

HOW TO GROW BULBS (LIKE WE DO) Here are some basic pointers.

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These brief notes are divided into the following sections:

Collecting Seed | Cleaning | Stratification | Storage | Propagation Seed Mix #1 | Moving Up | Soil Mix #2 | Watering | Fertilizing Harvesting | References and Resources | Big Lessons Learned | Gardening Tips

## COLLECTING SEED

- You know that it's illegal to collect bulbs from the wild, so you must grow them from seed. Here goes...
- You can collect seed yourself, or buy from collectors (some advertise in the back of "Fremontia", the magazine of the California Native Plant Society, C.N.P.S.).
- You need a permit to collect from public lands. Each public agency has its own system, average cost is \$50, and there are lots of restrictions. Quite a hassle. And of course, you need permission to collect from private lands other than your own.
- Responsible collecting. It is very easy to over-collect; pods contain an amazing number of seeds. One *D. multiflorum* pod might contain twenty seeds, one *C. luteus* pod might contain one hundred and twenty. Think hard why you would want more than a pod. So, use good judgement, take no more than 2% of a stand. Never collect in consecutive years or when there has been a poor crop.
- The easiest way to find seeds is to note or mark where the flowers are in spring! Pods are usually brown and dry and very hard to pick out. Do not rely on your memory, make copious notes, diagrams. Things look quite different when everything is brown, and you are trying to find brown pods amongst grass that has grown three feet since you found the flowers. Find a pure stand far from similar species in case they hybridize.
- Some types of pods (e.g., *C. monophyllus*) inconveniently mature "upside-down", scattering their seeds as soon as they are ripe, and making collection timing difficult. Other pods mature "right way up", and you can find some seeds at the bottom months after they are ripe, if they are not shaken by the wind or animals.
- Collect in paper or cloth bags, never in plastic, and label the bag with at least location and date immediately.
- Keep a detailed log! Set the trip meter at zero at a permanent marker or sign. Or, use a G.P.S. positioning system. You can get a basic one for as little as \$100.
- Let them dry out where there is good air circulation.

## CLEANING

- We are processing small quantities here, so it's done by hand.
- Some kinds of pods (e.g., fritillarias or lilies) are easy to break apart with fingers; separate the seeds into a plate.
- Some pods (e.g., ookows) are hard; you can break them up with a rolling pin (slower, but better control) or in a food processor if you put several layers of tape over the leading edges of the blades to prevent damage to the seeds. Use 1-second bursts.

- It's not necessary to remove all the detritus, you're not selling these seeds! But, it can get addictive for some folks.
- Fine chaff can be removed by winnowing. While shaking the seeds in a cookie pan with tall sides, or a bowl, blow over them (downwind!)
- Pick out the larger stuff. If you shake the pan rapidly at a slight angle, the seeds often settle to the bottom.
- We also use a set of screens (6 different sizes are commonly available from specialty companies, for example, Abundant Life Seed Foundation, P.O.B. 772, Port Townsend, WA 98368, (360) 385-7192).

## **STRATIFICATION**

- Stratification (the breaking of seed dormancy) is a large subject. There are some useful books, e.g., Seed Propagation of Native California Plants, by Dara Emery.
- Most native bulbs have simple stratification needs, either cold, warmth, moisture, or in combinations.
- Usually, the higher the source elevation, the more seeds need cold stratification, which can be done in the 'fridge. The lower elevation (below 2000') seed needs no stratification at all and germinates quickly with the onset of the rainy season.
- We've never tried seeding "green" (seeds that have not yet gone into dormancy or "waiting mode", we suspect high temperatures with moisture will lead to disease. Why bother?
- Most local seeds do fine in local conditions, our rain/freeze/thaw cycles are sufficient if started in fall

## **STORAGE**

- Excess seeds can be stored in refrigerator or freezer, but they must be dry (8% moisture is ideal) first. You can use silica gel to remove and regulate moisture.
- You can buy professional containers that have a double seal; heavy-duty freezer bags are O.K.
- Seed containers in various sizes are available from Southern Exposure Seed Exchange, P.O.B. 170, Earlysville, VA 22936 (804) 973-4703 [www.southernexposure.com](http://www.southernexposure.com). These containers will last the rest of your life!
- Label them well! Worth keeping good records, so much easier to look up what you've got than sorting through the freezer!
- In our experience, storage time in the freezer varies. Flat lily seeds up to 5 years, most others up to 7 years, sometimes more.

## **PROPAGATION**

- Seed in FALL! Lilies especially like those warm, moist conditions. Lower elevation species can be seeded later.
- We seed in flats, grow for two years, then move into big bins. Most reach flowering size in 3-4 years, lilies longer. Our experiments where we sow directly into large bins are

proving very successful, we recommend this for all small growers. This eliminates the trouble of transplanting later.

