

It seems that almost all cuttings will root satisfactorily with this method and we have had good success with *Hamamelis*, *Prunus*, *Viburnum*, *Cornus* and *Magnolia* species. After four years of production we can recommend sub-irrigation as certainly being the most reliable way to root white lilacs.

PROPAGATION OF NAMED DELPHINIUM CULTIVARS

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In *Plant Propagation: Principles and Practices*, 2nd ed., Hartmann and Kester say that "Delphiniums can be propagated easily by softwood cuttings taken in the spring." Unfortunately, they omit to say how. After struggling for five years with a variety of techniques, we finally came up with a system which is a combination of several ideas gleaned from the *Journal of Delphinium Society*.

Stock plants are dug out of the fields in the fall and all leaf and stem remains cleaned off. They are packed in wooden crates with slightly moistened shingle-tow around their roots and crowns, leaving their tops exposed. The crates are stored at 36°F and brought into a cool greenhouse in mid-January to promote new growth. The greenhouse night temperature is set at 45°F and the house is well ventilated on sunny days to prevent the shoots from becoming too soft. They are left in the shingle-tow to facilitate easy removal of the cuttings. Shoots appear in about two weeks and the first cuttings are ready for removal by mid-February. We usually take just the sturdiest shoots for they produce the most vigorous plants in the shortest time. The stock plants are either put back in the crates to get more cuttings, or are potted into 2 qt. pots using a peat-sand-vermiculite mix. When they have recovered, these plants are sold at our sales center with 2 to 3 vigorous shoots.

Cuttings are taken with a very sharp, pointed knife. It is essential to remove the cutting exactly at the interface of the old stem and the new shoot. This point can be identified by the swollen area at the base of the new shoot. If any part of the old stem is attached to the cutting it should be trimmed off for it will cause the cutting to rot. If the cut is made above the swollen area it will expose soft, pithy tissue or even the hollow area in the stem; this also causes rotting and removes buds which normally develop at the base of each stem.

To increase cultivars quickly we sacrifice stock plants and

take every available shoot. Sometimes these shoots are only $\frac{1}{2}$ inch long and $\frac{1}{4}$ inch across at the base. Although they take longer to root, they will produce 1 or 2 vigorous shoots for propagation during the first growing season.

The cuttings are stuck in moistened #2 vermiculite in plastic flats previously rinsed with LF-10. We have found it unnecessary to use any rooting compounds. The flats are set in water to a depth of $\frac{1}{4}$ - $\frac{1}{2}$ inches, on benches lined with polyethylene. This procedure keeps the vermiculite constantly moist (but not too wet). We are trying to eliminate this last step by using slow-release water in the form of Viterra-2 Hydrogel mixed with vermiculite. Fifty cuttings are stuck in an 11 by 22 in. flat just deep enough so that they stand upright and the flats are covered with newspaper for 10 days to prevent wilting from the bright winter sun.

The cuttings are checked daily for fungal infections, especially black-rot which is caused by *Rhizoctonia*. Immediate removal of diseased cuttings is essential. Shoots that rot are usually ones that were infected or damaged before insertion. Fungicidal drenches have not helped to prevent or cure this problem.

The first roots appear in about 21 days. At this time the water level in the benches is allowed to drop gradually through pin-holes in the plastic until the flats are no longer standing in water. After this the flats have to be checked daily for watering. When the roots are 2 to 3 in. long they are ready for potting into a peat-sand-vermiculite mix in 3 in. peat pots. They are well watered and covered with newspaper for a week to reduce wilting. Their growing points are pinched out as soon as the shoots develop to inhibit flowering of the primary shoot and to induce development of basal buds.

Nine weeks after striking, the cuttings will have rooted through the peat pots and usually have 3 to 4 shoots emerging from below soil level. At this stage they are either sold by mail-order or planted in the field as stock plants. They are planted with a mechanical planter of our own design and during the summer months are kept well fertilized, watered and sprayed. The tall flower spikes are tied up to a single string to prevent them from snapping off at the base in strong winds. We encourage flowering of stock plants to ascertain if they are true to cultivar name and also to inhibit the flowering of basal buds. The basal buds develop in the fall and provide us with propagation material for the following year.

Why is it necessary to propagate delphiniums by cuttings? There are over 120 named cultivars currently available in England; they are superior in every way to seed strains although

they are still not as perennial as we would like them to be in the hot humid eastern climate. However, I have had some in my own garden for five years so, with care, longevity can be induced. In the future there will be both red and yellow flowered delphiniums available; the best of these will have to be propagated by cuttings in order to maintain true stock.

PROPAGATION OF PERENNIALS USING KYES-KUBES

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In my talk I hope to show how we, at Spring Hill Nursery, use Kyes Kubes to advantage in the propagation of quality perennials for mail order shipment. The process of producing perennials with Kyes Kubes is not difficult and increases profits through reduced labor costs.

The K-4 Kyes Kube is a blend of natural peat moss with minor trace elements, wetting agent and starter fertilizer. It measures approximately 1 $\frac{3}{4}$ inches in diameter and 2 inches in height with a prepunched hole of $\frac{1}{4}$ in. diameter and $\frac{1}{2}$ in. deep.

We start by setting out the desired number of Kyes Kubes to be seeded and then water them in. During the process of watering we inject Banrot at 200 ppm. to kill any soil-born diseases; wetting agent is added to speed up the process. It normally takes 3 hours to water in 10,000 kubes. To fill in void areas between the kubes and aid in expanding root growth we peat down the kubes with Canadian peat so that the kubes have approximately $\frac{1}{4}$ inch of peat between them. The kubes are again watered to wet the peat and wash it down between the kubes, followed by a quick run over each flat with a pencil to repunch any filled holes.

The flats are now ready for seeding. We need basically two tools for seeding; a water fountain cup and pencil. Twice a year, winter and summer, we test our seed for viability and germination percentage. Depending on the perennial species and germination test results we decide how many seeds will be dropped into each kube. Normally 2 or 3 seeds are planted. The seeds are then covered with #4 vermiculite; normally the rule of thumb we use is to cover to a depth of $\frac{1}{2}$ the size of the seed. Exceptions are that we do not cover *Campanula* 'Blue Chip' or 'Crimson Coralbells'.