Propagating *Arctostaphylos* and *Ceanothus*©

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Arctostaphylos (the manzanitas) and *Ceanothus* (the blueblossoms, or wild lilacs) are two unrelated genera of extremely showy shrubs, both highly developed in California. They have dominated native plant horticulture in California for several decades, though traditionally only a handful of species in each genus have been widely used. Now, with a major resurgence of interest in California natives for private gardens, commercial and public landscapes, the list has expanded to several dozen species and their hybrids. This makes it imperative for those of us growing them in large numbers to find reliable ways to propagate them and to minimize the number of different custom regimes used. In this, their reputation as difficult subjects far exceeds the reality.

THE SETTING

Suncrest Nurseries currently grows about 30 species and cultivars of *Arctostaphylos* and nearly as many *Ceanothus* in containers. Nearly all, including species material from the wild, are selected clones propagated by stem cuttings. Our setting is fairly typical of California's Central Coast and quite distinct from that of the interior hills and valleys of California. Both summer highs and winter lows are normally limited by the ocean's influence, which includes many foggy mornings and evenings. Ambient humidity is generally high. This permits us to grow a wide range of both coastal and interior natives, though it often encourages nonseasonal growth, delayed maturity of shoots, and other challenging behavior in the nursery crops we normally use as stock material. Use of stock plantings in open ground has been limited both by lack of space and by the poor performance of cuttings from mature plants of some species. Other challenges, as well as opportunities, are presented by features of the plants themselves. In general, the larger, sturdier shrubs and small trees in both genera are the more difficult to propagate by cuttings, with tissues maturing more rapidly and entering a relatively inactive state. The lower, and particularly the prostrate, shrubs, like *A. uva-ursi* and *C. gloriosus*, tend to produce lush growth that may root as it travels, even in nature, and is often easily rooted. In a similar way, coastal species and their hybrids tend to be significantly more active, over longer periods — and easier to propagate — than those of the drier interior.

EARLY EFFORTS

Our original approach was derived from work at the old Leonard Coates Nurseries, on the same site in Watsonville. All selections of both genera were propagated during the early 1990s in closed, moderately shaded greenhouses, on benches with moderate (usually around 70 °F) bottom heat. We relied on ambient humidity, augmented by evaporation from the gravel floors of the greenhouses, to avoid dehydration of the cuttings. Supplemental misting was tried at various times, with mostly poor results — notably a major increase in *Botrytis* and both fungal and bacterial leaf spot diseases.

We learned very early that the condition of both the source material and the cuttings themselves were far more critical for these plants than for many common shrubs. Plants in the field must be exceptionally clean and free of all disease (even relatively innocent-looking leaf spots, particularly on certain *Arctostaphylos* species, expand quickly under greenhouse conditions to consume whole crops). Only the current season's shoots were (and are) used, and they must be in a visibly strong, vigorous state. The portions used, both of side shoot and near the shoot tips, were just matured, having fully expanded leaves and physically hardening at the point of the prospective cutting base. Softer material was occasionally successful with certain species, particularly of *Ceanothus*, but the base nodes of the cuttings often shriveled, leading to slow decline and death of the cuttings. Achieving the proper state generally required waiting until at least mid-October to begin propagation of most *Ceanothus* species and hybrids, and still later for most *Arctostaphylos*, with individual clones spread over as much as 4 months' time. One significant result of this maturation schedule was that we were limited in most cases to one crop per year, except where it proved possible to hold portions of cutting crops in flats for extended periods (results of these attempts have been very mixed, with some species visibly declining month by month).

Cuttings were otherwise fairly typical of shrubby cuttings, at least for us. Most consisted of 6–8 nodes, the lower two stripped for insertion and the upper 4–6 leaves left intact. Size was proportional to that of the plants themselves, varying from as little as 2 inches for the smallest kinds (*C. foliosus* is a good example) to around 6 inches for the largest, like *A. manzanita*. The cutting medium, consisting of coarse perlite and screened sphagnum peat moss (9 : 1, v/v), was also standard, as were the containers, originally wooden 14-inch × 22-inch flats and later polyethylene 17-inch × 18-inch "California propagation flats." We found that only moderate rooting hormones were generally required and settled on Hormex #8 rooting powder (0.8% IBA in a fine talc base). Dilutions (1 : 3 and 1 : 2) of Dip'N Grow® liquid (initially 1.0% IBA and 0.5% NAA in an alcohol base) in water were used for some of the larger, more quickly maturing and physically "harder" *Arctostaphylos*.

