

BUDBURST DELAY AND BERRY RIPENING AFTER VEGETAL OIL APPLICATION IN AUSTRIA

Authors: Jose Carlos HERRERA^{1*}, Robin KNÖBL¹, Gregor WIEDESCHITZ¹, Christa FEHRINGER¹, Christoph GABLER², Erhard KÜHRER², Astrid FORNECK¹

¹ BOKU University, Institute of Viticulture and Pomology, Konrad-Lorenz Str. 24, A-3430 Tulln

² Wein- und Obstbauschule Krems, Wienerstraße 101, A-3500 Krems

*Corresponding author: jose.herrera@boku.ac.at

Abstract:

Context and purpose of the study – Occurrence of freezing temperatures in early spring when grapevine shoots are developing is termed late frost in viticulture. Young green tissues are very sensible to temperatures below zero and damages often lead to important yield and quality losses such as the case in Europe in 2017. An indirect method to avoid late frost damage in vineyards consist in delaying the budburst. Previous research reported similar effects by applying vegetal oil on dormant buds. Here, we tested the application of rapeseed vegetal oil during late winter to delay the budburst on two *V.vinifera* cultivars of interest in Austria, Grüner Veltliner (GV) and Zweigelt (ZW).

Material and methods – The experiment was carried out in 2017 and 2018 in an experimental vineyard located in Krems (N-E Austria), on 4 consecutive rows of ZW planted in 2004 and 4 consecutive rows of GV planted in 2007 and pruned as single Guyot. Experimental design consisted on 8 blocks of 12 vines each (4 controls and 4 oil-treated) per cultivar. Rapeseed oil (10% v/v in water) was manually sprayed on dormant buds in March (ca. 30-45 days before budbreak). The budbreak phenology and shoot development was assessed at the beginning of the growing season and berry samples were collected 5 times during ripening to determine possible impact of the treatment. At harvest, yield and leaf area was determined.

Results – The oil application resulted in a delayed budbreak for both cultivars and in both seasons. While in the first season oil-treatment did not impact yield or berry composition in both cultivars, during the second season phytotoxicity (bud necrosis or reduced shoot growth) was observed mainly in Zweigelt, leading to reduced yields and the alteration of some berry compositional parameters. G. Veltliner showed a lower degree of phytotoxicity (mainly reduced shoot vigor) that eventually disappeared during the season, resulting in no statistical differences in berry composition or yields compared with the non-treated controls. Overall, our results suggest an interaction between genotype, climatic factors (mainly temperature) and oil application, resulting in variable effects observed after oil application that needs to be fully characterized to avoid possible phytotoxic effects and fine tuning the technique.

Keywords: budbreak, spring frost, freeze damage, ripening

1. Introduction.

Budburst delay and berry ripening after vegetal oil application in Austria

Jose Carlos HERRERA^{1*}, Robin KNÖBL¹, Gregor WIEDESCHITZ¹, Christa FEHRINGER¹, Christoph GABLER², Erhard KÜHRER², Astrid FORNECK¹

¹ Institute of Viticulture and Pomology, University of Natural Resources and Life Sciences, Vienna (BOKU), Austria

² Wein- und Obstbauschule Krems, Wienerstraße 101, A-3500 Krems, Austria

* E-mail: jose.herrera@boku.ac.at



Universität für Bodenkultur Wien
Department für Nutzpflanzenwissenschaften

Introduction

Spring frost damage is an important risk for viticulture. While direct methods for contrasting spring frost can be costly and sometimes not effective, an indirect and cost-effective method consist in delaying the budburst. Here, we tested for two consecutive years the application of rapeseed oil on dormant buds with the aim to delay the budburst of two *V. vinifera* cultivars of great interest in Austria, Grüner Veltliner (GV) and Zweigelt (ZW).

Key results

- ✓ The first year of experiments (2017) the oil treatment successfully delayed the budbreak in both, Zweigelt and G. Veltliner grapevines on average by 8 days (Fig 1), without influencing the yield (Fig 2) nor the ripening of berries (Table 1).
- ✓ The second year (2018) the oil treatment resulted in phytotoxicity events in both, Zweigelt and G. Veltliner, although more severe damage were observed in ZW (Fig 3).

