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## What Future for Plant Propagators?®

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### INTRODUCTION

In the not so distant past, the plant propagator was portrayed as the eccentric whose role was only to put roots on the cuttings, graft the scions, and peg down the branches of stock plants in the layer beds during winter. The only apparent measure of success was technical excellence as measured by rooting percentage or graft-take: Glory! Yes! Roots! “The euchryphias have rooted, not quite 100% but next year we will strive to get the 100%. A little more heat, less humidity, maybe a different hormone.” Plant propagators had their office in the shed where they were surrounded by a library of “Black Books” they called their “bibles”, together with authoritative monographs and periodicals giving many useful tips on different species — not always relevant to the task at hand.

Today’s propagators are no different. They are passionate about all plants. They still have their black bibles—books of religion, guides for life in the future: the propagator has only an average of 47 shots at goal and the goal is to achieve that elusive 100% rooting. But this author contends there are, perhaps, more important measures of a propagator’s success and contribution to the wider horticultural profession.

### EDUCATION AND TRAINING FOR PROPAGATORS

There are basically two categories of work for plant propagators—academic (in research organisations, botanical gardens, and other plant collections, for example) or commercial propagation. Whichever side of the profession a propagator ends up in, education is the most important beginning. There once was a passion in the educational institutes of the UK and Ireland but alas that is all but gone. Money has taken over as the ruler of the faculty whether it is in a university or college. Doctors, lecturers and professors, are just too busy to take time to nurture their students. “Mol an Óige agus Tíocfaidh Siad—Praise the young and they will come with you” is an old Gaelic proverb, but today’s student botanists or propagators are just not encouraged by the enthusiasm of their elders as in the past.

One major failing is that the teachers or trainers do not get out to see what is happening “in the field”. How many academics from your local horticultural college have visited your nursery, or trade shows or exhibitions, such as, Four Oaks, Plantarium, Hortiflora — N.T.V. or I.P.M.? It is interesting to note that I.P.M. in

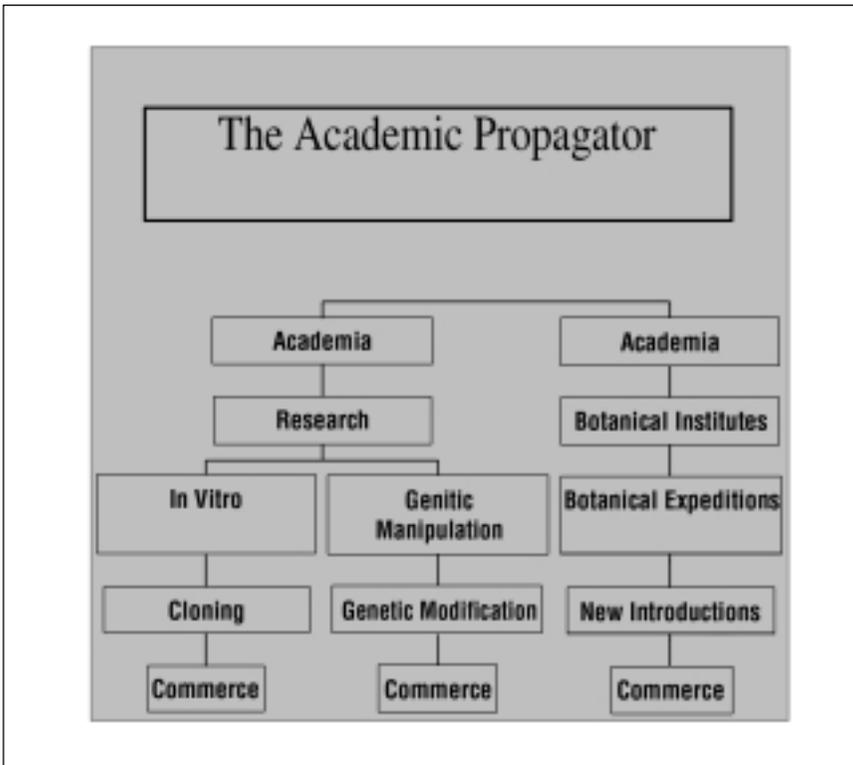
Essen, Germany, is very well supported by German educationalists and the results of this can be seen in their students. The vast majority of German students in plant propagation have a realisation that this is a profession and treat it as such. They exude enthusiasm, dedication, and a willingness to learn.

