Abstract

Microshoots of apple (Malus domestica Borkh.) rootstocks G. 65, G.30 and G.11 were transferred from stage II axillary shoot cultures to stage III rooting media containing 10 levels of indole-butyric acid (IBA) for four weeks to determine optimal conditions for rooting. Microshoots were inverted or left in an upright position. Rootstocks and microshoot position affected rooting and survival; the highest rooting was 30% for G.65 inverted with 2 mgcntdotL-1 I13A, 100% for G.30 upright with 3 mgcntdotL-1 IBA, and 100% for G.11 inverted with 1 or 2 mgcntdotL-1 IBA. No single set of conditions provided consistent rooting in vitro, and plants were not always of high quality. In a second experiment, microshoots were rooted and acclimatized ex vitro in a custom-built fog chamber to assess the effect of two carbon dioxide levels (450 or 1350 mumolcntdotmol-1) and three light levels (30, 50 or 100 mumolcntdotm-2cntdots-1). All rootstocks rooted equally well ex vitro, but survival varied. Plantlets had the highest dry mass, leaf area and growth rates under high light conditions compared to medium light or low light conditions. Supplemental carbon dioxide had no consistent effect. If plants survived fog chamber conditions, subsequent survival in the fog tunnel and greenhouse was 100%. Thus, these rootstocks can be rooted successfully in the fog chamber at high light conditions, which yielded high quality plants. A third experiment was conducted to evaluate the effect of chilling for four weeks at 3.3degreeC, or spraying with gibberellic acid 3 (GA3) on post-rooting dormancy, a problem which frequently occurs with recently rooted apple microshoots. Chilled plants had greater dry mass than control or GA3 plants, and the GA3 effect was short-lived. The ex vitro procedure suggested by these experiments could reduce the time associated with rootstock micropropagation to at most 6 months.