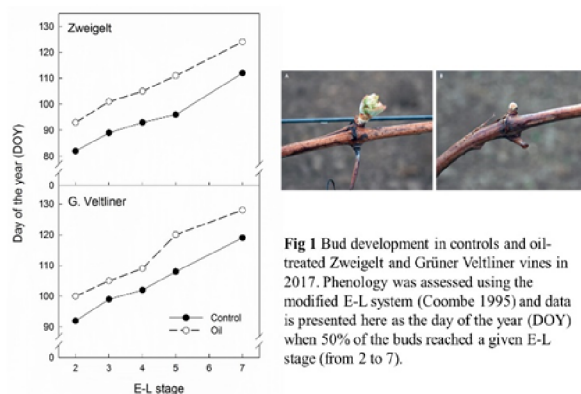


Fig 1 Bud development in controls and oil-treated Zweigelt and Grüner Veltliner vines in 2017. Phenology was assessed using the modified E-L system (Coombe 1995) and data is presented here as the day of the year (DOY) when 50% of the buds reached a given E-L stage (from 2 to 7).

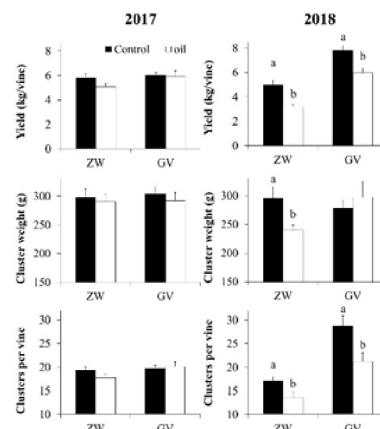


Fig 2 Yield components of Zweigelt (ZW) and G. Veltliner (GV) grapevines subjected to oil treatment during dormancy in 2017 and 2018. Different letter denotes statistical differences between control and oil treatment.

Methods

- ✓ The experiment was carried out in 2017 and 2018 in an experimental vineyard located in Krems (N-E Austria), on 4 consecutive rows of ZW planted in 2004 and 4 consecutive rows of GV planted in 2007.
- ✓ Experimental design consisted on 8 blocks of 12 vines each (4 controls and 4 oil-treated) per cultivar.
- ✓ Rapeseed oil (10% v/v in water) was manually sprayed on dormant buds in March (ca. 30-45 days before budbreak).

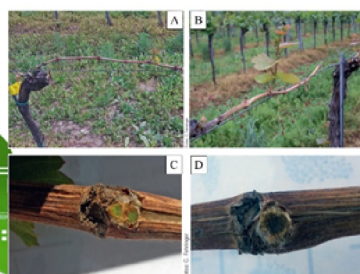


Fig 3 Phytotoxicity observed in ZW grapevines after oil application in 2018, characterized by low budbreak rate (A, B) as a consequence of a high incidence of bud necrosis (C, D) (Forneck et al. 2019)

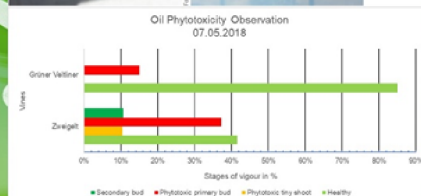


Table 1 Total soluble solids (TSS; Brix) and titratable acidity (TA; g/L) at harvest of Zweigelt and G. Veltliner in 2017 and 2018. Statistical differences between treatments are denoted with an * ($P < 0.05$)

	Zweigelt			G. Veltliner		
	Control	Oil	Sign	Control	Oil	Sign
2017						
TSS (Brix)	18.1	18.8	ns	21.3	20.8	ns
TA (g/L)	6.7	7.2	ns	6.0	6.0	ns
2018						
TSS (Brix)	19.2	20.7	*	20.4	21.3	*
TA (g/L)	6.3	6.9	ns	5.9	6.1	*

References

- Forneck A, Knöbl R, Gabler C, Kührer E, Herrera JC (2018) Austriebverzögerung als Spätfrost-Prävention. Der Winzer, das Fachblatt des österreichischen Weinbaus, 01, 7-11.
Forneck A et al. (2019) Ökologische Frostpräventionsstrategie. Neue Versuchsergebnisse aus Österreich. Der Winzer, das Fachblatt des österreichischen Weinbaus, 03, 10-13.
Herrera J C, Knöbl R, Gabler C, Kührer E, Forneck A. (2018) Effect of vegetal oil application on budbreak phenology timing. Mitteilungen Klosterneuburg, Rebe und Wein, Obstbau und Fruchterzeugung 08, 172-180.