

# GREENLEAF MANZANITA

## *Arctostaphylos patula* Greene

Plant Symbol = ARPA6

**Common Names:** green leaf manzanita, snowbrush manzanita, Klamath, smoke plant

**Prior Scientific Names:** *Arctostaphylos acutifolia* Eastw.; *A. parryana* Lemmon; *A. parryana* var. *pinetorum* (Rollin) Wies & Schreib.; *A. patula* Greene; *A. patula* ssp. *platyphylla* (A. Grey) P.V. Wells; *A. patula* var. *coalescens* W. Knight.

### Description

**General:** Heath Family (Ericaceae). Greenleaf manzanita is an erect evergreen shrub 3-6 feet tall, with a broad, rounded crown. The bark of young twigs is resinous to short hairy with golden glands, but mature bark is smooth and bright red-brown. Leaves have short petioles with ovate to almost round blades that are 0.75- 2 inches long, 0.6 – 1.5 inches wide, bright yellowish green, and glabrous on both sides. The flowers, which open from April to June, are arranged in panicles with glandular scale-like bracts that are 0.1 – 0.3 inches long. The urn-shaped corollas are white, sometimes tinged with pink, and 0.2 – 0.3 inches long. The fruits are globose, 0.3 – 0.4 inches in diameter, smooth and chestnut brown, with a mealy pulp that encloses several, hard-walled seeds (Holmgren et al., 2005; Parker et al, 2012). Greenleaf manzitanas in some areas, but not all, produce lignotubers, which are rounded woody growths, basal burls at or below ground level, containing buds and food reserves that resprouts to allow rapid vegetative recovery after fire (Blum, 1978; Hauser, 2007).

Hybrids between greenleaf manzanita and the prostrate kinnikinnick (*A. uva-ursi*) are found wherever the two species come into contact. Such hybrids have a spreading form, dense foliage, and white to pinkish flowers, which offer some promise as landscape ornamentals in areas experiencing cold winters (Whittaker, 1960, 1961).

**Distribution:** Greenleaf manzanita is one of the most widespread species within the genus, ranging throughout the mountains of western North America as far east as Colorado (Hanes, 1988; Rundel et al, 1988; Sawyer et al., 1988; and Thornebaugh, 1988, Thorne, 1988). For current distribution, please consult the Plant Profile page for this species on the PLANTS web site (<http://plants.usda.gov/>).

### Habitat Adaptation

Greenleaf manzanita inhabits well-drained, rocky or bouldered slopes in association with open coniferous forests and high elevation chaparral, with typical adaptation to dry, well-drained sandy loam to silty loam, mildly to moderately acidic soils in open sunny sites. Greenleaf manzanita is generally not tolerant of saline or alkaline soils (Hanes, 1988; Mallory et al, 1973).

Its general geographic range is characterized by cool, relatively dry summers and wet winters with precipitation ranging from 50 to 80 inches per year, partly as snow (Griffen, 1966,1967). Greenleaf manzanita has a high tolerance for cold, below-freezing winters, but depends partly on snow cover to protect dormant buds. Occasional fires may be important to successful seed germination and establishment and to crown sprouting in senescent plants (Sweeney, 1968). Greenleaf manzanita, like other members of the heath (Ericaceae) family, has an obligate relationship with mycorrhizal fungi. Under natural conditions, seeds often require fire followed by cold conditions to germinate (Hauser, 2007). Without a natural or induced germination stimulant, seeds can remain dormant in soil for hundreds of years.

### Uses

**Wildlife:** The fruits of greenleaf manzanita are utilized by bear, deer, other small mammals, and a wide array of birds. Greenleaf manzanita foliage exhibits little value as browse for livestock and wildlife, limited primarily to winter forage (Hauser, 2007). Mule deer tend to favor greenleaf manzanita more than other browsing ungulates. Following fire or other disturbances, most livestock and deer may lightly browse greenleaf manzanita sprouts and seedlings (Vankat, 1970). The fruits and seeds of greenleaf manzanita are important to a variety of birds and mammals. The fruits are a food source for American black bears in



Figure 1. Greenleaf manzanita William R. Hewlett © California Academy of Sciences @ CalPhotos

northern California and southern Oregon during late summer and early fall. Grouse, wild turkeys, songbirds, and deer mice also consume the fruits. Greenleaf manzanita provides valuable cover to numerous animal species due to the dense thickets it produces. It is also an important cover species for small mammals, birds, insects, and arthropods.

