

## **Propagation and Cultivation of *Arctostaphylos* in Relation to the Environment in its Natural Habitat in California, U.S.A.©**

Lucy Hart<sup>1</sup>

School of Horticulture, Royal Botanic Gardens Kew, Richmond, Surrey TW9 3AB U.K.

### **INTRODUCTION**

The Mary Helliar Travel Scholarship helped to fund a visit to California to study native plants in their natural habitats and in cultivation. Throughout my study I observed *Arctostaphylos*, commonly known as manzanita, growing naturally and was able to relate the natural habitats to cultivation conditions in botanic gardens and commercial nurseries where I learnt about the propagation and production of members of the genus.

*Arctostaphylos* is a fundamental genus to California, found almost exclusively in the state, with different species occupying a range of habitats. It is a member of the Ericaceae and is closely related to *Arbutus*, sharing the same subfamily, *Arbutoideae*. The generic name is derived from two Greek words — *arktos* meaning bear and *staphule*, a grape. The common name, manzanita (popularly used in California today) is Spanish for "little apple" from the appearance of its berry. There are approximately 60 species, of which several have many subspecies due to frequent hybridisations within the genus (Stuart and Sawyer, 2001). This can make identification difficult in areas where species ranges overlap. Schmidt (1973), a manzanita enthusiast, describes her excitement regarding the future possibilities for more horticultural forms from the natural hybridisations, as a "tantalising prospect."

### **KEY HORTICULTURAL FEATURES**

The genus includes many forms of evergreen, woody shrubs ranging from low, prostrate, mat-forming types to a few which approach tree size. The majority grow to between 60 and 200 cm tall and have a rounded or vase-shaped habit. All are relatively slow to mature. The fruits, especially those of the larger species, resemble miniature apples and are attractive to birds, while California Indians made cider from them. The seeds have an extremely hard coat, and the Indians used to grind the seeds to make a manzanita bread.

*Arctostaphylos* is prized for its colourful mahogany-red or cinnamon bark that is smooth to the touch or peeling in some species. The twisted limbs in the taller species provide sculptural interest.

The attractive urn-shaped flowers range from white to various shades of pink. The simple, alternate leaves are of a pleasing grey or lime-green shade, with new buds often providing a delightful contrast, some being pale green, downy from fuzzy hairs, crimson, or bronze (Schmidt, 1973).

### **NATURAL HABITATS**

*Arctostaphylos* species are most frequently found growing in the arid belts of California, on dry slopes and hillsides, and usually in full sunlight (Horn, 1998).

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<sup>1</sup>Recipient of IPPS GB&I Region Mary Helliar navel Scholarship, 2005

A typical habitat I observed while on a wildflower and botany course organised by the Yosemite Association is the Hetch Hetchy area of Yosemite National Park. The Hetch Hetchy dam trail is a foothill woodland habitat, 1300 m above sea level, hot and dry in summer with very little snow in winter. Many *Arctostaphylos* species including *A. viscida* subsp. *mariposa* were seen throughout the trail- While exploring the Merced giant redwood grove, *A. manzanita* was observed where there were gaps in the forest that let in valuable sunlight.

I was fortunate to join an expedition with Andrew Wyatt, head of propagation at Santa Barbara Botanic Gardens (SBBG) to collect seed and cuttings. We collected in chaparral vegetation around the Santa Ynez foothills of Santa Barbara, through Figueroa Loop and Ojai Highway 33. Chaparral — tough woody, evergreen shrubs with dense foliage — is the most widespread form of vegetation in the Mediterranean part of California, covering about 5% of the state (Dallman, 1998). *Arctostaphylos glandulosa* is common to the chaparral community (Ornduff et al., 2003). Other typical chaparral species were also encountered including *Yucca whipplei*, *Adenostoma fasciculatum*, *Fremontodendron californicum*, and *Ceanothus* species-

Drought Resistance. Exposed to high sunlight levels in the summer, *Arctostaphylos* has many interesting mechanisms to avoid dehydration- Species will lose their leaves to prevent loss of water. Most species will hold their leaves perpendicular to the sun to avoid the direct glare. Leaves are also particularly waxy.

#### VEGETATIVE PROPAGATION

During a 10-day internship at SBBG I worked alongside Andrew Wyatt who advised me on *Arctostaphylos* propagation techniques. For vegetative propagation, Wyatt (2005, pers. commun.) recommended using semi-mature cutting material taken from the previous season's growth. from December to January. Soft young growth is inclined to rot off more easily. The cuttings are treated with a standard IBA liquid hormone solution [concentration of 1 hormone : 15 water (v/v)] for 10 sec before inserting into 1 peat : 10 perlite (v/v) rooting mix- The cutting trays are then placed in a polythene enclosure in a shade house, under a solar-controlled misting unit with bottom heating mats. Wyatt has found lower growing cultivars such as 'Emerald Carpet' tend to root more easily and are more resistant to fungal pathogens. Some *Arctostaphylos* species have particularly downy leaves, which give rise to rotting and fungal problems.

Rooted cuttings are potted into liner pots containing a 1 sand : 7 peat : 7 perlite (by volume) potting mix. Established liners are then transferred to 1-gal pots containing a pre-mixed potting medium of 4-milled redwood bark chips : 1 washed and bleached sand (v/v), plus a base fertiliser ingredient, known only to the medium manufacturer. The medium has a dark blackish appearance mainly caused by the redwood bark tannins. The tannins have alleopathic properties that are leached out before being supplied as a growing medium ingredient. The medium has good pore space, holds moisture well, and has a springy texture that prevents compaction. Good aeration and drainage appears to be a key factor to the success of *Arctostaphylos* production. Weak concentrations of liquid foliar-feed fertilisers are applied to *Arctostaphylos*, as their leaves are susceptible to scorching, while growing on in 1-gal pots.

