

B.C. nursery trade as it offers a very viable alternative for junipers in cold localities. Hardy to U.S.D.A. Zone 2 (possibly 1).

The clone chosen for the P.I.S.B.G. program came from material sent by Royal Botanic Garden in Edinburgh. It will not be given a cultivar name unless it is sufficiently distinct from current material available.

It has a low, spreading habit attaining a width of 3 to 4 metres. During the summer the attractive fern-like foliage is bright green while during the winter it attains a coppery-brown colour.

It readily roots from cuttings taken from August to January. During the preparation of the cuttings 2.5 cm of the previous year's wood should be retained at the base of the cuttings. Rooting is improved with 0.8% I.B.A. in talc or a liquid preparation.

LITERATURE CITED

1. Macdonald, A.B. 1983. British Columbia establishes new plant introduction program. *Amer. Nurs.* 158(6):45-49.
2. Taylor, R.L. 1984. University of British Columbia Botanical Garden Plant Introduction Scheme — an opportunity for a new relationship between nurseries and the public garden. *Proc. Inter. Plant Prop. Soc.* 34:121-125.

HANDLE WITH CARE

ANDY HEWSON

Hillier Nurseries Ltd.
Ampfield House, Ampfield
Romsey, Hants

The object of my paper is to relate my observations concerning the materials handling and work organisation aspects of plant propagation.

We may naturally think of materials handling and mechanisation in connection with field and container production of hardy nursery stock. In the context of plant propagation these aspects are often considered less important than subjects such as propagation environments, improving the rootability of our cuttings, fogging or mist systems, treatment of cuttings, rooting media, or direct sticking. Perhaps I could suggest that materials handling and work organisation are equally important if we are to make maximum use of our expensive propagation facilities and our labour resources. At the moment labour costs represent in the region of 25 to 30 pence in every

pound worth of stock leaving the nursery gate.

Adequate forward planning together with careful attention to work organisation and handling aspects will result in smoother work flow reducing delays due to bottlenecks and double handling. This will increase work output while reducing labour and materials input movement adds only to the cost of your production and will not increase the value of your stock.

To set the scene here are a few facts:

The British nursery stock industry handles over 100 million containers per year.

In a work study exercise conducted on one nursery it was found that in order to grow a plant taking two years to reach saleable size, the cutting or plant was handled 95 times. By studying work methods, physical energy can be conserved and wastage reduced. Some examples of this are the carefully thought through bench layouts for potting and preparation of cuttings, the siting of materials to reduce travelling distances, and avoiding running with empty pallets in addition to the use of pallet systems to move large numbers of plants or heavy materials.

To illustrate these points I would like to look at a typical everyday work situation common to many nurseries whether they produce nursery stock, pot or bedding plants, or even vegetable transplants.

For example, take the small scale potting operation of placing rooted cuttings taken from trays into small liner pots. Firstly, it is essential that adequate forward planning is made to ensure that the operation runs smoothly and efficiently. This is done by identifying the objectives of the task. What are we trying to achieve? What is the timescale for the job? How many liners are to be potted? When do we intend to start? How does the task fit in with the other work in the propagation calendar?

During the planning operation it is essential to identify the priorities. For instance, which crops, if any, should be handled first, deciduous items before evergreens and some deciduous subjects before others? Some items may be required for sale before others. Assess how many plants are to be potted, the time available, and from this estimate the labor requirement employing sensible working targets. I will illustrate this by the following example:

- Production figure- 200,000 liners
- Liners ready for potting April 1st and the work must be completed work by May 1st. This is 22 working days.

$200,000 \div 22 \text{ days} = \text{daily potting requirement of } 9090 \text{ pots.}$

— A realistic potting target per person per hour is 400 pots.

$9090 \div 400 = 23$ man-hours required each day in order to complete the potting of 200,000 liners by May 1st.

Having set the objectives and identified the priorities, I now structure the approach to achieve the potting target. It may be decided to employ three full time staff, each for eight hours per day, or perhaps, alternatively, six part time staff in 4-hour shifts. The latter I would suggest is more effective, particularly with repetitive and monotonous work of this type. People working for 8-hour shifts will tend to work with peaks and troughs, probably with a less than acceptable output at the end of the day. Choose staff carefully, set targets, monitor regularly, and consider piece rate payments.

Analyse the structure of the job and where possible, break it down into its component parts, viz:

- (i) Preparation of rooted cuttings for potting, knocking out and grading.
- (ii) Transport to the potting area
- (iii) Potting, counting, labelling, and checking.
- (iv) Transport to growing area.
- (v) Standing down the potted plants.

It will be observed that every component part involves plant or materials handling to a greater or lesser degree. Much of this will occur at stage iii. It is here with careful planning most of the savings in time and labour can be made.

Consider the work place layout: The positioning of benches, roller conveyor, pallets, compost, access points, trays, pots, and plants all will require careful forethought. Use scale drawings in order to plan a smooth operation well in advance of the task. This will save valuable time later on.

People who are comfortable and relaxed in their work will be more efficient and operate more effectively, therefore one must provide adequate heating and light.

It will be observed that in order to reach the work potting target in the example given earlier, 23 man-hours potting must be achieved each day. This implies that uninterrupted potting must take place. To achieve this a person should be employed in order to supply the potters with all necessary materials. It then becomes the sole responsibility of that person to ensure that workers are continuously supplied with pots, plants, compost and labels. This principle should also be applied to other

nursery operations such as the preparation and handling of cuttings and bench grafting.

One should consider the use of mobile potting benches for the "in situ" handling of plants. These can be easily constructed from conventional trailers and they make the system far more flexible, reducing overall handling considerably. They are especially useful where plants are to be returned to the same standing ground area from where they were taken.

Careful thought should be given to the selection of containers for handling. Pots should fit snugly into tray systems with the minimum amount of wasted space. Similarly trays should be fitted neatly onto trailers or pallet systems where these are used. Trailer specification is important. For example, the height for ease of loading and offloading and the length and width for maximum carrying capacity bearing in mind maneuverability. Tiered trailers present another option to raise carrying capacity still further.

The benefits of a good handling system will be eroded if access around the nursery is poor. Routes should be as direct as possible and the road surface even and solid. Concrete roadways initially represent a high capital outlay but in the long term will save money. It makes sense to plan well ahead and allocate a proportion of the capital budget to the purpose, perhaps constructing a section each year in order to spread the cost.

I have discussed at length materials handling and work organisation but I think we should consider also the handling of people. This is an aspect of which we are not perhaps the best exponents.

Good labor management requires time and effort. It is easy to become caught up in the sophistication of the latest propagation techniques and the more technical aspects of our work at the expense of neglecting people. Impressions from my own limited experience lead me to consider that the motivation and welfare of our staff is something we need to think more about. Do you express an interest in people's welfare, work conditions, training, and safety. Are you a good listener? A little thought goes a long way and a reliable staff will respond to being thoughtfully considered. Labour is not a low cost component of the production budget so it is our own interest to make the most of what we have.