# Influence of Various Rootstocks on the Yield and Grape Composition of Sauvignon Blanc

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**Abstract**

Pulko B., Vršič S., Valdhuber J. (2012): **Influence of various rootstocks on the yield and grape composition of Sauvignon Blanc**. Czech J. Food Sci., **30**: 467–473.

This influence of various rootstocks on the yield and grape composition of Sauvignon Blanc was examined. The yield on rootstock 41B/72 was 1 kg/vine or more higher than on rootstocks SO4 cl. 31, Riparia cl. 1 and Kober 5BB. The vines grafted on the Börner rootstock gave the highest weight of 100 berries (241 g). The highest seed weight of 100 berries (6.9 g) was found on rootstock 196/17 Cl, while the lowest one was on the Riparia cl. 1 (5.6 g). There was a strong, positive correlation ($r$ = 0.91) between the berry and seed weights of vines on rootstock 41B/72 (2003). The total acidity content and the relationship between tartaric and malic acids were affected more by the weather conditions than by the rootstock. Relatively strong correlations between the grape yield and total soluble solids ($r$ = –0.89), and between grape yield and total acidity ($r$ = 0.76) were found in the grape juice on rootstock 41B/72 (in 2002).

**Keywords**: grapevine; yield parameter; grape juice; quality

The primary use of rootstocks is for pest resistance, especially to phylloxera (*Daktulosphaira vitifoliae* Fitch.). However, there is also an important role for rootstock compatibility with European vines (Richards 1983; Vršič *et al.* 2004) and adaptation to the soil, resulting in the development of the root system (Morano & Kliewer 1994), nutrient absorption (Fardossi *et al.* 1995), and vulnerability to drought (Himelrick 1991; Kocsis *et al.* 1998; Keller *et al.* 2001a,b; Satisha *et al.* 2010). The interactions between rootstocks and varieties have an important effect on the varieties vigour and productivity (Boselli *et al.* 1992; Ferroni & Scalabrelli 1995; Keller *et al.* 2001a,b). Intensive vegetative growth of the vine influences the yield (Hoover *et al.* 2004), mineral content in leaves (Lehoczky & Kocsis 1998), health condition, and chemical composition of the grape, mainly with regard to sugar, free amino nitrogen (FAN), and total acidity content (Kubota *et al.* 1993; Garcia *et al.* 2001a,b; Rogiers *et al.* 2004; Košmerl & Cigić 2008). The aim of this study was to determine the influence of various rootstocks on the vegetative growth of the Sauvignon Blanc cultivar, as well as to determine which rootstock and growth parameters correlate with the grape yield and quality, with particular emphasis on the Börner rootstock (*Vitis riparia* 183 Geisenheim × *Vitis cinerea* Arnold).

## MATERIAL AND METHODS

The trials were conducted in the years 2002 and 2003 at the University Centre of Viticulture and Enology Meranovo (4°53'N, 15°56'E, 420 m a.s.l.), Faculty of Agriculture and Life Sciences near Maribor, Slovenia. The yearly mean air temperature in the area is 10.1°C; the mean monthly minimum

Partly supported by the Slovenian Research Agency, and the Ministry of Agriculture, Forestry and Food, Republic of Slovenia, Project No. CRP-V4-0739.

