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# Does Mulch Affect Lavender Growth?

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SHORT COMMUNICATION

## Abstract
Lavender cultivation in Romania is continuously increasing due to its outstanding medicinal and ornamental properties. The raw material production of lavender may be increased by mulching. The aim of this study was to analyse how mulching can affect the growth of lavender seedlings. The experiment was performed between 2018-2020 on two varieties of *Lavandula angustifolia* ('Codreanca' and 'Sevtopolis'). Diameter growth was determined in three types of mulching: unmulched (control), straw and mulch foil. The results obtained showed that lavender diameter growth was influenced by both the type of mulching and the variety.

**Keywords:** diameter; *Lavandula;* mulch foil; sustainable; straw.

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## INTRODUCTION
The cultivation of medicinal and aromatic plants is rediscovering an ancient tradition and nowadays such species are becoming increasingly popular in gardens and as industrial crops.

The *Lavandula* genus includes about 45 species and more than 400 varieties (The Plant List, 2020; Koulivand et al., 2013). *L. angustifolia* Mill. is a Mediterranean native species but largely cultivated in other areas of the world (Mokhtarzadeh et al., 2013; Lis-Balchin, 2012).

Plant growth and productivity can often be limited by weed infestation, non-optimal soil conditions, and water scarcity (Hatfield et al., 2017; Zhang et al., 2019). Sustainable, biological or ecological agriculture promotes ecosystem conservation, protection and can provide natural sources for a longer time period (Gary, 2004). Weed management is a major factor in ecological agriculture, as weeds can affect the stand-establishment of the cultivated plants (Fontana et al., 2006). One of the techniques used to reduce weed density is mulching (Chakraborty et al., 2008), which can also improve plant growth and retain soil moisture (Scarascia-Mugnozza et al., 2006).

The aim of this research was to analyse how mulching can affect the lavender seedlings growth. In one of our previous works (Szekely-Varga et al., 2020), it was demonstrated that the use of mulching foil can reduce weed appearance on a higher scale than straw mulching. In the present study we investigate how mulching texture can affect the lavender seedlings growth.

## MATERIALS AND METHODS

The experiment was carried out for a period of 3 years in the didactical field, at the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca.

The biological material used were two *Lavandula angustifolia* Mill. varieties: var. 'Codreanca' with origin in Romania and var. 'Sevtopolis' from Bulgaria. Three experimental variants were established (Figure 1): unmulched (control), straw and mulch foil; randomized in four variants. The lavender seedlings were planted on a 270 $m^2$ agricultural field, which was divided in two equal plots of 135 $m^2$. On each plot 120 one-year lavender seedlings were planted. Each seedling diameter was measured three times: first on the 30$^{th}$ of May 2018 (the seedlings were planted), second on the 10$^{th}$ of June 2019 (growth), and third on the 15$^{th}$ of July 2020 (growth).

The diameter measurements were made with a 2-meter-long string, which was placed around the lavender shrubs, and then the corresponding length of the string was determined with a linear meter. Each lavender shrub diameter growth was determined as followed: first was measured the height of the shrubs; after this, the measured height was divided into two equal parts to find the middle of the lavender plants; and this was the part of the plant where the diameter growth measurements were conducted with the string.

The results were statistically analysed using Paired Two Sample for Means t-Test (<0.05), with Microsoft Excel program and post hoc comparisons were made using a Tukey HSD test.

