Research Concerning the Use of Different Mulching Methods on Lavender

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Abstract

Lavandula angustifolia Mill. is a highly appreciated and precious shrub worldwide due to the high essential oil content and properties. The aim of this research was to determine the influence of organic farming on lavender production. The experiment was carried out during a 2-years period (2018 - 2019) at the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, in the experimental field. The biological material used in this experiment was represented by two *Lavandula angustifolia* Mill. cultivars ('Codreanca' and 'Sevtopolis'). The observations consisted of the evaluation of weed density, two times/year, at the beginning and at the end of the flowering period of the lavender plants. As expected, the highest weed density was in the control treatment followed by the straw/hay treatment while the lowest weed density was recorded in the treatment with the mulch foil.

Keywords: lavender, mulching, mulching foil, sustainable, straw/hay, weed control

Introduction

Weeds were found in the agricultural field since humanity have began cultivating plants for food and fiber (Price, 2012). In the 60's it was a movement called 'Green Revolution' that would solve practically the problem of feeding the entire world, everybody thought that the agriculture does not have anything new to provide. This was a set of research technology transfer initiative, which resulted in controlled water-supply, adaptation of new technologies, chemical and agro-chemical fertilizers and new methods of cultivation. After the green revolution had finished, the agriculture fields faced new challenges to cope with, like generalization of modern crops, achieving record yields, promoting non-conventional forms of agriculture (biological, organic) (Stan,

2010). Sustainable forms of agriculture ensure ecosystem conservation and economical efficiency in the circumstances and it is promoting the unconventional/organic biological or ecological agriculture (Gary, 2004). According to Cezar *et al.* (2015) weed control is one of the most important management practices in the production systems and it can highly influence the agriculture production and also can have an impact on the environment. Mulching plays an important role in medicinal and aromatic plant cultivation, weed control and plant growth (Fontana *et al.*, 2006). *Lavandula angustifolia* Mill. is a highly appreciated and precious plant due to the high essential oil content and properties (Berringer Bader, 2012), which is used for treating many human diseases such as anxiety, hypnosis, cold, with anti-

inflammatory, antiseptic role and it is also used in the cosmetical field for soap, cream perfume (Toma, 2009). Also for the use of the lavender essential oil in the medicinal and cosmetic industry it is recommended to have a lavender field which is not contaminated with chemicals from herbicides. Regarding this important benefits of lavender, high quality essential oil should be obtained considering that when harvesting the lavender flower stem, the weeds could pollute the essential oil (Hoeberechts *et al.*, 2002).

The aim of this research was to determine the influence of the organic farming to have good results, quantitatively (a high vegetable raw material) and qualitatively (essential oil of the highest quality). For this purpose, the main objective of the research was to use different mulching types to reduce the weed occurrence in the raw material composition leading to cleaner essential oil.

Materials and methods

The research was carried out for a period of 2-years and there were used two *Lavandula angustifolia* Mill. cultivars ('Codreanca' and 'Sevtopolis'). In this experiment unmulched (control), straw/hay and mulch foil variants were used. The experimental field had a 270 m² agricultural land. This land was divided into two equal plots of 135 m², which then were divided into four equal parcels of 33.75 m² and on each plot were planted 30 lavender plants of the two cultivars. Then there have been applied the three experimental variants: control, straw/hay, mulching foil. Weed evaluation were made using a square frame of 0.6 m × 0.6 m. From each repetition one lavender was selected and coded as V₁, V₂, V₃, V₄. Weed density was evaluated by counting the weeds/m² of each species. Weed density was evaluated two times/year, at the beginning and at the end of the flowering period of the lavender plants.

The results were statistically interpreted using Paired Two Sample for Means t-Test (<0.05), with Microsoft Excel program from the Microsoft Office package.

