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Performance of 'Gewürztraminer' (*Vitis vinifera* L.) on Three Rootsystems

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Abstract

'Gewürztraminer' vines on three rootsystems [own-rooted (OR); self-grafted (GWZ); S.O.4 (SO4)] in a randomized complete block experiment were evaluated over a 3-year period (1989-91) for yield components, fruit composition, and weight of cane prunings. No significant differences in yield components or fruit composition were observed between the treatments in 1989. Weight of cane prunings were also not affected by rootsystem, and ranged from 0.93-1.20 kg/vine following the 1991 season. Yield, cluster weight, and berries/cluster were highest in SO4 vines in 1990, and both the SO4 and GWZ treatments contained highest berries/cluster in 1991. The SO4 and GWZ treatments were also highest in °Brix in 1990 and 1991, but no effect of rootsystem was observed on either TA or pH. It was considered noteworthy that use of a rootstock had some beneficial effects on yield and fruit composition in the absence of biotic factors (phylloxera and nematodes), nutrient deficiencies, high pH soils or water stress. Use of rootstocks in areas with low phylloxera populations may therefore be beneficial for environmental adaptation, with potential for attendant vine devigoration, yield increases, or improvement in winegrape quality.

Introduction

Vitis vinifera vines are customarily grafted to prevent injury from biotic problems such as grape phylloxera or nematodes (6). Numerous studies (4, 10, 11) have demonstrated the advantage of using rootstocks such as Couderc 3309 (*Vitis riparia* X *V. rupestris*), Selektion Oppenheim #4 (S.O.4), Kober 5BB, and Teleki 5C (*V. berlandieri* X *V. riparia*) in terms of improved yields and fruit composition. Most of these responses, however, have been attributed to secondary effects of rootstocks mediated through increases in vine vigor, usually as a consequence of phylloxera resistance. Few studies have concentrated on the benefits of rootstocks in overcoming abiotic problems such as salinity (2, 3), nutrient uptake (2, 9), chlorosis (12), and drought (6), and fewer still, if any, have been conducted in the absence of confounding biotic factors. The purpose of this brief (3-year) study was to compare the performance and fruit composition of young 'Gewürztraminer' vines that were own-rooted, self-grafted, or grafted to S.O.4 rootstock.

Materials and Methods

'Gewürztraminer' vines on three rootsystems [own-rooted (OR); self-grafted (GWZ); S.O.4 (SO4)] were planted at the Agriculture Canada Research Station, Summerland, B.C. in 1987 in a randomized complete block experiment containing four blocks and six-vine treatment replicates. SO4 was the rootstock of choice in this trial due to its widespread availability in Canada. Soil was a Skaha sandy loam (5) that had never been planted to grapes, and soil sampling in 1987 indicated a lack of phylloxera and parasitic nematodes.

Vines were spaced at 1 m X 3 m (vine X row), trained to 1.8 m-high bilateral cordons, and pruned to 20 nodes/m row as two-node spurs. Vines were irrigated with overhead sprinklers (1987-90) and by drip emitters (1991). Soil management and pest control practices were consistent with local recommendations (1). Data were collected for weight of cane prunings, yield and clusters per vine, berry weight (100-berry random samples for each treatment replicate at harvest), °Brix, titratable acidity (TA), and pH

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from 1989-91. Cluster weight and berries/cluster were estimated from yield, clusters/vine, and berry weight data. Analysis of berries for °Brix, TA, and pH was consistent with published methods (8). Circumstances necessitated removal of the vines in April 1992.

Results and Discussion

No significant differences in yield components or fruit composition were observed between the treatments in 1989 (data not shown). Weight of cane prunings were also not affected by rootsystem, and ranged from 0.93-1.20 kg/vine for the 1991 growing season (Table 1). Yield, cluster weight, and berries/cluster were highest in SO4 vines in 1990. Both the SO4 and GWZ treatments contained highest berries/cluster in 1991 (Table 1). The SO4 and GWZ treatments were also highest in °Brix in 1990 and 1991, but no effect of rootsystem was observed on either TA or pH (Table 1).

This short-term study produced results consistent with those of several researchers (4, 7, 11), who have reported increased yields and improved fruit composition in grafted grapevines. The aforementioned studies, however, were conducted at sites with substantial phylloxera populations. It is thus noteworthy that use of a rootstock, in this case SO4, had some beneficial effects on yield and fruit composition in the absence of biotic factors (phylloxera and nematodes), nutrient deficiencies, high pH soils, or water stress.

Table 1. Impact of three rootstocks on weight of cane prunings, yield components, and berry composition of Gerwürztraminer, 1990-91.

