OBSERVATIONS ON NURSERY STOCK MANAGEMENT IN NORTH AMERICA

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These observations on nursery stock management in North America were made during a visit there in September, 1986, as recipient of the Great Britain and Ireland Region's Mary Helliar Travel Scholarship award.

During the six week trip, which began in Boston, Massachusetts, and finished in Olympia, Washington State, I travelled some 7,000 miles and viewed 20 production nurseries in reasonable depth. The nurseries, of varying size and composition were selected to provide a cross section of approaches to contrast, compare, and make comment on.

COMPANY POLICIES

The product line. Generally speaking, production nurseries in the United States grow a more specialised product line than is the case in the U.K. Plants are put into production more because they are commercial than because they are choice. This is not a recent trend but appears to be a combination of tradition and company policies which reflect current market trends and production capability. A product range of 300 to 500 lines would be fairly representative of many nurseries I visited. Compare this with the trend in Britain towards greater specialisation.

Diversification into growing a wide range of plants which require markedly different growing regimes can place undue strain on production efficiency. Administration and production costs may rise as more stock plants and growing facilities are required. Labelling and stock control become more complicated and as a company diversifies marketing costs rise.

Despite these shortcomings diversification can provide a nursery with some buffer against possible shifts in market trends which can leave the more specialist grower more vulnerable.

Buying policies. Some 75 per cent of the nurseries I visited implement a buying policy and most usually this means liners and young plants bought in for growing on, often in response to shortfalls or crop failures. Many nurseries on the east coast and in the mid-west states, regularly buy in their tree whip requirements from the more specialist producers on the west coast, such as Schmidts of Oregon. Understocks and tissue culture plantlets are also commonly bought in.

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Economics and convenience are the main reasons behind buying in, though such a policy brings with it other advantages such as allowing nurseries to capitalise on stock surpluses, rather than adding to them through their own over-production. Also, where production resources may be limited, buying in selected items rather than growing them allows these resources to be put to better and more effective use.

Contract production. *This approach is perhaps more evident* in Europe than in the United States, where the use of a secondary grower producing selected items on a contract still appears to be fairly uncommon. I found this a little surprising, especially for the larger growers experiencing heavy demands on space (in particular protected space) where the use of another grower's facilities and overheads, if applied sensibly, can bring considerable advantage. In the U.K. the technique has become more widespread as more glasshouse space has become available for nursery stock following the departure by many growers from traditional salad and cut flower crops as heating costs continue to rise and competition within the EEC intensifies.

Quality and customer service. Quality of production and efficient customer service appeared to be emphasised on the nurseries I visited, even on the larger operations where a uniform and consistently good quality product may be more difficult to achieve. This positive attitude has doubtless been encouraged by the competitive market which now exist in the United States. This competition has been intensified by the recent departure of many growers from the older ball and burlap production in favour of container growing as the garden centre sector continues to expand, augmented by the greater interest currently being shown in nursery stock by the larger multiples.

Health and Safety. As in the U.K. there is an increasing awareness in the American nursery trade of the importance of sound health and safety practice. In the past standards may have been a little inconsistent, with attitudes fairly indifferent, especially to machinery and pesticides handling. But recent legislation in the United States has led to the introduction of the "Right to know" law. This has made all employers legally obliged to inform all employees of potential work hazards. Nursery staff must be briefed fully and instructed correctly in safe working practices and be provided with all the requisite protective clothing and equipment needed to operate safety. Employers now have a legal obligation to keep all staff up to date and informed fully about health and safety matters.

Forward planning. I was interested to learn how nurseries approach the forward planning of their production departments and for this purpose I devised three categories:

Short-term planning: up to 12 months ahead

Medium-term planning: up to 5 years ahead
Long-term planning: up to 10 years ahead

Most nurseries I visited did some form of short term planning such as the organisation of work schedules, allocation of labour, job planning, ordering of materials, etc.

Medium and longer term planning was not so commonplace. Of my visits, the most notable exceptions to this were Studebaker's Nursery (Ohio) whose production and marketing strategy is centered around a 5 year plan which is constantly reviewed and updated as necessary, and Monrovia Nursery Company (Oregon and California).

