CALIFORNIA NATIVE PLANTS FOR SUSTAINABLE BAY AREA GARDENS,

BAWSCA Landscape Class Series Spring 2010
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Landscaping with Drought Tolerant California Natives

In California : Over 6,000 known native plants, over 3,000 endemic only to California. Native Plant Nurseries and organizations now make many hundreds available to wholesalers and home gardeners.

Garden Designers also use plants from other Mediterranean climates like ours: western coastal temperate regions of South Africa, Chile, South Australia, and the Mediterranean Basin.

Water Supply in California

Water has been supplied from elsewhere at a high energy cost, but low price, allowing a growing season that is year round, so we have been able to grow a great variety of plants all year. However our population is outgrowing that supply. Eastern and Northern US and European plants supplied by nurseries are accustomed to much more water and nitrogen rich organic soil than we can give them as water shortages become more permanent. Even SW plants get some summer water naturally-not California plants.

Climate

Understanding the Mediterranean climate is important to gardening successfully with many California native plants.

Characteristics our Mediterranean climates

1. Rain during fall, winter and spring with rain concentrated in cool season
2. Rainfall is irregular, varying greatly from year to year
3. Droughts and fire are common natural occurrences
4. Hot dry summers with no rain for average of 6 months
5. Average summer temperatures from 75-100+ F, winters rarely less than 30F
6. High light intensity and solar radiation causing heat stress
7. Winds are a daily occurrence and blow mostly from west to east, dehydrating
8. Soils are thin and underlain by bedrock, except in large valleys where clay soils dominate. SC Valley Hillsides can be sandstone, serpentines, and granite.
9. With only 10-15 inches a year on the Santa Clara Valley floor, and 20 inches at the base of the Santa Cruz Mountains, topsoil has minimal decomposed organic matter.

So, that makes summer drought tolerant California native plants ideal for California gardens, climate wise, water conservation wise, pest management wise, and also fertilizer wise.

1. Most Native plants in dry regions do not have much organic matter in the soil, so are used to less nitrogen from the soil. (Many native shrubs fix nitrogen from air).
2. The native plants also support a huge and diverse native fauna, including pollinator birds, bees, and insects that can keep the plant pests in check if we provide the native plant communities. (600+ native bee species)
3. Flora and fauna need each other here, foreign plants do not support much life in comparison. Reproduction of many natives is dependent on native pollinators.
4. These have been the primary reasons for promoting native plants until recently-but now the water savings have taken front stage.

So how do native plants help conserve water?
Drought Mechanisms;
California natives have had to develop mechanisms to survive summer heat. Their foliage consists of tough and leathery evergreen leaves, often protected by a waxy cuticle or dense surface hairs to resist heat & dehydration. Some may have a powdery white coat or change to grey-green to reflect heat. They toughen up in the summer, often taking on a waxy or dull cast, their aromatic oils or resins concentrating to repel grazing animals. Their metabolism slows down, and the plants take a rest, reducing both new growth and loss of moisture by transpiration. Some plants shed some of their foliage to reduce the amount of moisture they lose. Some grow tiny summer leaves. Some grow woody insulating stems, a wooly coating, and less herbaceous growth.

*** Not all native plants are drought-tolerant:**
Mature Redwoods need 40 inches minimum here, and an ever increasing amount of water as they grow larger. On the coast they get 20 inches of fog drip in addition to 20 from rain. They need moist cool air, acidic highly fungal soil with deep mulch, and get scrawny and sometimes diseased, here in the valley floor once near adult size. They do well where fog is frequent and air is cool. (One 24'diameter tree needs ~600 gal month)

For success with any natives we need to simulate their original habitat as much as possible-and for the drought-tolerant plants that includes

1. matching soil type in some cases
2. providing especially good drainage, since the most colorful are from the hilly places
3. restoring the soil microbes that feed the plants,
4. and beneficial insect life that pollinate them and protect them
5. avoiding concentrated chemical fertilizers because they kill the soil life and pollute,
6. using mulches to suppress weeds, keep the soil cool, and feed the soil organisms,
7. keeping out exotic competition
8. watering correctly during the establishment period, and after established, if at all.

We need to change habits, and our garden aesthetics, and learn how to garden in a summer dry climate.

