

Australian industry and the public with a computer search service in the fields of science and technology, including agriculture. CSIRO also offers computerised current awareness services which can provide an enquirer with a regular listing of up-to-date literature on a particular topic, on greenhouse management, for example, or fruit tree rootstocks.

The information and library services outlined in this paper are an important national resource. They can and should be exploited by the plant propagator who wishes to keep abreast of the latest technology in his field or to enlarge his knowledge of any aspect of plant science.

## **THE ROLE OF EDUCATION IN GAINING RECOGNITION FOR THE PLANT PROPAGATOR**

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The first thing we must recognize is that the people we employ in the 1980's must be different from the people we employed in the 1950's or 60's. Even those of us who had advanced training and education, have learnt much of our present expertise by experience, often from the boss. We have had 20, 30, 40 years of experience.

I am impatient. When I employ someone, whether it be a gardener a clerk or a lecturer, I don't want to wait 20 years for him to get experience. I want him to be able to do the job NOW. I can hear some of you saying that there is no substitute for experience. Think of the most difficult technique that you can do. How did you learn it? My guess is that for most of you, you may have read about it somewhere and then by trial and error, by a lot of experience, you have mastered the technique. Now looking back, couldn't you teach it to someone else a lot quicker? You could tell him what he needs to know, show him the little short cuts that you can take and the ones you can't. Sure it will take experience — but less than what it took you.

That's what we want from education — to get people to a particular level in a particular type of work in a shorter time and with cost efficiency. Cost efficiency is getting the most training for the least amount of finance, and it is going to be the single most important factor in education and training institutions in 1980.

Whether we like it or not, the two most important factors in the status given by the community to any occupation is the level

of training required to enter the industry and the salary paid to those people. The low status accorded those in the nursery industry is a reflection — partly of our own attitude towards both these factors. Neither salary nor training necessarily makes a good nurseryman or plant propagator. However they are factors in attracting the best practitioners into the field and that's what we need — the best people we can get.

In the past there has been a tendency for all horticulturists to be called gardeners, and since gardening is the single most common form of recreation, the community feels anyone can be a gardener. This attitude needs to be counteracted. Within gardening there are specialized areas and propagation is one of the most specialized. With the introduction of tissue culture a new breed of technologists will be required; these people need to be highly trained and have a thorough understanding of many disciplines including pathology, microbiology and plant nutrition.

To gain recognition for the profession of propagation we need to take two very positive steps —

(a) We need to improve our public image

(b) We need to ensure that there is opportunity for adequate training

Firstly let us consider how to improve the public image of those in this field of employment. Each of us needs to have a great deal of confidence in what we do and then we must take every opportunity to let the public know what we do and that we are skilled in our tasks. How often do we hear how skilled airline pilots are? They continually use this argument to justify their salaries.

We also need to impress upon those we employ how important is a good public image. In addition to individual promotion there must be a real effort from the industry — from groups such as the I.P.P.S. How often does this Society make a news release on a new technique? It is these developments that are making a wider range of plants available to the public. This is information that the public wants to know about and it is only societies such as this that can provide the information to the news media.

You, the producers, must be prepared to put money into promotion. It is not just a question of greater sales, it is also important that the public understands what you do, how you do it, and why you do it. The public must be convinced that propagation is a profession.

The second area is the area of training. Since I will be referring to Victoria — I should outline what is available here. Within the State there is a well developed training scheme for the horticultural trades. Apprentices are indentured to employers



for four years. Normally, for the first three years, apprentices attend a trade school for 1 day a week, or for country students, they attend in blocks of one or two weeks for an equivalent period. There are two Centres — one at Oakleigh Technical School and one at Collingwood Technical College. There has been a very dramatic increase in the number of apprentices employed (Table 1).

**Table 1.** Number of persons in horticultural trade training in Victoria

Year	No of New Indentures	No Completing	No at Schooling
* 1968	31	6	24
1969	41	6	63
1970	35	10	88
1971	40	5	100
1972	63	18	144
1973	84	36	181
1974	85	29	208
1975	85	42	224
** 1976	165	69	213
1977	155	62	380
1978	259	92	570
1979	298	121	734

\* Horticultural Trade — Gardening and Turf Management

\*\* Horticultural Trades — Gardening,  
— Turf Management,  
— Landscape Construction,  
— Nurseryman

In 1976 the single trade was divided into 4 separate trades with a number of common units — and then separate units for each trade.

What we need to understand clearly is what each level of training aims to achieve. Trade training leads to a “Certificated Gardener” — these are practitioners. However their training does not include management training.

Burnley Horticultural College offers three-year full-time courses (or equivalent part-time courses) leading to the award of a “Diploma of Applied Science in Nursery Production and Management,” and a “Diploma of Applied Science” in Amenity Horticulture.” These students are trained in all aspects of management as well as receiving a thorough training in practical skills. Mr. McCure will give greater details of the actual methods used in the nursery section. The number of students enrolled is shown in Table 2. This also shows a marked increase in demand. At both the trade level and the diploma level there are currently more applicants than can be trained in the three institutions.

