In Vitro Propagation of Pineapple

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Abstract. Pineapple (Ananas comosus (L.) Merr.) was cloned by in vitro culture of axillary buds from crowns of mature fruit. Explants were initially placed in Murashige and Skoog medium (MS) with 25% coconut water (CW), subcultured after 2 weeks on half-strength MS with 25% CW, and finally placed on half-strength MS supplemented with 6-benzylamino purine (BA). Small crowns were disinfested after defoliation by soaking in 0.5% sodium hypochlorite (10% Clorox) with 3 drops of wetting agent (Tween 20/100 ml) for 60 minutes and excised axillary buds in 1% Clorox for about 20 minutes prior to initial culture. About 5,000 plantlets can be produced in 12 months from a single crown by this technique.

Pineapples are most commonly propagated asexually by whole crowns in Hawaii or slips and suckers in other parts of the world. About 5 cuttings can also be obtained from a crown and these will bear mature fruit in 24 months. It takes 13 years at this rate to produce enough planting material for 1 ha (7). Other efforts to develop rapid commercial methods of propagation have used sections of stumps with buds (1, 8), bud pieces (7), lateral shoot induction on adult plants (6), and organogenesis from callus (2). Fifty-one plantlets can be obtained by the bud-piece method from an adult plant in 6 months which will produce fruit in about 18 months. There still is a need for more efficient methods for asexual propagation of pineapples especially as part of breeding programs to rapidly increase selections for further trial and evaluation. Application of tissue culture for rapid clonal propagation has been reported as highly successful for a number of economically important plants (3). In vitro culture of lateral buds from crowns of mature pineapple fruit is described in this paper.

Small crowns from mature fruit after careful removal of all the leaves were disinfested in 0.5% sodium hypochlorite (10% Clorox) with 3 drops of wetting agent (Tween 20/100 ml) for 60 min. Axillary buds were then excised and disinfested in 1% Clorox for about 20 min. Explants were cultured in 16 mm screw cap culture tubes containing 4 ml of Murashige and Skoog inorganic nutrients (MS) (4) with 25% by volume coconut water (CW) and placed on a TC-3 Rollerdrum at 1/5 rpm at 26 ±2°C under continuous light of about 2.1 klx.

Explants were initially placed in Murashige and Skoog medium (CW) and finally placed on half-strength MS supplemented with 6-benzylamino purine (BA). Solitary shoots with 5 to 8 leaves were obtained within 2 months after initial culture (Fig. 1). These were subcultured into half strength MS supplemented with 0.5, 1, 3, or 5 mg/l of BA. At least 3 axillary shoots were produced in cultures of 0.5 or 1 mg/l BA within 30 days (Fig. 2). Further multiplication was obtained by separation of axillary shoots and subculture 4 times in half strength MS medium with BA. Thereafter, individual shoots were transferred to solid half strength MS medium (Fig. 3).

An average of 16 shoots were obtained from 23 axillary buds per crown; others were lost due to contamination or failure of buds to grow. Therefore, it is estimated that by application of tissue culture techniques at least 5,000 plantlets can be produced in 12 months from a single crown. Pannetier and Lanard (5) have estimated the possibility of producing 2 million uniform individual plantlets from a single bud in 2 years by use of a similar technique.

Literature Cited

Fig. 1. Plantlet after 2 months in culture.

Fig. 2. Axillary shoots on initial explant.

Fig. 3. Rooted plantlets on agar medium of half strength MS nutrients.