The effect of manure on plant development and yield of the wild edible species *Cichorium spinosum*, *Scolymus hispanicus* and *Sonchus oleraceus*.

SPYRIDON PETROPOULOS (spetropoulos@uth.gr) *
Nikolaos Polyzos (npolyzos@uth.gr)

[1] University of Thessaly, Department of Agriculture, Crop Production and Rural Environment, Fytokou Street, 38446, Volos, Greece

Abstract

The Mediterranean basin is an abundant hotspot of native wild edible plants which have gained great interest for their commercial exploitation as alternative crops in terms of sustainability due to rich phytochemical profile and tremendous bioactive properties. At the experimental farm of the University of Thessaly during the period of May 2022 and July 2022 a field trial was conducted in order to evaluate the effect of manure on the morphological traits and yield of the three wild edible species, namely *Scolymus hispanicus*, *Sonchus oleraceus* and *Cichorium spinosum*. Seeds of species were sown in seed trays and young plants were transplanted to the field at the stage of 3-4 fully developed leaves. For the execution of the experiment, two treatments (manure and control) were tested, while each treatment included three plots with a size of 8 m^2 (4 x 2 m, n=3). Twenty plants per wild edible plant were transplanted in each plot with distances of 0.40 cm between the rows and 0.30 cm within each row. For the manure treatment, 40 kg/plot of manure were added directly in soil and incorporated with a tiller, whereas in the control treatment no manure was added. The cholorophyll content of leaves (SPAD values) and the diameter of the plants' rosettes were evaluated during the growing period. Plants were harvested when fully developed and prior to anthesis and morphological traits were determined, namely the weight of plant (g), the number of leaves/plant, the weight of leaves/plant (g), the leaf area index (cm^2), specific leaf area (m^2/kg) and the dry matter of leaves (%). The experiment was carried out according to a Completely Randomized Design with three replications (n=3) per treatment. All data were checked for normal distribution according to the Shaphiro-Wilk test and mean values were compared according to the Tukey's test at p=0,05, whereas the statistical analysis was performed with the software with JMP v. 16.1 (SAS Institute Inc.). Based on the current findings, the application of manure had a significant positive impact on the tested yield parameters namely the weight of plant, the number of leaves, and the weight of leaves/plant for all the studied species, whereas significant statistical differences were also observed regarding the chlorophyll content of leaves, the diameter of plant, the leaf area index and specific leaf area compared to the control treatment. In conclusion, the manure application could be a useful cultivation practice to improve yield characteristics and the overall growth development of the tested plants, which could be implement by the farmers in a sustainable point of view, especially in small-scale farms that are the backbone of crop production in the broader Mediterranean area; however, further studies are needed to be carried to define the optimum cultivation practices for the commercial cultivation of these species, while more analyses are need to study the effect of this practice on the chemical composition, the nutritional value and the bioactive properties of these wild edible species.

Keywords: Wild edible plants; Growth parameters; Soil amendment; Sustainable agriculture; Small-scale-farms

Acknowledgments: This work was funded by the General Secretariat for Research and Technology of Greece (Prima 2019-11) and PRIMA foundation under the project Valuefarm (project number 1436).

The effect of manure on plant development and yield of the wild edible species *Cichorium spinosum*, *Scolymus hispanicus* and *Sonchus oleraceus*.

Nikolaos Polyzos[1], Spyridon A. Petropoulos[1*]

[1]University of Thessaly, Department of Agriculture, Crop Production and Rural Environment, Fytokou Street, 38446, Volos, Greece
*Corresponding author: spetropoulos@uth.gr

