ABSTRACT

Studies on *in vitro* propagation of *Aloe barbadensis*

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A standardised procedure for *Aloe barbadensis* micropropagation was developed using young side shoot material. Stem segments and shoot apices obtained from side shoots were used as explants. Factors influencing *in vitro* culture establishment, shoot proliferation and development, *in vitro* and *ex vitro* root initiation and development, and acclimatisation of *in vitro* produced plantlets to *ex vitro* conditions, were studied. Shoot origin was determined by histological studies on proliferating and non-proliferating explants, as well as on proliferating mature stem.

Establishment of viable cultures was affected by explant type, surface contamination and phenolic browning. The most viable cultures were obtained using shoot apices and side shoots.

BAP, 2ip, kinetin or TDZ in MS medium were investigated for shoot induction. BAP (1-5 mg/l) resulted in optimum shoot initiation. TDZ (5-20 μM) was second best, but shoots formed were abnormal.

Shoot proliferation was significantly increased by subculturing initiated explants onto MS medium containing BAP(5 mg/l).

Elongation of *in vitro* produced shoots was examined. Activated charcoal (500 mg/l) resulted in longer shoots than MS medium alone. Root initiation was observed in both instances.

Multiplication of *in vitro* produced plantlets was attempted. BAP at 1-2 mg/l in the medium resulted in maximum multiplication of shoots. An increase in BAP to 3 mg/l significantly reduced shoot multiplication and shoot lengths.

Histological studies showed that *A. barbadensis* does not vegetatively propagate by means of underground rhizomes but, rather, buds appear directly on basal stem tissue. No axillary buds were found in the axils of leaves.

Shoot initiation and development followed similar patterns *in vitro* and *in vivo*. BAP in the culture medium resulted in direct formation of adventitious buds on stem tissue. However, TDZ caused callus formation on stem and the abaxial surface of leaf tissue, which regenerated into shoots.

Rooting of *in vitro* produced shoots was best obtained using hormone free MS medium. *Ex vitro* rooting of shoots, though possible in either promix or coconut fibre, resulted in poor rooting and shoot hardening. However, hardening of *in vitro* plantlets was successful in either promix or coconut fibre.

In vitro multiplication rates were significantly higher than those of macropropagation. Recommendations were made to improve and optimise conditions for obtaining aloe plantlets through micropropagation techniques.