Research in Food Science and Nutrition

Volume 1

THE PRODUCTION PRESERVATION AND PROCESSING OF FOOD

EDITORS
J.V. McLoughlin
B.M. McKenna

Proceedings of the Sixth International Congress of Food Science and Technology, Dublin, September 18 – 23, 1983

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PRODUCTION OF FOOD

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RAPID IN VITRO MULTIPLICATION AND MAINTENANCE OF POTATO CULTIVARS

B.S. AHLOOWALIA

Plant Breeding Department, Agricultural Institute, Oak Park, Carlow

Cultivars of potato, Solanum tuberosum L., can be maintained and multiplied rapidly by in vitro techniques. In vitro propagation of potato allows production of insect and disease free plants in large number, small space, with less labor and cost. The in vitro production of plants is not dependent on season and is free of the environmental stress. The propagules can be shipped more easily and at a lower cost than the conventionally produced seed potato. The in vitro propagation and maintenance of seed potato is of value in the developed and developing countries alike.

Potato explants of several cultivars, Amber, Avondale, Cara, Clada, Golden Wonder, Home Guard, Kerr's Pink, King Edward, Mizen, Record, Red Cara and Tuskar, were used as the starting material. Tubers, indexed for viral freedom, were cut in 4 to 5 pieces, each with one or two eyes. Cut tubers were dipped for one minute in concentrated solution of 'Benlate ', placed on wetted filter paper in a plastic box, and allowed to sprout in dark at 20-25^{0}C for 10 days. Explants, 1 to 1½ cm long, each with a bud or apical meristem taken from the sprouts, were surface sterilized with 1:2 (v/v) solution of sodium hypochlorite and sterile water for 25-30 min., given a quick dip in absolute alcohol and rinsed twice in sterile water and cultured singly on half-MS (half-strength Murashige & Skoog's medium 1962) in pre-sterilized plastic tubes. Sterilization and transfer to medium was carried out in a laminar sterile air flow cabinet. Two weeks later, each explant developed into a plant with 2-3 leaves and 1-3 roots. The plants were transfered to MS medium either in 250ml flasks or disposable pre-sterilzed petri dishes and cultured for 6 weeks. The stems proliferated and were cut into several pieces (up to 100) and recultured in petri dishes on MS medium for propagation or on half-MS medium to establish stock cultures. This procedure could then be repeated indefinitely to produce plants. All cultures were maintained under 12/12h, 28/20^{0}C light/dark regime. The lighting was provided with two cool day-light fluorescent tubes fixed 35 cm above the bench surface (Ahloowalia, 1982). Stock cultures, once established as aseptic plants, could be maintained on half-MS medium for more than a year without retransfer. Maintenance of explants on MS medium for 4-5 months without retransfer produced mini-tubers ranging 3 to 5 mm in diameter. The mini-tubers

could be stored in dark at 10^0C and reused to initiate new plants. Such mini-tubers can be shipped across the world either in sterile tubes or plastic bags.

Plants in petri dishes developed rudimentary leaves. On transfer to soil in glasshouse such plants produced multiple shoots with normal leaves in less than 20 days and generated normal plants and tubers on transfer to field. The tubers produced in the field could then be used for the production of commercial tuber crop.

Literature cited:

Ahloowalia, B.S. 1982. Plant regeneration from callus culture in potato. Euphytica 31: 755-759.

Murashige, T. and F. Skoog. 1962. A revised medium for rapid growth and bioassy with tobacco tissue culture. Physiol. Plant. 15: 473-497.