,5	n.s.
Brix degrees	21,59 ± 1,71	21,88 ± 1,57	n.s.
total acidity (g/L)	4,40 ± 1,86	4,30 ± 1,90	n.s.
pH	3,57 ± 0,35	3,65 ± 0,34	n.s.

'Note: (n.s.) not significance (*) significance between 95 and 99% (**) significance of 99% or superior from ANOVA

Table 2 : Aroma compounds characterising Gewürztraminer juice (vineyard S.Michele, 3 years)

year	*2002*				*2003*				*2004*			
clone	*920*		*921*		*920*		*921*		*920*		*921*	
material	*MP*	*HT*	*MP*	*HT*	*MP*	*HT*	*MP*	*HT*	*MP*	*HT*	*MP*	*HT*
Compounds as free form (ug/L n-heptanol)												
linalool	0,9	1,1	<0,5	<0,5	1,5	2,2	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
citronellol	3,6	7,4	<0,5	<0,5	6,3	3,3	< 0,5	< 0,5	4,1	1,3	< 0,5	< 0,5
nerol	42,5	90	4,3	1,0	50	49	3,3	1,3	12	6,0	1,3	1,6
geraniol	137,5	260	16,5	3,3	136	174	10	6,9	77	44	3,2	3,1
Compounds as aglycons from bound forms (ug/L n-heptanol)												
linalool	5,2	13,5	1,2	<0,5	3,8	0,5	< 0,5	< 0,5	0,7	2,1	< 0,5	< 0,5
citronellol	18	3,5	2,1	0,6	19	5,3	0,7	0,6	14	11	< 0,5	< 0,5
nerol	130	297	19,5	3,9	159	48	6,6	5,5	76	66	2,5	2,3
geraniol	525	782,5	73,5	27	443	199	29	22	279	291	10	8,7

by HRGC-MS according to bibliography (Versini et al., 1988).

References

Malossini U., Nicolini G., Versini G., Roncador I., Vindimian M.E., Carlin S., 2002. Aggiornamenti e nuove omologazioni di Traminer aromatico. L'Informatore Agrario, 17: 51-55.

Malossini U., Ciccotti A. M., Bragagna P., Vindimian M. E., Moser S., Versini G., Nicolini G., 2003. Changes in agronomical and oenological performances of clones of the grapevine cv Gewürztraminer after *GLFV* elimination by heat therapy. In: Proc. 14th Meeting I.C.V.G., September 2003, Bari, Italy. pp. 252-253.

Versini G., Dalla Serra A., Dell'Eva M., Scienza A., Rapp A., 1988. Evidence of some glycosidically bound new monoterpenes and norisoprenoids in grapes. In "Bioflavour'87", Schreier P. ed., de Gruyter & Co., Berlin-New York: 161-170.