

VOICE: What is your method of propagating *Populus tremuloides*?

BRUCE McTAVISH: We have had little success with seed propagation — but I know some people do. You have to collect the seed in the exact maturity stage — 3 or 4 days either way will not do. We use root division very successfully. Or we use sprouts from root pieces over bottom heat for cuttings — and these will root. Under our weather conditions *P. tremuloides* is very susceptible to a leaf blight. Young plants set out-of-doors soon defoliate and die.

VOICE: We have had good success with softwood cuttings of *P. tremuloides*, taken in early spring from trees at 8000 ft. Also from our 1 and 5 gal. containers plants. Take cuttings when new growth is 6 to 8 in long and slightly hardened.

PROPAGATING CEANOTHUS

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Ceanothus, the wild lilacs, are horticulturally among the most interesting and popular of western North American native plants. At least half the 40-odd western species and many hybrids have been cultivated during the past century. Yet they are regarded to this day as cranky and unpredictable by nurseryman and gardener alike. I would like to consider this group from a propagator's viewpoint, perhaps separating some myth from fact while describing how several nursery friends and I deal with the problems we encounter¹. We will briefly review three alternative methods of propagation, each with unique problems and applications.

Cuttings. The overwhelming majority of *Ceanothus* in commerce are propagated by cuttings. This is not only because most have shown themselves amenable to cutting techniques but they also exhibit enormous genetic diversity in the traits for which they are valued most — such ornamental features as plant size and shape, abundance and color of flowers, and disease resistance — making clonal selection and perpetuation nearly a must.

Botanists divide the genus *Ceanothus* into two subgenera, *Cerastes* and *Euceanothus*, and we are finding this subdivision an increasingly useful predictive tool when we encounter unfamiliar species or hybrids. Most of the *Cerastes* species, including *Ceanothus gloriosus* (Pt. Reyes ceanothus), *C. cuneatus* (buckbrush) and *C. prostratus* (squaw carpet), are recognized easily by opposite (paired) leaves. The branches of most members of this group mature or "harden" quickly even under nursery conditions (two popular selections of *C. gloriosus* being striking exceptions). Thus they tend to require stronger rooting hormones and longer periods on the bench for successful rooting than those of *Euceanothus*. However, they are also tougher, and the relatively thick, hard leaves last well, permitting them more bench time without deterioration.

Members of *Euceanothus* include most of the species and hybrids familiar to Californians and are identified most easily by their alternate ("normal") leaf arrangement. Their branches generally mature more slowly than the last, remaining in a relatively soft, active state both over time and in distance along each branch. Though most are classed as evergreen, the individual leaves generally last less — sometimes much less — than a season and may drop suddenly, even while apparently healthy, in response to such stresses as fluctuations in temperature or moisture and even (as nearly as I can discern) rooting hormones. Cuttings made from young, vigorous shoots often root quite rapidly with mild hormone concentrations, yet there is always an implicit race for time between rooting and deterioration, expressed in yellowing leaves and browning stems.

We have learned through experience some general do's and don'ts applicable to both categories, as well as some areas of latitude. For the evergreen species and hybrids, the time of year seems to be less crucial than the condition of the cutting stock, if (and this is important) moderate temperatures can be maintained in the propagating facility. Nursery plants grow and are "cuttable" almost continuously, while those in the wild respond to cycles of moisture and drought. We tend our stock plants carefully, keeping them well fertilized and watered and doing preventive fungicidal applications well in advance of cutting. We have also learned to avoid marginal material, regardless of need: cuttings from plants under obvious drought or other stress usually decline slowly and die, while even apparently healthy material from plants affected by fungus leaf spotting or twig blights can be lost overnight, in spite of disinfective treatment.

In selecting shoots for the actual cuttings, we avoid those that are thick and pithy, which are prone to quick collapse,

and opt for more slender ones (say, 1/8-in. or less). We prefer shoots in current or just-completed growth, long enough to permit a firm basal node, heel or otherwise (again insurance against collapse in the early stages), and at least three, preferably more, leafy nodes above the medium (the extra productive and storage area seems to help prevent the slow decline which often plagues *Ceanothus* cuttings).

We remove soft tips from the main shoots, partly to avoid immediate wilting, but even more to prevent the sort of rapid growth which can make it impossible to transfer even well-rooted cuttings out of the greenhouse without collapse. I should add that the alternative of short, soft tip cuttings can yield quick, spectacular success with such species as *C. griseus*, *C. thyrsiflorus*, and *C. impressus* and their hybrids, though without near-perfect propagating conditions overnight disaster is more likely.

A further step, where possible, is removal of incipient flower-cluster buds; when the flower clusters fade and die, *Botrytis* often attacks — first the dead flowers then the live stems and leaves. The cuttings are finished in the normal manner, except that in many cases the lower leaves or branchlets must be cut, rather than stripped from the stems, given the tough, fibrous nature of the tissues.

I strongly recommend a fungicidal dip (we combine Benlate and Subdue) with one of the plastic resin-type stickers, allowed to dry on the cuttings before they are hormone-treated and stuck; this helps avoid the “mysterious” disease problems for which *Ceanothus* cuttings are noted.

