

INFLUENCE OF *Cannabis sativa* L. ON GUAIACOL PEROXIDASE ACTIVITY IN *Ambrosia artemisiifolia* L.

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Abstract

Agricultural research is increasingly focused on finding alternative, biological methods of pest control. It is known that many plant species have allelopathic properties and allelopathy may be one of the mechanisms of biological weed control in the future. Allelopathic substances responsible for biochemical interactions between plants are secondary metabolites of plants. Unlike many pesticides on natural bases present on the market, the number of preparations based on allelochemicals with herbicidal action is insufficient. Therefore, it is necessary to investigate the influence of allelochemicals on weed plant species.

Cannabis sativa L., as a type of confirmed allelopathic properties, has a significant impact on cultivated and weed plant species. Finding allelopathic substances that would have negative effect on *A. artemisiifolia* L. is very important due to its invasiveness. Changes in guaiacol peroxidase activity are one of the indicators of oxidative stress in plants produced by allelochemicals.

Key words: allelopathy, *Cannabis sativa* L., *Ambrosia artemisiifolia* L., guaiacol peroxidase

Introduction

Allelopathy is a relationship between two organisms in which one organism affects the other positively or negatively with its secondary metabolites [1]. Allelopathic substances can have a significant effect on changing the composition of weed flora but also on crop growth and yield, and can potentially be used as a weed control [2]. The allelopathic properties of different organisms are an important mechanism for the spread of invasive plant species [3]. The lack of coevolutionary tolerance and resistance of autochthonous vegetation to new allelopathic substances produced by introduced invasive weed species can negatively affect the dominant species of autochthonous biocenoses [4]. Although allelopathic interactions of *Cannabis sativa* L. and other plant species have been known for a long time, it is necessary to investigate in detail the mechanisms of action of allelopathic *C. sativa* L. substances on other plant species [5]. *Ambrosia artemisiifolia* L. is a very invasive weed species in Europe and finding new compounds for its suppression is becoming increasingly important [6].

Aim of this study was to determine allelopathy effect of *C. sativa* extract on the activity of guaiacol peroxidase in leaves of *A. artemisiifolia*.

Experimental

In the experiment was used a milled dry plant material of *C. sativa* collected at the ripening stage. Extract was obtained by classic extraction (20g in 200ml water). Applied concentrations of extract was 100%, 50%, 25% and 10%. Plants of *A. artemisiifolia* were treated under field conditions in initial stages. Sampling was performed after 6h and 24h. Fresh leaf samples (2g) were homogenized in 10ml phosphate buffer and then centrifuged. After dissolving 20 μ l of sample in 3ml of guaiacol solution and 20 μ l of 1% H₂O₂, absorbance at λ =436nm was read, after addition of H₂O₂ at 1min intervals. Activity of guaiacol peroxidase was determined on basis of transformation of guaiacol into tetraguaiacol over 1 minute. The activity was expressed in U/g fresh weight (U/g FW)

Result and discussion

In untreated plant samples, control plants, activity of guaiacol peroxidase was 19,9 U/g FW after 6h, while in variant with application of 100% of the *C. sativa* extract it was 20,7 U/g FW. An experiment variant with 50% *C. sativa* extract activity was 20,8 U/g FW, with a 25% *C. sativa* extract value was 24,5 U/g FW and with a 10% *C. sativa* extract value was 14,1 U/g FW. After 24h, guaiacol peroxidase activity in control variant was 22,5 U/g FW, in variant with 100% *C. sativa* extract was 22,7 U/g FW, with 50% *C. sativa* extract was 24,3 U/g FW, with 25% *C. sativa* extract was 19,5 U/g FW and with 10% *C. sativa* extract was 17,02 U/g FW. The *C. sativa* applied extract increased guaiacol peroxidase activity after 6h in the treatment with 25%. After 24h guaiacol peroxidase activity were increased in variant with 50% while in variant with 25% and 10% were decreased.

Conclusion

Changes in activity of guaiacol peroxidase indicate the presence of oxidative stress in treated plants of *A. artemisiifolia* compared to control group of plants. Based on the results it can be concluded that *C. sativa* extract, in concentration 25% and 50%, possess a negative effect against *A. artemisiifolia*.

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References

- [1] Farooq M., Bajwa A., Cheema S., Cheema Z. Application of allelopathy in crop production, International Journal of Agriculture & Biology, 2013 15, pp 1367-1378
- [2] Singh, H.P., Batish, D.R., Kohli, R.K. Allelopathy in Agroecosystems: an overview Journal of Crop Production, 2001, 4(2): 1-41
- [3] S. Akhtar, N. Bangash, R. Asghar, M. Munir, N. Khalid, Allelopathic assessment of selected invasive species of Pakistan, Pak. J. Bot., 2014, 46(5): 1709-1713
- [4] Hierro, J.L., Callaway, R.M. Allelopathy and exotic plant invasion. Plant and Soil. 2003, 256: 29-39.
- [5] J. M. McPartland, *Cannabis* as repellent and pesticide, Journal of the International Hemp Association 1997, 4(2): 87-92
- [6] Vladimirov V., Valkova M., Maneva S., Milanova S. Suppressive potential of some perennial grasses on the growth and development of *Ambrosia artemisiifolia*. Bulg. J. Agric. Sci, 2017, 23 (2): 274-279