- Not all seeds germinate the first year. Don't throw a flat out for at least three years! This is particularly important with lily seeds. Some species do all their development underground the first year, and nothing shows above ground for all that effort, while others will produce a tiny leaf.

- We use seed mix on following page for all flats, except for desert species which are diluted by half with clean sharp sand. If you are using commercial mix, you can add sand or perlite to enhance drainage.

- If you use our mix formula, break up the peat first, and pre-moisten.

- If you are doing much mixing, use a cement mixer. This is the most accurate way to mix quantities, by far. Otherwise, it is very hard to mix in things like trace minerals evenly.

- Adding enough moisture to wet the mix, but not so much that water squeezes out if you compress it in your fist, use the following formula:

**SEED MIX # 1** for seeding, using (3) 5-gallon buckets: 2.5 cu. ft). 1 PEAT, 1 VERMICULITE, 1 PERLITE (1 bucket each to make 3 buckets total) + 8.5 oz Osmocote Pro 13-10-13 with IBDU and micronutrients, or equivalent + 4 oz rock phosphate (this stuff is mined, and is released over a very long period) + 2 oz dried kelp (these last two available locally from Peaceful Valley Farm Supply on Idaho-Maryland Rd in Grass Valley, CA)

- Prepare clean flats (see our note above about sowing directly into big bins; if you go that way, sow into an inch of this mix laid over seed mix #2, below). We use 17" by 17" commercial type. Place 18" by 18" **commercial heaviest-duty** landscape fabric in the bottom, to stop soil coming through and roots coming up, and, very importantly, to stop bulbs pulling through to the soil beneath. (Rolls often are usually 36" wide, so saw the roll in half with a hacksaw first).

- Fill flat with mix to 1/2" of top, and tamp down with a plywood board.

- Spread seeds thinly and evenly. You want to avoid later transplantation angst.

- Cover seeds with 1/8" (smaller seed) to 1/4" (larger seed) of mix, and tamp down again.

- We cover the flat with a mulch of pine needles. You can gather them in good quantities from the side of the road after the second or third good storm of the year. Being run over a couple of times makes them soft and easy to lay! Mulch stops heavy rain from knocking mix out of the flat, moderates the temperatures. Shoots grow through fine.

- Water in thoroughly. You may have to water during winter if there is no rain for a few days; test the top of the mix.

- Use two labels (we use color-coded Dymo tape on a stainless steel strip for one) on each flat, and— keep records! We put one label at one edge, just below the surface, where it is protected against being pulled out and the weather, as a back-up for the other one.

- Put flats in the same conditions that they will grow in, similar to where you harvested the seed from.

- Once containers dry out in late spring, protect them from hot sun by moving to shade, orcover with shade fabric.

## **MOVING UP** (after two years)

- Some bulbs are big enough to plant out in your landscape after two years (though they won't be flowering size). We recommend that you do this if you can, you'll get a better survival rate.
- We, however, move our bulbs up into big bins and use a different mix which drains faster and is cheaper, too. If you are growing smaller quantities, you can just plant the seeds (in a layer of seed mix over the regular mix) directly to the big bins, and save yourself the moving-up job.

Note: in later years, we changed to seeding into the final bins, and this worked fine, and it saved a lot of work.

- You can use good commercial potting mix, such as Supersoil, instead of our mix. You can increase drainage if necessary by adding perlite, decomposed granite, or sharp sand.
- Note that black flats, pots or bins can get very hot in the sun. Move to shade, or cover with shade fabric in the summer.

**SOIL MIX # 2** for big (ours are 26" x 20" x 6", filled to 4 1/2") bins, using (6) 5-gallon buckets: 5 cu. ft) 1 PEAT, 1 PERLITE, 1 clean sharp SAND, 3 COMPOSTED BARK (6 buckets total) + 17 oz Osmocote Pro 13-10-13 with IBDU and micronutrients, or equivalent + 8 oz rock phosphate + 4 oz kelp

- You can add more perlite or coarse sand to improve the drainage for desert, alpine types that grow on scree or gravel.
- We transfer the bulbs before the rains, usually in October, using the following "quick and dirty" method.
- On your potting bench, take a 17" by 17" plywood board, lay it on the flat, and turn them upside down, as a unit.
- Remove the flat and landscape fabric.
- Flip the board and mix back over onto the big bin. Don't worry, you'll get better! The bulbs are now right way up.
- Spread out the mix in chunks, then fill in the "cracks" with fresh mix. You are doing this when the bulbs are dormant, so they are not disturbed.
- Wash and disinfect the flat and landscape fabric by rinsing off soil, then soaking in 2% chlorine solution for a day. They can be reused many, many times.