temperature occurs in January, with 0.3°C, and the average monthly maximum temperature occurs in July, with 20.1°C. The average annual rainfall in the area is 1033 mm. The precipitation is, on average, relatively equally distributed over the whole year (Agromet 2002, 2003). The soil consists of gleyic fluvisols on Holocene floodplains, with a pH value of 4.4 (0.1M KCl). Based on the ammonlactate extraction procedure (Egner *et al.* 1960), the soil contains < 1 mg $P_2O_5$, 30.8 mg $K_2O$, and 9.1 mg MgO per 100 g of air dry soil from 0–30 cm soil layer, and 5.5 mg $P_2O_5$, 18.9 mg $K_2O$, and 12.9 mg MgO per 100 g of air dry soil from 30–60 cm soil layer. The vines of the Sauvignon Blanc cv. were grafted on different rootstocks selected from interspecific crosses or individual species: *V. berlandieri* Planch. × *V. riparia* Michx. (Kober 5BB and SO4 cl. 31), *V. riparia* 183 Gm × *V. cinerea* Arnold (Börner); (*V. vinifera* × *V. berlandieri*) 41B/72, (*V. vinifera* × *V. rupestris*) × *V. riparia* (196/17 Cl), *V. riparia* (Riparia cl. 1). The grafted vines (30 vines per rootstock) were planted in the year 1997 in an experimental vineyard, with a slope of 40% on average at a density of 4500 vines per ha, trained in the double Guyot system and pruned normally (two yielding canes per vine with eight buds/cane and one renewal spur with two buds). The trial was set up as a randomised group with six replications (5 vines in each replication). During the experimental period, the natural permanent green cover was used as the soil management system, and the surface around the grapevines (a 0.6 m strip) was treated with herbicide (glyphosate).

***Yield and mechanical composition of the grapes***. The harvest dates (30th September 2002 and 8th September 2003) were determined on the basis of weekly analyses of the grape composition. The reason for the early harvest in 2003 was a higher-than-average temperature during the growing season. We counted the grapes of each vine in the vineyard and weighed the mass. In every replication, 10 grapes were picked at random, weighed, and the mechanical composition was determined (weight of the berries and weight of the stem per grape). We also weighed one hundred randomly selected berries and counted and weighed their seeds (accuracy 0.001 g).

***The chemical composition of grape juice***. The grapes were crushed in the laboratory, and a separate sample of grape juice was taken from each replication to analyse the following: total soluble solids (°Oe), total acidity (g/l), pH-value, organic acids (tartaric, malic, citric acids). The analysis of organic acids was performed with the HPLC-UV/VIS system Waters 600E composed of isocratic pump W600, autosampler Waters 717+ and Waters 996 photodiode array detector (Waters Corporation, Milford, USA). The experimental conditions were the following: mobile phase 0.004M sulphuric acid; isocratic method; flow-rate 0.6 ml/min; detection at 210 nm; injection volume 20 μl; HPLC column Aminex HPX-87H, 300 × 7.8 mm, 9 μm (Bio-Rad, Gladesville, Australia), column temperature: 35°C. All solvents were HPLC-grade and were degassed before use. The standards of citric, malic, tartaric, and lactic acids were purchased from Sigma-Aldrich (St. Louis, USA). All reagents and standards were prepared using Milli Q deionised water (Millipore, Bedford, USA). The composition of the main minerals (Ca, K, Mg) was determined with atomic absorption spectrophotometry Determining Community methods for the analysis of wines (EEC 2676/90 – matrix for grape juice).

***Experimental design and statistical analysis***. The analyses of variance (ANOVA) were carried out for the data on the yield, mechanical composition of the grapes, and chemical composition of the grape juice. The correlations were determined between the individual parameters. The averages were specified with the Tukey test. The statistical significance was evaluated at $P \leq 0.05$ (SPSS-17).

## RESULTS AND DISCUSSION

### Yield and mechanical composition of grapes

The comparisons of different grafting combinations for the variety Sauvignon Blanc are shown in Table 1. In both years (2002, 2003), the highest yield was obtained with rootstock 41B/72 (3380 and 3653 g/vine, respectively). It was higher by more than 1 kg/vine in comparison with rootstocks SO4 cl. 31, Riparia cl. 1, Kober 5BB (in 2002 and 2003) and also higher in comparison with 196/17 Cl (in 2002). Rootstock 41B/72 showed to be promising with respect to its association with the consistently higher yield and grape stem weight. Tardaguila *et al.* (1995) reported that the dry weight portioning of the cv. Cabernet Sauvignon differed on different rootstocks, in that 101-14 Mgt favoured the dry weight accumulation in canes, while 41B favoured the accumulation in clusters. In 2002, the

