



The effect of a warm summer on grapevine growth in southern Finland – Short report

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General Note



Article is recommended to print as color version in recycled paper. *Save Trees, Save Climate.*

ABSTRACT

Throughout Northern Europe and southern Finland, summer 2018 was exceptionally warm and long. In the Helsinki region, the grapevines 'Rondo' and 'Zilga' were mature for harvesting on September 8. The Huglin Index 1521 was 90% and the Amerine-Winkler Index 904 was 47% higher; the growing season was over three weeks longer than the average of the years 1952 – 2017. It would have allowed many pure *Vitis vinifera* varieties suitable for cool wine-growing regions to grow.

Keywords: climate warming; growing season; Huglin Index; Amerine-Winkler Index; northern viticulture

1. INTRODUCTION

The climate warming in the Northern Hemisphere has advanced the spring and starts the growth of plant (Post, Steinman & Mann, 2018). In Europe, this will influence the choice of agricultural crop varieties and crop rotation and move wine growing more to the north than the current latitude 50° north. In southern Finland, climate warming has occurred, as felt in several warm summers compared to long term averages (Finnish Meteorological Institute, 2018). It has increased interest in wine growing in Finland up to

the latitude 63° north. During warm summers, the effective temperature sums for the growing season and soil temperatures have risen while growing seasons have lengthened, which has appeared as earlier bud break and harvest. Throughout Northern Europe, summer 2018 was exceptionally warm and long. According to the weather statistics of the FINNISH METEOROLOGICAL INSTITUTE (2019), the Finnish summer heat record of 33.7°C was measured on July 18, and the air temperature exceeded 25°C on 40 days in July and August. The aim of the study was to point out how exceptional the summer 2018 was in southern Finland and how much the high temperatures of the 2018 growing season in the Helsinki region differed from the long-term averages and what effect the temperatures had on the growth cycle of grapevines.

2. MATERIAL AND METHODS

Indexes, air temperatures, and length of growing seasons based on the weather statistics of the Finnish Meteorological Institute from 1952 – 2018, and growth stages of the grapevines 'Rondo' and 'Zilga' based on phenological growth stages of the grapevine according to Eichhorn-Lorenz (Eichhorn & Lorenz, 1977) and on the author's notes from years 2002 – 2018.

3. RESULTS

In 2018, the Huglin Index was 90% and the Amerine-Winkler Index 47% higher. The growing season was over three weeks longer than the average of the years 1952 – 2018. Also, the average annual temperature of the climates, the average temperature of the growing season, the number of warm days over 10°C, and the Hydrothermal Index exceeded the averages of the years 1952–2017 (Table 1).

Table 1 Grapevine growth indexes and air temperatures in 2018 and the average of the years 1952–2017 in Tuusula vineyard in the Helsinki region

Indexes	Tuusula 2018	Tuusula 1952–2017
Huglin Index	1521	801
Amerine-Winkler Index	904	616
Average annual air temperature	6.7	5.7
Growing season's average temperature	14.8°C	11.7°C
Growing season precipitation	258 mm	336 mm
Hydrothermal Index (Hyl)	14.8°C x 258 mm = 3818°C mm	11.4°C x 336 mm = 3830°C mm
Length of growing season	191 vrk (5°Cvrk)	168 vrk (5°Cvrk)
Number of days T over 10°C	142	114

In 2018, the budburst began (Eichhorn-Lorenz 5) on May 7, fruit setting (Eichhorn-Lorenz 27) was on July 5 and harvesting (Eichhorn-Lorenz 38) started on September 8, when the degree Brix was 18–20. The time periods between beginning of budburst and fruit setting, and between fruit setting and harvest, were shortened; total growth circulation from the beginning of budburst to the start of harvest was shortened in 2018 by almost two weeks compared to the average of the years 2002 – 2017.

4. DISCUSSION

Finland's average annual air temperature rose by 2.3°C country-wide between the years 1847 and 2013 (Mikkonen, Laine, Mäkelä, Gregow, Tuomenvirta, Laitinen & Laaksonen, 2015) is forecast to rise by 0.4°C/decade (Irannezhad, Chend & Klöve, 2015). In the Helsinki region in southern Finland (60°N, 25°E), the warming air temperature has been most noticeable from November to January and in spring from March to May. The air temperature in winter months is forecast to rise by 2 – 7°C during the years 2040–2069 compared to the average from 1981 to 2010 (Ruosteenoja, Jylhä & Kämäräinen 2016). This forecast raises the temperature in southern Finland to the level of existing central European wine-growing regions.

During long-term follow-up between 1952 and 2000, the average annual air temperature exceeded 7°C only once, but between 2000 and 2018 it exceeded 7°C six times. Summer 2018 was exceptionally warm. The average air temperature (15.3°C) in May was 4.9°C higher than the previous 30-year period, and the average air temperature (21.2°C) in the warmest month, July, was 3.5°C higher than the average of that period (Finnish Meteorological Institute, 2018). Also, in Denmark's wine-growing locations were

measured temperature records. In June, July, and August, the average air temperature was 17.7°C, while the average air temperature in July was 19.2°C, 3.6°C above the long-term average (Toldam-Andersen, 2019).

According to the climate classification indexes of Amerine-Winkler (Amerine & Winkler, 1944), Huglin (Huglin & Schneider, 1998), and Tornietto and Carbonneau (Tornietto & Carbonneau, 2004) for grape-growing regions, the Helsinki region belongs to a cold climate region. The cold climate region refers to the extreme areas of a cool climate region, where early ripening hybrid varieties and suitable *Vitis vinifera* varieties can be grown. The warm summer and long growing season of 2018 would also have allowed the farming of many *Vitis vinifera* varieties such as 'Gewürtztraminer', 'Riesling', or 'Pinot Blanc' in cold climate regions. Since 2000, summers almost as warm as in 2018 have become more frequent (Karvonen, 2014). They accelerate the growth cycle and as a result several more pure *Vitis vinifera* varieties can be grown.

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