Please note these changes: In 2001, we modified our soil mix because we moved to an area with higher rainfall (50"), and needed better drainage. To the above mix, we add 1/2 bucket 5/16" granite chips, used for "Chip and Seal" paving. This has helped a lot with drainage, but makes for much heavier bins. So we have started moving to the smaller Anderson propagation flats, (Anderson Die & Manufacturing, 2425 S.E. Moores Street, PORTLAND, OR 97222, (503) 654-5629), which are 17 by 17 by 5 inches, with a strong mesh bottom which drains excellently. These are very durable, and are even used as lobster traps with an indefinite lifespan. They weigh 1/2 of our large bins when filled, about 20-25 lbs. We still line them with landscape fabric to stop the bulbs pulling themselves through, and to discourage roots coming in from below.

## **WATERING**

- Flats dry out easily. They must be kept moist from seeding time until consistently hot weather arrives, including during winter. The bins, which have a much higher volume to surface ratio, rarely need winter watering. Start watering November 1 if the rains haven't started. Water until hot weather starts. But remember, most of these bulbs dislike high soil temperatures and moisture at the same time, so if this combination occurs, stop watering. [Back to Top](#)

## **FERTILIZING**

- After the second year, topdress flats each fall with slow-release fertilizer. We use these amounts:
  - Topdressing + 17" flats—1 LARGE tablespoon Osmocote-type fertilizer each (17.6 grams) + Big Black Bins (1.35 cu. ft = 2234 cu. in)—3.2 tablespoons Osmocote (47 grams)
  - When watering, we use Miracle-Gro in a Miracle-Gro mixer/dispenser on the hose every two weeks, from March until drying out time (see "Watering") at HALF strength. Don't leaf fertilize on hot days, and follow up by watering the next day.

## **HARVESTING**

- Bins dry out before August and bulbs are dormant. Empty bins out on the potting bench, and sift through mix carefully. Be careful of dust, wear a mask if necessary. The sizes of the bulbs will vary dramatically. The littlest bulbs can be hard to find (the size of rice grains and sometimes the same color as the mix). •

Note: some dryland species form bulblets from the base, and some form offsets on the stem. Separate, and grow on.

- Sort into sizes, replant little 'uns back in same mix after incorporating fresh batch of slow-release fertilizer.
- Of course, do not reuse mix if there has been disease!

## **BIG LESSONS LEARNED** (over 20 years!)

- It took us years to learn this lesson... Use the heaviest-duty landscape fabric you can find to line your Anderson bins. The majority of these bulbs can pull themselves down right through regular landscape fabric into the soil below. The next season, they cannot find their way back up through the same hole, so they die. We lost thousands upon thousands of bulbs before realizing this (we thought the holes we saw were from tree roots or insect tunnels).
- Do not grow bulbs beyond five years in the same bin. The losses become increasingly heavy. If you are growing these as a hobby to plant out on your land, they are big enough at two years old. Plant them out then, the survival rate will be the highest at that point.
- Do not use 'natural' fertilizers. We tried compost, compost tea, and organic fertilizers. What may be good for other plants is death to native bulbs—probably they have little resistance to unfamiliar microbes.
- Do not be tempted to use the offsets produced by the *Dichelostemmas*. Use fresh seed instead. Give away or plant out those offsets instead.

- Replace any labels over four years old. Use two labels per bin, with one pushed down the side as insurance. Of course, you are logging all your seeding, aren't you?
- The ideal growing situation is: lots of sunshine in the spring, some way to shade the growing bins as soon as the plants have died back. Homeowners can move the bins under the porch, larger scale growers must use shade fabric. The worst case scenarios are: moist soil and high temperatures at any time of the year, and: cooking the bulbs in black containers in the sun. Do whatever is necessary to avoid these scenarios!

## REFERENCES AND RESOURCES

- Growing California Native Plants, by Marjorie Schmidt
- Complete Garden Guide to the Native Perennials of California, by Glen Keator
- Seed Propagation of Native California Plants, by Dara Emery
- Wild Lilies, Irises and Grasses: Gardening with California Monocots by Nora Harlow, Kristin Jakob, editors (University of California Press, 2003)

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## GARDENING WITH CALIFORNIA'S NATIVE BULBS

Nancy Gilbert, the co-owner of Far West Bulb Farm, wrote this article. She has designed landscapes of all kinds over the last twenty years, has operated a commercial native plant nursery, and is a specialist in native and Mediterranean climate plants.