Table 1. Yield and mechanical grape composition ($\bar{x}$ ± SD) of the Sauvignon Blanc on different rootstocks in 2002 and 2003

| | 5BB | BOE | SO4/31 | RIP/1 | 196/17 | 41B/72 |
|---|---|---|---|---|---|---|
| **Yield** (g) | | | | | | |
| 2002 | 2216 ± 328$^{bc}$ | 2884 ± 285$^{ab}$ | 2013 ± 250$^{c}$ | 2272 ± 968$^{bc}$ | 2188 ± 388$^{bc}$ | 3380 ± 279$^{a}$ |
| 2003 | 2645 ± 271$^{b}$ | 3232 ± 403$^{ab}$ | 2564 ± 368$^{b}$ | 2589 ± 987$^{b}$ | 2819 ± 541$^{ab}$ | 3653 ± 323$^{a}$ |
| **Cluster weight** (g) | | | | | | |
| 2002 | 149.2 ± 1.8$^{a}$ | 144.7 ± 3.5$^{ab}$ | 136.9 ± 4.0$^{b}$ | 124.1 ± 12.0$^{c}$ | 139.1 ± 2.3$^{b}$ | 139.3 ± 1.5$^{b}$ |
| 2003 | 134.8 ± 4.1$^{ab}$ | 144.0 ± 2.6$^{a}$ | 133.1 ± 2.1$^{b}$ | 116.8 ± 11.7$^{c}$ | 136.2 ± 5.7$^{ab}$ | 137.6 ± 3.4$^{ab}$ |
| **Grape stem weight** (g) | | | | | | |
| 2002 | 7.5 ± 0.3$^{ab}$ | 6.8 ± 0.3$^{bc}$ | 6.5 ± 0.4$^{c}$ | 5.4 ± 0.9$^{d}$ | 7.4 ± 0.2$^{abc}$ | 8.1 ± 0.6$^{a}$ |
| 2003 | 6.5 ± 0.3$^{ab}$ | 6.7 ± 0.2$^{ab}$ | 6.3 ± 0.3$^{b}$ | 5.0 ± 0.4$^{c}$ | 6.2 ± 0.6$^{b}$ | 7.4 ± 1.0$^{a}$ |
| **Weight of 100 berries** (g) | | | | | | |
| 2002 | 205.7 ± 6.6$^{ab}$ | 241.2 ± 28.8$^{a}$ | 184.7 ± 32.3$^{b}$ | 180.0 ± 24.3$^{b}$ | 211.7 ± 34.4$^{ab}$ | 177.3 ± 12.0$^{b}$ |
| 2003 | 208.3 ± 10.2$^{ab}$ | 241.7 ± 22.6$^{a}$ | 191.0 ± 25.6$^{bcd}$ | 171.7 ± 19.0$^{cd}$ | 199.7 ± 14.9$^{bc}$ | 161.0 ± 21.4$^{d}$ |
| **Seed number/100 berries** | | | | | | |
| 2002 | 163.7 ± 14.6$^{a}$ | 177.3 ± 9.7$^{a}$ | 164.7 ± 19.9$^{a}$ | 159.3 ± 16.3$^{a}$ | 171.7 ± 17.0$^{a}$ | 167.7 ± 5.0$^{a}$ |
| 2003 | 157.7 ± 12.6$^{ab}$ | 144.3 ± 9.1$^{b}$ | 160.3 ± 17.4$^{ab}$ | 143.7 ± 6.1$^{b}$ | 181.0 ± 12.8$^{a}$ | 155.0 ± 18.4$^{b}$ |
| **Seed weight/100 berries** (g) | | | | | | |
| 2002 | 6.2 ± 0.7$^{a}$ | 6.6 ± 0.8$^{a}$ | 6.3 ± 0.7$^{a}$ | 5.7 ± 0.9$^{a}$ | 6.8 ± 0.9$^{a}$ | 5.8 ± 0.4$^{a}$ |
| 2003 | 5.8 ± 0.8$^{bc}$ | 6.8 ± 0.5$^{ab}$ | 5.6 ± 0.4$^{c}$ | 5.5 ± 0.9$^{c}$ | 7.0 ± 0.4$^{a}$ | 5.5 ± 0.8$^{c}$ |

