

## LITERATURE CITED

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### **RAPID PROPAGATION OF POTATO: WHY? HOW?**

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**Why?** Potatoes (*Solanum tuberosum*) are normally propagated as tubers. The use of tubers gives this crop the major advantage of rapid crop development, leading to higher yields in a short period (3 to 4 months from planting) than any other major crop. However, the use of tubers leads to two major problems:

1. Plants very readily become infected with serious tuber-borne diseases such as leaf roll virus, which are then passed on to subsequent crops. These crops give low yields. The spread of the most serious diseases is via aphids and, for this reason, “seed” tubers are typically produced in areas low in aphids — for example the highland areas of New South Wales. It is also possible to eliminate the most serious virus diseases from individual shoot tips using apical meristem culture.

2. The second major problem with tubers is slow propagation, normally 7 to 10 fold per year, in field conditions. This severely limits the rate of introduction of new selections, or of apparently virus-freed cultivars.

As a consequence of the previous two factors many countries operate a “pathogen-tested” “seed” potato scheme. A very small number of plants of each cultivar are grown from clean tubers in rigorous isolation. Each year about 30 tubers from these are tested for pathogens. Provided they are shown to be free of diseases, they are propagated, year by year, at first in “foundation seed” farms, then in “mother seed” farms, and finally in “certified seed” farms, until their progeny are numerous enough to provide the planting material for one crop in one year in the region. The next year a completely fresh lot of seed is used, and so it goes, in a continuous flush out system. The propagation from the pathogen-tested tubers to the farmers “seed” takes about six years. Propagation is expensive, in that the prime clones must be maintained in specially

dedicated, remote farms. There is also a considerable risk of infection over the extended propagation period.

There is obviously a need for ways to rapidly propagate potatoes under conditions where the risk of infection is low. The question is, how?

**How?** A large number of techniques for the rapid propagation of potatoes have been described in the last five years. These can broadly be described as either glasshouse techniques — shoot cuttings, sprout cuttings, leaf bud tubers, and a technique developed here, (single node cuttings), or tissue culture techniques (including two developed here). The generally accepted belief has been that tissue culture techniques give more rapid propagation, and are bound to be superior. However, by optimising glasshouse propagation techniques, we have been able to achieve propagation rates compatible to tissue culture and, in fact, rates which are much higher when allowance is made for the time and effort spent in establishing plant material in culture and in its rooting and hardening after removal from culture. Furthermore, glasshouse propagation uses much simpler equipment, and makes less arduous demands on the operators. It can also be made virtually disease-secure. On the other hand, tissue culture requires the full complement of glasshouse space which would itself be enough for glasshouse propagation, and, as well, requires all the equipment needed for tissue culture.

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