17. NURSERY HANDLING OF PROPAGULES

J.A. DRIVER and G.R.L. SUTTLE

1. INTRODUCTION

Propagation of trees by conventional means tends to be highly geared to local requirements, with commercial firms often specializing on certain species. This is especially exemplified by the horticultural tree nursery industry. With the development and refinement of micropropagation techniques, a new means of propagation is available, especially for species that are difficult to propagate by conventional methods.

Our experience is chiefly with horticultural tree crops. It is believed that these crops will lead the way in defining commercial micropropagation practices, and the experience gained will be applicable to forestry. Also horticultural plant systems may be understood in greater detail because of substantial conventional asexual propagation experience.

From a conventional nursery perspective micropropagation should be viewed as another propagation tool. It is with this perspective that specific aspects of laboratory practice that affect commercial production are addressed.

2. COMMERCIAL NURSERY NEEDS VS. LABORATORY PRACTICE

The product from micropropagation must meet three criteria: 1. It must be needed. 2. It must be cost effective. 3. The micropropagation system must be defined adequately to deliver the product in the quality and quantity desired. Given these criteria, the number of tree species that 'should' be micropropagated is small. If dependable conventional methods exist for asexual propagation of the species (ie. air layering, mist propagation, hardwood cuttings, etc.), and if the end products are saleable units, conventional methods should be the methods of choice. However, it may be advantageous to establish mother stock from tissue culture for specific objectives (virus...
elimination, rejuvenation, rapid increase of a new cultivar) and subsequently use conventional methods to mass propagate the improved product. The greatest promise for forestry is in the propagation of elite genotypes from species where conventional asexual propagation is difficult or impossible (24).

Thus, if the objective for micropropagation is production of large quantities of a particular species, and it is cost effective, tissue culture propagation will gain in importance. With some forest species, there is progress towards this objective. This is due in large part to a more complete definition of the micropropagation system for each particular species. An example of this is the optimization of such media components as the hormones and mineral elements (51). It must be noted that many species demonstrate a high degree of specificity with regard to elemental concentration and the resulting morphological and physiological responses (69).

3. SEASONALITY OF GROWTH AND PRODUCTION CYCLES

For each particular crop, the commercial nursery has production cycles that correspond to seasonal climatic changes. This is especially true for temperate tree crops. Dormancy requirements or rest periods must be satisfied for each crop to allow successful propagation and growth (36). The tissue culture laboratory usually does not have these constraints during multiplication. Once the propagule is placed in the greenhouse or field, the plant becomes subject to seasonal factors such as daylength and temperature that control subsequent growth and development.

The effort to control output from the lab is thus complicated by these factors. Production should be constant throughout the year, since facilities are utilized most efficiently that way. Bulking up of plant material at various stages in vitro with cold temperature storage, is an aid in the control of output (1, 56).

4. MICROPROPAGATION OPTIONS

4.1. Trends in commercial micropropagation

It may be presumptive to assume trends in commercial micropropagation when so few firms are actually doing truly commercial production. One trend that is identifiable is specialization. Difficult to propagate tree species require a great research effort, and generalizations about propagation systems are difficult to make. The high degree of specificity requires that each