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EFFECT OF SOME ESSENTIAL OILS TREATMENTS ON THE GERMINATION PROCESS OF
MAIZE (*ZEA MAYS* L.) SEEDS

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Abstract: The present scientific work presents the results of the effects of lavandin and marjoram essential oil treatments at different concentrations on the germination of maize seeds. The essential oils were obtained by hydrodistillation of the aerial of the plants. The experiment showed that the application of lavandin essential oil at a concentration of 25 $\mu\text{l/ml}$ has a beneficial effect on the germination process of maize seeds, causing stimulation of the development of vegetative organs. Increasing the concentration from 25 $\mu\text{l/ml}$ to 50 $\mu\text{l/ml}$, produced an inhibition of corn pore germination, thus obtaining a germination percentage of only 70%, compared to the control group where a percentage of 90% was obtained. Marjoram oil proved an inhibitory effect regarding the germination of maize seeds, for all tested concentrations.

Introduction

Natural substances, such as essential oils, are today an important ecological reservoir. The use of volatile oils as biopesticides in agriculture, especially in post-harvest practices, can be a more sustainable solution to protect crops, the environment and not least to protect human and animal/consumer health. The main objective of the present study was to evaluate the influence of the application of essential oils of *Lavandula x intermedia* and *Origanum majoranum*, of different concentrations, on the germination process of maize seeds, taking into account the biological properties of the essential oils mentioned above. It is necessary to identify sustainable and ecofriendly solutions in the control of crop pests or grain storage pests, given the urgent need to reduce dependence on synthetic pesticides and antimicrobials used in agriculture today

Material and method

The research focused on following the effects of treatments of two different concentrations of essential oils (25 and 50 $\mu\text{l/ml}$ respectively) on the germination process of maize seeds. Corn seeds were subjected to lavandin and marjoram essential oil vapour treatments for eight days. After the eight days of fumigate we determined for each sample: coleoptile length, embryonic root length and adventitious root length (mean), and the data obtained were statistically analysed. Then, the seeds were moved to clean Petri boxes, over which 10 ml of distilled water was added, and then germinated at $25 \pm 2^\circ\text{C}$.

Results and discussions

The evaluation of the seeds from the experimental group in comparison with the samples of the groups that were treated with lavandin essential oil, at a concentration of 25 $\mu\text{l/ml}$, showed a stimulation of germination, but also a stimulation of the average increase in the size of the coleoptile, the embryonic root and the adventitious roots, compared with the average results of the samples from the control group. Increasing the concentration from 25 to 50 $\mu\text{l/ml}$ resulted in an inhibition of germination of maize root balls, thus obtaining a germination percentage of only 70%, compared to the control group where a percentage of 90% was obtained. Also, analysis of the mean sizes of adventitious roots, embryonic roots and coleoptile of the germinating samples of the experimental batch compared to the control batch samples also showed a significant inhibition/reduction in the development of the target parameters/vegetative organs.