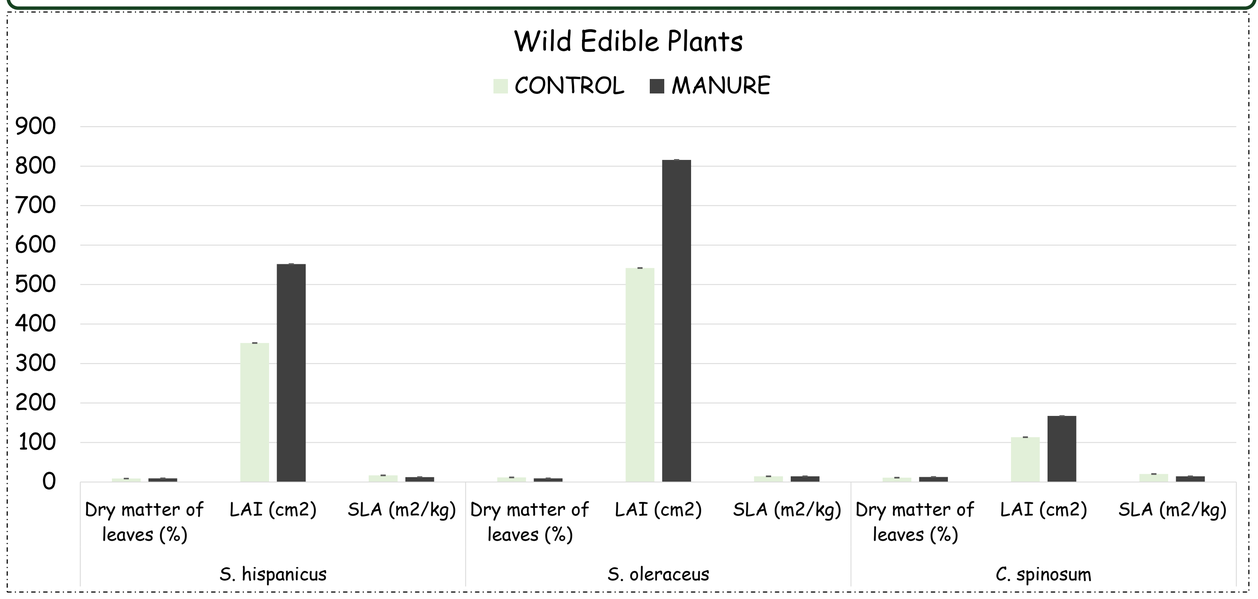
INTRODUCTION

- The Mediterranean basin is an abundant hotspot of native wild edible plants (WEPs) which have gained great interest for their commercial exploitation as alternative crops in terms of sustainability.
- These species present remarkable high adaptability to biotic and abiotic conditions such as salinity, high temperatures and drought conditions but also can be grown in a wide range of soils even in degraded or eroded soils .
- The increased demand by the consumers for high added value products combined with beneficial health effects have created the need to further study the commercial cultivation of these species due to its high nutritional profile and rich content in bioactive compounds.
- In the present study, we evaluated the effect of manure to the growth development and yield of the wild edible plants namely *Cichorium spinosum*, *Scolymus hispanicus* and *S onchus oleraceus*.

