THE VITAL LINK: THE NEED FOR GOOD LABORATORY/NURSERY COMMUNICATIONS

MARGARET M. DEAN

The Green Shoot Company
Bookham, Surrey

The Vital Link between laboratory and nursery is a matter of life and death for the plant. A dramatic situation—so where are the heroes and where are the villains? It is always easier to identify villains than to recognize heroes so let's start with them.

One villain is the white coat worn by the laboratory worker. People in white coats seem threatening but the white coat has its place. A lot of bleach is used for sterilisation and white is the only practical colour to wear. It also shows up any grubbiness and this helps to maintain high standards. So the white coat is just a useful tool.

The second villain is the "Keep Out" sign on the laboratory door. This is even more destructive. The funny person in the white coat kept behind closed doors must be up to something sinister. Again there are good reasons for "Keep Out" signs. A laboratory where muddy boots are frequently tramping through will be impossible to maintain to the required standard of hygiene and too many curious visitors can use up a lot of time with disastrous effects on profitability.

There are good reasons why there should be a sharp division between the laboratory and the nursery, but there are better reasons why they should be integrated.

There are basically two interfaces between the laboratory and the nursery. One before micropropagation and one after. In the first case the laboratory needs to know what plants the nursery requires, in what quantity, and when. The nursery, on the other hand, needs to know what is possible from the laboratory. "How long will it take?" is a frequent question and one to which there is usually no straight answer.

Taking this as an example, suppose a market was perceived for 10,000 units of a plant. This might take as little as 4 to 6 weeks to establish in culture, or it might take as many years. Here the nurseryman can help by supplying high quality stock plants that should be as young as is feasible, true to type, and of a superior clone. They should be as healthy as possible and plants given regular fungicidal sprays in the greenhouse are much easier to clean up in the laboratory than open ground plants.

When a plant is new to micropropagation it can also help to know what conventional techniques are most successful. Sometimes information on the best type of cutting or time of year can be useful.

Stage two is the multiplication phase. How long will that take? Suppose the target is 10,000 plants and the subject is multiplying at a rate of ×5 every two months. If there are 100 pieces to start with then after eight weeks there will be 500 pieces; 400 of these can be sent for rooting and 100 retained for multiplication. Then at 16 weeks the process can be repeated and this can continue until the desired number have been produced. At this rate, of 2400 per annum, it will take over 4 years to reach target!

Micropropagation involves a lot of capital expenditure and is labour intensive, so it is important to make maximum use of both facilities and manpower. The system just described is very good for the laboratory as there is a constant use of space and the labour requirement is distributed through the year. But does the nurseryman like this? Does he want six different batches of plants of different ages? Does he want to wean 400 microcuttings at a time? What is his market requirement?

An alternative system involves continually multiplying until the required number is reached, then planting them out all at once. Using this system, the target can be reached in 6 months—so of course that is the way to do it. But what are the implications in space and labour requirements and how can these be accommodated? Ideally, the laboratory would produce 12 different crops each requiring 10,000 per annum but to be weaned at monthly intervals.

In order to approach this situation, the requirement for plants should be decided 12 to 18 months before they are planned to come off the production line. The system must ensure that space will be available in the weaning house at all times, since delay in moving material from the laboratory leads to its deterioration and also overcrowding in the growth room. This can only be achieved if everyone concerned understands what is going on and is committed to its success.

Here we see the other interface with the nursery where plant material is leaving the shelter of *in vitro* culture to return to the "normal" world. Maximum cooperation is essential between laboratory and weaning house so that problems can be identified at the earliest possible stage and steps taken to minimize damage.

People who have years of experience working on a nursery know how to grow plants but these microcuttings are not like normal cuttings. They are very small, fragile, and susceptible to water loss, heat stress, and disease. They are also easily damaged by chemicals—so what is good about them? The potential is terrific if only they can be nursed through those first few weeks when they do need constant attention.

There is a temptation, because of the system of micropropagation, to think of it as a production line for nuts and bolts. But these are living plants and need care to survive this period of adapting from a highly controlled environment where neither roots nor photosynthesis are necessary, to a rooted plant capable of absorbing water and nutrients from the compost—avoiding excessive water loss by *growing leaves with normal cuticle and functional stomata*, and able to provide their own energy supply instead of relying on sugar supplied in the gel medium.

These are problems which must be faced on the nursery but which can be influenced by treatment of the material in the laboratory. If there is a sharp line of division then it is easy for each side to blame the other when plants do not survive or perform poorly.

If plants die during weaning, is it because the nutrients in the gel in the growth room were wrong, or the growth regulator balance was inappropriate for rooting; or was it because the plantlets received the wrong temperature and humidity control; or because the compost dried out or became saturated; or because sciarid flies chewed the emerging roots; or botrytis took its toll? With goodwill and determination to succeed the answers can be found.

CONCLUSIONS

Micropropagation will only work to the advantage of the industry if it is considered as part of a continuing process in which each phase is dependent on that before and influences that which follows. Many of the problems encountered are similar to those met in conventional propagation but they must be recognized and solved by cooperative action by all those concerned. The result of this can be the production of excellent plants at a competitive price.