Vitis **43** (3), 155–156 (2004)

Research Note

Compatibility of the rootstock Börner with various scion varieties

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K e y w o r d s : propagation, rootstock, Börner, callus, root formation.

Introduction: Grafting of *Vitis vinifera* varieties on American rootstocks is still considered to be the most effective way of protection against phylloxera (*Daktulosphaira vitifoliae* Fitch). Phylloxera induces formation of nodosities with elevated metabolic activity on young grapevine roots (Forneck *et al.* 2002). Large population of this pest have negative effects on the rootstock productivity (Granet and Kocsis 2000). In the last few years, damage due to phylloxera has increased again (Rühl *et al.* 1999). Thus the tolerance of new rootstocks to this pest has to be tested. In 1988 and 1989 several vineyards in Germany were replanted with vines grafted on the rootstock Börner (Becker 1989; Basler 1994; Hafner 1998), which was selected from crossing *V. riparia* 183 Gm x *V. cinerea* Arnold (Ambrossi *et al.* 1994).

Materials and Methods: In 1996 and 1998 cvs Welschriesling, Furmint, Riesling, Chardonnay, Sauvignon blanc, Müller-Thurgau and Kerner were grafted on the rootstocks Börner and Kober 5BB. Prior to grafting, the rootstocks and scions were disinfected by Chinosol W and kept at 2 °C. In total, 200 scions of each cultivar were grafted on each rootstock. To evaluate the rate of successful graftings, the level of callus formation was determined. The grafted material was left in water for 24 h and then planted in a trial based on a randomised complete block design (with 5 replications, 40 grafted plants per replicate). After digging out the plants, we checked the healing at the grafted site and determined root growth. The first grade grafted vines had at least three equally developed roots which were thicker than 3 mm (the accepted minimum). For the statistical analysis of the data, the programme SPSS 11.0 was used (Anova - analyses of variance, $p = 0.05$).

Results: C a l l u s f o r m a t i o n : After the forcing period, grafted vines were divided into three groups, (1) vines with completely developed callus, (2) vines with partially developed (3) and vines without callus (Tab. 1). In 1995, the weather conditions for wood maturation were not optimal and this was reflected in the callus formation in 1996. The average percentage of grafted vines in 1996 with completely developed callus was on average 10 % higer using Kober 5BB, except for Sauvignon blanc. The number of grafted vines with partially developed callus was higher when Börner was used. The greatest difference among rootstocks was observed for Chardonnay. Furmint had the highest number of grafted vines with partly developed callus (both rootstocks); this can be considered variety-specific, especially in years when weather conditions are not favourable for wood maturation (*e.g.* in 1995). In 1998, the average percentage of grafted vines with completely developed callus was higher than in 1996 for both rootstocks and all varieties (the highest increase had cv. Furmint). In 1998, after forcing the average percentage of grafted vines with com-

T a b l e 1

Callus formation (%) in the rootstock Börner (Boe) and Kober 5BB (5BB) after forcing

Cultivar	Root-stock	1996			1998		
		Complete	Partial	Without	Complete	Partial	Without
Welschriesling	5BB	60***	34	6	63	27	10
	BOE	47	47	6	81***	12	7
Furmint	5BB	50***	43	7	90	9	1
	BOE	43	49	8	91	7	2
Riesling	5BB	70***	21	9	84	9	7
	BOE	59	32	9	94***	4	2
Chardonnay	5BB	92***	5	3	83	12	5
	BOE	64	34	2	82	14	4
Sauvignon	5BB	55	38	7	70	20	10
	BOE	58**	39	3	83***	13	4
Kerner	5BB	-	-	-	80	13	7
	BOE	-	-	-	91***	8	1
Müller-Thurgau	5BB	-	-	-	91	7	2
	BOE	-	-	-	95	4	1

** $p<0.01$, *** $p<0.001$. Significant differences between rootstocks Börner and Kober 5BB (t-test).

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pletely developed callus was higher in Kerner, Welschriesling, Riesling and Sauvignon blanc, grafted on the rootstock Börner. In both years, a significant impact of Börner was found only in the case of Sauvignon blanc. For other varieties there were no significant differences between rootstocks in 1998 (Tab. 1).

Percentage of first grade grafted vines: The average percentage (in both years) of the first grade grafted vines was highest when Kober 5BB was used. It varied from 61.2 % (Riesling) to 70.2 % (Welschriesling). In the case of Börner, this percentage was lower and ranged from 49 % (Riesling) to 59,8 % (Chardonnay). This is probably associated with the reduced root number and thickness of Börner. In 1996, there were significant differences ($p = 0.01$) between both rootstocks for all varieties (exception: cv. Furmint). In 1998, cvs Müller-Thurgau and Kerner were added to the experiment. The percentage of first grade grafted vines was higher for Welschriesling and Riesling ($p = 0.05$) and Furmint ($p = 0.01$) on the rootstock 5BB.

Root development: In 1998, the first grade grafted vines were divided into two groups: those with three roots (the accepted minimum) and those with 4 or more roots. Here, the differences among rootstocks were even greater and 39.3 % of the grafted vines on Kober 5BB had three roots and 60.7 % had 4 or more roots. For Börner it was the opposite, 63.1 % of the grafted vines had three roots and only 36.9 % had 4 roots or more (Tab. 2).

Table 2

Formation of adventitious roots (%) of the rootstocks Börner (Boe) and Kober 5BB (5BB)

		3 roots	>4 roots
Kerner	5BB	28	72***
	Boe	43	57
Welschriesling	5BB	44	56***
	Boe	73	27
Chardonnay	5BB	31	69**
	Boe	38	62
Furmint	5BB	44	56***
	Boe	82	18
Riesling	5BB	49	51
	Boe	71	29
Müller-Thurgau	5BB	38	62***
	Boe	68	32
Sauvignon	5BB	41	59***
	Boe	67	33

** $p<0.01$. *** $p<0.001$. Significant differences between rootstocks Börner and Kober 5BB (t-test).

Conclusions: It can be concluded that the rootstock Börner was compatible with all varieties used in our experiment. Sufficient callus formation was not observed when wood maturation of rootstock and scion was not appropriate (VRŠIČ 1996).

For the stock plantations (to produce scions) to be completely resistant against phylloxera and tolerant to virus which is transmitted by nematodes. Thus a reinfection of vines in newly planted vineyards can be reduced.

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Received February 11, 2004