Monrovia is currently looking to expand its production and due to its present base in Azusa, California, being in a land-locked situation has recently considered a new and larger site (625 ha) in nearby Ventura County to replace it. The transition is to take place gradually with the minimum disruption to production and customer service. A long term plan outlining the phased approach to the move has been drawn up, which will act as a target to work to and provide a timescale so that the transfer of resources between sites is completed smoothly, on time, and with the minimum of disruption.

The Studebaker 5 year plan is a flexible framework in which to plan production and marketing. It is reviewed annually and updated as production performance or sales trends change. The nursery sets out work targets for some tasks and productivity is monitored tightly. This involves the use of a work study exercise known as "Required efficiencies" through which realistic work targets are set for measured jobs such as potting, cutting preparation, or staking and tying. A bonus is paid to staff where these targets are reached or exceeded.

A well planned approach to costings and budgeting is also evident and is based on the use of capital and revenue type systems. These are linked to projected sales and productivity figures and comprise an integral part of the 5 year plan. Each department manager receives a weekly computer print-out of their allocated labour budget and each month the production director uses a similar print-out detailing information on work performance related to budgets, then this is used to monitor financial status and work progress.

Management structures. This refers to the way responsibilities for crop production and management are divided and the criteria applied to their selection. For production to be efficient and competitive a nursery must be organised to make maximum use of the skills and resources available. An effective way of achieving this, particularly with high volume production, is to implement a departmental management system. Here, the nursery is sub-divided into sections, or mini-nurseries, with a supervisor in charge of each.

Monrovia Nursery Company is well known for its successful adoption of this approach. It has worked very effectively with its exceptionally high volume production—currently 40 million saleable units on 330 ha in Los Angeles, California, with a further 12 million in Dayton, Oregon. With this method each division supervisor is responsible for watering, pruning, spacing, stock control, weed control, lifting stock for sales, and plant protection. The advantages of departmental management are:

It encourages the grouping together of plants with similar cultural requirements, i.e. shade, nutrition, water regimes, and space, and this simplifies crop management.

Stock control becomes clearer and less complicated.

It allows the development of more specialist growing knowledge.

As a result there may be greater competence in practical skills as staff become more familiar with a specific group of plants.

It follows that plant knowledge should improve and the quality of the finished plant is likely to be of a higher standard.

Management responsibilities become more clearly defined.

Nursery staff may be encouraged to take greater pride in their respective sections, and so keep the nursery clean and tidy.

A more varied work schedule for nursery staff will tend to reduce repetition and monotony, raise morale, and perhaps lead to higher productivity.

Other nurseries using a similar approach include Iselis (Oregon) and Greenleaf (Oklahoma and Texas).

Labour and training. Obtaining consistently good labour for nursery work has never been easy. Once recruited it can be equally difficult to keep on a longer term basis and this is a problem common to many nurserymen. In this respect America experiences similar problems, being heavily reliant on migrant labour, largely unskilled, for its main workforce. Nurseries in the mid-west and on the east coast draw regularly on local Puerto-Rican (and more recently Cambodian) labour and west coast nurseries rely largely on local Mexican labour.

Some nurseryman prefer this arrangement, some do not and it has advantages as well as shortcomings. Labour is cheap and plentiful, always available and there to be used, sensibly or otherwise. It is consistent, returning each year to the same nurseries, usually between March and December. The more capable often progress to supervisory positions and often become crew leaders.

Low cost seasonal labour is particularly convenient for large scale production as much of the work is monotonous and labour intensive and—with skilled supervision—fairly straightforward. American nurseries generally grow a less diverse range of plants than in the U.K. and this to some extent simplifies matters.

The shortcomings of using unskilled staff are often overcome

by using contract labour. This is a widespread practice for seasonal work such as field budding and rootball digging, much of which continues to be done by hand. This is cheaper than employing full-time labour and is highly skilled and productive because it is so specialised. It is also there as needed and does not have to be kept occupied during quieter periods. Contract budders and diggers are most usually paid piece rate.