$^{a-d}$the same letter indicates that there is no significant difference at $P \leq 0.05$; SD – standard deviation

yield on Börner rootstock was 0.8 kg/vine higher in comparison with SO4 cl. 31 ($P \leq 0.05$). In spite of the dry stress conditions in 2003, the yield was higher in all rootstocks than the yields in 2002. Comparing both experimental years, the highest yield difference for the same rootstock occurred with rootstock 196/17 Cl, and the lowest one with rootstock 41B/72. The influence of rootstocks on the yield has been reported by many studies (Williams & Smith 1991; Bica *et al.* 2000; Ollat *et al.* 2003). The results of these studies suggest that rootstocks differ in the root distribution patterns and the total root numbers, both of which influence the yield and pruning weight as well as the yield to pruning weight ratio (Morano & Kliewer 1994). Schmid *et al.* (2005) state that, with the cv. Pinot Noir cl. 20, the yield was higher on Kober 125AA cl. 3 Gm rootstock in 2001, whereas in 2002 and 2003 it was higher on Börner rootstock.

The weight of 100 berries on Börner rootstock was 30–46% higher in comparison to rootstocks SO4 cl. 31 and Riparia cl. 1, 41B/72 in 2002 and 2003, and also higher in comparison to 196/17 Cl in 2002 ($P \leq 0.05$). The results concerning the grape mechanical composition show that Riparia cl. 1 and SO4 cl. 31 rootstocks resulted in a lower average weights of the cluster, grape stem, and seeds, in comparison to other rootstocks. The highest cluster weight was recorded with Kober 5BB rootstock in 2002 and with Börner rootstock in the dry year 2003 ($P \leq 0.05$). Contrary to all other rootstocks from 2003, the correlation between the number of seeds and weight of berries was negative ($r$ = –0.81) on Börner rootstock. However, the seed weight on Börner rootstock in 2003 was the highest (6.8 g/100 berries). The correlation between the seed number/100 berries and yield (2002) was strong ($r$ = 0.74) with Kober 5BB rootstock. A significant difference in the seed weight/100 berries between the rootstocks was found only in the dry year 2003.

## Chemical composition of the Sauvignon Blanc grape juice

***Total soluble solids***. In comparison to the other rootstocks tested in 2002, the highest yield was

Table 2. Grape juice composition ($\bar{x}$ ± SD) of the Sauvignon Blanc on different rootstocks in 2002 and 2003