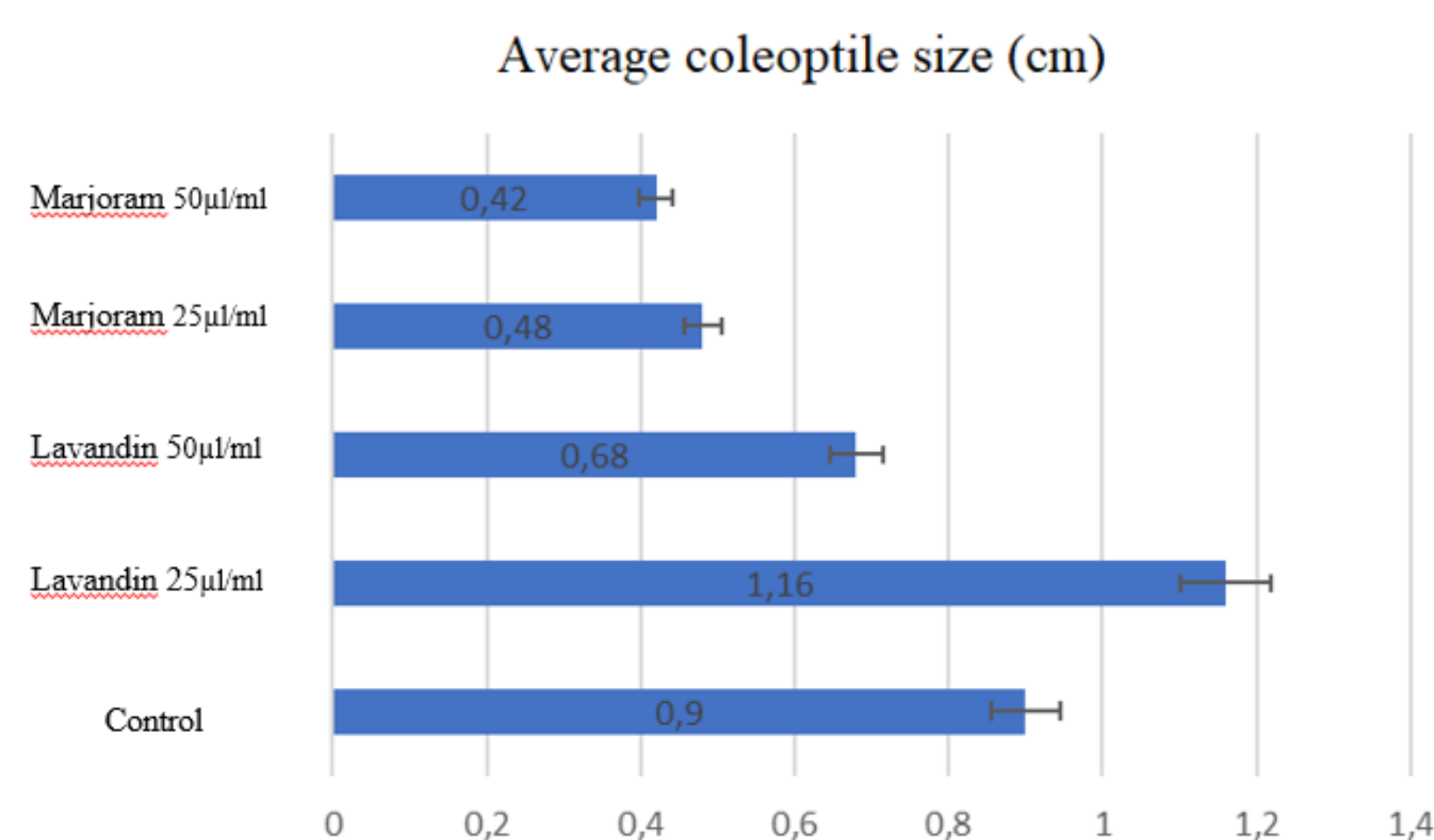


Figure 1. Effects of essential oil treatments on coleoptile size development of maize seeds