*Livestock:* The palatability of greenleaf manzanita is extremely low for cattle, horses, and even goats. It is apparently more palatable to domestic sheep. The crude protein of greenleaf manzanita taken from California ranges from a low of approximately 5% in winter months (January-February) to a high of approximately 8% in late summer to fall (August-September).

*Erosion Control and Ornamental:* Greenleaf manzanita is a valuable species for revegetating severely disturbed sites, and is considered a superior shrub for erosion control on applicable foothill and mountain sites. Greenleaf manzanita is often used as an ornamental plant in landscaping applications (Kruckeberg, 1982, Smith, 1995).

*Domestic Use:* Fully ripe fruit is mildly acidic with a flavor resembling green apples. The fruit can be dried, ground into a powder, then used in making cakes, etc. The fruit can also be used for making jelly and cider. Seed can be ground into a powder and added to soups, although the seed is very small and difficult to separate from the fruit (Balls, 1975; Facciola, 1990). A yellowish-brown dye obtained from the leaves and does not require a mordant, or dye fixative, to bind the dye to fabrics (Grae, 1974). The crooked wood of central stems and lower branches are used in several cottage industries, including lamp stands and other decorative wood crafts (Everett, 1997).

### **Ethnobotany**

Dried leaves mixed with tobacco were used for smoking by the Klamath Indians of Oregon (Colville, 1897). The leaves are astringent, and infusions of the leaves and bark were used by some native Americans as a poultice to treat cuts and burns (Moerman, 1998). The fruits were eaten whole, made into cider and jelly, and brewed into tea (Shenk and Gifford, 1952). The leaves were used as an emetic, for treating insect bites, and to relieve bronchitis, dropsy, and other diseases and also used to treat poison-oak (*Toxicodendron diversilobum*) exposure.

### **Status**

Greenleaf manzanita is a global species of concern, with global rank 'G4' as an individual species (apparently secure - uncommon but not rare; some cause for long-term concern due to declines or other factors); and rank 'G5' as a component of the greenleaf manzanita / pinemat manzanita (*Arctostaphylos nevadensis*) chaparral plant community (secure - common; widespread and abundant). California state rank is S5 (secure- common, widespread, and abundant in the state).

Ranking and status values may change over time. Please consult the PLANTS Web site (<http://plants.usda.gov/>) and your state's Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

### **Planting Guidelines**

Greenleaf manzanita naturally inhabits areas of sun or semi sun (i.e., canopy gaps and openings). All manzanitas should be planted higher than the surrounding soil to prevent crown rot, which can result from excessive water and soil moisture, especially during the summer (Kreckeberg, 1982; Stoner, 2009). Mulching is desirable to control weeds, retain soil moisture, and reduce the need for irrigation. Rock mulches have proven more successful than organic mulches. There should be no need to water established plantings in their native montane habitat. If the plant appears stressed, water once every 4-6 weeks. Greenleaf manzanita is susceptible to root rot and certain fungi, and for this reason watering should be kept to a minimum. For the urban environment, organic nutrient rich soils and acidic fertilizers encourage seedlings and more specifically cuttings.

### **Management**

Under natural conditions, no special management is required to maintain established manzanitas. Either scarified seeds or well-rooted container plants may be used to revegetate cleared sites (Hauser, 2007). In the urban landscape, several horticultural techniques should be used to ensure healthy plants. Periodic watering every 4-6 weeks will keep foliage healthy without weakening plants. Pruning should be avoided and used only to remove dead wood and diseased branches.