| | 5BB | BOE | SO4/31 | RIP/1 | 196/17 | 41B/72 |
|---|---|---|---|---|---|---|
| **Total soluble solids** (°Oe) | | | | | | |
| 2002 | 97.0 ± 1.8$^{a}$ | 93.5 ± 4.5$^{ab}$ | 94.2 ± 9.1$^{ab}$ | 92.5 ± 4.6$^{ab}$ | 87.0 ± 2.4$^{bc}$ | 81.8 ± 6.2$^{c}$ |
| 2003 | 86.7 ± 4.2$^{a}$ | 88.8 ± 3.2$^{a}$ | 87.7 ± 5.0$^{a}$ | 91.5 ± 7.0$^{a}$ | 92.2 ± 4.2$^{a}$ | 89.7 ± 4.5$^{a}$ |
| **Total acidity** (g/l) | | | | | | |
| 2002 | 10.3 ± 0.5$^{a}$ | 10.5 ± 0.8$^{a}$ | 10.2 ± 1.1$^{a}$ | 10.1 ± 1.1$^{a}$ | 10.9 ± 0.6$^{a}$ | 11.2 ± 0.9$^{a}$ |
| 2003 | 6.3 ± 0.3$^{b}$ | 6.1 ± 0.4$^{b}$ | 6.4 ± 1.0$^{b}$ | 6.8 ± 0.9$^{b}$ | 8.2 ± 0.4$^{a}$ | 7.2 ± 0.7$^{ab}$ |
| **Tartaric acid** (g/l) | | | | | | |
| 2002 | 2.3 ± 0.3$^{b}$ | 2.8 ± 0.2$^{a}$ | 2.6 ± 0.1$^{ab}$ | 2.7 ± 0.2$^{ab}$ | 2.7 ± 0.3$^{ab}$ | 2.7 ± 0.3$^{ab}$ |
| 2003 | 4.1 ± 0.2$^{ab}$ | 3.8 ± 0.2$^{b}$ | 3.9 ± 0.3$^{b}$ | 4.0 ± 0.3$^{b}$ | 4.6 ± 0.3$^{a}$ | 4.6 ± 0.1$^{a}$ |
| **Malic acid** (g/l) | | | | | | |
| 2002 | 5.0 ± 0.2$^{b}$ | 5.2 ± 0.4$^{b}$ | 5.2 ± 0.4$^{b}$ | 5.1 ± 0.6$^{b}$ | 6.4 ± 0.4$^{a}$ | 5.1 ± 0.4$^{b}$ |
| 2003 | 1.6 ± 0.1$^{c}$ | 1.7 ± 0.1$^{cd}$ | 1.8 ± 0.3$^{bcd}$ | 2.1 ± 0.2$^{b}$ | 2.5 ± 0.2$^{a}$ | 2.0 ± 0.3$^{bc}$ |
| **Citric acid** (g/l) | | | | | | |
| 2002 | 0.20 ± 0.01$^{b}$ | 0.25 ± 0.04$^{ab}$ | 0.25 ± 0.04$^{ab}$ | 0.29 ± 0.06$^{a}$ | 0.28 ± 0.02$^{a}$ | 0.27 ± 0.03$^{a}$ |
| 2003 | 0.16 ± 0.02$^{b}$ | 0.19 ± 0.03$^{ab}$ | 0.17 ± 0.04$^{ab}$ | 0.18 ± 0.05$^{ab}$ | 0.22 ± 0.02$^{a}$ | 0.19 ± 0.02$^{ab}$ |

$^{a–d}$the same letter indicates that there is no significant difference at $P \le 0.05$; SD – standard deviation

achieved with rootstock 41B/72, but there was a strong negative correlation with the total soluble solids ($r = -0.89$) (Table 2). A significantly higher total soluble solids content than that with rootstock 41B/72 occurred in the grapes on Kober 5BB rootstocks (Δ = 15.2°Oe), SO4 cl. 31 (Δ = 12.4°Oe), Börner rootstock (Δ = 11.7°Oe), and Riparia cl. 1 rootstock (Δ = 10.7°Oe). In that year, the discrepancy in total soluble solids between grapevines on Kober 5BB and 196/17 Cl rootstocks was also in favour of Kober 5BB rootstock at 10°Oe ($P \le 0.05$). In the dry year 2003, the grapes on 196/17 Cl and 41B/72 rootstocks showed higher total soluble solids in the grape juice compared to the previous year, whereas all the others contained less total soluble solids. The lower total soluble solids in the grape juice from 2003 probably resulted from the high yield, insufficient absorption of nutrients because of water shortage, and slower mineralisation, while the rootstocks had no significant influence on the total soluble solids ($P \le 0.05$).

***Total acidity and pH value of the grape juice.*** In 2002, the average total acidity content in the grape juice ranged between 10.1 g/l (Riparia cl. 1) and 11.2 g/l (41B/72), with average pH values of 3.08 (41B/72) and 3.19 (Riparia cl. 1). In 2002, however, there were no statistically significant differences between the rootstocks ($P = 0.05$). Total acidity content in the grape juice was moderately correlated with the yield on Börner ($r = 0.71$) and 41B/72 ($r = 0.76$) rootstocks. In 2003, the highest total acidity content occurred with rootstock 196/17 Cl (8.2 g/l) whereas for Börner, Kober 5BB, SO4 cl. 31, and Riparia cl.1 rootstocks, it was significantly lower. The average pH value in 2003 ranged between 3.12 (196/17 Cl) and 3.34 (Börner). In 2003, the pH value of the grape juice was not significantly affected by the rootstock ($P \le 0.05$). In comparison to the previous year, the total acidity content was considerably lower on all rootstocks (by 25% in 196/17 Cl and by 41% in Börner). The low acidity content in 2003 can be ascribed to a higher intensity of dissimilation since the air temperatures were above average over the whole growing season. In the same year, Schmid and Manty (2004) also found extremely low levels of organic acids (from 4.5 to 5.25 g/l), probably resulting rather from the weather conditions than from the rootstocks.