Our hormone treatments are generally moderate, ranging from nothing, or perhaps 0.1% IBA, with the small tips mentioned above, to 0.5% or more IBA/NAA on really “hard” cuttings out of the wild, particularly of *Cerastes* types. There is evidently an absorption problem, too, with hard cuttings, because use of one of the alcohol-based dips to which we have added about 20% (by volume) DMSO yields spectacular improvement in rooting; it also avoids basal “scorch,” which often destroys the basal node and can kill the cutting.

There are two points worth making on the “sticking” stage. We give the cuttings what would be an extravagant amount of space for most items. However, this pays off in limiting the spread of any diseases which may crop up in the flats. The medium is negotiable but must be well-drained; ours is roughly 80% medium perlite, 20% screened peat.

We consider misting, more with *Ceanothus* than with most plants, a necessary evil. Frequent or heavy misting or too long a period on the mist bench almost invariably results in prob-

lems with fungal and bacterial disease. Thus we reduce misting needs by maintaining moderate temperatures and some shading and wean our cuttings to dry/shady bench conditions as rapidly as possible (generally when callused). Bottom heat of 65 to 75°F speeds rooting dramatically for most species, but we find it causes rapid deterioration on *C. prostratus*, *C. Purpureus*, and some other *Cerastes* types if applied before callus forms. Once the cuttings are at least callused, we find light but regular fertilizing to be of considerable assistance in completing the rooting process. From this point on, they may be handled like most common shrubs; in fact, after a two- or three-stage hardening process, we plant most of our *Ceanothus* directly into one-gallon containers.

Layering. It seems odd to discuss layering as a propagating technique for shrubs. However, some matting *Ceanothus* species, such as *C. prostratus* in *Cerastes*, and *C. diversifolius* (pine mat) in *Euceanothus*, root where the nodes touch the ground. These may be carved into chunks of a few branchlets each and replanted separately. This method is easy and quick, especially with container-growth stock, though not as productive numerically as cuttings.

Seeding. For purposes of natural revegetation and large-scale ground cover, seeding is a useful and relatively inexpensive technique, even for *Ceanothus*. Since I am growing only clonal selections, I will be speaking mostly of others' experience². The first problem encountered is collecting the seed. These plants have explosive seed capsules capable of flinging their contents several feet in all directions. This presents us with two alternatives: Pluck the small, clustered capsules when they are just ripe — reddish to tan in color, but not dried, and the seeds brown to black. Or sweep the fallen seeds and assorted debris from beneath the plants and separate them by screening, winnowing, and perhaps flotation.

At sowing time (which can be any time for the southern coastal species, probably fall for northern and montane species), steps must be taken to make the hard, dense seed coats more permeable to water. Immersing them in nearly (not quite) boiling water and allowing the mixture to cool and stand at least overnight will get them imbibing water and aid germination considerably. Seeds of such northern and mon-

¹ I especially thank Gerd Schneider, of Gerd Schneider Nursery, and Harry Marken, of Leonard Coates Nurseries, for the information they have shared over the years on these and other "difficult" native subjects.

² Harry Marken has supplied data from many years' seedling experience with eight *Ceanothus* to which I have added my own field experience and general techniques for seeding "touchy" shrubs.

tane species as *C. prostratus* and *C. sanguineus* are further assisted by stratifying in moist perlite or other porous medium at normal refrigerator temperatures (35 to 45°F) for a couple of months.

The seeding medium must be fast-draining (ours is about 50% medium perlite), and I would recommend mixing in Truban or another Terrazole compound at the recommended rate to avoid damping-off. Germination times will vary widely among species. From the point of germination on, except for quick remedy of whatever fungus problems may develop, the seedlings are handled like those of most common fibrous-rooted shrubs.

VOICE: What rooting medium do you use for your *Ceanothus* cuttings?

MICHAEL SMITH: We use the same rooting medium for everything — 80% medium grade perlite and 20% screened Canadian sphagnum peat.

VOICE: Have you been able to root *Ceanothus cordulatus* or *C. velutinus* cuttings?

MICHAEL SMITH: I have tried but never rooted either one satisfactorily. I have rooted a related species, *C. incanus*; these rooted rather well. *C. prostratus* cuttings do not root well, either under mist or with bottom heat. Just place them on a shady, cool bench and finally a good percentage will root.

PHIL BARKER: What size screen do you use for your peat moss, and are there different kinds of Canadian peat moss?

MICHAEL SMITH: In central California we have to use whatever we can get. Some brands are excellent and some are filled with all kinds of foreign material. We use a ¼ in. mesh for the screening.

VOICE: Do you find your peat moss to be free of diseases?

MICHAEL SMITH: We do not trace any diseases to the peat moss but we do get weed problems from it. Pearlwort comes from some batches of peat moss — also bittercress. We use less and less peat moss — due to the cost and the labor of screening it. We now substitute for the peat our regular canning mix — aged and sprinkled redwood sawdust plus some dolomite lime.