Results and Discussion

The main weeds that have counted were: *Setaria viridis*, *Setaria glauca*, *Echinochloa crus-galli*, *Agropyrum repens*, *Amaranthus retroflexus*,

Chenopodium album, *Convolvulus arvensis*, *Xanthium italicum*, *Taraxacum officinale*.

Figure 1 show the results of the first evaluation which was made in 16.07.2018. Statistically significant differences can be observed between the control, straw/hay and mulching foil treatments. At the 'Codreanca' cultivar the control treatment, without mulching presented the highest weed density compared to the other two treatments. Thus the average density for the control variant was 55.55%, straw/hay variant 38.19% and the mulching foil version was 19.42% per 1 m². Regarding 'Sevtopolis' cultivar, the highest weed density was in the control 52.20% per 1 m², followed by the straw/hay 37.85% and the mulch foil 21.65% variants.

The second evaluation (Fig. 2) of weed density was made in 12.09.2018. At 'Codreanca' cultivar no statistically significant differences were found between the three treatments. The average weed density in the control variant was 42.35%, in straw/hay variant 27.77% and in the variant with the mulching foil it was 20.83% per 1 m². There were no statistically significant differences in the 'Sevtopolis' cultivar between control and straw/hay treatment. On the other hand, the control and mulching foil are showing significant statistical differences. The average weed density was 41.22% in the control, 31.72% in the straw/hay treatment and 20.08% in the mulching foil.

The third weed density evaluation (Fig. 3) have been made in 10.06.2019. This time at 'Codreanca' cultivar were observed statistically significant differences between the control treatment and straw/hay, and also between the control and mulching foil. The average densities were: control 67.35%, straw/hay 38.88% and the mulching foil 18.05%. At 'Sevtopolis' cultivar no statistically significant differences were observed, thus the average density for the control was 61.3%, straw/hay treatment 29.16% and mulch foil 22.24%.

The fourth evaluation of weed density (Fig. 4) was carried out in 02.09.2019. In this case the 'Codreanca' cultivar showed no statistically significant difference between the control (29.16%) and the straw/hay (19.44%) treatments. Between the control (29.16%) and mulching foil (11.10%) treatments statistically significant differences were recorded. At 'Sevtopolis' cultivar, between control and straw/hay treatments there are no statistically significant differences

Figure 1. Evaluation of the weed density in 16.07.2018

Figure 2. Evaluation of the weed density in 12.09.2018

Figure 3. Evaluation of the weed density in 10.06.2019

Figure 4. Evaluation of the weed density in 02.09.2019

observed. Between control and mulching foil treatments statistically significant differences were recorded. Average weed occurrence: 25.69% in control, 13.88% in straw/hay and in the mulch foil is 8.32%.

Our results are in accordance with Hoeberechts *et al.* (2002) research, where the mulching foil have had the same effects at the lavender and rosemary cultivation. Similar results were also obtained by Singh (2013), who proved that by adding mulch to rosemary it can be improved the content and the quality of the oil.

Campiglia *et al.* (2009) research results are similar, where the mulches have suppressed weeds in an average density of 80%. In a research conducted by Radics and Szné Bognár (2002) concerning tomato and bean cultivation, the best weed control technique resulted was plastic and paper covering. Similar result were obtained by Mahajan *et al.* (2007), who proved that the plastic mulch accelerated early growth, height and fruiting of the baby corn and also gave a satisfactory weed control.

Massa *et al.* (2019) tested organic mulching and chemical herbicide effect on weed control, and in both cases the results were the same.

Conclusion

This research remarks the importance of using mulching materials and finding new techniques for their use in weed control in lavender cultivation, to make the fields less dependent on chemical weeding.

Our work has led us to conclude that, the highest weed density was in the control treatments followed by the straw/hay treatment and the lowest weed density was recorded in the treatment with the mulch foil. In the present research, we have demonstrated that weed control by mulching with foil reduces the average weed density to 20%, compared to the straw/hay where the average weed density was 30-35% and the control (unmulched) variant with 50%.

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