

Comparative Analysis of Chemical Composition and Biological Activities of *Ajuga genevensis* L. in in vitro Culture and Intact Plants

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Abstract : One of the tasks in contemporary biotechnology, pharmacology and other fields of human activities is to obtain biologically active substances from plants. They are very essential in the treatment of many diseases due to their actually high therapeutic value without visible side effects. However, sometimes the possibility of obtaining the metabolites is limited due to the reduction of wild-growing plants. That is why the plant cell cultures are of great interest as alternative sources of biologically active substances. Besides, during the monitored cultivation, it is possible to obtain substances that are not synthesized by plants in nature. Isolated culture of *Ajuga genevensis* with high growth activity and ability of regeneration was obtained using MS nutrient medium. The agar-diffusion method showed that aqueous extracts of callus culture revealed high antimicrobial activity towards various gram-positive (*Bacillus subtilis* A1WT; *B. mesentericus* WDCM 1873; *Staphylococcus aureus* WDCM 5233; *Staph. citreus* WT) and gram-negative (*Escherichia coli* WKPM M-17; *Salmonella typhimurium* TA 100) microorganisms. The broth dilution method revealed that the minimal and half maximal inhibitory concentration values against *E. coli* corresponded to the 70 $\mu\text{g/mL}$ and 140 $\mu\text{g/mL}$ concentration of the extract respectively. According to the photochemiluminescent analysis, callus tissue extracts of leaf and root origin showed higher antioxidant activity than the same quantity of *A. genevensis* intact plant extract. *A. genevensis* intact plant and callus culture extracts showed no cytotoxic effect on K-562 suspension cell line of human chronic myeloid leukemia. The GC-MS analysis showed deep differences between the qualitative and quantitative composition of callus culture and intact plant extracts. Hexacosane (11.17%); n-hexadecanoic acid (9.33%); and 2-methoxy-4-vinylphenol (4.28%) were the main components of intact plant extracts. 10-Methylnonadecane (57.0%); methoxyacetic acid, 2-tetradecyl ester (17.75%) and 1-Bromopentadecane (14.55%) were the main components of *A. genevensis* callus culture extracts. Obtained data indicate that callus culture of *A. genevensis* can be used as an alternative source of biologically active substances.

Keywords : *Ajuga genevensis*, antibacterial activity, antioxidant activity, callus cultures

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