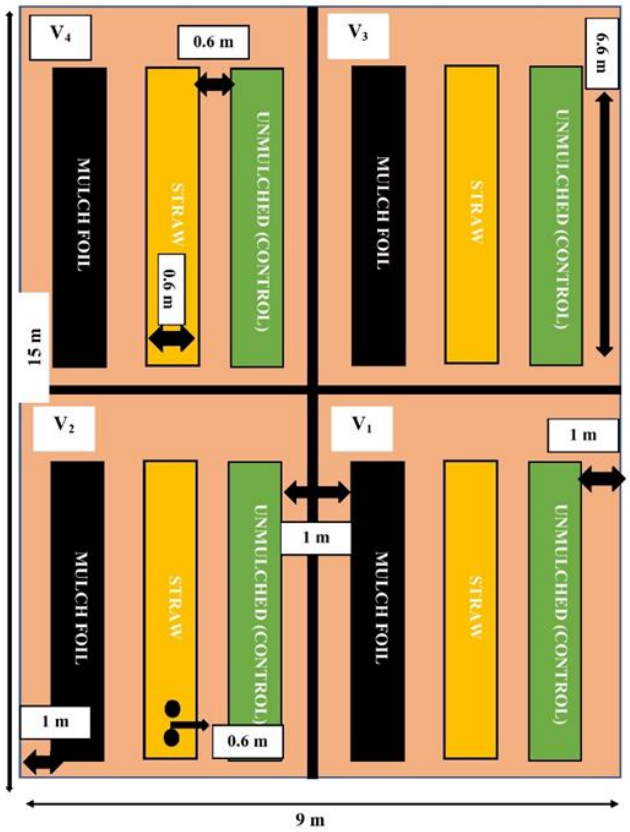
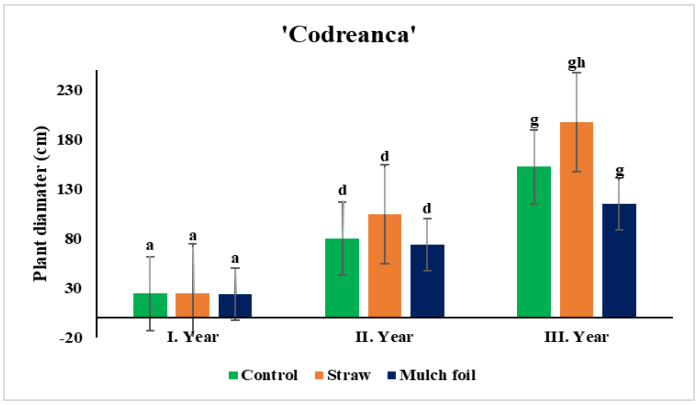



**Figure 1**. Experimental variants of *Lavandula angustifolia* varieties subjected to mulching control (unmulched), straw/hay, mulch foil

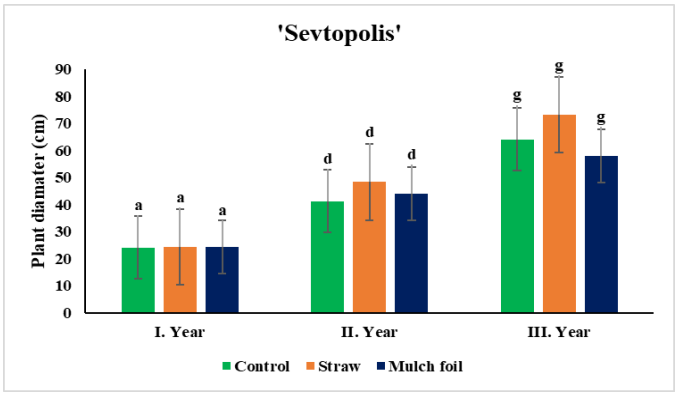
## RESULTS AND DISCUSSIONS

Diameter growth was determined in both lavender varieties subjected to the mulching experiment. In the first year of the experiment in all variants (unmulched, straw and mulch foil) the diameter of the lavender seedling was similar. Nevertheless, some changes were noticed in the second year of growth. In the 'Codreanca' variety (Figure 2a) the highest increase in diameter was registered in the straw variant (104.6 cm), but differences were not statistically significant. In this case of the other two variants the diameter was almost similar, unmulched 79.93 cm and mulch foil 74.15 cm. In the third year of the experiment, the diameter growth was almost identical to that of the second year. In this case also the more pronounced diameter growth was observed at the straw variant (197.43 cm), but the seedlings from the unmulched (control) variants have exceeded the mulch foil lavender plants with almost 38 cm, yet no significant difference was determined.

On the other side 'Sevtopolis' variety (Figure 2b) showed similar diameter growth as the 'Codreanca'. In this case also the highest increase in diameter was reported at the straw variant in both years, when the measurements were made. In the third year can be observed that the control variant showed a small growth in diameter compared to the mulch foil, however no significant differences were determined.