Results of this set of techniques were mixed but generally acceptable, with rooting percentages usually ranging from a low of 50% for the most difficult species (occasional crop failures excepted) to 100%. Rooting times generally varied from 2 to 4 months, with many *Ceanothus* rooting both more quickly and more evenly than their *Arctostaphylos* counterparts. However, we noted several recurrent problems that seemed related to the greenhouse setting itself. Some *Arctostaphylos* — particularly those with hairy stems and/or leaves, like *A. edmundsii* — frequently developed *Botrytis* and other fungal blights that spread quickly in the propagation flats. Others at times showed the basal shriveling and slow decline described above for insufficiently mature material. A frequent problem with several *Ceanothus*, particularly *C. impressus* and its hybrids, was premature senescence, yellowing and dropping of leaves, followed by gradual decline of the whole cutting, even after callusing or root initiation had begun and with all portions of the stems apparently healthy. This seemed to be a stress reaction, aggravated by extended bouts of late warm weather. Finally — and particularly a problem with certain *Arctostaphylos*, like *A. uva-ursi* — extended warm temperatures also encouraged initiation of rapid growth before cuttings were adequately rooted, leading to losses either when they were removed from the greenhouses for "hardening" or immediately after potting.

NEW DIRECTIONS

Solving several of the problems just described combined a bit of logic with some retrograde technology. Most species of both *Arctostaphylos* and *Ceanothus* flower, initiate new growth, during cool weather — anytime from December to March for lowland species and as late as June or July for those of the higher mountains. Thus it seemed reasonable to suppose that rooting might occur under cool conditions. We began around 1995 to experiment with placing cutting flats on unheated benches in a small, wind-protected shade house normally reserved for starting cool-germinating seeds.

The results were immediately gratifying. In most cases both the basal shriveling and resulting decline of *Arctostaphylos* cuttings and the premature leaf yellowing and loss on various *Ceanothus* were nearly eliminated. The incidence of disease on the most troublesome *Arctostaphylos* species was significantly reduced, as was its rate of progress in the flats, making both chemical control and simple removal of diseased cuttings more effective in saving crops. Both quantity and uniformity of roots were improved nearly across the board (In retrospect, we should have done specific "before" and "after" measurements for clearer comparisons, but we relied on simple gross-level observations). Premature top growth was reduced significantly, as was post-potting mortality. The major drawback of this technique was that it increased rooting times by 1 to 3 months, delaying the entire planting cycle.

We were intrigued by the potential of open-shade propagation for other native shrubs and perennials. Experiments quickly showed that it worked well for native shrubby *Salvia* species, certain *Ribes* (especially *R. speciosum* and other gooseberries), *Heuchera*, *Armeria*, some native grasses and other groups. It also proved spectacularly successful for the Mediterranean *Cistus* and their kin. The list is still expanding, usually in response to failures with more conventional techniques.

REFINEMENTS

We still consider our propagation of *Arctostaphylos* and *Ceanothus* to be a work in progress, and are continuing to refine our techniques, with some stumbles along the way. Three years ago an exceptionally rainy winter brought back disease levels we thought were permanently behind us on several *Arctostaphylos* species. The need for a simple rain roof over the cutting area was clear. Two dry winters since then have left us procrastinating but enjoying nearly immaculate crops (something sure to change when more normal weather patterns resume). We have found it possible to reduce rooting times by a month or two, simply by moving cutting flats to heated benches once the cuttings are callused, or the first few roots appear. This "finishing" process takes just a few weeks and, thus far, has involved no penalty in the form of disease or decline of the cuttings. Dehydration, a nagging warm-weather problem with some of the larger-leaved species, has been greatly reduced by spraying the finished flats of cuttings with an antitranspirant. Vaporgard has given the best results to date. The next topic for experiment will be finding an optimal light level for maximum rooting progress.

More recently, attention has turned to the liner stage. Liners of nearly all *Arctostaphylos* and *Ceanothus* in our experience grow rapidly and well in an unheated shade house, requiring only regular pruning. However the standard overhead sprinkler irrigation normally used in this setting has introduced several serious problems. *Botrytis*, *Botryosphaeria* (a twig-killing fungal disease), and a range of

leaf spot diseases have erratically plagued a number of species, particularly of the *Arctostaphylos*. Chemical controls have been only moderately effective. Isolating an area of the house with simple hand valves and watering these liners less frequently and primarily by hand, during the warmest part of the day to promote rapid drying, was an easy and surprisingly economical solution. Even under this regime, the soil surface of some slower-growing types remains constantly moist, leading inevitably to colonization by liverwort. We have found these infestations nearly impossible to eradicate once established. Most recently, we have experimented with various materials that maintain a dry, porous surface and directly discourage liverwort growth. Chopped walnut shells, a byproduct of normal nut harvesting operations, are thus far the most promising, though applying them is a labor-intensive operation.

PARTING WORDS

I hope that the experience described above will provide some useful ideas to anyone contemplating the propagation of various *Arctostaphylos* and *Ceanothus*. However, I would like to offer some cautions in extending this experience. Growers who propagate from established plants in the open ground may find quite different techniques, possibly including even standard greenhouse propagation, more effective. Growers in areas with colder winters may need to provide roofs over benches for frost protection, particularly in the case of the larger-leaved *Ceanothus*. And those in drier interior climates may find further measures to reduce dehydration of the cuttings–even intermittent misting — indispensable. Working out details like these is what keeps our lives as propagators interesting.