

## Article

# Pilot Cultivation of the Vulnerable Local Endemic Cretan Marjoram *Origanum microphyllum* (Benth.) Vogel (Lamiaceae): Effect of Fertilizers on Growth and Herbal Quality Features

**Supplementary Table S1.** Product details of purchased fertilizers used in the pilot cultivation of *Origanum microphyllum* in Heraklion, Crete, Greece

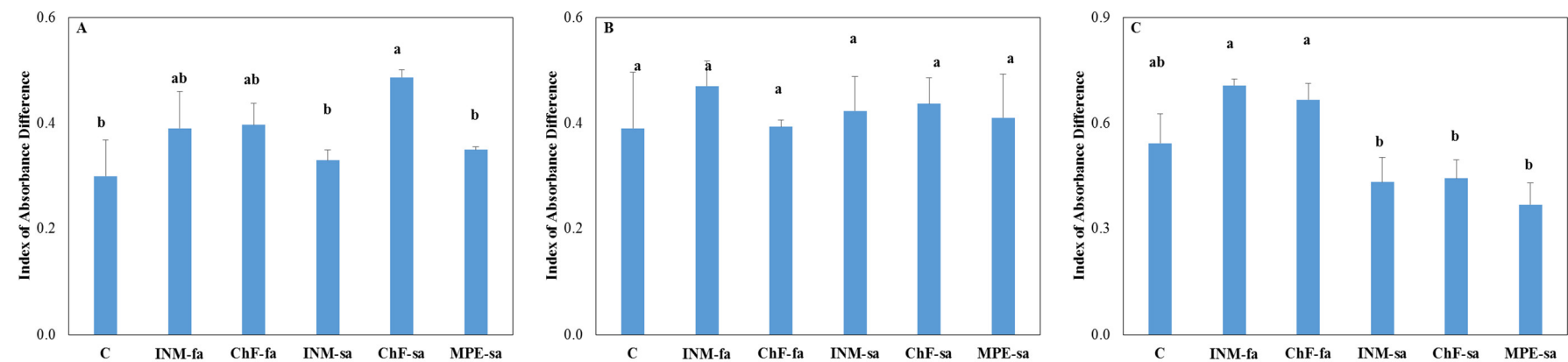
Fertilizer	Composition	Company purchased
THEORUN	A nitrogen source liquid fertilizer with N 17% (w/w) P <sub>2</sub> O <sub>5</sub> 0 % (w/w) K <sub>2</sub> O 1.5% (w/w), organic matter 3.2 % (w/w), C/N 0.09, pH 9.1, diurea 0.26%, electric conductivity 86 mS/cm [liquid extract (1‰)]	THEOFRASTOS, Industrial area of Korinthos, GR-20100 Korinthos, Greece
THEOCAL	Organic calcium powder fertilizer which mainly contains calcium formate, pH 7.1, Ca 30% (w/w) and organic matter 30%	
THEOFAST	Liquid plant growth enhancer including plant extracts of edible raw materials with organic matter 4.4% (w/w) (plant extracts), pH 9.5 and electric conductivity 78 mS/cm [liquid extract (1‰)]	
THEOMASS	Liquid plant growth enhancer including plant extracts of edible raw materials with organic matter 5.4 % (w/w) (plant extracts), pH 9.4 and electric conductivity 85 mS/cm [liquid extract (1‰)]	
0-0-52	Soluble granule fertilizer of K <sub>2</sub> SO <sub>4</sub>	AGRI.FE.M. LTD Fertilizers, Greece
MgSO <sub>4</sub>	Mg 25.6% containing MgO 16%, soluble Mg 9.6% and SO <sub>3</sub> 32%	
Plex Mix	Containing Fe 3.1% w/w, Mn 1.5% w/w, Zn 0.29% w/w, Cu 0.12% w/w, B 0.27% w/w and Mo 0.13% w/w	
10-47-10 + TE	Containing Total Nitrogen 10%, Phosphorous (P <sub>2</sub> O <sub>5</sub> ) 47 %, Potassium (K <sub>2</sub> O) 10 %, Iron (Fe) 0.1%, Manganese (Mn) 0.05%, Zinc (Zn) 0.015%, Copper (Cu) 0.011%, Molybdenum (Mo) 0.007 %, Boron (B) 0.02%, Monoammonium Phosphate, Potassium Nitrate, Urea, Fe EDTA, Mn EDTA, Zn EDTA, Cu EDTA, Disodium Octaborate Tetrahydrate, Sodium Molybdate 2-hydrate	
34.4-0-0	Neofert®, NH <sub>4</sub> NO <sub>3</sub> ammonium nitrate EC fertilizer with total nitrogen content on dry basis 17% NH <sub>4</sub> form and 17.4% NO <sub>3</sub> form	Neochim PLC, Bulgaria
Ca(NO <sub>3</sub> ) <sub>2</sub>	NITROCAL. Contains total nitrogen of 15.5% and CaO 27%.	Agrohimiki, Greece

**Supplementary Table S2.** Experimental field soil properties of the research garden of the Hellenic Mediterranean University used for the fertilization trials on *Origanum microphyllum*. CEC: cation exchange capacity; EC<sub>se</sub>: saturation extract electrical conductivity; SAR: sodium absorption ratio.

