Vitis **58**, 151–152 (2019) DOI: 10.5073/vitis.2019.58.151-152

Research Note

Testing different methods of grape seed germination

A. Perko[1)], A. Ivančič[2)] and S. Vršič[1)]

[1)] University of Maribor, Faculty of Agriculture and Life Sciences, Maribor, Slovenia
[2)] University of Maribor, Faculty of Agriculture and Life Sciences, UC of Viticulture and Enology Meranovo, Maribor, Slovenia

K e y w o r d s : grapevine; grape seeds; germination; hydrogen peroxide.

Introduction: The *Vitis* seeds generally have very low germination rates unless endodormancy has been overcome (Ellis *et al.* 1983). Seed dormancy in grape is often attributed to a thick and tough seed coat that can be a mechanical barrier to germination (Conner 2008). In general, seed dormancy removal is achieved by cold stratification of seeds in a period of 3 to 4 months, although in many *V. vinifera* L. cultivars, this treatment results in only modest germination percentages (Selim *et al.* 1981, Ellis *et. al.* 1983). Other reasons for poor germination can be incomplete physiological maturity (not fully developed endosperm and embryo, when seeds are harvested too early), inappropriate germination technique and/or unfavourable weather conditions during vegetation. The rate and dynamics of seed germination varies considerably depending on the species. The germination rates of *V. vinifera* and *V. labrusca* L. are generally lower than 30 %, whereas the germination rates of *V. rupestris* Scheele, *V. riparia* Michx. and *V. acerifolia* Raf. are ranging from 40 % to almost 100 % (Rombough 2002).

Material and Methods: The impact of different grapevine genotypes (varieties and seed germination techniques on the germination rate were studied in 2016, at the Meranovo Centre of Viticulture and Enology, University of Maribor, Faculty of Agriculture and Life Sciences. The fully mature berries, which developed on self-pollinated inflorescences, were collected on 14th Oct. 2015. The germination experiment was carried out in a greenhouse at the Faculty of Agriculture and Life Sciences. The seeds of nine varieties (wine and table grapes), 'Muskat Letnij', 'Bianca', 'Biserka rana', 'Evita', 'Jutrzenka', 'Ranfol', 'Muscat Ottonel', 'Muscat à Petits Grains Blancs' and 'Zelenec', were used and planted in three replications (160 seeds per replication). Seeds were stratified at 9 °C for 160 d, and were soaked in water for 48 h before sowing. The treatments involved the following four approaches: (1) control, no treatments (M1); (2) scarification (M2); (3) scarification and soaking in 30 % H_2O_2 for 2 h (M3) and (4) scarification and soaking in 15 % H_2O_2 for 2 h (M4). The seeds were sown on 20th April 2016, in transplanting trays, filled with normal vegetable planting substrate and topped with vermiculite. The germination was monitored until 30th June 2016. For the statistical analysis, the programme SPSS 21.0 was used (ANOVA – analysis of variance, $p = 0.05$).

Results: The genotype (variety) had high impact on the germination rate, which ranged from 7−14 % ('Ranfol') to 61.7−85.8 % ('Zelenec'), when compared with the

T a b l e

The influence of genotype (variety) and seed treatment on germination rate

Varieties \ methods	Average germination rate (%)							
	M1		M2		M3		M4	
	Average ± SN	*	Average ± SN	*	Average ± SN	*	Avergage ± SN	*
Muscat Letnij	35.3 ± 6.79	bcde (A)	17.6 ± 3.40	c (A)	27.5 ± 8.55	cd (A)	31.4 ± 3.92	de (A)
Bianca	56.3 ± 2.30	ab (A)	43.7 ± 7.54	abc (A)	55.2 ± 9.12	bc (A)	60.9 ± 8.05	abc (A)
Biserka Rana	24.2 ± 6.67	de (A)	24.2 ± 3.00	c (A)	29.2 ± 3.63	cd (A)	35.0 ± 5.20	cde (A)
Evita	29.4 ± 6.12	cde (A)	26.5 ± 7.40	bc (A)	35.3 ± 6.12	bcd (A)	29.4 ± 6.12	de (A)
Jutrzenka	54.2 ± 3.33	abc (A)	60.0 ± 7.64	ab (A)	50.8 ± 5.46	bc (A)	60.8 ± 4.64	abc (A)
Ranfol	11.4 ± 5.75	e (A)	14.0 ± 6.33	c (A)	7.0 ± 3.16	d (A)	12.3 ± 3.16	e (A)
Muscat Ottonel	30.0 ± 3.82	cde (A)	40.0 ± 11.27	abc (A)	51.7 ± 5.46	bc (A)	39.2 ± 6.51	bcd (A)
Muscat à Petits Grains Blancs	38.3 ± 3.63	bcd (A)	40.8 ± 4.41	abc (A)	35.8 ± 5.07	bc (A)	45.8 ± 5.83	bcd (A)
Zelenec	71.7 ± 5.83	a (AB)	61.7 ± 6.67	a (B)	85.8 ± 2.20	a (A)	80.0 ± 1.44	a (AB)
Average	38.7 ± 3.36		36.1 ± 3.40		43.8 ± 4.10		45.7 ± 3.80	

