

## EVALUATION OF A BIOLOGICAL FOLIAR FERTILIZATION SYSTEM, IN THE PRODUCTION, AGRONOMIC AND QUALITY CHARACTERISTICS OF THREE WINE GRAPE VARIETIES

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### Abstract:

**Context and purpose of the study** – Evaluation of the fertility management practices in wine grape varieties production. Wine grape represents one of the most important productions in Greece with major impact to the socioeconomic characteristics of the country. The objective of this study is to evaluate, with the support of Geospatial Technologies, the potential effects of an innovative foliar fertilizer system, which is composed of three parts: a mineral fertilizer in a micronized formulation, a biostimulant as an enhancing factor of the process and, an amino acid compound (SANOVITA concept). The study was established at a collaborative, private vineyard, in the area of Trilofos-Thessaloniki, at the region of Northern Greece. The overall process will enhance the existing, cultivating practices of the vineyard, developing qualitative characteristics of the final product in order to establish a strong brand name called "Petit Oineonas". The spraying was chosen to be made in only three French varieties (Merlot, Cabernet Sauvignon and Syrah), mainly because of an equal area size.

**Material and methods** – The vineyard was established at the location of Trilofos, Thessaloniki, Greece in fifteen lines in an area of almost 0.4 ha (4 stremmata). Half of the vineyard is sprayed with the system at two growth stages, while the grower applies organic management to the vineyard.

The experimental design includes for each line of the fifteen corridors the following approaches: 1<sup>st</sup> part-a Control part with no application, 2<sup>nd</sup> part-an application of the SANOVITA concept (applied foliar in two growth stages during the growing season), 3<sup>rd</sup> part-a second Control part with no application and 4<sup>th</sup> part-an application of the SANOVITA concept. Data measured included NDVI, GIS (Geographic Information Systems) applications, use of Sentinel-2 satellite images, fruit size, sugar content and visible observations were recorded.

**Results** – Results from this year, have shown that the additional application of the foliar system based on GIS applications and spatial statistics has increased the yield and improved the overall quality of the grapes (weight, grape size and resulted in changes in sugar content). The study will be continued for additional 3 years for establishing further spatiotemporal comparison achievements.

**Keywords:** vineyard, GIS (Geographic Information Systems), Merlot, Cabernet Sauvignon, Syrah, SANOVITA concept.

### 1. Introduction.

## Evaluation of a biological foliar fertilization system, in the production, agronomic and quality characteristics of three wine grape varieties



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### PROJECT SUMMARY

### BASICS OF GEOMORPHOLOGICAL ANALYSIS

### GEOSPATIAL ANALYSIS

**Abstract**  
Wine grape represents one of the most important productions in Greece with major impact to the socioeconomic characteristics of the country. The objective of this study is to evaluate, with the support of Geospatial Technologies, the potential effects of an innovative foliar fertilizer system, which is composed of three parts: a mineral fertilizer in a micronized formulation, a biostimulant as an enhancing factor of the process and, an amino acid compound (SANOVITA concept). The study was established at a collaborative, private vineyard, in the area of Trilofos-Thessaloniki, at the region of Northern Greece. The overall process will enhance the existing, cultivating practices of the vineyard, developing qualitative characteristics of the final product in order to establish a strong brand name called "Petit Oneonas" (in English, "Small Vineyard"). The three wine grape varieties are: Cabernet Sauvignon (a), Merlot (b) and Syrah (c).



**Purpose of the study**

- Evaluation of the fertility management practices in wine grape varieties production

**Conceptual Approach**

**Basics of Experimental Design**

A) Basic Geomorphological Characteristics of the Landscape (A1):



Anaglyph of the area  
(Source: <http://www.comlandnews.com>)

**B) CASE STUDY AREA**

B1) Location: The vineyard was established at the location of Trilofos, Prefecture of Thessaloniki, Greece in fifteen (15) lines in a plot of 0.4 ha (4 stremmata)

Latitude: 40° 27' 10.7" N  
Longitude: 22° 57' 56.5" E  
Altitude: 180 m



**C) SUITABILITY MAP For vineyard cultivation at the case study area**  
(Source: <http://ifs.gov.gr/>)



**D) EXPERIMENT CHARACTERISTICS**

D1) Spacing & aligning



Spacing between vines: 1.1 meters  
Spacing between rows: 1.2 meters

- Cabernet Sauvignon : 6 rows
- Merlot : 4 rows
- Syrah : 5 rows

D2) Orientation of vineyard's rows & organizing application of organic foliar



Half of the upper stumps and half of the bottom stumps will be sprayed

**E) CLIMATIC CHARACTERISTICS**  
(Source: <http://climatlas.hnms.gr>)

i) Classification Map of the Aggregate of Annual Sunshine hours : 2328.9 hours (20 years data)



ii) Classification Map of the Aggregate of Annual Precipitation (in mm): 489.01 mm (20 years data)



iii) Classification Map of the Aggregate of Average Temperature (in °C): 15.07 °C (20 years data)



**Materials and Methods**

**TYPES OF THREE (3) ORGANIC FOLIARS, MIXED TOGETHER**  
(provided by SANOVITA)  
(<https://www.sanovita-gmbh.de/>)

- i) **Herbageen Z20**  
1 stremma = 1.000 sq. meters  
Proportion: 160 gr / 1 stremma  
(Inorganic nutrients)
- ii) **Herbageen Fluisan**  
Proportion: 10 ml / 1 stremma  
(Biostimulant)
- iii) **Herbageen Amino acid**  
Proportion: 100 ml / 1 stremma  
(Aminoacids)

**NDVI spatiotemporal variation**



Normalized Difference Vegetation Index (NDVI)

$$NDVI = \frac{(NIR - Red)}{(NIR + Red)}$$


ORDINARY KRIGING of NDVI values



### RESULTS

**Cabernet Sauvignon 1-9-2018**



**Syrah 1-9-2018**



**Merlot 1-9-2018**



Statistical analysis was performed with JMP 12.0 s/w ([www.jmp.com](http://www.jmp.com)) and Student's test was used to compare means for significance.

- Concerning foliar treatments, SANOVITA produced statistically higher average grape weight (g), maximum grape diameter (mm), grape length (mm), sugars (%) and NDVI.
- Among varieties:
  - Cabernet Sauvignon had shown statistically higher NDVI.
  - Merlot had shown statistically higher average grape weight (g), maximum grape diameter (mm), grape length (mm) and NDVI.
  - Syrah had shown statistically higher average grape weight (g), maximum grape diameter (mm), grape length (mm) and NDVI.

### CONCLUSIONS

Combinations of Geospatial Technologies, with In-the-field support of smart sensors could provide significant evolution of efficiency of organic foliar to sustainable vineyards.