

7. Massante, H. 1963: Investigations on the effect of temperature on the stange and germination of seeds of ornamental plants. *Gartenbauwissenschaft* 28:173-197.
8. Neuray, G. 1971a: Disinfection of cyclamen seeds. *Revue Horticole Suisse* 44(10):303-306.
9. Sumitomo, A.; Kosugi, K. 1963: Studies of Cyclamen I: on germination of seed. Kagawa University. *Technical Bulletin of Faculty of Agriculture* 14:137-140.
10. Valaskova, E. 1974: The influence of different methods of soil disinfection on the germination of ornamental plant seeds. *Sbornik UTVI Zahradnictvi* 1(4)(1):71-78.
11. Wareing, P.F.; Phillips, I.J.D. 1970: The control of growth and differentiation in plants. Oxford, Pergamon: 303 pp.
12. Widmer, R.E. 1976: Environmental and chemical control of growth and flowering of *Cyclamen persicum* Mill. *Acta Horticulturae* 64:211-216.

## **AIDS TO PRODUCTION AND MARKETING IN A SMALL NURSERY**

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As plant propagators we are all practising conservation. It is in our interests to see that the conservation effort extends to a better use of our capital and labour inputs. Many small nurseries, and indeed larger enterprises, struggle with a shortage or at least an imbalance of capital and labour and the results show up in a variety of ways such as poor production or marketing volumes, or poor plant quality. Conservation means using what resources we have wisely. We need to make our operations cost-effective. We need to practice economy. If our businesses are running well we will have better opportunity to develop our propagation skills.

Although I am intensely interested and involved in ornamental plant production generally, I came into nursery work from a background in business management, economics, and accountancy. I use my previous experience to make my small nursery successful and my work enjoyable. The total labour force is equivalent to two full time labour units. We produce container grown ornamentals with an Australian plant emphasis. These plants are retailed from the property.

Firstly, I wish to emphasise that one of the basic keys to a successful nursery operation is good layout. With only two people in my nursery, good visual control is important, and this is achieved by grouping the retail area, the potting shed, and house, etc. around a central carpark. This reduces unproductive time to a minimum.

I now wish to briefly detail some major and minor nursery aids that make my nursery function well and, therefore, reduce costs. Of course these aids are not expected to be suitable for all nursery operations. For example, larger operations can obviously justify a larger range of equipment with specific capabilities.

### NURSERY TRANSPORT

(a) **Tractor.** I need a versatile basic transport unit. Eight years ago I purchased a 14 hp "Power Pony" tractor with a hydraulic front end loader. This unit tows, mows, and, thanks to the loader, shifts potting mix ingredients, loads out retailed mulching bark, and does a variety of minor earthwork functions. This tractor has a low profile and narrow wheelbase which makes it very convenient working in confined spaces and in and out of sheds and shadehouses.

(b) **Pallet system and trailer.** In my nursery I am fortunate to have a large stock of 1 m square tanalised pallets due to a fortuitous purchase some years ago. These pallets and the pallet trailer which moves them is the method I use to transport my plants. This pallet system forms the biggest single time and energy saver in the nursery. Most plants are bagged twice before reaching a saleable grade. Each pallet holds up to 100 plants, depending on the bag size. Because of the large pallet stock, I retain all plants on pallets during the initial bag size. This enables me to shift these plants promptly from the potting shed to the shade house or to stand-out areas, and eventually back to the potting shed for re-bagging. Only when plants are in their finished bag size are they lined out in a conventional nursery row. The pallet system has other advantages such as the assembly of orders. In fact, I also keep all my retail sales stock on pallets for speed of preparation. The pallet system is justifiably used simply as a transport system with a smaller stock of pallets and, of course, many nurseries do use this system.

In my small nursery I could not justify a fork-lift vehicle or even rear mounted forks on a larger tractor. Nor would such equipment suit my row spacing and shade house and shed heights. The loaded pallets are too heavy for the "Power Pony's" hydraulic system and, in any case, I did not wish to interfere with the availability of the front end loader for other work. Consequently I designed a pallet-trailer which tows behind the "Power Pony" as the cheapest and best solution.

