Rapid propagation techniques for potato cultivars

P.B. Goodwin[1], Y.C. Kim[2], T. Adisarwanto[3] and G. Brow[1]

[1] Department of Agronomy and Horticultural Science, University of Sydney, N.S.W. 2006.
[2] Jean Buk Rural Development Office, Dong San-Dong, IRI-city, 510, Korea.
[3] Faculty of Agriculture, Brawijaya University, Malang, Indonesia.

A limiting factor in the release of newly imported or bred potato cultivars is the build up of seed tuber material. In general only a few tubers are brought through quarantine, or are initially available from a breeding program. Multiplication in the field is slow - about tenfold per year. Hence, a number of years can pass before there is enough of a cultivar for field trials, let alone for commercial release.

We have developed a number of rapid propagation techniques. Two use aseptic propagation in culture - they are micro propagation techniques. The first, propagation in flasks using a shaker, will give at least 1500 shoot tips from one tuber in six months. The second uses Petri dishes without shaking, and gives similar multiplication rates. The tips are rooted and transferred to the field. Material multiplied by these techniques has given yields between 50% and 100% of those of tubers, when transplanted into the field.

The third technique uses glasshouse conditions. Nodal cuttings are taken from plants and rooted under humid conditions. Small plants grow from the axilliary buds and within 2 to 4 weeks these, and the original plants, are again cut to nodal cuttings. Seven cultivars have been successfully propagated, giving approximately 1000 nodal cuttings per tuber in three months, or potentially 106 nodal cuttings from one tuber in six months. Two field plantings of this material have been made, but both have failed, the first due to flooding, and the second due to extreme field temperatures immediately after transplanting. A third field planting has now been made, and is expected to perform as well as the micro propagated plants.

These techniques are seen as encouraging the rapid build up of new cultivars for field testing, and perhaps eventual release. In the tropical highlands the nodal cutting technique may replace conventional methods of seed potato propagation.