RAPID PLANTING MATERIAL PRODUCTION OF *Aloe vera* (L.): *IN VIVO* AND *IN VITRO* APPROACHES

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Aloe vera (L.) cultivation has gained recent attention due to its commercial and medicinal benefits. Limited availability of good quality planting materials has restricted the commercial cultivation of superior genotypes. Therefore, this research was designed to develop a commercially viable protocol for the production of quality planting materials. First, *in vivo* propagation was tested in a factorial design with two combinations of potting media (sand and sand with compost), three different ages of leaf cuttings (Mature, Middle, Young), and in root induction hormones. No shoots or roots were observed in tested treatments. Therefore, in the next *in vitro* propagation experiment, several sterilization methods, including mercuric chloride ($HgCl_2$) and sodium hypochlorite (NaOCl), were tested to find the most suitable sterilization method. Among them, 5% NaOCl (20% Clorox) resulted only 6% contamination and selected for the subsequent work. In indirect regeneration, leaf explants with four combinations of 6-benzylaminopurine (BAP), 1-naphthaleneacitic acid (NAA), Kinetin, and 2,4- dichlorophenoxyacetic acid (2,4-D) were used. Murashige and Skoog (MS) medium containing 1.0 mgL^{-1} BAP and 1.0 mgL^{-1} NAA resulted 63% calli formation within four weeks. Since phenolic browning of explants was observed during culture establishment of *Aloe vera,* inhibitory effects of several additives such as polyvinylpyrrolidone (PVP), activated charcoal, ascorbic acid, and citric acid were tested against the browning of leaf explants. The combination of 1.0 gL^{-1} PVP, 0.5 gL^{-1} activated charcoal and, 100 mgL^{-1} ascorbic acid in MS medium was the most effective treatment to reduce browning. Sterilized shoot tips from middle-aged mother plants were planted on MS medium with combinations of BAP, NAA, and Kinetin to test direct regeneration ability. The medium containing 2.0 mgL^{-1} BAP and 0.5 mgL^{-1} NAA produced 25% of shoots in four weeks and some developed roots. Therefore, further optimization with a longer culture time mignt produce sufficient planting materials from elite germplasm.

Keywords: *In vivo* propagation, Phenolic browning, Direct regeneration