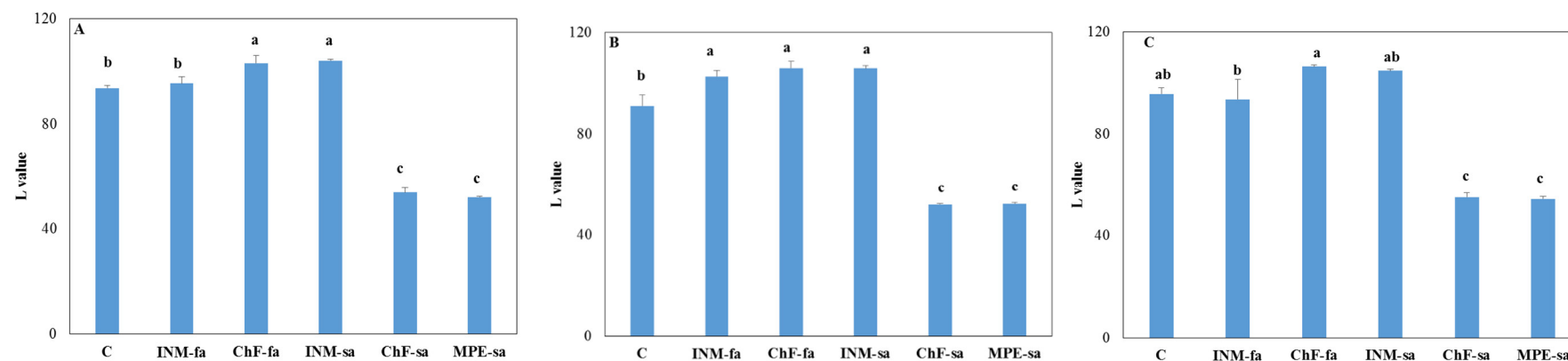
Soil texture			pH	CaCO <sub>3</sub>	EC <sub>se</sub>	SAR	Organic C	Total N
Sand	Silt	Clay						
	(g kg <sup>-1</sup> )		(1:2 H <sub>2</sub> O)	(g kg <sup>-1</sup> )	(dS m <sup>-1</sup> )		(g kg <sup>-1</sup> )	
651 <sup>†</sup> ± 7 <sup>‡</sup>	195 ± 7	154 ± 0	8.1 ± 0.0	369 ± 4	0.63 ± 0.06	0.52 ± 0.03	19.3 ± 2.1	17.6 ± 0.2
CEC	Available concentration of macronutrients							
	NO <sub>3</sub> -N	NH <sub>4</sub> -N	P	K	Ca	Mg		
(cmol <sub>c</sub> kg <sup>-1</sup> )	(mg kg <sup>-1</sup> )							
16.9 ± 0.4	68.8 ± 15.0	10.8 ± 0.6	15.4 ± 3.4	260 ± 17	3145 ± 62	163 ± 20		
Available concentration of micronutrients								
B	Cu	Zn	Fe	Mn				
		(mg kg <sup>-1</sup> )						
0.61 ± 0.08	8.0 ± 0.1	0.89 ± 0.02	5.2 ± 0.4	3.6 ± 0.5				

<sup>†</sup>Mean

<sup>‡</sup>Standard deviation



**Supplementary Figure S1.** Effect of fertilization through different (root/foliar) application methods on leaf index of absorbance difference of *Origanum microphyllum* at: (A) Vegetative; (B) Early flowering; (C) Full flowering stage. C: Control (water); INM-fa: Integrated nutrient management (INM) by foliar application; ChF-fa: Conventional fertilization by foliar application; INM-sa: INM by soil application; ChF-sa: Conventional fertilization by soil application; MPE-sa: Mixture of plant extracts as biostimulant by soil application. Values represent the mean of three replicates  $\pm$  SEM. Within each plot different letters indicate significant differences.