Parameter	Own-rooted	SO4	Gewürztraminer	Significance
1990				
Yield components				
Yield (mT.ha^{-1})	9.6b	15.8a	9.8b	*
Clusters/vine	37.6	45.8	36.9	NS
Cluster wt. (g)	79.0b	112.9a	85.8b	***
Berries/cluster	62.6b	79.9a	63.6b	**
Berry wt. (g)	1.27	1.42	1.46	NS
Fruit composition				
°Brix	20.9b	21.3ab	21.7a	**
Titratable acidity (g. liter^{-1})	10.9	9.2	10.8	NS
pH	3.68	3.65	3.60	NS
1991				
Wt. of cane prunings (kg)	1.20	1.16	0.93	NS
Yield components				
Yield (mT.ha^{-1})	12.3	11.3	8.5	NS
Clusters/vine	37.6	31.2	21.3	NS
Cluster wt. (g)	106.3	112.4	115.3	NS
Berries/cluster	72.6b	82.4a	82.4a	*
Berry wt. (g)	1.46	1.40	1.31	NS
Fruit composition				
°Brix	20.4b	21.9a	22.0a	*
Titratable acidity (g. liter^{-1})	10.2	10.6	10.1	NS
pH	3.39	3.46	3.41	NS

*, **, ***, NS: Significant at $p < 0.05$, 0.01, 0.001, or not significant, respectively.
Means within rows followed by different letters are significantly different, $p \leq 0.05$, Duncan's Multiple range test.

The grafting process had no major effect, but fruit from self-grafted vines had higher °Brix than fruit from own-rooted vines in 1990 and 1991. Use of rootstocks in British Columbia, and other viticultural areas with low phylloxera populations, may therefore still be of some benefit for purposes of environmental adaptation with the potential for attendant vine devigoration (Reynolds, unpubl.), yield increases, or improvement in winegrape quality. It is expected that an ongoing replicated trial at Summerland containing nine cultivars on each of five different rootstocks may further clarify the benefit of rootstocks under our conditions.

Literature Cited

1. British Columbia Ministry of Agriculture, Fisheries, and Food. 1992. Grape Production Guide. Extension Systems Branch, Victoria, B.C.
2. Downton, W. J. S. 1977. Influence of rootstocks on the accumulation of chloride, sodium, and potassium in grapevines. Austral. J. Agric. Res. 28:879-889.
3. Downton, W. J. S. 1988. Growth and mineral composition of the Sultana grapevine as influenced by salinity and rootstock. Austral. J. Agric. Res. 36:425-434.
4. Howell, G. S. 1987. Vitis rootstocks. In: Rom, R. C. and R. F. Carlson (eds.). Rootstocks for Fruit Crops. Pp. 451-472. John Wiley and Sons, New York.
5. Kelley, C. C., and R. H. Spilsbury. 1949. Soil survey of the Okanagan and Similkameen Valleys, British Columbia. B.C. Dept. of Agric. Rept. No. 3 of the B.C. Survey. Victoria, B.C., 88 pp.
6. Pongracz, D. P. 1983. Rootstocks for Grapevines. David Philip, Capetown.
7. Reynolds, A. G., and R. M. Pool. 1980. Root distribution in relation to growth and yield of 'Delaware' grapes. Proc. N.Y. State Hort. Soc. 127:35-46.
8. Reynolds, A. G., and D. A. Wardle. 1989. Impact of various canopy manipulation techniques on growth, yield, fruit composition, and wine quality of Gewürztraminer. Amer. J. Enol. Vitic. 40:121-129.
9. Ruhl, E. H., P. R. Clingeleffer, P. R. Nicholas, R. M. Cirami, M. G. McCarthy, and J. R. Whiting. 1988. Effect of rootstocks on berry weight and pH, mineral content and organic acid concentrations of grape juice of some wine varieties. Austral. J. Expt. Agric. 28:119-125.
10. Shaulis, N. J., and R. G. D. Steele. 1969. The interaction of resistant rootstock to the nitrogen, weed control, pruning and thinning effects on the productivity of Concord grapevines. J. Amer. Soc. Hort. Sci. 94:422-429.
11. Striegler, R. K., and G. S. Howell. 1991. The influence of rootstock on the cold hardiness of Seyval grapevines. I. Primary and secondary effects on growth, canopy development, yield, fruit quality and cold hardiness. Vitis 30:1-10.
12. Valat, C., M. Valadier, R. Pouget, and M. Ottenwaelter. 1988. Comportement de porte-greffes resistants a² la chlorose dans le vignoble de Tavel: Resultats de 9 années d'experimentation. Progrèes Agric. Vitic. 105:407-410.

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