Tilden Botanic Garden, Berkeley, claims to have probably the most complete collection of California *Arctostaphylos* to be found anywhere (Friends of the Re-

gional Parks Botanic Garden, 2005). Its propagation techniques differ from those at SBBG. Steve Edwards, Tilden Botanic Gardens' director, said that cuttings of *Arctostaphylos* are taken during the summer months but grown in dry shade tunnels with no overhead misting or irrigation. He believes good ventilation, no bottom heat, and good drainage in pots with holes in the sides as well as the bottoms are imperative for success.

In Berkeley, I helped the California Native Plant Society (CNPS) East Bay Chapter with their native plant production for their autumn annual plant sale. Here cuttings are taken from November to February in order to produce 1-gal saleable plants for the following October. McPheeters (2005, pers. commun-) commented on the variable time for *Arctostaphylos* to root. Low-growing coastal species such as *A. uva-ursi* tend to root within 6 weeks with *A. uva-ursi* 'Woods' being one of the quickest to establish. Medium shrub and tree-like species such as *A. glandulosa* can take much longer, from 3 to 5 months to root.

### SEED PROPAGATION

Seed propagation of *Arctostaphylos* is more difficult than vegetative propagation. After seed collecting, food processors are used to extract the resilient fruit flesh from around the seeds. *Arctostaphylos* seeds have a tough, thick, seed coat and a scarification treatment is required to break the physical dormancy it imposes. Emery (1992) reported *Arctostaphylos* species can be given an acid treatment to break down the seed coat by soaking in dilute sulphuric acid for 2 to 4 h.

Fire scarification treatments are used at SBBG (Wyatt, 2005 pers. commun.). The technique involves setting fire to a 100 to 150 mm layer of pine needles placed over the seedbed with a few small pieces of wadded paper to help ignite the material. The flash fire treatment is a quick process, but effective high temperatures are reached. *Arctostaphylos* seeds then require a minimum of 2 months to germinate (Emery, 1992). If seeds are sown in October and no germination has taken place by June, the seedbeds are dried out for the summer and watering is resumed the following autumn, some germination may occur as late as the following spring (Emery, 1992).

### MANZANITA CULTIVATION IN GREAT BRITAIN AND IRELAND

The Californian climate offers its plants long, hot, dry periods, something that a summer in Great Britain and Ireland only occasionally does. *Arctostaphylos* are generally very drought tolerant. High rainfall within the Region of Great Britain and Ireland may therefore be the limiting factor to successful cultivation, rather than low temperatures. Most species are hardy to -12°C or lower (Baldwin, 2005). There are, however, some durable cultivars grown in the Californian nursery industry, and utilizing drainage techniques such as growing in raised beds or in well-drained soils, moisture problems could possibly be overcome. At Tilden Botanic Gardens granitic and shale substrates are used in the planting area for higher elevation species (McPheeters, 2005, pers. commun.).

During my stay in Santa Barbara County I visited a few nurseries, including San Marcos Growers, who grow a good selection of *Arctostaphylos* cultivars. Baldwin (2005, pers. Commun.) recommends a reliable and garden worthy cultivar, *A. densiflora* 'Howard McMinn', which appears to grow happily almost anywhere. He has also found *A. 'Pacific Mist'* to be dependable under adverse conditions (especially for a grey leaved manzanita). Bornstein (2005, pers. commun.) suggests *A. 'Canyon*

Sparkles', a SBBG introduction that might be suitable for the GB&I Region climate. Baldwin (2005, pers. commun.) also recommends 'Emerald Carpet', which grows quite well in California near the coast and requires summer irrigation in southern California. Baldwin (2005, pers. commun.) additionally suggests another of the cultivars San Marcos Growers produces, 'Sunset', describing it as an attractive garden-tolerant selection.

Provenance can play a big part in cultivation success, with species from northern California such as *A. canescens* usually being more tolerant of summer rainfall and lower temperatures (Wyatt, 2005, pers. commun-). *Arctostaphylos columbiana* has dark reddish-brown and white flowers and, according to Las Pilitas Nursery (2005), grows in clay soil as well as dry rocky slopes in the wild.

In southern parts of the U.K., perhaps the drought tolerance of manzanita species is a welcomed attribute rather than a limitation. It is well reported that climate change exists, and gardeners need to become proactive in reducing the usage of water. One obvious technique would be to grow species that require less irrigation.

#### IMPROVING MANZANITA POPULARITY

Despite the ornamental attributes of these ericaceous, evergreen flowering shrubs there is still the potential to improve the popularity of *Arctostaphylos* within the Californian plant sale industry. Mcpheeters (2005, pers. commun-) comments that manzanitas are very popular at the CNPS plant sales with those who "enjoy the outdoors life" and who see *Arctostaphylos* growing in the wild on their walks and hikes. *Arctostaphylos* are an integral part of the California countryside. The walkers identify the plants with nature and are keen to capture that in their gardens. Those people who are not so familiar with the wild species do not identify their subtle beauty and tend to understand *less* about their specific cultivation needs.

With the stunning bark, urn-shaped flowers and interesting lime green to grey shades of evergreen leaves, it seems that *Arctostaphylos* has most of the ornamental features that garden centres require for their stock, except for being slow-growing and difficult to establish. *Arctostaphylos* is perhaps a plant for the dedicated only, but certainly one to experiment with.

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Wyatt, A. Propagation Manager, Santa Barbara Botanic Gardens, California, U.S.A.