Despite the low cost convenience of migrant and contract labour some American nurserymen are now concerned about the apparent shortage of skilled labour available to the nursery trade. Leading growers are looking to the adoption of apprenticeship schemes and nationally co-ordinated training programmes to help remedy this. Some feel that current training is too academic and does not meet the more immediate practical needs of the trade at technician and middle management level.

TECHNICAL OBSERVATIONS

The American nursery trade, like Britain's, has witnessed continued expansion in recent years. Current valuation of the nursery stock industry in the United States stands at around $5.3 billion at wholesale prices. The contribution made by the container sector is steadily increasing as garden centres continue to expand, landscapers undertake more summer contracts, and the DIY multiples become more informed and show a greater commitment. In the U.K. it is estimated that the nursery trade handles around 120 million containers a year and American production is currently put at 15 times that in volume.

Technical aspects of production remain quite basic though. Generally, propagation systems are less sophisticated than those found in Europe where, perhaps, more difficult-to-root plants are grown. Conventional mist systems appear standard throughout American nurseries and direct sticking is used only to a limited extent though this may change as cell systems become more affordable. Polythene standing bases with overhead irrigation are the main growing regime and capillary beds with low level system appear uncommon. American product lines are generally less diverse and these simpler systems appear to meet most present needs. Surprisingly, many growers did not appear familiar with the capillary bed system or its benefits and those that were had been discouraged by the higher capital costs involved. Rigid containers with side slits or mesh bases assist greatly with drainage as do the fairly high levels of bark (30 to 60 per cent) used in some mixes.

As in the U.K., rigid containers appear to have almost completely replaced polythene bags and largely for the same reasons: ease of handling, appearance, and customer acceptance.

Composts. Composted bark, peat, and sand are the main bulk

ingredients; the inclusion of bark varied from levels of 20 to 60 per cent. Many growers include hardwood bark in their mixes, either instead of, or in addition to, softwood bark. For some nurserymen the former is more readily available and so with lower shipping costs is cheaper. It is also thought to contain some micro elements and to contain certain pathogens believed to control, to some extent, phytophthora.

It decomposes much faster than softwood bark, probably because of its higher cellulose levels. This can result in considerable volume loss and the ideal balance probably lies in combining the two types in the mix. Generally a much coarser grade of bark is used than in the U.K. and mixes appear to be either very open with high porosity or quite heavy with a poor air:water balance.

Monrovia and Princeton nurseries incorporate pasteurised loam into their mixes to provide some buffer against extremes of pH, moisture, and salt levels.

Osmocote continues to be the main controlled-release fertiliser used though surprisingly few nurseries incorporate this at the mixing stage, preferring to add the Osmocote as a top dressing after potting. Reasons for this are:

Long standing periods which may lead to damaging salt levels through build up of high compost temperatures.

Mixing gear remains somewhat basic, resulting in physical damage to the resin coats.

Inadequate mixing facilities leading to mixes which are not uniform.

A technique known as "dibbling" may help overcome these problems. This involves placement of the fertiliser granules immediately beneath the rootball at potting as opposed to the current practice of applying Osmocote as a top dressing. This approach minimises high salt levels, avoids uneven distribution, and allows fertiliser to be placed in the immediate vicinity of the root and is available as required. It appears to have potential, though application rates must be accurate to avoid root scorch problems.

Stock plants. Few nurseries appear to use selected stock plants as a source of propagation material, electing instead to obtain it from saleable or growing stock on the nursery. This appears to meet most needs and the costs involved with stock plant management coupled with land inevitably tied up has so far discouraged the widespread use of stock plants.