**(a)**

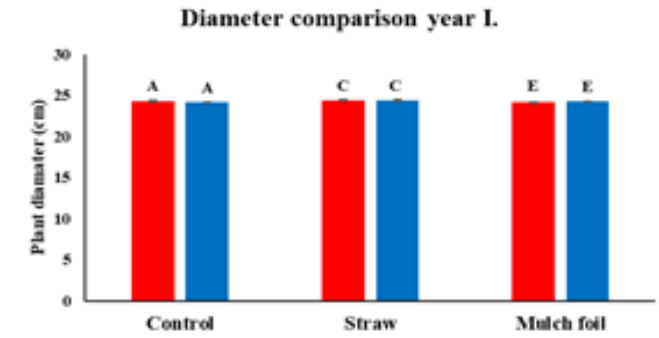



**(b)**

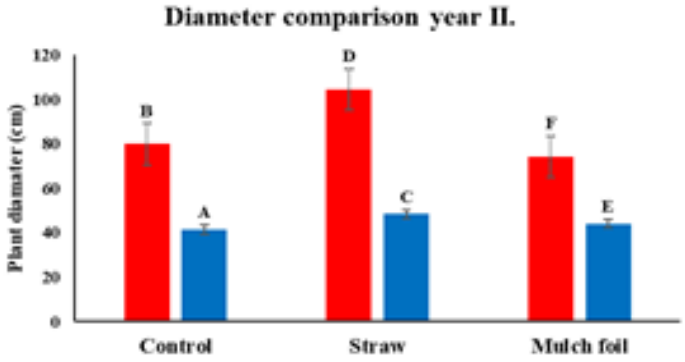
**Figure 2.** Diameter measurements of *L. angustifolia* var. 'Codreanca' (a) and var. 'Sevtopolis' (b) at the three-year time period. Bars represent means ± SE ($n$ = 10). Different lowercase letters above the bars indicate significant differences between the variants for each year, according to the Tukey test ($\alpha = 0.05$).

At the beginning of the experiment all one-year lavender seedlings diameter was almost identical in both varieties, approximately 24 cm (Figure 3a). In the second year (Figure 3b) the *L. angustifolia* var. 'Codreanca' has registered an increase in diameter more than the var. 'Sevtopolis', in all three mulching variants. The third-year (Figure 3c) measurements were similar to the second-year, where the 'Codreanca' variety also showed an increase in the diameter, up to 100 cm. In the second and third year statistically significant differences between the two lavender varieties were found.

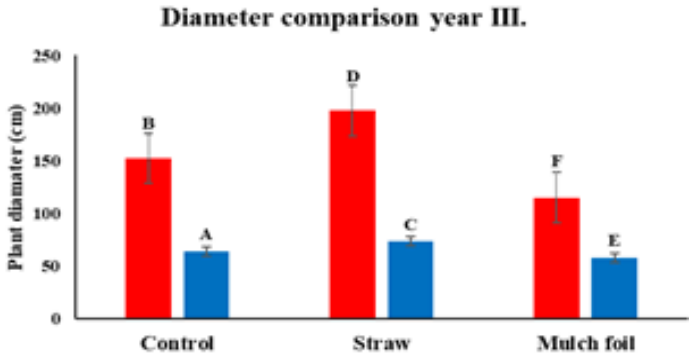
Similar results were reported in *Triticum aestivum* L. (Chakraborty et al., 2008), in this case the organically (rice husk) mulch was the most beneficial. Traux et al. (1993) in an experiment on butternut, white ash and bur oak had come to a conclusion that mulching can affect plants growth, but after a longer period of time. Yin et al., (2019) also stated that mulching can promote the growth of the plants and also improve the soil environment. Contrary to our findings, in an experiment on strawberry mulching, the best results were obtained with black foil mulching (Codrea et al., 2020). Considering results from our previous work (Szekely-Varga et al., 2020), it can be concluded that the use of mulch foil in lavender decreases the plant diameter, but when it comes to weed density the mulch foil produced the best results.




**(a)**




**(b)**




**(c)**

**Figure 3.** Diameter measurements comparison of the first year (**a**), second year (**b**) and third year (**c**) of the two lavender varieties ('Codreanca' and 'Sevtopolis'). Bars represent means ± SE ($n$ = 10). Different uppercase letters above the bars indicate significant differences between the variants for each year, Tukey test ($\alpha$ = 0.05).

## CONCLUSIONS

The present study provides data on the influence of mulching on two *Lavandula angustifolia* varieties, 'Codreanca' and 'Sevtopolis', which are commonly cultivated in Romania. Although mulching can have an effect on plant growth, due to its influences on the environmental conditions, the data obtained indicated that the highest increase in diameter was observed by straw mulching and the lowest by mulch foil. When comparing the two varieties 'Codreanca' showed a higher increase in diameter than 'Sevtopolis'. This difference could be related to the origin of the varieties, as *Lavandula angustifolia* var. 'Codreanca' is a Romanian cultivar, and could be more acclimatized to the climate conditions. However, further investigation is needed for more detailed results.

**Author Contributions:** M.B., M.C., and E.K. Conceived and designed the analysis; ZS.SZ.V. Collected the data; M.B., M.C. and E.K. Contributed data or analysis tools; ZS.SZ.V. Performed the analysis; M.B., M.C., E.K., and ZS.SZ.V. Wrote the paper.

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**Conflicts of Interest:** The authors declare that they do not have any conflict of interest.

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