### **Pests and Potential Problems**

Overhead watering should also be avoided because it tends to encourage fungal diseases (host to at least 12 fungal species, 3 of which are "important" plant pathogens such as *Botryosphaeria* spp.) that cause branch die-back and leaf spot (Kruckeberg, 1982). Manzanitas are also generally susceptible to the manzanita leaf gall aphid (*Tamalia copweni*), which cause young leaves and flower buds to curl, swell into fruit-like, pod-shaped galls, and cease growth.

## Environmental Concerns

None known.

## Control

Greenleaf manzanita can be successfully controlled by grubbing. In a young northern California Pacific ponderosa pine plantation, greenleaf manzanita was significantly reduced over a 10-year period on grubbed sites (Fiddler and McDonald, 1999). The species is also susceptible to herbicidal control using herbicides with known activity on woody species.

Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

## Seeds and Plant Production

*Natural Establishment:* Greenleaf manzanita, like most manzanita species, requires insect visitation to ensure seed-set. The flowers are pollinated most effectively by bees that grasp the flower and shake it by actively beating their wings. This process, like shaking a salt and pepper container, permits efficient collection of the pollen, which is used for food. Fruits are dispersed primarily by animals, which presumably aid later germination by ingesting and digesting the fruit and softening the outer seed coat. However, natural germination is sporadic except after fire, which cracks the hard coat of seeds that have accumulated in the litter layer. (Hauser, 2007).

*Seed Propagation:* Propagation from seed is difficult, because of the thick, bony seed walls and low rates of germination (less than 10%) without treatment (Berg, 1974; Carlson and Sharp, 1975). However, if propagation from seed is desired, treatment must ensure that the seed coat is broken without damaging the embryo. Individual seeds may be filed with a steel file, but larger quantities can be treated by placing them into a container of boiling water that is removed from the source of heat after 12 minutes. Seeds also respond well to burning, which is accomplished by firing a 4-inch deep layer of combustible leaves and twigs over a flat planted with seeds. These treatments crack the seed coats but may reduce viability. Treated seeds should be stratified in a moist mix of milled sphagnum and beach sand for 2-8 months until they germinate. Other techniques, including use of sulfuric acid (concentrated H<sub>2</sub>SO<sub>4</sub> for 2-4 hours) to soften the seed coat, may enhance germination, but also requires special precautions against spillage and contamination. For acid treatment, single nutlets and stone pieces (often without embryos) and entire stones should be treated separately, as they require different amounts of time in acid.

*Vegetative Propagation:* Vegetative propagation is preferred over seeds. Greenleaf manzanita is most easily propagated by cutting terminal shoots that include 1-2 inches of the woody stem from the previous year. Cuttings work best if taken between March and May (Stoner, 2009). Shoots should be dipped in a rooting hormone before being placed in a moist sand-peat mixture. Cuttings need to be kept moist by regular watering or misting until roots appear. Once rooted, they should be transplanted into small containers using potting soil, to allow for proper root development. Manzanitas generally do not transplant well, so they should be grown to vigorous conditions in one-gallon containers and then moved to a permanent position in the late fall or early winter. Relatively slow growth rates during the first few years can be expected. If plants are used in an urban landscape, the use of organic-rich soils and acidified fertilizers is recommended.

## Cultivars, Improved, and Selected Materials (and area of origin)

'Altura' Greenleaf Manzanita was released in 1989 by the NRCS Plant Materials Center in Lockeford, California. This is a native, erect to semi-erect, evergreen shrub, 3-6 feet high and about 3-5 feet wide. It was collected from native plants in August and September of 1972 at South Lake Tahoe, California and was developed as a critical area stabilization plant for dry, rocky slopes and droughty, well-drained soils. It is slow to establish ground cover, but 3-4 year old plants provide good cover and erosion control. Stems root at nodes when put in contact with the ground by heavy snows. It seems to be useful for environmental enhancement and foundation plantings around mountain homes. It grows well in the Tahoe Basin, but is adapted to elevations down to 2000 feet where precipitation is adequate.

Cultivars should be selected based on the local climate, resistance to local pests, and intended use. Consult with your local land grant university, local extension or local USDA NRCS office for recommendations on adapted cultivars for use in your area.

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