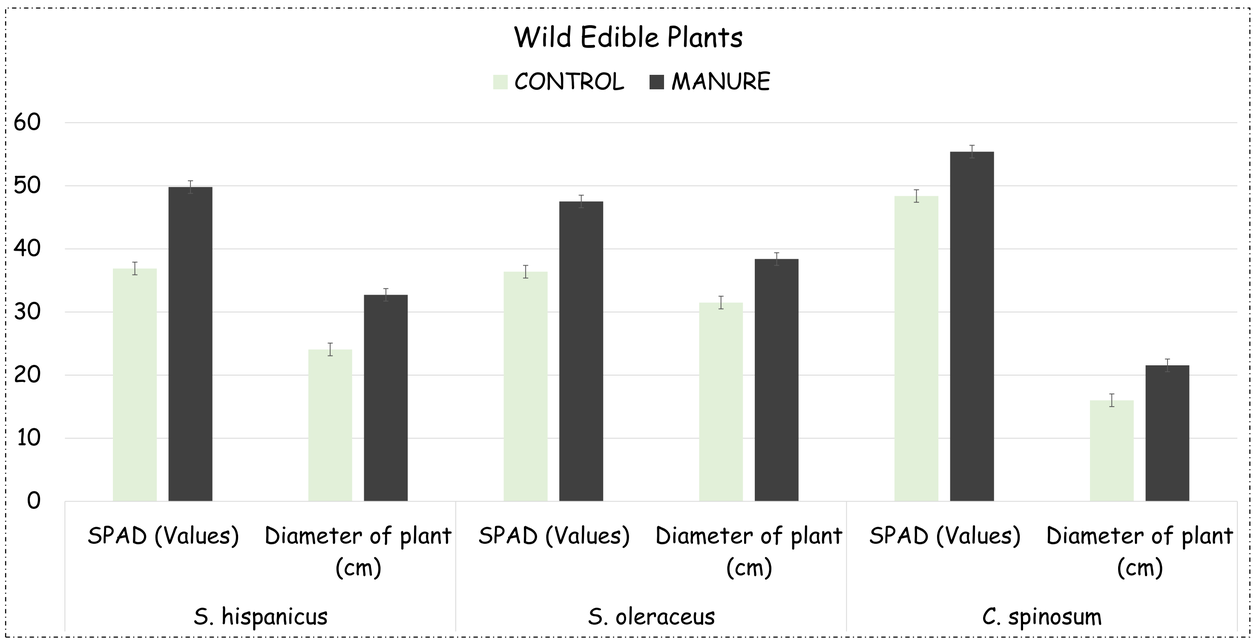
MATERIALS AND METHODS

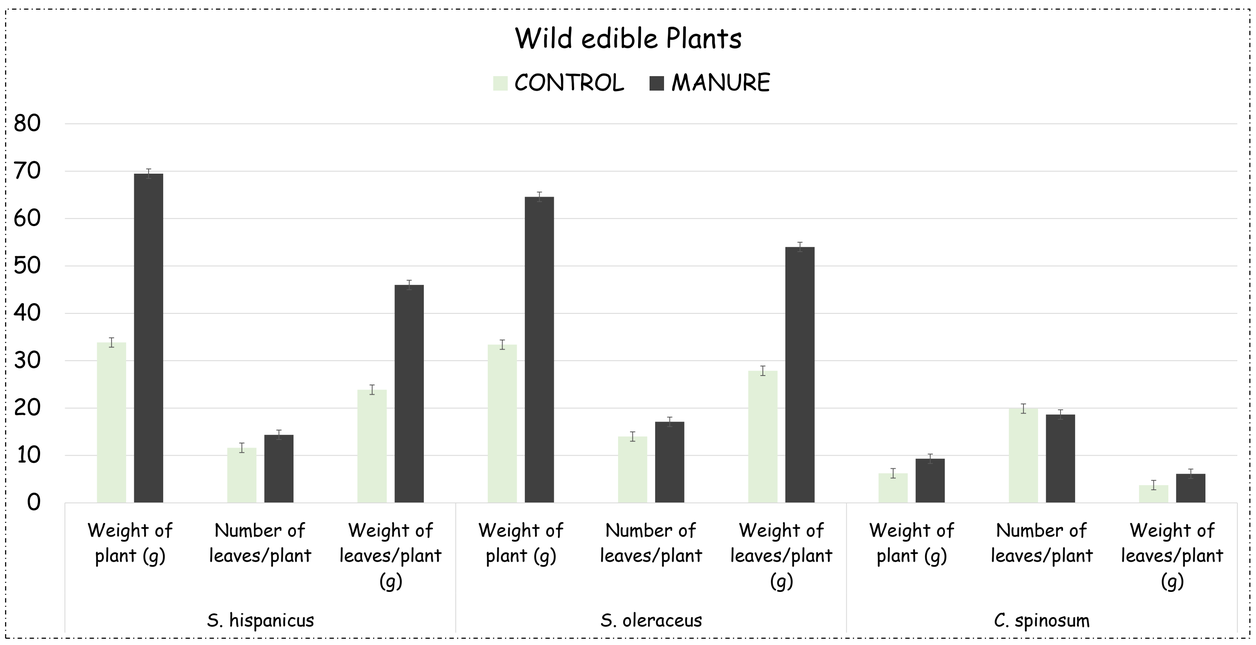
- A field trial was conducted at the experimental farm of University of Thessaly during the period of May 2022 and July 2022 in order to evaluate the effect of manure on the morphological traits and yield of the three WEPs, namely *S. hispanicus*, *S. oleraceus* and *C. spinosum*.
- Seeds were sown in seed trays and the young plants were transplanted to the field at the stage of 3-4 fully developed leaves.
- Two treatments (manure and control) were tested, while each treatment included three plots with a size of 8 m^2 (4 x 2 m, n=3). Twenty plants per species were transplanted in each plot with distances 0,40 cm between the rows and 0,30 cm within each row. For manure treatment, 40 kg/plot of manure were added directly in soil and incorporated with a tiller, whereas in the control treatment no manure was added.
- The chlorophyll content of leaves (SPAD values) and the diameter of plants rosettes were evaluated during the growing period. Plants were harvested when fully developed prior to anthesis and morphological traits were determined namely weight of plant (g), number of leaves/plant, weight of leaves/plant (g), the leaf area index (cm^2), the specific leaf area index (m^2/kg) and dry matter of leaves (%).
- The experiment was carried out according to a Completely Randomized Design with three replications (n=3) per treatment. All data were checked for normal distribution according to Shaphiro-Wilk test and mean values were compared to according to the Tukey's test at p=0,05, whereas the statistical analysis was performed with the software with JMP v. 16.1 (SAS Institute Inc.).