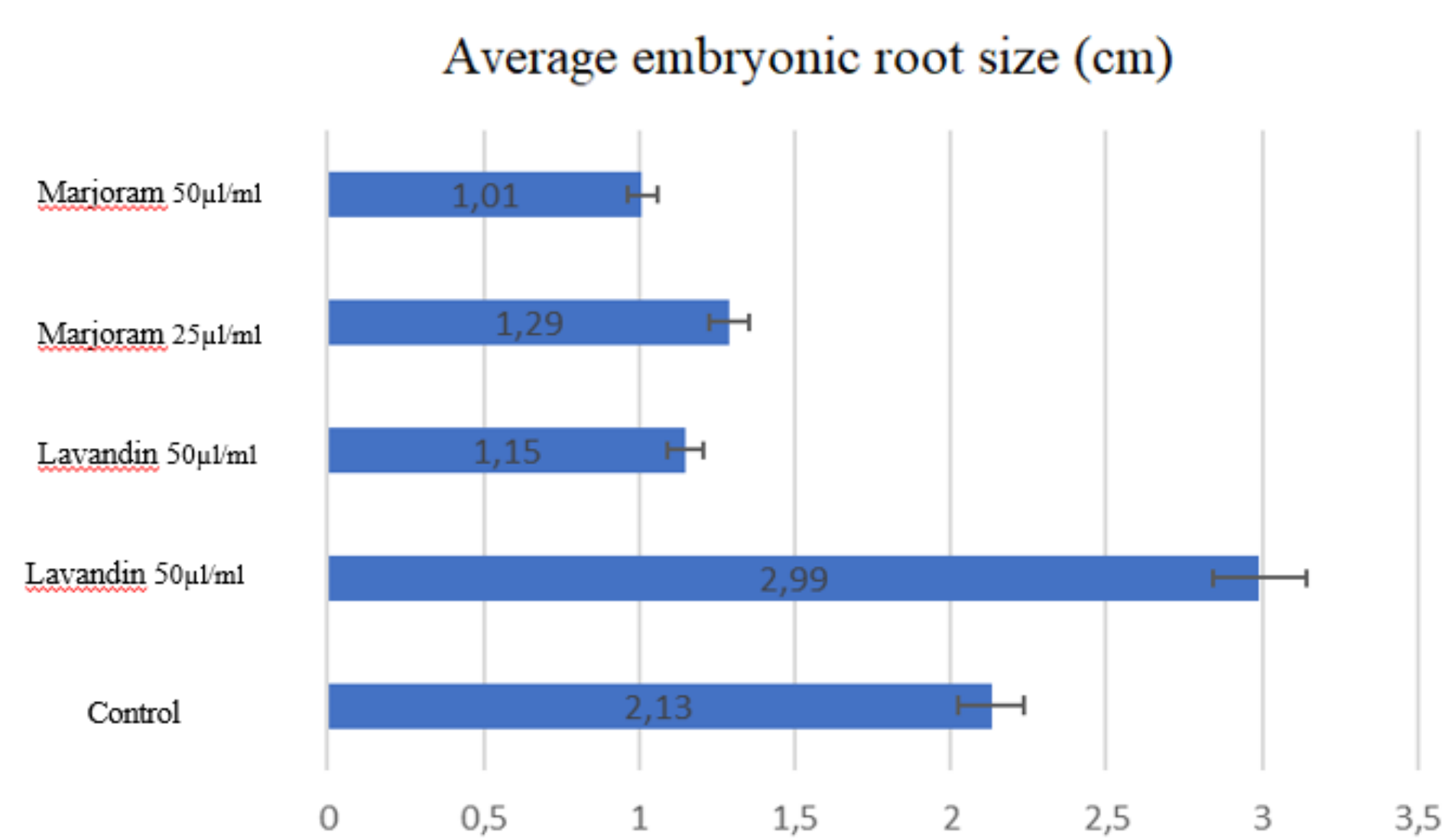


Figure 2. Effects of essential oil treatments on embryonic root development of maize seeds

Seeds from the experimental lots subjected to treatments with marjoram essential oil vapour (at both 25 $\mu\text{l/ml}$ and 50 $\mu\text{l/ml}$ concentrations), produced germination inhibition of maize samples compared to untreated maize samples from the control lot. In percentage terms, only 70% of the treated samples germinated. A significant reduction in embryonic root development, adventitious root development and coleoptile development was also observed in germinated maize compared to untreated samples, as can be seen from the graphical representations, Figure 1-3.

Conclusions

Considering the results obtained from the *in vitro* experiment, we noticed that *Lavandula x intermedia* essential oil, at a concentration of 25 $\mu\text{l/ml}$, has a beneficial effect on the germination process, stimulating the development of vegetative organs and can be considered as an ecofriendly fungicide in grain warehouses. Following these results, it is necessary to continue both *in vitro* and *in vivo* testing, regarding the stimulating effect of lavandin essential oil on the germination on several crop seeds and also the inhibitory effect of marjoram essential oil on the germination of weed seeds, with applicability in organic farming.