Seasons in a Mediterranean Climate: **PLANT GROWTH BY SEASON**
FALL
First rains appear mid-late October/November.
(Sometimes a second very short spring for natives in Sept or October)
Cooler nights, shorter warm days
Roots grow
Seed Germination
Beginning of vegetative growth above ground
Best time to plant-Mid Oct-Early December
WINTER Cool wet.
Cool Rainy season—weeding time to reduce competition and weed seeds
Some root, shoot growth, a few flowering shrubs (Frosty areas-no growth)
Pruning time for deciduous shrubs

SPRING
Last rains, Lush Spring, February, then again in April to May/June
Wildflowers paint the hillsides in El Nino rain years
Warming days and nights, vegetative and flowering growth, some root growth and beginning of seed production
Second best time to plant if you missed the Fall; March-April for perennials.
(Plant drought-tolerant trees & shrubs in fall or winter, by end of February.)
High water use time
SUMMER
Long dry season May to October,
Dormancy in Hot Dry Months mid July to late September
Seed production
Mainly blue-greens, greys, and red-brown or blond seedheads
Pruning time for Coast Live Oaks, manzanitas, evergreen drought-tolerants
Pruning, clean-up time, except to leave seed heads for birds
No other growth, except for late summer bloomers: California Fuchsias, Tarweeds, and coastal fog plants
Irrigation should mimic the dormancy cycle and reduce summer water from Aug –Sept for California & Mediterranean drought-tolerant plants

Soil
Many drought-tolerant California natives require excellent drainage, and low or no fertilizer, except natural leaf droppings. Gravelly or sandy soil on hillsides with some partially decomposed organic matter, such as composted leaves, provides well-aerated soil and good drainage. Roots also need air in the soil. Faster drainage allows more air in soil, and less chance of root rots.. *Poor drainage and constant warm wet soil in the hot season promotes overgrowth of soil fungi and results in water mold fungi diseases that eventually kill many trees.* **If you have clay or clay loam soils, you will need to water infrequently, slowly, and deeply in order to allow air to penetrate**.

If you have flat clay soil, you may need to mound the soil to provide good drainage for most native plant communities originating from the hills and mountains, or northern and southern extremes of the state. An exception is our Oak grassland plant community on the Santa Clara Valley floor. Plants of the valley floor tolerate fine clay soil, alkalinity, slow drainage, as well as long dry summers. Variety of species is less on the floor, mainly grasses, bulbs, wildflowers, and oaks, except along rivers and creeks.

Testing Soil-Drainage
If you have any question about the drainage or are planting in a new area, it is best to start by digging one hole about 12-18" deep, filling it with water and checking to see how fast it drains. Fill it twice and check the rate after the second fill. If any water remains in the hole after 3-4 hours, you will have to plant on large **mounds** built up with soil at least 12" high for the plants from the Chaparral and hillsides. You can also squeeze it when wet, and it will form a long sticky ribbon that won't break off easily if it is mostly clay. If it is sand, or drains in less than 5 minutes, it will drain too fast, and it will need compost to hold water and nutrients longer.

Soil Ph
If your soil is a clay or clay loam and has a pH of 6-7, most nutrients in the soil are available, and most soil decomposing and nitrogen-fixing bacteria will thrive with enough air in the soil.
If it is acidic, it is probably frequently watered, most fungi will be the decomposers, and nitrogen rich compost will be needed to establish plants. Do not add sulfur or lime as these will worsen soil conditions for planting.

The Soil Food Web
Healthy soil is filled with live tiny organisms, all working as a system, providing nutrients to plants, getting nutrients from plants. Some hook up with roots and bring minerals and water into the roots. When you feed the plants with organic matter, (leaves, mulch, compost) you are actually feeding the soil organisms, which then feed your plants. Concentrated chemicals destroy them. (Fertilizers, herbicides, pesticides)

Soil Prep
When soil has been compacted with heavy equipment, scraped, torn up by rototilling, or saturated with concentrated chemical fertilizers, the web of soil of life is destroyed, and can no longer support plants. You may need to restore the topsoil with a compost layer. It can be rototilled into the top 6-8 inches if the area is compacted. When planting, you can add mycorrhizae, beneficial root fungi, to help re-establish them, and give the plants an early chance to become more drought tolerant, by getting access to soil nutrients and water from mycorrhizae, which they would not have when grown in a nursery pot. Where topsoil and leaves have been left in place over time to decay, and the soil has not been disrupted, you may not need these additives when planting native or other plants. Avoid trenching, rototilling, and amending (mixing things into) the soil where tree roots are already established in the area-even beyond the tree canopy. Most feeder roots are in the top 2-3 feet for trees and other plants, especially in shallow or in clay soils.