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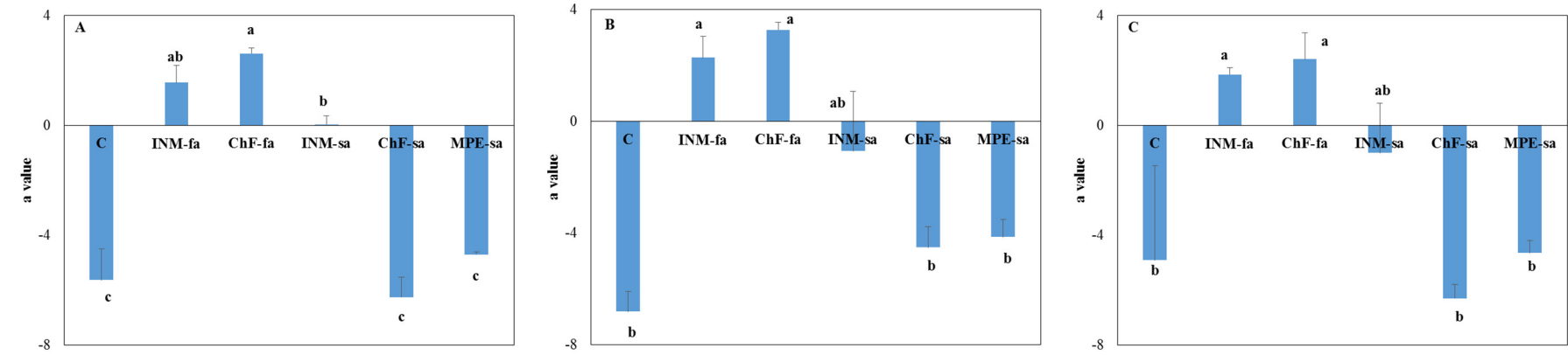
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**Supplementary Figure S2.** Effect of fertilization through different (root/foliar) application methods on leaf L value of *Origanum microphyllum* at: (A) Vegetative; (B) Early flowering; (C) Full flowering stage. C: Control (water); INM-fa: Integrated nutrient management (INM) by foliar application; ChF-fa: Conventional fertilization by foliar application; INM-sa: INM by soil application; ChF-sa: Conventional fertilization by soil application; MPE-sa: Mixture of plant extracts as biostimulant by soil application. Values represent the mean of three replicates  $\pm$  SEM. Within each plot different letters indicate significant differences.



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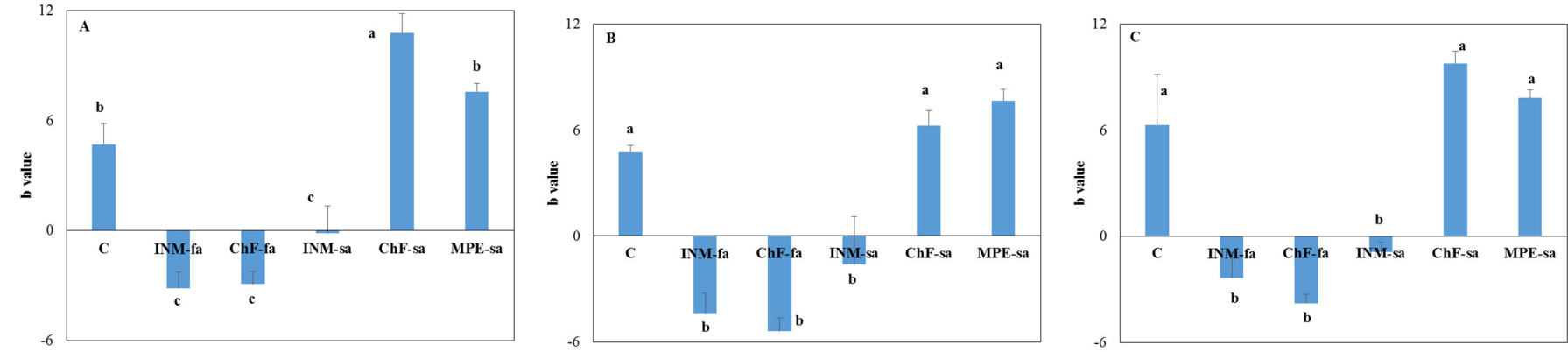
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**Supplementary Figure S3.** Effect of fertilization through different (root/ foliar) application methods on leaf a value of *Origanum microphyllum* at: (A) Vegetation; (B) Early flowering; (C) Full flowering (C) stage. C: Control (water); INM-fa: Integrated nutrient management (INM) by foliar application; ChF-fa: Conventoinal fertilization by foliar application; INM-sa: INM by soil application; ChF-sa: Conventional fertilization by soil application; MPE-sa: Mixture of plant extracts as biostimulant by soil application. Values are the mean of three replicates  $\pm$  sem. Within each plot different letters indicate significant differences.



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**Supplementary Figure S4.** Effect of fertilization through different (root/foliar) application methods on leaf b value of *Origanum microphyllum* at: (A) Vegetation; (B) Early flowering; (C) Full flowering (C) stage. C: Control (water); INM-fa: Integrated nutrient management (INM) by foliar application; ChF-fa: Conventional fertilization by foliar application; INM-sa: INM by soil application; ChF-sa: Conventional fertilization by soil application; MPE-sa: Mixture of plant extracts as biostimulant by soil application. Values represent the mean of three replicates  $\pm$  SEM. Within each plot different letters indicate significant differences.