

In Vitro Propagation of Aloe vera and Aloe littoralis Plants: Gamma Radiation, Biochemical and Genetic Changes

Authors : Z. Nourmohammadi, F. Farahani, M. Shaker

Abstract : Aloe is an important commercial crop available in a wide range of species and varieties in international markets. The applications of this plant have been recorded in the ancient cultures of India, Egypt, Greece, Rome and China. Aloe has been used for centuries and is currently being actively studied for medicinal purposes. Aloe is propagated through lateral buds, which is slow, very expensive and low income practice. Nowadays, it has been cultured by in vitro propagation for rapid multiplication of plants, genetic improvement of crops, obtaining disease-free clones and for progressive valuable germplasm. The present study focused on the influence of different phytohormones on rapid in vitro propagation of Aloe plants. We also investigated the effect of gamma radiation on biochemical characters as well as genetic changes. Shoot tip of 2-3 cm were collected from offshoot of Aloe barbadensis and Aloe littoralis, and were inoculated with MS medium containing various concentrations of BA (0.5, 1, 2 mg/l), IAA (0.5, 1 mg/l). The best treatment for a highest shoot number and bud proliferation was MS medium containing 2 mg/l BAP and 0.5 mg/l IAA in A. barbadensis and A. littoralis. Maximum percentage of proliferated shoot buds (90% and 95%) from a single explant were obtained in MS medium after 4-5 weeks of the second and the first subcultures, respectively. Different genome sizes were also indicated among treatments and subcultures. The mixoploids identified in flow cytometry histograms in different treatments. The effect of gamma radiation on A. littoralis showed that by increasing the dose of gamma radiation, amounts of chlorophyll A, B, carotenoids, total protein content and superoxide dismutase were significantly increased compared to control plants. Genetic variation analysis also revealed significant genetic differences between control and gamma radiation treated regenerated plants by AMOVA test. Higher genetic heterozygosity was observed in radiation treated plants. Our findings may provide useful method for improving of Aloe plant proliferation with increasing of useful material such as antioxidant enzymes.

Keywords : aloe, antioxidant enzyme, micropropagation, gamma radiation, genetic variation

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020