Different letters (a – e) within each column indicate significant differences among studied varieties; block capitals A – B in () indicate significant differences among different treatments (Tukey $p \leq 0.05$); values represent means ± standard error.

Correspondence to: A. Perko, University of Maribor, Faculty of Agriculture and Life Sciences, Pivola 10, 2311 Hoče, Maribor, Slovenia. E-mail: a.perko@um.si

treatments of seeds before the sowing (Table). The variability in germination rate among studied varieties could be associated with self-pollination. It is expected to be lower than the germination rate of seeds originating from open or cross-pollination (Doijode 2001, Sabir 2011). The treatments of seeds had no significant effect on the germination rate on all varieties, except on the variety 'Zelenec', where it was higher when hydrogen peroxide was used (when compared with the control). The hydrogen peroxide (30 %) resulted in a significantly higher germination rate only in 'Zelenec' (85.8 % when compared with M2), while lower concentration (15 %) had statistically the same impact as the control ($p = 0.05$). Compared with the control, grape seeds treated with H_2O_2 had higher average germination rates in all studied varieties (45.7 % (30 % H_2O_2) and 43.8 (15 % H_2O_2)) although the differences were not significant.

Conclusions: In most varieties, the treatments of grapevine seeds with hydrogen peroxide before sowing did not significantly affect the germination rate. The significant impact was documented only when using higher concentration (30 % H_2O_2) for seeds of the variety 'Zelenec'. There were high differences in germination rates among varieties. For better understanding of grapevine seed germination we should also consider specific characteristics of individual varieties (genetic structure such as level of heterozygosity, duration of vegetation period and time of harvesting seeds, seed anatomy, and climatic and weather conditions).

Conner, P. J.; 2008: Effects of stratification, germination temperature and pre-treatment with gibberellic acid and hydrogen peroxide on germination of 'Fry' muscadine (*Vitis rotundifolia*) seed. HortScience, **43**, 853-856.

Doijode, S. D.; 2001: Seed Storage of Horticultural Crops, 2nd edition, Haworth Press.

Ellis, R. H.; Hong, T. D.; Roberts, E. H.; 1983: A note on the development of a practical procedure for promoting the germination of dormant seed of grape (*Vitis* spp.). Vitis, **22**, 211-219.

Rombough, L.; 2002. The grape grower: a guide to organic viticulture, 164-168 and 252. Chelsea Green Publishing, Vermont.

Sabir, A.; 2011: Influences of self-and cross-pollinations on berry set, seed characteristics and germination progress of grape (*Vitis vinifera* cv. Italia). Int. J. Agric. Biol. **13**, 591-594.

Selim, H. H.; Ibrahim, F. A.; Fayek, M. A.; El-Deen, S. A.; Gamal, N. M.; 1981: Effect of different treatments on germination of Romi red grape seeds. Vitis, **20**, 115-121.

Received May 21, 2019
Accepted July 29, 2019

VITIS Volume 59 Number 1 (2020)

Erratum

A typing error has occurred on page 151 (Vitis Vol. 58 No. 4) of the manuscript:

Testing different methods of grape seed germination

A. Perko[1)], A. Ivančič[2)] and S. Vršič[1)]

[1)] University of Maribor, Faculty of Agriculture and Life Sciences, Maribor, Slovenia
[2)] University of Maribor, Faculty of Agriculture and Life Sciences, UC of Viticulture and Enology Meranovo, Maribor, Slovenia

The authors addresses should appear as follows:

A. Perko[1)], A. Ivančič[2)] and S. Vršič[1)]

[1)] University of Maribor, Faculty of Agriculture and Life Sciences, UC of Viticulture and Enology Meranovo, Maribor, Slovenia
[2)] University of Maribor, Faculty of Agriculture and Life Sciences, Maribor, Slovenia

The editors apologise for this mistake.