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Horticultural Engineering MSc, full-time course

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Allelopathic effect of leaf extracts and essential oils of *Artemisia* species on seed germination and seedling growth of white mustard *(Sinapis alba)*

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Abstract:

This study investigated and analysed the allelopathic effect of plant extracts and essential oils of six species of *Artemisia* genus (*A. absinthium* L., *A. alba* Turra, *A. annua* L., *A. pontica* L., *A. scoparia* Waldst. & Kit., and *A. vulgaris* L.) on seed germination and seedling growth of white mustard *(Sinapis alba).* The *Artemisia* genus has been widely studied, including the investigation of their allelopathic effect. Plant species with allelopathic effects are considered as the perfect alternative to synthetic herbicides, because they do not exert residual of toxic effect (Cheng, Cheng, 2015; Li et al., 2021). They have broad application prospects and high research value (Li et al., 2021).

This study aimed to reveal the differences and interactions between the inhibitory effect and allelopathic potency of the taxa and volume. The experiments were carried out in the framework of Hungarian-Serbian contribution, therefore, the examined *Artemisia* plant material was collected and extracted in Serbia in 2022 and 2023. White mustard seeds were treated with a 0,01% solution of ethanol leaf extract in 100 μL, 300 μL or 1000 μL, while the other experiment involved 10 μL, 30 μL, and 90 μL essential oil treatment. In both of the cases, seeds were germinated in Petri dishes with a Sanyo MLR-351H incubator (program: 8 hours light (~12 klux) at 30 °C; 16 hours dark at 20 °C). The whole incubation period was 7 days. Seedlings were quantified on the 3rd day (germination energy), and quantified and measured on the 7th day (germination capacity, seedling height, root length). SPSS software was used for statistical analysis, including descriptive data analysis and two-way analysis of variance (ANOVA). For the analysis of seedling height and root length Post Hoc test was also used.

The results revealed that all investigated *Artemisia* species had allelopathic effect on seed germination and seedling growth, in which volume played a significant role. Interaction between taxa and volume was observed in most of the cases. During the experiment with ethanol plant extracts, *A. annua* caused the strongest inhibitory effect, although the 1000 μL of

A. scoparia showed a greater reducing effect on germination capacity. In the essential oil treatment, *A. alba* showed the strongest effect, completely inhibiting germination in every volume. In addition to inhibiting germination and reducing seedling height and root length, some species caused significant chlorosis on the leaves. This study shows that the genus *Artemisia* has the potential to be used as a bioherbicide. Further research is recommended.