Planting
Mid-October to mid-December is by far the best time for planting natives because the winter rains give the plants time to send out roots and get established before the dryness of summer arrives. Definitely plant trees, shrubs and irises only in fall. The second best time is mid-March through April for smaller plants. If you do plant in summer, the best chance for success is to plant early in the morning on cool moist overcast days. Definitely transplant or move plants early the morning when the air is still cool and a bit moist. Transpiration of water from the leaves is minimized when it is cool and moist, causing less stress on the plants. For summer plantings, you have to check the soil and water regularly the first season, as roots have not had time to develop and support the top growth, which grows in spring and summer.
Group plants in watering zones that have the same watering requirements-Low water plants together, Moderate water plants together, and High water plants, such as vegetables together in their own zones for efficient and less wasteful irrigation.

How to plant
Contrary to common practice, the holes should be dug wide but not deep. (Most plants, even trees, do not have big tap roots but rather a wide network of fine roots that feed

within 12-24" of the surface. The roots grow sideways first. Later, when larger, trees my send down anchoring roots.) Dig the holes 2-3 times the width of the pot or root ball and only as deep as the root ball. (Five times wider in heavy clay soil, as roots spread wide at first).

Remove the plant from the container only after the hole is dug. Roots die quickly, stunting growth; exposure of roots to should be less than one minute. Place the plant on the soil. Gently rinse off loose potting soil, set it in the hole, filling the hole with water and native soil until soupy, and let plant settle before completely filling the hole. For 5 gallon and smaller plants, the potting soil can be mixed into the soupy native soil, but for rootballs deeper than 8 inches, avoid mixing organic matter below the top 8 inches of soil. It will still decompose, but without much air, root toxins will be produced in the decomposition process. The root crown of woody trees and shrubs should remain about 1-2 inches above the soil level after the hole is filled. Add soil only up to the top edge of the root ball. Water immediately after planting to minimize air pockets.

For woody chaparral plants like Ceanothus, Manzanitas, and Fremontodendrons, do not loosen the roots, or score the rootball, unless there are roots circling the pot, which could eventually strangle the plant. Cleanly cut off a circling root-do not pull them loose.

For seeds, plant after October 15, just before a heavy rain to help seeds get good contact with the soil, or water them in well. Before October 15, the passing White Crowned Sparrows may eat all the seeds. Poppies, Madia elegans, and Clarkias reseed well after the first planting.

Compost and Mulch

Apply a 1" thick layer of organic compost on top of the soil <u>after planting,</u> for gradual nutrient provision. Apply a 3-4" layer of wood chips, leaves or straw as a mulch over the compost to keep moisture, air, and temperature levels evenly balanced and stable.
Keep mulch 4-8" away from stems and trunks to prevent moisture on the root crown, which can cause rotting. Use gravel mulch for chaparral and desert plants. Eventually, the leaves of larger plants will shade the ground and supply leaf mulch.

Watering new plants:
New transplants need even soil moisture, even amount of air in the soil, and even soil temperature to allow root growth and keep them alive until enough roots have expanded into the landscape. Even moisture means the same level of moisture spread evenly around the plant where roots spread out, and not dry or too wet between watering. Under-watering new plants, and over-watering plants in general, are main causes of failure in new landscapes.
Check the root ball and surrounding soil with a soil moisture meter (OSH or nurseries for $7-9) and water both when top 3 inches dry, or lower soil reads at lowest end of " Medium moisture" on the scale.

Perennials may establish in one season, but trees & shrubs need deep watering regularly for first 2-3 hot seasons before roots are established in the landscape.

Drought tolerant chaparral and desert plants, planted in Fall, need only be watered every 1 to 2 weeks the first summer in clay soils, every 3 weeks the second summer, and every 4 weeks, or not at all in subsequent years.

Watering Established Plants

When the plant begins a big growth spurt, it is established in its new home. Drought-tolerant species are then able to survive without added summer water, except in drought years.

However, monthly watering will keep these plants looking healthier, except for Fremontodendron and Mariposa lilies, which resent any summer watering at all, and many species of Ceanothus which may not need summer watering after year two.

In drought years water mainly in the cool season, to help plants stay healthy enough get through the hot season. In the spring add supplemental water, because this is the fastest growing season for most plants, and soil water can be quickly reduced in a mature landscape. As the weather gets hot, top growth will slow and seeds will set. Start decreasing irrigation by lengthening the intervals between watering until no water or only monthly watering August 1 to Sept 30 for the low-water use and drought-tolerant plants.

