

Effects of salt applications on root growth and secondary metabolite production in madder (*Rubia tinctorum*) root cultures

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Madder (*Rubia tinctorum* L.) is a perennial herbaceous plant, its roots and rhizomes are very rich in anthraquinones used excessively in carpet, rug and textile as natural dye source. Additionally, this dye is used in food industry because of their resistance against hot and light. They have also anticancer, antimalarial, antimicrobial and antioxidant activities. Phenolic compounds are another unique metabolite group for cosmeceuticals, foods and pharmaceutical industries. The increased interest to natural metabolites these days caused to use alternative techniques to get them with high quality and quantity. Root cultures are an important *in vitro* technique especially for root-derived metabolites. In order to increase the metabolite synthesis in *in vitro* conditions, elicitor applications could have been done effectively. Salinity is an important stress factor influencing growth and secondary metabolite metabolism in plants. This study was carried out to determine the effect of salt on root growth and secondary metabolite accumulation in madder. For this aim, madder roots obtained from stem explants in *in vitro* conditions were used as plant materials. Roots were cultured in MS medium containing different concentrations of sodium chloride (NaCl) (0, 100, 200, 300 and 400 ppm) for seven days. Then roots were evaluated in terms of root growth index, total anthraquinones, alizarin, purpurin and total phenolic contents. At the end of the study, it was determined that root growth decreased in line with the elevating level of NaCl while secondary metabolite accumulation increased with NaCl applications compared to the controls.

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Evaluation of antiproliferative and antioxidant activity of *Swertia chirata*

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The objective of this study was to investigate anti-proliferative effects of the *Swertia chirata* (SCME) methanolic extract against human breast cancer cells MDA-MB-231 and MCF-7 in a dose and time-dependent manner. Our experimental findings demonstrated significant positive results. Microscopic assessment of cellular and nuclear morphology of SCME treated human breast cancer cells indicated apoptosis as a mode of cell death. Anti-oxidant profiling of SCME also indicated presence of high concentration of polyphenols and anti-oxidant enzymes like *SOD* and *Catalase* with potent free radical scavenging activity. Further studies are required for isolation and characterization of specific bioactive compounds in SCME and determination of their mechanism of action responsible for their anti-proliferative activity.

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