Abstract

Hemp (*Cannabis sativa* L.) is a multi-use crop, able to provide fibre celulose a hurds for industrial treatment seeds for oil preparation biomass for energy conversion and produces secondary metabolites useful for pharmaceutical application. For its resistence to stress ability to accumulate high concentration of heavy metals and low cultivations demands, it can also be used for phytoextractions. Current research is focused on establishment of cultivation protocol, which allows transformation of callus cultures, and their regeneration with high efficiency. In this thesis, several varieties of hemp were transferred to *in vitro* conditions and were tested for their ability to form callus. The best results were achieved using the hypocotyl segments in a nutrient medium supplemented with 1 mg/L of naphtylacetic acid and one of these two synthetic cytokinins 0,5 mg/L of thidiazuron or 5 mg/L of 6-benzylaminopurine. No significant difference in the use of these two cytokinins were observed. None of the explants on four different test media for regeneration of shoots were able to succesfully regenerate. Transformation of hemp was tested using two different methods. Transformed protoplasts from hemp leafs after agroinfiltration were isolated. This method turn out to be unsuitable for use with hemp due to its problematical application. For explants co-cultivated with *Agrobacterium tumefaciens*, no succesfful transformation were revealed.

Keywords: *Cannabis sativa*, *Agrobacterium tumefaciens*, transformation, micropropagation, callus, *in vitro*