California is blessed with one of the richest and most diverse flora in North American, largely due to the incredible climatic and geological variety. The bulb, corm and rhizome producing plants rank among the most interesting and beautiful of California's plants and have tremendous gardening potential, which is largely untapped by the horticultural trade. For simplicity's sake, I'll use the term 'bulb' to refer to plants that produce a bulb, corm, tuber or rhizome.

Hundreds of species of California bulbs can be found growing in ecosystems ranging from alpine, chaparral, oak woodland, valley grassland, desert, riparian and coastal rain forest. Bulbs can be seen growing in wet areas, such as the edges of vernal pools, drainages and seeps, as well as on dry, rocky and difficult sites such as serpentine. There is a native bulb for almost every niche in your garden.

A primary key to successfully landscaping with native bulbs is to know the preferred habitat of the species, including soil type, exposure, amounts of light or shade and water, and then to duplicate this habitat as closely as possible in your garden. California native bulbs have sometimes been labeled as 'difficult to grow', but numerous species are very easy to propagate and grow in a wide range of conditions. Among the easiest and most versatile are the members of the genera Brodiaea, Dichelostemma and Tritoleia. Most of

the species in these genera are adapted to summer drought but many species will accept occasional summer water, so long as the drainage is good and the soil dries between watering. Many even perform well in heavy clay soils.

Some species, such as *Triteleia peduncularis*, *Triteleia hyacinthina* and *Brodiaea coronaria* grow on sites that are very wet in spring and prefer moisture through flowering. We have observed in our own garden that many of the *Brodiaeas* and *Triteleias* actually grow more robustly if they receive occasional watering during the dry season. *Brodiaeas*, *Triteleias* and *Dichelostemmas* are perfectly suited to the mixed border, especially in a xerophytic planting of native and other Mediterranean plants that receive occasional or no summer water. They are lovely growing up through *Creeping Sage* and *Bearberry* or with the apricot-colored flowers of *Bush Monkeyflower* as a backdrop.

For maximum effect, plant them in closely spaced groups to give a strong splash of color.

There are over fifty species of *Alliums*, or wild onions, found growing in California. Most are easy to grow and multiply rapidly in the garden. The species that are native to the mountains or moist meadows, such as *Allium unifolium*, prefer full sun and regular watering all season. The majority of wild onions are from dry, rocky habitats and need good drainage with summer drought. Most *Alliums* are well-suited to rock gardens, where they can be planted in colonies among short-growing *Brodiaeas*, such as *Brodiaea purdyi*. Their lovely pompom blooms can also be displayed to advantage when planted in groups towards the front of the mixed, dry perennial border.

The genera *Calochortus* includes some of the more challenging species for the gardener, but also contains numerous easy growers. This genus contains some of the finest ornamental species, so it is well worth it for the beginner to try some of the more carefree varieties, while the more avid horticulturists will enjoy the reward of seeing a more difficult species, such as the exquisite *Calochortus kennedyi*, blooming in their rock or desert garden.

The *Calochortus* all need good drainage and a period of summer dormancy. Among the most dependable *Calochortus* species to use in the landscape are: *Calochortus albus*, *Calochortus amabilis*, *Calochortus amoenus*, *Calochortus luteus*, *Calochortus vestae*, *Calochortus monophyllus*, *Calochortus uniflorus*, *Calochortus argillosus* and *Calochortus superbus*. *Calochortus albus*, *amabilis*, and *amoenus*, commonly referred to as *Fairy Lanterns*, prefer partial shade and will accept occasional summer water if they have good drainage; they are often seen growing on steep, north or east facing banks. The *Pussy Ears* and *Star Tulips* occupy varied habitats, from temporarily wet meadows to dry pine woodlands. *Calochortus monophyllus*, *Yellow Star Tulip*, is an open woodland grower and prefers filtered light and summer dry, whereas *Calochortus uniflorus*, which grows in meadows, is best with some early summer water.

The Mariposa Lilies, such as *Calochortus superbus*, appreciate sunshine and require summer drought. They are stunning planted in drifts with native bunch grasses and other wildflowers, in the mixed, summer dry border, or planted among California native shrubs, such as Coffeeberry, Manzanita or Toyon. The Mariposas also can be used for spring color on your deck or patio by planting several of them in a deep container with well-drained soil. The container should be stored in a dry, shady location once the blooming period is over. Many of the species in the genera *Fritillaria* and *Lilium* tend to be a bit temperamental when planted outside of their native habitat. However, if you live in the area where they grow naturally or you have the commitment to provide them with their requirements, they are among the most rewarding of plants to have in your landscape.

