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In vitro culture establishment and biomass production of *Cichorium intybus* L. hairy roots

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Many chicory varieties *(Cichorium intybus* L., *Asteraceae)* are important agricultural and medicinal plants used throughout Europe. The bitter taste of chicory is associated with the presence of large quantities of sesquiterpene lactones. Some of the guanolides isolated from chicory, play role as antifeedants and phytoalexins, and possess cytotoxic activity towards cultured cancer cells, while the root extracts have anti-inflammatory and hepatoprotective activities. Hairy roots obtained by *A. rhizogenes* transformation grow fast and do not require hormones in the medium. The greatest advantage of hairy roots is that they often exhibit greater biosynthetic capacity for secondary metabolite production compared to the mother plants. The main scope of our investigation was to optimize protocols for transformation of two chicory cultivars, *C. intybus* blue and *C. intybus* catalogna, with *A. rhizogenes* bearing 35S-GUS reporter vector and to establish optimal conditions for hairy roots growth. Transformation was confirmed in 8 *C. intybus* blue and in 6 *C. intybus* catalogna clones by PCR with GUS-specific primers. The GUS expression was confirmed in 6 *C. intybus* blue and.4 *C. intybus* catalogna clones by RT-PCR and histochemical GUS staining. Two of the transformed clones of *C. intybus* catalogna explained the greatest biomass production and growth potential. The established transformation protocol will be the basis for future planned transformation experiments and for the large-scale production of target secundary metabolites using hairy root cultures.

Somatic embryogenesis from mature zygotic embryo culture of *Allium giganteum*

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Induction of *in vitro* morphogenesis of mature zygotic embryos of *Allium giganteum* was investigated. Somatic embryogenesis and whole plant regeneration were achieved. Isolated zygotic embryos were cultured on MS mineral solution contained 3% sucrose, solidified by 0.7% agar with in mg l-1: casein hydrolysate 250.0, L-proline 250.0, 2, 4-D and kinetin (1.0, each) or thidiazuron (1.0). Embryogenic callus was derived from mature zygotic embryos after 4 weeks on MS medium supplemented with 2,4-D and kinetin and somatic embryos arise from surface of the embryogenic calli. Somatic embryos were formed directly from zygotic embryos cultured on media with thidiazuron. Maximum somatic embryo induction 98% and the highest number of somatic embryo (0.63 ± 0.94) per explant was obtained on MS medium containing thidiazuron. The bulblets formation was also observed on MS medium containing thidiazuron. Multiplications of somatic embryos, as well as, bulblets were observed after subsequent transfer on hormone free medium. This is successful report of plant regeneration through somatic embryogenesis for this very important horticultural plant.

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