RESULTS



RESULTS





CONCLUSIONS AND RECOMMENDATIONS

- According to the results of this study, manure application on the wild edible plants had a detrimental positive impact on the crop development and to the traits related to the yield characteristics such as weight of plant (g), number of leaves/plant and weight of leaves/plant (g), whereas significant statistical differences were also recorded regarding the chlorophyll content of leaves (SPAD values), diameter of plant (cm), leaf are index (cm^2), specific leaf area index (m^2/kg) and dry matter of leaves (%) for all species.
- The incorporation of manure could be a beneficial cultivation practice to improve total yield but also could be a significant stepping stone for improving the nutritional value and phytochemical properties of the species.
- Further studies are needed to be carried out for the exploitation of the wild edible plants as alternatives crop in order to be implemented by the farmers in a sustainable point of view in case of small-scale farming systems thinking that these farms are the backbone of crop production in the broader Mediterranean area.

ACKNOWLEDGMENTS

- This work was funded by the General Secretariat for Research and Technology of Greece (Prima 2019-11) and PRIMA foundation under the project Valuefarm (project number 1436).

REFERENCES

- Petropoulos, S. A., Fernandes, Â., Ntatsi, G., Levizou, E., Barros, L., & Ferreira, I. C. F. R. (2016). Nutritional profile and chemical composition of Cichorium spinosum ecotypes. *LWT - Food Science and Technology*, *73*, 95–101. https://doi.org/10.1016/j.lwt.2016.05.046
- Petropoulos, S., Fernandes, Â., Karkanis, A., Antoniadis, V., Barros, L., & Ferreira, I. C. F. R. (2018). Nutrient solution composition and growing season affect yield and chemical composition of Cichorium spinosum plants. *Scientia Horticulturae*, *231*(August 2017), 97–107. https://doi.org/10.1016/j.scienta.2017.12.022

The PRIMA programme is supported and funded under Horizon 2020, the Framework European Union's Programme for Research and Innovation

GENERAL SECRETARIAT FOR RESEARCH AND TECHNOLOGY