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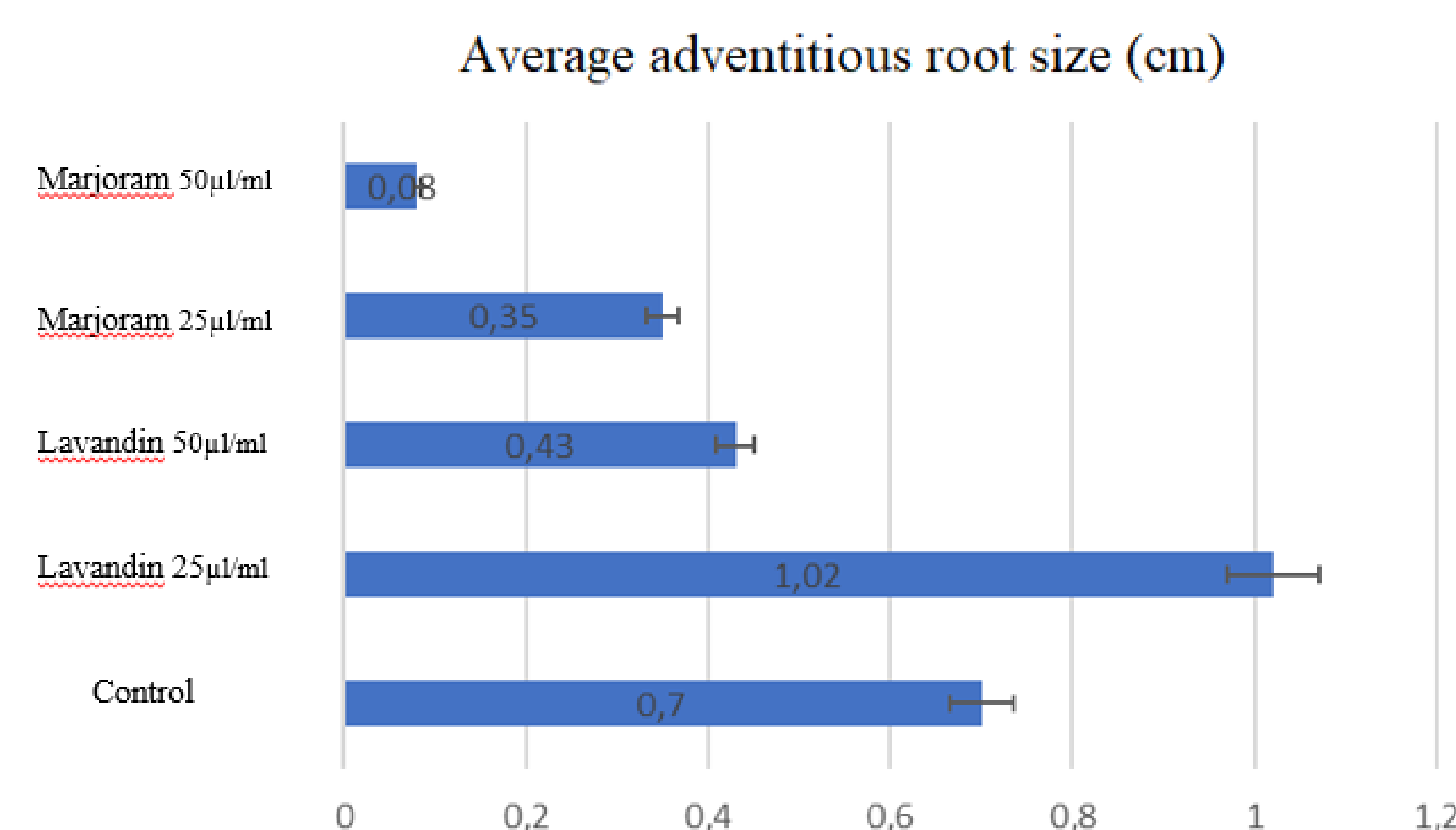


Figure 3. Effects of essential oil treatments on adventitious root development of maize seeds