Olive-mill and grape-mill waste adding's may affect the growth of grapevines young cuttings

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Introduction

Olive tree and grapevine cultivations are the main crops in the Mediterranean area. Intensive crop production is resulting to high yields for both crops but processes that follow harvesting (olive oil and wine production) derive a great amount of wastes that are causing concerns about their effects on environmental and human health, after their disposal. Reuse of wastes in agriculture sector is attracting research interest.

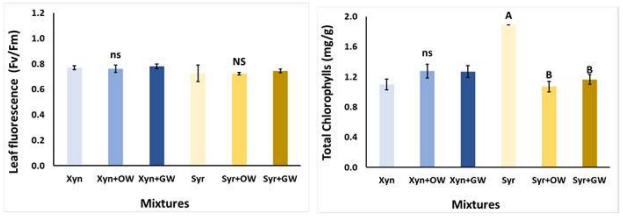
Experimental set up

The potential use of olive-mill wastes (OMW) and grape-mill wastes (GMW) at 15% v/v in soil was evaluated for the production of international (Syrah) and indigenous (Xynisteri) grapevines cultivars. One year old cuttings were transplanted in the mixtures of i) soil, ii) soil+OMW or iii) soil+GMW in 7 Lt pots. After 32 days of cultivation, during which they were watered according to plants' needs, plants were sampled, and a series of growth and physiology parameters were assessed. Additionally, the physiochemical features of the produced mixtures were evaluated.

Mixtures characteristics

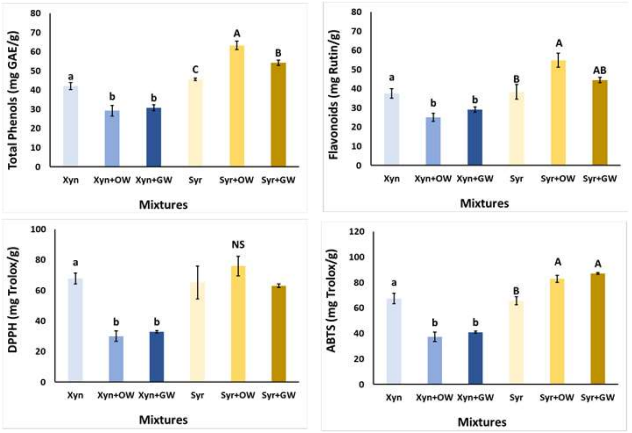
	pH	EC (dS/m)	Organic matter (%)	$CaCO_3$ (%)	N (g/kg)
Soil	7.75 a	0.92 c	2.17 a	59.17 a	1.40 c
Soil+OMW	7.06 c	1.47 a	2.54 a	59.76 a	1.65 b
Soil+GMW	7.39 b	1.23 b	1.96 a	55.12 a	2.02 a

Plant physiology parameters



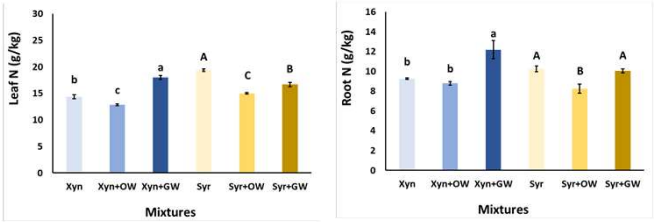
- **The adding of OMW and GMW in soil increased EC and N content but decreased pH of the mixtures.**
- **In Xynisteri, Chlorophylls (a, b, total) were remained unaffected but in Syrah, Chlorophylls were decreased in OMW- and GMW-treated plants.**
- **Leaf fluorescence was similar to all examined treatments.**

Phenolics, flavonoids and antioxidant activity



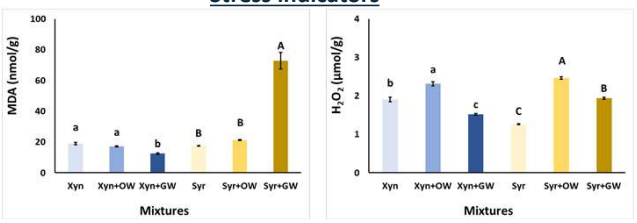
- **Xynisteri: Total phenols, antioxidant capacity (DPPH, FRAP, ABTS) and flavonoids in leaves were decreased by adding OMW and GMW in soil.**
- **Syrah: Total phenols and antioxidant content (ABTS) in leaves were increased by adding OMW and GMW in soil. OMW stimulated flavonoids in leaves comparing to control**

Mineral content



- **Xynisteri: Nitrogen was accumulated more at GMW-treated plants in both Xynisteri leaves and roots.**
- **Syrah: Nitrogen accumulation in leaves was decreased by adding the OMW and GMW in soil.**

Stress indicators



- **Xynisteri: MDA content as a stress indicator for lipid peroxidation was high in leaves on plants grown in soil or soil+15% OMW but decreased at soil+15% GMW, while similar reduced values were found for hydrogen peroxide at the same treatment.**
- **Syrah: MDA was increased at GMW-treated plants.**

Conclusion:

Both GMW and OMW have the potential to be mixed with soil, providing minerals and organic matter to the mixtures but further research is required to obtain the appropriate fertigation scheme when using plant residues, avoiding any possible plant stress.

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