Both of these genera are quite the favorites with the deer, so it is important to plant them where the deer either cannot reach them or are likely to overlook them. If your yard is fenced to exclude deer, then you can plant them in the open under the native trees, but if not, our experience has taught us to plant them strategically among rock outcrops, on steep banks or under shrubs to help protect them from predation. We have also had good success with some of the commercial deer repellents on the market.

The Fritillaries appeal lies in their subtle daintiness, with delicate blossoms that frequently have checkered color patterns on the petals. The Fritillaries are generally considered finicky in the garden and often take every other year off from flowering for a rest period. If you want a good show of flowers each year, it is advisable to plant a colony of several bulbs. They are found growing in a wide array of habitats, from coastal forests and grasslands to hot foothill locations to high montane forests. The majority of the Fritillaries require a summer dormant period with no water as well sharp drainage. *Fritillaria pluriflora*, commonly called Adobe Lily, and *Fritillaria liliacea*, White Fritillary, tolerate heavier soils and are easy to grow if you have a sunny, warm site in a meadow or summer dry border. Woodland growing species, such as *Fritillaria affinis* (*lanceolata*), may be watered occasionally throughout the year.

For many, the lilies are the queens of the garden, and the California native lilies are no exception. There are both wet land and dry land growers among this species, and their growing requirements must be met for success.

Among the dry land lilies, Humboldt's Tiger Lily is one of the most sensational and is fairly easy to cultivate. It can be found in nature growing in the foothills, under oaks and pines and among native shrubs, such as Coffeeberry and Toyon. It is long-lived (some in foothill cemeteries are at least 50 years old), often attaining a height of over six feet with up to 30 Turk's cap type blooms per plant. *Lilium pardalinum*, the Leopard Lily, is a wet grower and can be found growing in colonies along seeps and creeks in both the coastal and Sierra regions. If you have a perennially moist, partially shaded location, this striking lily can be quite easy to grow. Washington Lily has white to slightly blushed lilac blooms, and many consider it to be the noblest of the native lilies. It needs the cooler temperatures of higher



elevations above 3000 feet to thrive and will reward you with its grace and heady fragrance. It is another dry land lily requiring good drainage.

The Erythroniums, or Fawn Lilies, are some of the most enchanting native bulbs, lending a fairyland look to the landscape. They are best appreciated up close and should be planted in groups at the front of the garden for maximum effect. Their cultural requirements vary, depending on their native habitat, and care should be taken to simulate those conditions in the garden. Species with mottled leaves come from foothill woodlands and rocky openings and prefer summer dormancy, although they will accept light summer watering. Examples are *Erythronium californica*, from the north Coast Ranges and the Sierra form, *Erythronium multicaepodium*, found growing on dry, rocky slopes. The Erythroniums from montane meadows, such as *Erythronium tuolumense*, have solid green leaves and are adapted to winter dormancy and summer moisture.

The Fawn Lilies generally require good drainage and those species native to bog edges or moist meadows should be given supplemental water during the summer.

Unfortunately for gardeners, most of the California native bulbs are a tasty treat for gophers and squirrels. So if you have these rodents in your area, it behooves you to protect your bulbs, especially at the time of planting, when they are most vulnerable. Tucking them into rock outcrops is one way to make them less accessible. You can lay one inch chicken or aviary wire over the bulbs, just below the surface of the ground or construct a subsurface cage of the same materials. Commercial sprays and slow release, systemic tablets that protect bulbs are readily available, but this can become a bit expensive if you have a large number of bulbs to protect. There are recipes on the internet for making your own sprays from hot peppers, eggs and other available materials. Sprays and repellent tablets will also work to repel rabbits, which can sometimes munch on the leaves of bulbs. If you have an overabundance of gophers, you may want to consider trapping them.

Most California native bulbs prefer lean soils with sharp drainage. Exceptions are those found growing in adobe soils, wet meadows, woodland areas or along creeks and seeps. Soils only need to be amended if you are trying to grow a species in a soil that differs markedly from the bulb's natural habitat. Woodland species may need to have humus added to the soil and bulbs native to rocky mountain scree areas will need to grow in rock gardens where soils have been altered for fast drainage. In general, it is not advisable to add any fertilizer to the planting holes except those formulated specifically for bulbs. These fertilizers are high in phosphorous and potassium, but low in nitrogen. We add only soft rock phosphate to our planting holes and have had good results.

All-in-all, California native bulbs offer the Mediterranean gardener or landscaper beautiful, versatile and water efficient plants whose full potential is just beginning to be

appreciated. Many species are becoming rare in the wild, so using them in your garden is also a way to preserve these gems for future generations.