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Title

detection of eight types of apricot virus and elimination some of its cultivars through various techniques of tissue culture

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Abstract

Eight different experiments were conducted to optimize and establish an efficient in vitro propagation protocol for three Iranian apricot cultivars, including Ordubad, Shams, and Qaysi. Sterilization, in vitro establishment, proliferation, root induction, and acclimatization steps were assessed. The fungal and bacterial infections were significantly decreased when nanosilver (2.5%) was applied in sterilization of initial explants. The highest number of active buds was obtained from summer-season collected lateral bud explants. The establishment responses of apricot cultivars to investigated basal culture media were different and the best results for Ordubad, Shams, and Qaysi cultivars were obtained from Driver and Kuniyuki (DKW), Woody Plant Medium (WPM), and modified Quoirin and Lepoivre (QL) basal media, respectively. The highest number of induced lateral shoots in Ordubad cultiva (2.33) was obtained from basal QL medium supplemented with BAP (4.44 µmol L^{-1}), GA3 (1.44 µmol L^{-1}), and IBA (0.098 µmol L^{-1}). In Shams and Qaysi cultivars, the highest numbers of induced lateral shoots were obtained from WPM basal medium. In comparison with routine solid culture system, a 10 min h−1 temporary immersion bioreactor system led to the significant increase of the number of induced lateral shoots, with higher shoot quality, in all investigated cultivars. The half strength QL medium supplemented with 19.68 µmol L^{-1} of IBA resulted in the highest rooting percentage in all investigated apricot cultivars.

Also, different experiments were conducted to optimize and establish an efficient in vitro propagation protocol for Myrobalan 29C rootstock. The best in vitro establishment and in vitro propagation of Myrobalan 29C rootstock were obtained in DKW and WPM basal medium respectively, supplemented with BAP (2.22 µmol L^{-1}) + GA3 (2.88 µmol L^{-1}) + IBA(0.04 µmol L^{-1}) + 228.72 µmol L^{-1} Fe-EDDHA. Among investigated different types of cytokinins —BAP, 2ip, kinetin, zeatin, and thidiazuron—the highest number of lateral shoots was achieved by application of 2.33 µmol L^{-1} of kinetin. The positive effects of applied silica nanoparticles on micropropagation of Myrobalan 29C rootstock were observed, as the highest number of lateral shots was obtained by application of Fe (100 ppm), Zno (10 ppm) TSiO2 (1 ppm), ASiO2 (10 ppm), and bio-synthesized RSiO2 (10 ppm) nanoparticles. The highest number of roots was induced by application of 29.52 µmol L^{-1} IBA in half strength DKW medium.

In this work, Thermotherapy, chemotherapy, Cryotherapy and Electrotherapy in vitro were applied to eliminate 8 viruses (PVD ،PNRSV ،PPV ،TRSV ،ToRSV ،ACLSV ،ApMV and ArMV) cause serious disease problems in apricot trees in in vitro cultures. Detection of 8 viruses with double antibody sandwich-enzyme-linked immunosorbent assay (DAS-ELISA) and multiplex reverse transcriptase-polymerase chain reaction (RT-PCR) was studied.

RT-PCR analysis showed that viruses (ACLSV, ApMV and ACLSV) in infected apricot trees were eliminated in the survived ones after thermotherapy, chemotherapy, cryotherapy and electrotherapy.

Key words: Micropropagation, thermotherapy, Temporary immersion bioreactor, Plant growth regulator, electrotherapy