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INFLUENCE OF SOIL FERTILIZATION WITH PLANT WASTE ON PHYTOCHEMICAL COMPOSITION AND GROWTH OF SOME MEDICINAL PLANTS

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Introduction

Agricultural activities generate a large amount of crop residues that can create environmental problems, like occupying vast areas and often being a source of pathogenic microorganisms. However, this plant waste can be a potential source of organic carbon and other major macronutrients: nitrogen, phosphorus, potassium (NPK), essential for plant growth.

Given this background and the fact that Hofigal is a major producer of dietary supplements and medicinal plants and produces an important amount of plant waste from plant processing, its researchers aimed to study the influence of soil fertilization with plant waste on phytochemical composition and growth of some medicinal plants.

Materials and methods

For this purpose, we selected three medicinal plants: French marigold (*Tagetes patula L.*), marigold (*Calendula officinalis L.*) and lavender (*Lavandula angustifolia Mil.*), which were cultivated from organic certified seeds.

The experiment was carried out on a 300 square meters' area, 100 square meters for each plant, divided in 2 sections of 50 square meters each: one fertilized with plant waste (Sample) and the other one unfertilized (Control). Prior to conducting the study, the plant waste was converted into compost during a three-year period.

The soil quality was tested for major macronutrients (NPK) and pH levels for both Control and the Sample.

The difference in growth between plants cultivated on fertilized soil versus the ones on unfertilized soil was visually observed.

Regarding the phytochemical composition of the three studied plants (Control and Sample), they were harvested during flowering period and analyzed for total polyphenols, total tannins and antioxidant activity. Volatile oils from dry French marigold and marigold flowers and fresh lavender flowers were also determined.

Results and conclusions

During the experiments, it was observed that the studied plants grew healthier on the fertilized soil and also their productivity increased. The quantity of flowers for French

marigold increased from approximatively 460 g to 940 g, for marigold from 280 g to 570 g and for lavender from 640 g to 1530 g.
Soil analysis revealed that the pH value decreased from 7.8 in the unfertilized soil to 7.1 in the fertilized soil, which is beneficial for the growth of the selected species. Regarding the major macronutrients, the nitrogen, phosphorus and potassium content was higher in the Sample group.
The phytochemical composition was higher for all analyzed compounds as shown in the table 1 below.

Table 1. The comparative phytochemical composition for analyzed plant materials

Analysis	**Control**			**Sample**		
	French marigold	marigold	lavender	French marigold	marigold	lavender
total polyphenols - gallic acid equiv. [%]	1.12	1.32	1.96	1.65	1.55	2.23
tannins - pyrogallol equiv. [%]	6.5	2.4	6.2	7.9	5.3	9.7
antioxidant activity - TROLOX equiv. [mmol/g]	66.9	56.3	38.7	73.8	64.4	47.5

As for volatile oil content, results indicate no difference between Control and Sample for dry marigold flowers. For dry French marigold and fresh lavender flowers instead, increased values were obtained for the fertilized group. Therefore, we registered 0.05% volatile oil compared to 0.04% in French marigold and 0.9% compared to 0.7% in lavender.
Having a higher macronutrient content and optimal acidity levels in the fertilized soil and also increased levels of phytochemical compounds in the plants grown on that soil, we can confirm the positive influence of soil fertilization with plant waste.