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Factors Involved in *in vitro* Shoot-tip Grafting of Apple (*Malus domestica* Borkh.) and Pear (*Pyrus* sp. L.)

RAFAIL TOMA, MOSLEH DUHOKY

University of Duhok, College of Agriculture, Horticulture, Iraq

Abstract

The aim of the study was to investigate the influence of different factors involved in *in vitro* shoot-tip grafting of apple (*Malus domestica* Borkh.) and pear (*Pyrus* sp. L.). The results revealed that autografting (homografting) was superior to the heterografting. The highest percentage of successful grafts (80%) was obtained when shoot tips of Anna apple and Aly-Sur pear were obtained from tissue culture grown plantlets as compared with those obtained from flushes in trees grown under field conditions (30 and 40%, respectively). A significant difference was noticed in apple micrografting success while using *in vitro* micropropagated shoots as rootstocks (60%) as compared with the use of *in vitro* germinated seedlings (48%). The same micrografting success (60%) was achieved for pear micrografting with both kinds of rootstocks. Micrografting success could be raised from 30 to 90% by adding BA (2 mg l^{-1}) to the nutrient medium but soaking scions and rootstocks in BA solution was unprofitable. Adding sucrose with 30 g/l to the nutrient medium was significantly effective on raising grafting success in both apple and pear to 60% and 70% from only 50% and 40% at 15 g/l sucrose level, respectively. Using liquid medium significantly raised successful grafts percent to 60 and 70% from only 10% in case of solidified media with agar for both apple and pear micrografts, respectively. Adding an agar drop to the grafted area was highly profitable which raised micrografting success to 70 and 60% as compared with grafting without an agar drop (10%) for both apple and pear micrografts, respectively. No significant differences were recorded in micrografting success percentages as a result of using both supporting agents (M-shaped perforated filter paper or a piece of cotton). By inverted-T incision, there were 80 and 90% successful micrografts in Anna on MM106 apples and Aly-Sur on *P. calleryana* pears, respectively. Lower success of 70% in both apple and pear was observed when scion was grafted by surface placement using cleft grafting. A high mortality rate was found with grafted plants transferred to soil which reached to 85 and 90%, respectively.

Keywords: Apple, *in vitro*, micrografting, pear, shoot-tip grafting