### RESPONSIBILITIES OF THE ACADEMIC PROPAGATOR

These days even the academic propagator's successes have to be measured in money terms. Gone are government grants, subsidies, and reliance on the taxpayer to fund their careers. Most institutions undertake research for commercial gain whether it is campus companies or straight faculty research.

The academic propagator has a wide range of career topics from which they can choose. Their contribution to the future of plant propagation can be outlined as in Fig. 1 below.

Modern research in plant propagation may range from the *in vitro* propagation of a specific species to be grown for its medicinal qualities, to improving propagation efficiency in many different areas of horticulture. It may be propagation involved with plant breeding, either conventionally or through genetic modification or manipulation. Botanical research linked with propagation might discover new species which can be added to breeding lines to lead to new commercial cultivars and new introductions.



**Figure 1.** Areas of interest for academic propagators.

The modern nursery industry revolves around having something new or, if not new, something that can be re-introduced under a new name. The academic propagator and the commercial propagator must work hand in hand whether developing new plants or new growing technologies. Once the research is done and the new plant or technique is introduced, it must be exploited to its fullest potential by the commercial grower.

**RESPONSIBILITIES OF THE COMMERCIAL PROPAGATOR**

The commercial propagator is no longer just the person who roots the plants by the cheapest means. They must show their full potential by, for example, assessing a potential new plant, looking at the market trends, and viewing the nursery’s production systems. Are the existing facilities suitable? How is the plant to be cultivated? Can propagation and production of the plant be planned to fit in with other operations and with the needs of sales, marketing, and finance, leading to good profitability for the nursery? The propagator can no longer hide away in the shed but must liaise with all these different elements of the business and play a full role in decision-making.

Today, the market place is fraught with pitfalls. More professional marketing has increased the range of market outlets but there has to be a full commitment to whatever market you wish to fill.

**THE PROPAGATOR’S RELATIONSHIP WITH THE MARKET**

In recent surveys in both the U.K. and Ireland, it has become apparent that 80% of the market is controlled by 15% of the nurseries. In Germany, 70% of retail sales are controlled by the D.I.Y. stores, and only 10% of garden centre sales are plants. Therefore, the demand for green material is in direct competition with the pet’s corner, Christmas fair, sundries, books, and so on.

The onus lies on the propagator to ensure the plants being propagated and grown will fulfil consumer needs, constrained by the need to programme specific plants for



**Figure 2.** Factors influencing marketability of finished plants.

particular niche markets. The propagator must also take account of related issues such as changes in the market acceptance of or demand for particular compost substrates, packing and potting materials, methods of pest and disease control, and so on (Fig. 2).

### **IMPLICATIONS OF SPECIALISATION**

Standardisation and specialisation are the two most important words in the modern nursery and are going to be essential as a means of meeting ever-tougher market demands. Gone are the days of nurseries trying to grow a wide range of material. It takes too long with too many losses to keep a large catalogue of species. It is easier and far more profitable to specialise in a certain range of subjects. There is a lesson to be learned from the Dutch on this issue, as seen in Zundert and Boskoop in Holland where the propagator is an expert only in a limited range of plants. With the introduction of garden centre chains such as Wyevale with 122 outlets the demand is for deals on large numbers of single subjects

### **ESSENTIAL SKILLS FOR THE MODERN PROPAGATOR**

For the modern propagator to survive, they must not only be a plants person but also be conversant in finance, automation, ergonomics, economics, accountancy, and be fully aware of the profitability of their organisation.