These two levels of training complement each other. What there is not, either in Victoria or elsewhere in Australia, is a degree course in amenity horticulture. There is a need for a

small number of highly trained technologists. Some of these will be required in industry and some will be required in research and teaching.

**Table 2.** Number of persons in diploma course at Burnley Horticultural College

Year	Total Number Enrolled
* 1956	30
1966	62
** 1967	56
1968	63
1969	66
1970	83
1971	80
1972	93
1973	98
1974	104
1975	122
1976	119
1977	113
*** 1978	136
1979	127
1980	148

\* Certificate of Competency in Horticulture

\*\* Diploma of Horticultural Science course commenced (Diploma of Horticulture course commenced in 1958)

\*\*\* Diploma of Applied Science in Amenity Horticulture

Diploma of Applied Science in Nursery Production and Management

Diploma of Applied Science in Horticultural Crop Production and Management

One of the most obvious features of the amenity horticultural industry (and in that I include all aspects of nursery production) is the lack of research. There are three reasons for this: —

- (i) There is no Australian university course in amenity horticulture and therefore little encouragement of post-graduate work
- (ii) There is no government department of horticulture. Most, like Victoria, include it with agriculture where it receives scant attention. Of the 205 Victorian Departmental Programmes only 6 refer specifically to amenity horticulture.
- (iii) The various sections of the industry are poorly organized and have few pressure points in parliaments. (This must be compared with the cattlemen and their extremely strong political voice which has resulted in their achieving very considerable research).

This lack of research has resulted in a slow rate of development of the industry; it also results in a lack of focus of attention on the industry. These are both reflected in the low status accorded horticulture.

A high standard of training and a high standard of research are often linked together. Teaching staff involved in research are kept at the frontier of knowledge. Without research, staff tend to

teach what was, rather than what is coming. Staff at tertiary institutions teaching horticulture should be involved in at least limited research. I believe my own institution suffers from a separation of teaching and research. This must affect both the students and subsequently the industry.

I believe that at least these three levels of training should be available. Because of the large numbers involved, there should be a trade training scheme in each State. This should be consistent throughout the Commonwealth. There will necessarily be differences in each State, reflecting the local horticultural plants and practices. The establishment of training at this level is essential if the industry hopes to gain recognition, otherwise it will remain with the old "gardening" image.

In considering the establishment of diploma and degree courses, careful consideration should be given to the number and type of courses. However special attention should be given to utilizing courses, subjects, and facilities of existing teaching institutions.

Finance for education is becoming more and more limited. The one advantage of this is that the various institutions are having to look very closely at their courses. They can no longer afford to ignore the wishes of industry. For this reason, any organization, such as the I.P.P.S., has no need to be fearful in approaching a training institution with suggestions for modifying courses. Indeed most institutions, but not all, notably universities, have course Advisory Boards or Committees with industry representation.

As I mentioned previously, finance for education will be limited. But it is not only in education. Politicians are no smarter than anyone else. Anyone who believes that politicians by themselves can or will sit down and determine the correct priorities for the community and will provide the finance accordingly is living in a dream world. Politicians (Federal, State and Local Government) respond to advice provided to them. If they don't get any advice, no money is provided. Horticulture has suffered from us all being absorbed by our nurseries, by our plants. We have not put enough time into supporting our organizations and preparing submissions. Unless the industry becomes more professionally organized, the industry will continue to suffer both financially and in its professional standing.

Recognition for the craft and profession of the plant propagator is important. It involves adequate financial reward for those in the industry and it involves an equitable share of government resources being directed to the industry. Education and training can and does assist in gaining this recognition. However, each of you here today have an obligation to be involved with the train-



ing institutions and with your various organizations. On the one hand you need to tell the training institution what is required and on the other you need to ensure that those institutions get the staff, the finance, and the facilities to provide it.

## **HYDRAULIC ENGINEERING RELATIVE TO PLANT PROPAGATION**

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### **1.0 INTRODUCTION**

The basic aim of an irrigation system designer is to design a system capable of applying equal and even amounts of water in a controlled fashion to every plant within the system as required by the plant.

This aim is common to every system whether large or small. Such a system allows application of the optimum water requirement to each plant, thus optimizing production. The plant or plants depending on this system are usually of high value, when taken in terms of crop loss, lack of seed germination, reduced growth or replacement of the plants. Hence there needs to be a greater appreciation of system costs in relation to possible losses incurred by poor system performance.

In the practice of plant propagation the system becomes a part of the environmental control rather than solely an irrigation system. However many of the same principles of hydraulic design apply and the requirement for correct performance becomes of even greater importance.

Engineering technology today is sufficiently advanced to enable the development and installation of some very sophisticated irrigation systems but pure theoretical knowledge is not sufficient to guarantee optimum performance of the plant or plants. The designer must be made aware of the practical requirements of the system and the problems associated with operation, installation, and interaction with other cultural operations.

The user of an irrigation system is not required to have a detailed knowledge of the irrigation componentry and of irrigation system design. The most critical task which the user performs is the specification of the system which will suit his requirements and consequently he must either communicate this to the designer or manufacturer or select the equipment which will perform his specified task.

The object of this paper is to provide guidelines in preparing