Direct sticking. Not widely adopted so far and of the major nurseries I visited, only Briggs Nursery, Olympia, Washington was showing any commitment to the technique, currently producing some 150,000 pots each year, mainly 4 litre, using 3 cuttings per pot. If the limiting factors of extra space and propagation material can be overcome then for the easy-to-root items, direct sticking does confer considerable savings in time and labour input. To a certain

extent there exists a transfer of labour input with direct sticking from the potting stage to the propagation stage. It is ideally suited to the easy-rooting, quick-growing, cheaper items such as *Ribes, Forsythia, Philadelphus, Potentilla, Euonymus, Hypericum,* and *Spiraea,* so the range of plants grown is also a determining factor in whether this approach is pursued.

At Briggs Nursery the direct sticking method has been refined well to minimise handling and labour. Pots are filled with compost on a potting machine with cuttings being inserted as pots come off the conveyor. This is done centrally in one shed and all materials are close to hand. Cuttings are made expediently using secateurs to prepare only best quality material. Basal leaves are not usually removed. Prepared material is set down in unheated single span polythene tunnels and overhead spray-lines maintain the required humidity. Mainstream sticking is done in June and July and rooted material is grown on to produce strong, well-rooted plants for over-wintering. The following spring plants are trimmed to get good basal branching and sold later that year.

Cell systems. Some American nurseries, usually the more specialist, are moving over to using cell or plug systems for propagation. In addition to minimising transplant stress, cell systems can provide savings in time, handling, and labour. Ground cover and herbaceous specialists in particular are looking to cell systems where automatic box filling and direct seeding equipment expediate work still further.

Cell systems, though initially aimed at the bedding plant sector, have developed quite rapidly in the United States and it has been estimated that over 1.5 billion cells are produced each year. Nutrition, irrigation, humidity, and seed quality are the most critical aspects of successful production. Fog systems have been found to provide a constant and even humidity needed for seed germination and rooting leafy cuttings. Waterlogging and leaching are also avoided. High seed germination and good rooting performance are essential for efficient use of cell systems. Seed and cuttings, therefore, should be of the best quality.

Tissue Culture. The use of tissue culture for propagating woody ornamentals continues to be a growth area of the nursery trade. Of the 10 larger nurseries I visited, 5 had installed their own tissue culture laboratories and each gave similar reasons for doing so:

It allows the propagation of disease-free material.

It is a rapid propagation technique useful for bulking up new introductions, choice plant material, and in maintaining stocks for which there is a consistently heavy demand.

It offers an alternative means of propagating difficult-to-root woody ornamentals such as *Rhododendron, Kalmia,* and *Betula.*

Plants propagated by tissue culture demonstrate good growth

habits, with basal branching, producing well-shaped plants because of the shorter internode length.

It obviates suckering and incompatibility problems associated with traditional grafting techniques.

It is quicker.

Nurserymen also expressed the same reservations—largely economic—as tissue culture continues to be an expensive propagation method, with high capital and running costs.

The range of plants produced in this way were similar throughout and included some difficult-to-root woody ornamentals such as *Rhododendron, Syringa, Pieris, Stewartia* and *Fothergilla;* new introductions being bulked up and, usually in response to heavy demand, plants which require rapid propagation.

Briggs Nursery, which has largely pioneered tissue culture of woody ornamentals, interprets the technique as a tool of propagation. It is dependable, predictable, and unlike more conventional methods, is not subject to the vagaries of climate and season. It gives the nurseryman the benefit of all year round propagation in a sterile and controlled environment.

Monrovia estimates that at present it is breaking even with costs on tissue culture so contract growing arrangements are favoured to streamline production and give smoother cash flow. The need to consider costings critically before placing a plant into production was emphasised throughout and, for commodity items, a multiplication rate of 1 × 10 may be the minimum acceptable for propagation to be economic in this way.

Successful weaning of tissue-cultured material requires great care and attention as, unlike conventional cuttings, plantlets possess thinner cuticles and stomata, and have underdeveloped root systems. At this stage they are especially sensitive to moisture and temperature extremes.

Apical meristems (shoot tips) are thought to provide the best explants, being genetically uniform and less likely to produce off-types than other cultures.

For the future the financial aspects will, I suspect, continue to provoke most concern. Because of the high costs involved tissue culture is likely to continue for the present, at least, as an alternative to conventional methods, as opposed to replacement.