Deer

There is no such thing as a deer-proof plant. Deer seem to avoid plants that are thorny, spiny, poisonous, have a milky sap, or have a strong taste and aromatic foliage. Deer are also less likely to eat twiggy plants with very small leaves. However, when the deer's natural food source becomes scarce, at the end of the dry season in fall, during drought or in newly developed areas, deer eat almost anything. Also, in spring, new babies will not know that some plants taste bad and may sample "deer-proof" plants. Finally, plants that are never eaten in one area may be regularly eaten in another place.

New plants and older plants with lush new growth are especially susceptible to deer browsing. Well established, large old plants may be browsed but not destroyed. Even if they find a plant they love to eat, deer generally will not eat all they find of a large plant but rather will move on after a few minutes. So the trick is to start with deer-resistant plants and then try to get them to a size that can withstand some nibbles.

New plantings should be protected with a chicken-wire cage large enough to allow the plant to grow for a year or two. After the plant is established, remove the cage and observe how the plant gets along with the deer. Since in spring bucks will rub their antlers against the trunks of trees that they will not eat, trees may need to be protected well after their canopy has grown above the height that deer can reach.

The only fool proof way to protect plants from deer is a high fence (7', or more on a slope) or two 5' high fences that are 5' apart.

California Plants by Climate& Water Need

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Chaparral and Desert (Sun, dry or occasional deep watering)

Fremontodendron californica (Flannel bush)

Dendromecon harfordii (Bush Poppy)

Ceanothus 'Skylark' (California Lilac)

Ceanothus 'Concha' (California Lilac)

Ceanothus 'Joyce Coulter' (California Lilac)

Ceanothus 'Dark Star' buds (California Lilac)

Festuca idahoensis (Idaho Fescue)

Mimulus aurantiacus (Sticky Monkeyflower)

Eriogonum umbellatum var. polyanthum 'Shasta Sulfur' (Sulfur Buckwheat)

Romneya coulteri (Matilija poppy)

Clematis lasiantha (Chaparral Clematis)

Penstemon, Eschscholzia californica (Ca Poppy) & Eriogonum umbellatum var polyanthum

Salvia clevelandii (Cleveland Sage)

Salvia leucophylla 'Point Sal Spreader' (Purple Sage)

Salvia clevelandii 'Winifred Gilman' (W.Gilman Cleveland Sage)

Cercocarpus betuloides (Mountain Mahogany)

Garrya elliptica (Silk Tassel Bush)

Rhus ovata (Sugar Bush)

Arctostaphylos 'Howard McMinn' (McMinn Manzanita)

Trichostema lanatum (Woolly Blue Curls)

Baccharis pilularis 'Twin Peaks' (Coyote Brush)

Ericamerica linearifolia (Golden Fleece Bush)

Lupinus albifrons (Silver Bush Lupine)

Linum lewisii (Blue Flax)

Oak Woodland / Foothill Woodland
(Shade or part shade, dry or occasional deep watering)

Pinus sabiniana (Foothill Pine)

Aesculus californica (California Buckeye)

Stylomecon heterophylla (Wind Poppy)

Monardella villosa (Coyote Mint)

Penstemon heterophyllus (Foothill Penstemon)

Eriophyllum lanatum (Woolley Daisy/Sunflower, Oregon Sunshine)

Sisyrinchium bellum (Blue eyed grass) & Lupinus densiflorus 'Alba'

Rhamnus californica, cvr. 'Eve Case' (Coffeeberry)

Cercis occidentalis (Redbud)

Heteromeles arbutifolia espaliered (Toyon, Christmasberry)

Clarkia elegans aka C. unguiculata (Elegant Clarkia, Mtn Garland)

Salvia sonomensis 'Darah's Choice'

Epilobium canum canum (California Fuschia) (Zauschneria 'Silver Select')

Madia elegans (Elegant Tarweed)

Holodiscus discolor (Cream Bush, Ocean Spray)

Ribes sanguineum (Pink Flowering Current) and Carpenteria californica (Bush Anemone)

Arctostaphylos glauca (Bigberry Manzanita)

Sidalcea malviflora (Checkerbloom)

Iris douglasiana (Douglas Iris)

Iris 'Canyon Snow'

Festuca californica (Blue & Green varieties)

Muhlenbergia rigens (Deer Grass)

Triteleia laxa ((Ithuriel's spear)

Calochortus luteus (Golden Mariposa Lily)