This trailer is backed into position and the lifting and lowering device is a hand-operated 1 to 6 boat winch. In designing a pallet trailer one needs to ensure that when loaded

the point of balance is slightly forward of the trailer wheels. My trailer works very well and, provided the tractor operator is skilled at backing, can be manoeuvred quickly into spaces with minimal clearances. Incidentally, my trailer can lift a pallet to a height of 800 mm which makes it convenient when loading a truck, or as a mobile workbench.

### PREPARATION OF POTTING MIXES

For several years I relied primarily on purchasing prepared potting mixes. Although I was purchasing from reliable sources I was never convinced that this was the best arrangement. For the last year I have been preparing my own potting mixes using a concrete mixer and a simple trolley. The trolley is a set of four wheels and, by using a hand pulled rope, the mix is conveyed up a timber rail to the potting bench where the trolley tips forward, spilling its contents.

The preparation of my own potting mixes has proved very worthwhile for the following reasons:

1. After allowing for labour and overheads, mix costs have been reduced by 35%.
2. The mix is always fresh when used and the ingredients and fertilisers in it are known.
3. Special mixes such as an acid mix or an experimental mix are quickly prepared in any quantity.
4. Dry storage space and funds are not tied up in keeping several heaps of different prepared mixes.

### COMPUTER LABELLING

A recent improvement has helped considerably in providing descriptive plant labels. I have a 16K Commodore PET microcomputer and printer. Using a label programme at present loaded on cassette tape I am able to quickly provide descriptive labels in any quantity and need only hold a stock of blank computer tags. Hand writing labels is a tedious and costly job and pre-printed labels have many disadvantages relating to minimum quantities, space taking, etc. The computer prepared labels can also be priced or unpriced.

At present I have the minimum computer equipment to do the labelling job. This gives me a memory storage of 60 different descriptive labels and the facility to prepare any other label. When I can afford a disc drive input I will be able to vastly increase the number of different plant descriptions held in the library for immediate availability. The availability of a microcomputer will also give me the opportunity to perform other accountancy and record keeping functions. As an indica-

tion of possibilities read the article in the AMERICAN NURSEYMAN, 15 February 1982, by Robert West, entitled "How I Trained a Nursery Computer".

### OTHER NURSERY AIDS

Some other efficiency aids in my nursery are:

Intercommunication system between potting shed and house.

Bicycle for quick check up jobs, or maybe quick getaways!

"Richdel" automatic watering system.

Blackboard by the telephone.

Winstone 100 litre spray trailer.

Pre-emergent weed control in containers using "Ronstar", at half the suggested rate, at time of potting up.

Dumping area for waste in a convenient location.

### CONCLUSION

There are many ways in which New Zealand nurseries can be made more efficient. I have detailed some aids to production and marketing that have helped me. I hope to encourage others to observe more closely their own organisations and make improvements. Improvements need not involve large cash outlays and, in fact, by definition they should bring early cash benefits.

## INFLUENCE OF NITROGEN, PHOSPHORUS, POTASSIUM, AND LIME ON GROWTH AND FLOWERING OF POTTED CYCLAMEN

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**Abstract:** The effects of five levels of nitrogen (N), phosphorus (P), potassium (K), and lime on potted cyclamen (*Cyclamen persicum*) grown in peat/sand, 1:1 v/v were studied. Nitrogen strongly influenced most aspects of growth and flowering; it was supplied by Osmocote (26% N). Strongest corm and foliage growth occurred at 450 to 600g N m<sup>-3</sup>, while early flowering and flowers per plant were promoted at these levels, as long as added P was low. Low to medium levels of P and K appeared primarily to be required for flower quality, such as size. The plants appeared very tolerant of liming and a rate as high as 24 kg m<sup>-3</sup> was optimal for flower size (dry weight) and stalk length, when combined with very high N rates.

### INTRODUCTION

Previous studies on the nutrition of cyclamen considered (a): simple proprietary mixed or slow release fertilisers, as used by Burghardt (2), Soupcoop and Matous (8) and others or,