The Future. It is obvious that the interest in horticulture will continue for a long time into the foreseeable future. Proof that people have accepted house plants as a permanent feature inside the home can be seen by the buoyant pot plant industry.

Proof that people are staying in their own home sections more than before can be seen by the vitality of the seed and garden centre businesses.

And proof that New Zealand can produce first quality fruit, vegetables, trees, shrubs, cut flowers, mushrooms and other crops yet to come can be seen by the ever-increasing volume of horticultural exports.

The Government now is lending its support in the way of export incentives, rural bank loans plus other incentives to encourage horticultural production. Transport and marketing will be the major problems of the future but provided quality of the product is beyond question, then the world tomorrow will continue to seek our horticultural production.

The Institute of Horticulture will continue to be vigilant in meeting the training needs of the practical horticulturist for it is this person who will be called upon to "produce the goods."

NEW GROUND FOR THE PLANT PROPAGATOR

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We all appreciate the fact that ground or soil is an animate mixture. If cropped ad infinitum it gradually loses its productiveness, maybe not particularly noticeable, but it does happen in fact. Consequently, injections of fertilizers and maybe fallows are necessary to improve the nutrient status and "breathing space" or soil structure

So too, with plant propagation. Too often we go about our work as it has been done for years previous seemingly apathetic of the fact that we too are very much part of the cost-price squeeze. Maybe it would do us good to have a "fallow" — to stand back, look at ourselves and inject a new stimulus into our operation.

At this stage it would be useful for us to bear in mind the concept that an individual plant has an inherent capacity to grow, flower or fruit, which is limited by its genetical make-up.

We do not know what this limit is, because almost certainly we have never realized it. There are indications, however, that growth rates far above those normally achieved are within this genetic capability. Why do we not achieve these?

The growth, or productivity, we secure from the cultivation of our plants is the product of the plant's potential capacity modified by health, and the environment in which it grows. Plant health aside we might, therefore, think of our plant as a factory which is producing below capacity because the environment creates a disincentive for the work-force (7).

Light, moisture, nutrition, and temperature are the major factors which affect the growth rate of our crops. Our failure to achieve optimisation of these leads to the comparatively poor productivity which we actually achieve. This difference between these two is the untaken harvest of the crops' potential. In a competitive world, can we afford to neglect this harvest which may be ours for the taking?

Maybe we tend to rest on our laurels too much? A simple illustration may point to potential increases.

Let's say we are quite happily plodding along producing crop x, we are setting 1,000 cuttings of x, getting 800 to root and finally 700 for sale. Five years later, instead of 1,000, we are now initiating 10,000 cuttings. If we could improve our rooting percentage by 5% and reduce deaths between GOL potting and sale by 50%, then we could increase our numbers available for sale by 1,000 units!

Most nurseries have crops they are renowned for that they "do well." But that doesn't necessarily mean that they could not *do them better still! As I see it, there are many underutilized* management tools available to the propagator. We must be innovative enough to use these resources along with the natural ability of our labour to increase our efficiency. I put it to you that the nursery industry in New Zealand is steeped in tradition. (I say this having had seven years dealing with farmers, who are normally looked upon as the standard when it comes to conservatism.)

In my experience the traditionalism I spoke of very often leads to barriers being put up immediately a new proposal is mooted. Isn't it true that at some time you have had a good idea which has been killed, or never got off the ground because of somebody else's traditional, "but we have always done it this way and it has worked," attitude. If a new technique is put forward, then perhaps with a bit of lateral thinking we could in fact establish further uses for it. As an example, consider the growth regulator Atrinal (di-kegulac sodium). It is used extensively overseas for chemical pinching of not only *Azalea* and *Rhododen-*

dron, but also many other crops such as *Pyracantha, Euonymous,* etc. Let us take this a little further then; why not use it on our stock plants to increase the number of cuttings off a given area of land? Trials have established that cuttings from Atrinal sprayed plants root just as well as those from unsprayed stock.