The financing of the propagation unit, costs, and yields per square metre are very important. Just because a plant is easy to root does not mean it is easy or profitable to sell. There might be pressure on pricing from the continent due to over production. The subject may not be suitable climatically, or carriage expenses might be too high for the product.

Financing and investment must be at appropriate levels and should help ease the workload not complicate it. There can be a tendency to over-capitalise a propagation unit thus making it non-profitable if the unit is too sophisticated for the subjects being grown and returns do not justify the expense.

The handling of cuttings, grafts, or layers, must be done efficiently, and sticking returns and records should be kept for all staff. Training, leadership, and direction must be shown at all times. Handling of tools and the consideration of the welfare of fellow workers must be impressed on all. We are in an age of litigation and it is all too easy for anyone who manages others to become embroiled in court actions. The proper training of staff in using machinery, whether tray filling machines, computer environmental control systems, glasshouse or tunnel management, and automation, is all very important, so our modern propagator is a teacher as well as mechanic, accountant, and botanist.

Whether or not to propagate at all is an important question. It is always difficult to rely on others but should there be a problem propagating certain items, it is better to leave that to a specialist. However, it has been shown that propagation of your own plants does lead to competitiveness in the market place, giving you the extra margin so you will be seen to give value for money.

There are a great many questions being asked about standards, qualities, and value for money. With the enlargement of the E.U., there will be more competition in all facets of nursery production. The propagator should be seen to promote standards in quality, grade, pot size, plant colour, etc. Pricing in relation to the final products should be considered at all times. Inflation in Ireland over 22 years has

been 353%. The price of plants has only risen 60% in the same period, so the propagator has to be more efficient, fully aware of the market trends, pricing, and consumer demands at all times.

To keep up with all the demands of the 21st Century, the modern propagator should travel, which is of course a great educator; be active members of all professional societies like the I.F.A., N.F.U., I.P.P.S, and Garden Centre Association; visit the opposition and be willing to learn from your mistakes and from others. The task at hand may be getting harder, but for the dedicated propagator, the world is your oyster.

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## Theory of Grafting®

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### INTRODUCTION

This review of the theory of grafting will examine the main requirements for a successful graft. Whatever the degree of experience in grafting a propagator has it is necessary at times to go back to the basic principles to improve the success of a particular graft or successfully graft an unfamiliar species.

To carry out a graft both the scion and rootstock have to be cut and brought together so that they will form a single plant. The initial phase of this union is the adhesion of the scion and stock by the polymerisation and deposition of cell wall materials in response to wounding. All species traditionally grafted have been found to be strong “wall compartmentalizers” (Santamour, 1996), forming a necrotic layer of cells that prevents further decay. A callus bridge of parenchyma cells then extends into the necrotic layer from stock and scion, giving tensile strength to the graft. New vascular cambium then differentiates from the parenchyma cells and finally, secondary xylem and phloem are produced by the reconstituted cambium, providing the vascular connection between stock and scion (Moore, 1983).

Several factors are required to ensure a successful graft: compatibility—often dependent on the systematic relationship between graft partners; the correct physiological stage of rootstock and scion; quality of rootstock and scion material; freedom from disease, pests, and herbicide toxicity; the physical proximity of tissues; the grafters’ skill; and the correct environmental conditions to prevent temperature stress, oxygen deprivation, and dehydration (Andrews and Marquez, 1993). The key factors will be discussed individually below.

### COMPATIBILITY

Selecting compatible stock and scion is one of the most important requirements for a successful graft. Graft incompatibility has been fully reviewed by Andrews and Marquez (1993). Incompatibility may be either localised, where the inclusion of an interstock that is compatible with both stock and scion will overcome the incompatibility problem; or translocated, where toxins still prevent successful graft union even if a compatible interstock is used (Mosse, 1962) (see list of indicators below).