Calochortus venustus (White Mariposa Lily)

Eschscholzia californica (California Poppy)

Salvia spathacea (Hummingbird Sage)

Lonicera hispidula (Hairy Honeysuckle)

Coastal and Meadow (part sun, moderate water)

Achillea millefolium (Yarrow)

Heuchera micrantha hybrid(Coral Bells)

Heuchera maxima (Island Alumroot)

Myrica californica (California Wax Myrtle)

Aquilegia formosa (Red Columbine)

Dicentra formosa (Western Bleeding Heart)

Polystichum munitum (Western Sword Fern) and Acer circinatum (Vine Maple)

Vitus californica 'Roger's Red'(Wild Grape)

Calystegia occidentalis (Wild Morning Glory)

Calystegia macrostegia ssp macrostegia ('Anacapa Pink' Morning Glory)

Aristolochia californica (California Dutchman's Pipe) & Heuchera maxima

Epilobium (Zauschneria septentrionalis) 'Select Mattole' (California Fuschia)

Epilobium canum 'Cloverdale' (California Fuschia)

Ceanothus griseus 'Diamond Heights'

Carex tumulicola (Ca /Berkeley Sedge)

Mimulus 'Pumpkin' (Monkeyflower)

Verbena lilacina (Lilac Verbena)

Verbena lilacina de la Mina (De la Mina Verbena)

Allium unifolium (Wild Onion)

Armeria maritima (Sea Thrift)

Erigeron karvinskianus & Blue-Eyed Grass

Erigeron glaucus (Beach Fleabane)

References: Gardening with California Natives seminars

City of Santa Monica Traditional vs Sustainable Landscapes **www.smepd.org/landscape** See the garden/garden comparisons.

Drip Irrigation for Every Landscape and All Climates **by Robert Kourik.** See **www.robertkourik.com** for more information

Urban Farmer Store Catalogue, irrigation classes and supplies for the homeowner
www.urbanfarmerstore.com
And a 2-side card: "July Watering Guide, & Drought Conservation Strategy"

RESOURCE LIST:

Going Native Garden Tours:
Santa Clara, San Mateo Counties **www.goingnativegardentour.org** (West Bay)
Alameda Contra Costa Counties: **www.bringingbackthenatives.net** (East Bay)

California Native Plant Society: www.cnps-scv.org
Gardening with Natives, *subgroup*: **www.gardeningwithnatives.com** Meets 1st Thursday at various libraries, speakers, seed exchanges etc

Native Plant sales;
CNPS Nursery, Hidden Villa Ranch Moody Rd, April, & October 16, 2010 www.cnps-scv.org
Tilden Regional Parks Botanic Garden Berkeley www.nativeplants.org April

CNPS Spring Wildflower Show, April Mission College, classes, books etc

Where to buy native plants:

Native Plant Nursery List on **www.gardeningwithnatives.com** website, and the California Native Plant Professionals List for more help designing, managing, or installing your native plants.

BOOKS

California Native Plants for the Garden, by Bornstein, Fross & Obrien ISBN 0-9628505-8-6

Plants & Landscapes for Summer Dry Climates of the San Francisco Bay Region by East Bay Municipal Utility District ISBN 0-9753231-1-3

Designing California Native Gardens, The Plant Community Approach to Artful, Ecological Gardens by Keator & Middelbrook ISBN 978-0-520-25110-6

Care & Maintenance of Southern California Native Plant Gardens by O'Brien, landis, and Mackey ISBN 0-9065808-4-0

Landscape Plants for California Gardens by Bob Perry ISBN 978-0-9605988-5-4 (water need plant groups, categories, irrigation patterns for drought-tolerants and regular, climate groups)

SOME COMPOST & MULCH SUPPLIERS

Wheeler Farms & Equine Waste Mgmnt.(SMto & SCCo Deliveries) (650) 424-1896 (3yd min.)Cooper Garrod Stables (Saratoga-you pickup) (408) 867-9527. Local Recycle Centers for local residents (some free compost): Cupertino; Stevens Creek Quarry & recycle; Sunnyvale-MV-PA: Sv SMART Station, Zanker Rd , S Jose, Guadelupe Landfill in San Jose New Almaden area, Allied Waste(BFI) in Milpitas Garden Suppliers: Lyngso, RC, Ciardella's PA, MV Garden Supply, Payless Rockery in San Jose, South Bay Materials in San Jose, etc, Your own leaves., Arborists who chip their trimmings.