***Content of organic acids in grape juice***. In 2002, the grape juice from all rootstocks was characterised by substantially higher levels of malic acid than tartaric acid. The ratio between the two acids ranged from 1:1.8 (Börner) up to 1:2.2 (Kober 5BB). The highest content of tartaric acid (2.8 g/l) occurred with Börner rootstock, whereas

Table 3. The influence of different rootstocks on the content of certain macro elements ($\bar{x}$ ± SD) in grape juice of the Sauvignon Blanc in 2002 and 2003

| Rootstock | K (mg/l) | | Mg (mg/l) | | Ca (mg/l) | |
|---|---|---|---|---|---|---|
| | 2002 | 2003 | 2002 | 2003 | 2002 | 2003 |
| 5BB | 1643 ± 116$^{ab}$ | 1047.5 ± 39.3$^{ab}$ | 78.7 ± 4.7$^{ab}$ | 69.0 ± 4.3$^{a}$ | 41.2 ± 4.2$^{a}$ | 45.5 ± 3.1$^{a}$ |
| BOE | 1508 ± 185$^{ab}$ | 1077.0 ± 42.7$^{ab}$ | 76.0 ± 2.6$^{ab}$ | 68.2 ± 3.4$^{a}$ | 43.2 ± 3.4$^{a}$ | 41.7 ± 4.3$^{a}$ |
| SO4/31 | 1568 ± 251$^{ab}$ | 1080.3 ± 51.2$^{a}$ | 73.3 ± 6.0$^{ab}$ | 68.5 ± 3.5$^{a}$ | 47.7 ± 5.7$^{a}$ | 45.8 ± 1.8$^{a}$ |
| RIP/1 | 1503 ± 220$^{ab}$ | 1007.8 ± 78.8$^{b}$ | 81.5 ± 4.4$^{a}$ | 68.8 ± 8.8$^{a}$ | 49.2 ± 4.9$^{a}$ | 46.8 ± 5.8$^{a}$ |
| 196/17 | 1776 ± 109$^{a}$ | 1121.8 ± 48.4$^{a}$ | 73.2 ± 3.8$^{ab}$ | 73.5 ± 3.7$^{a}$ | 44.3 ± 3.7$^{a}$ | 39.5 ± 3.4$^{a}$ |
| 41B/72 | 1441 ± 127$^{b}$ | 1026.8 ± 32.2$^{b}$ | 70.7 ± 7.1$^{b}$ | 75.0 ± 5.5$^{a}$ | 40.0 ± 8.3$^{b}$ | 43.2 ± 7.2$^{a}$ |

$^{a,b}$the same letter indicates that there is no significant difference at $P \leq 0.05$; SD – standard deviation

grapevines on 196/17 Cl rootstock had the highest content of malic acid (6.4 g/l). In 2002, grapevines on Kober 5BB rootstock showed the lowest content of tartaric (2.3 g/l), malic (5.0 g/l), and citric (0.2 g/l) acids. A significant influence on the content of citric acid in grape juice was found with SO4 cl. 31 and 41B/72 rootstocks ($P \leq 0.05$). In 2003, the rootstocks had a significant influence on the content of tartaric, malic, and citric acids in the grape juice. In that dry, hot year the content of tartaric acid was considerably higher for all rootstocks, whereas the content of malic acid was lower. The ratio between the two acids ranged from 2.3:1 (196/17 Cl) up to 6.7:1 (Kober 5BB) in favour of tartaric acid. The significantly highest content of malic acid (2.5 g/l) occurred in grapevines on 196/17 Cl rootstock and the lowest on Kober 5BB rootstock (1.6 g/l). The temperature strongly influences many biochemical mechanisms involved in the grape maturation such as malic acid degradation (Romieu *et al.* 1989). The lower content of malic acid in year 2003 in comparison to 2002 can be explained by this biochemical process.