Another example would be controlled slow-release fertilizers such as Nutricote and Osmocote. These are management tools in their own right — to be used in the appropriate manner. Their use in soil-less composts is virtually universal. However, I wonder how many people are using it either in the propagating medium or as a surface application to callussed cuttings as referred to in numerous trials (10). Granted, where we have, shall we say, an increase in technology we have an increase in the level of expertise required to manage that technology (e.g. tissue culture).

We had an example of this recently at Duncan and Davies when we purchased a planting machine that will plant items up to F8 size, through polythene film. With the tractor-mounted machine initial trials were an apparent disaster whilst we were learning the adjustments which had to be made to suit our requirements. After a few weeks we were planting at a higher rate per man-hour than a team of manual planters with years of experience. The resulting job was not as tidy as by hand. The rows were not quite military straight, the holes in the polythene were not neat circles; however, this did not stop the product from growing just as well!

Now to touch on *some* of the possible "new ground" I mentioned earlier.

(a) Fertilizer for the most acceptable growth rate in soil-less culture is determined in most cases by experience. Surely soil tests would be a more certain way. Levin Horticultural Research Station has developed a quick test for NPK in soil-less mediums. This will be used as a diagnostic tool — it will allow the situation to be monitored quickly, cheaply and accurately. This will enable the grower to monitor the situation and take corrective action at the critical nutrient level rather than waiting until visual symptoms become apparent. This may well require trials to establish these critical nutrient levels. To be meaningful and repeatable a trial should be laid out statistically, be given the necessary time to run its course, and we must not preconceive the results.

(b) I would predict that less and less local peat is going to be available in the medium to long term because of environmental drainage board considerations. Pine bark is, and is going to become more and more important. We will

have to understand the different management requirements of bark such as the fact that it fixes nitrogen; e.g., a trial we carried out at Duncan and Davies recently compared different sources of bark. All mixtures had our standard mix plus 900 gm/cubic metre of ammonium nitrate. The leaf analysis was carried out approximately nine months after potting. During this time no additional fertilizers were added. Table 1 shows that the composts with high proportions of bark had lower foliar N levels, suggesting fixation of nitrogen by the bark.

Table 1. Percent nitrogen in leaves

		Casuarina	× *Cupressocyparis leylandii* 'Leighton Green'
PB	100%	1 51	1 12
PB/SAND	75 25	1 63	1 11
PB/SAND	50 50	1 69	1 22
W	100%	1 44	1 07
W	75 25	1 53	1 12
W	50.50	1.72	1.14

PB = Processed Bark W = Wanganui Bark

(c) Numerous possibilities in the growth regulator field. Such things as gibberellins which have been shown to stimulate sprouting of dormant buds — this could be of use on crops such as *Cordyline* (2, 4, 8).

Ethylene producing compounds such as ethephon may stimulate root initiation on certain herbaceous material and can also be used to overcome apical dominance. Ethephon has also been shown to be of use in overcoming dormancy in some seeds.

(d) Pre-emergence herbicides for use in field and container situations. Herbicides such as oxadiazon (Ronstar) and alachlor (Lasso) have been well proven overseas (9), as being effective herbicides whilst being non phytotoxic on a wide range of ornamentals. There is an obvious labour saving factor here. Our Nursery Research Centre has shown Ronstar to be of value (NRC Annual Report 1978).

(e) In New Zealand we persist in using black polythene bags for container production. Recently published research (11) has confirmed that very high tempertures have been recorded in the root zone — as high as 49.5°C in this case. This has connotations not only from a physical protein destruction (direct burning effect) but also the fact that at these higher temperatures the rate of release of the so-called 'slow release' fertilizers is speeded up dramatically. There could well be a place here for bags

manufactured by Panda (film-black on one side, and white on the other).

Lastly, let us consider the question; will it be profitable to strive for maximum growth. To be practical there is no doubt that the law of diminishing returns will determine that it will not be profitable. However, it might well be profitable for most nurserymen to move toward the potential productive capacity by improving the environment for their plants. This may well include breaking new ground. This will come about only when we have had a close look at the whole process of plant cultivation, including those ideas we take for granted at present. Only then, with this data, will we be in a position to make the required management decisions.

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