In 2003, the content of citric acid ranged from 23% (Kober 5BB) to 56% (Riparia cl. 1), which was less than in 2002. The grapevines on 196/17 Cl rootstock (0.22 g/l) ($P \leq 0.05$) showed a significantly higher content of citric acid than those on Kober 5BB rootstock. The grapes infected with *Botrytis cinerea* Pers. in 2002 could be the reason for the higher citric acid levels. Ribéreau-Gayon *et al.* (2000) and Jakob *et al.* (1997) came to a similar conclusion.

***Content of certain macro elements in grape juice***. Some rootstocks had a significant influence on the content (g/l) of potassium, magnesium, and calcium in the grape juice of the Sauvignon Blanc variety (Table 3). In general, the contents of potassium and magnesium in the grape juice were considerably higher in 2002 than in the dry year 2003 ($\Delta X$= 59%). The highest content of potassium was determined in the grapes grown on rootstock 196/17 Cl (2002 and 2003), whereas the lowest was found on rootstocks 41B/72 (2002) and Riparia cl. 1 (2003) ($P \leq 0.05$). Based on the correlation between the grape yield and the content of potassium in the grape juice ($r = -0.78^*$, $r = -0.82^*$), we can conclude that rootstock 41B/72 significantly influenced the above-average yields in 2002 and 2003 (3380 g/vine, 3653 g/vine) as well as the lower potassium contents in the grape juice. In 2002, the significant difference between the potassium contents in grape juice from Riparia cl. 1 and 41B/72 rootstocks was in favour of the former ($P \leq 0.05$). Wooldridge *et al.* (2010) reported that in the Chardonnay and Pinot Noir varieties, rootstocks 99R, 110R, 140Ru, and SO4 on a different soil type (coarse, sandy loam soil, pH-value 5.9) did not affect the potassium content in the grape juice. Schmid *et al.* (2005) stated that in 2001 the quantity of mineral nutrients in grape juice from Pinot Noir cl. 20 Gm variety from Börner and 125AA rootstocks was directly correlated with the type of soil. The potassium content in grape juice was somewhat higher on 125AA rootstock, whereas calcium and magnesium contents were not affected by either rootstock or the type of soil. Brancadoro *et al.* (1994) stated that the potassium content in the grape juice from the Croatina variety on a sandy clay loam soil was influenced by the rootstock. The highest potassium levels were induced by 44-53 M and SO4 rootstocks, while the lowest ones were induced by 140Ru, 420A rootstocks, as well as rootstock 1202C.

## CONCLUSION

The results of our two-year study indicate that the yield, fruit composition, and chemical composition of Sauvignon Blanc grape juice vary with the rootstock used. On 41B/72 and Börner rootstocks, the average yield was 13% to 35% higher, compared to the other rootstocks. The lowest average yield, infructescence (fruit cluster), grape stem weight and weight per 100 berries occurred in the grapevines grown on SO4 cl. 31 and Riparia cl. 1 rootstocks. The following rootstocks had the highest impact on the chemical composition of the grape juice: Kober 5BB (the highest average total soluble solids), 41B/72 (the lowest average total soluble solids), 196/17 Cl (the highest average total acidity), and Kober 5BB, Börner, SO4 cl. 31 (the lowest average total acidity). The lowest average potassium content in the grape juice was found on rootstock 41B/72 (from 1027 to 1441 mg/l), whereas the highest content was found consistently on rootstock 196/17 Cl (from 1121 to 1776 mg/l). The data from this sample trial show no significant differences between Börner rootstock and our standard Kober 5BB rootstock ($P \leq 0.05$).

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Received for publication August 30, 2011
Accepted after corrections November 9, 2012

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