

The Art of Raising Succulents

Saturday Dec 5, 2021
1:00 -3:00 pm



Art courtesy of Kathy Tranmer, UCMG 1996. kathytranmer.com



UC Master Gardeners of Napa County

<http://napamg.ucanr.edu/>

Our mission: "To extend research-based knowledge and information on home horticulture, pest management, and sustainable landscape practices to the residents of California and be guided by our core values and strategic initiatives."



Don't be Prickly ... Take Our Survey!

Our follow-up survey provides us the tools we need to grow and improve the quality of our program.

Speakers and Topics

Mike Quinn: Succulent Characteristics, Origins, and Types

Jane Lommasson: Care, Maintenance, and Propagation

Marcy Berruezo: Designing with Succulents in Containers and the Landscape

To the best of our knowledge, the photos used in this presentation are referenced, in the public domain, free to share and use, or are our own.



Art courtesy of Kathy Tranmer, UCMG 1996.
kathytranmer.com

What is a Succulent?

- Get your smart phone ready and put in camera mode

The Succulent Odyssey



Classification

- Kingdom – Plant v Animal
- Phylum
- Class
- Order
- Family
- Genus
- species

Dudleya

Dudleya farinose



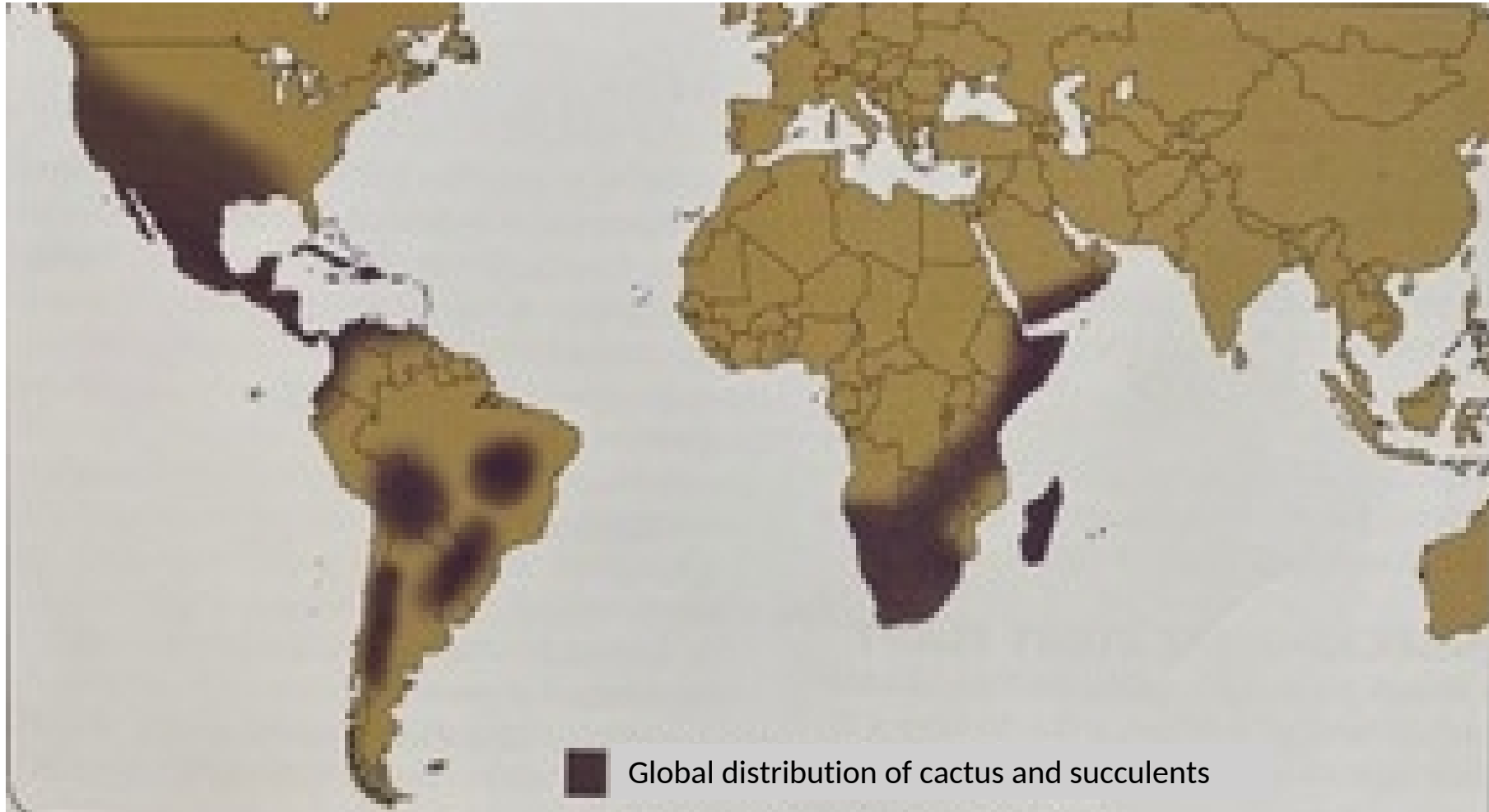
Dudleya brittonii



Large Families!



World map



Ground, Rocky Walls & Trees



Why Grow Succulents?



They're Easy!



Labels?



Sunburn & Frost Damage



Climate

Sunset Climate zones



Sunset Western Gardens

- Zone 7: Lake Berryessa, Gray Pine
- Zone 14: Valley floor, Coastal Warm
- Zone 15: Hillsides, Coastal Cool
- Zone 17: Carneros, Marine

USDA/ Sunset Climate Zone Conversion Chart

USDA Zone	Temp. (F)	Temp. (C)	Sunset Equiv.
1	below -50F		A1
2a	-50 to -45F		A1
2b	-45 to -40F		A1
3a	-40 to -35F		A1
3b	-35 to -30F		A1
4a	-30 to -25F		A1
4b	-25 to -20F		A1
5a	-20 to -15F		1A, 1B, A2
5b	-15 to -10F		1-2
6a	-10 to -5F		1-3
6b	-5 to 0F		1-3
7a	0 to 5F		6
7b	5 to 10F	-14.9 to -12.3C	6-7
8a	10 to 15F	-12.2 to -9.5C	4, 6-9
8b	15 to 20F	-9.4 to -6.7C	4-5, 7-9
9a	20 to 25F	-6.6 to -3.9C	16
9b	25 to 30F	-3.8 to -1.2C	16-22
10a	30 to 35F	-1.1 to 1.6C	17-23, 26
10b	35 to 40F	1.7 to 4.4C	23-24, 26
11	above 40F	above 4.5C	25, H1, H2

Microclimates at Home



Cacti

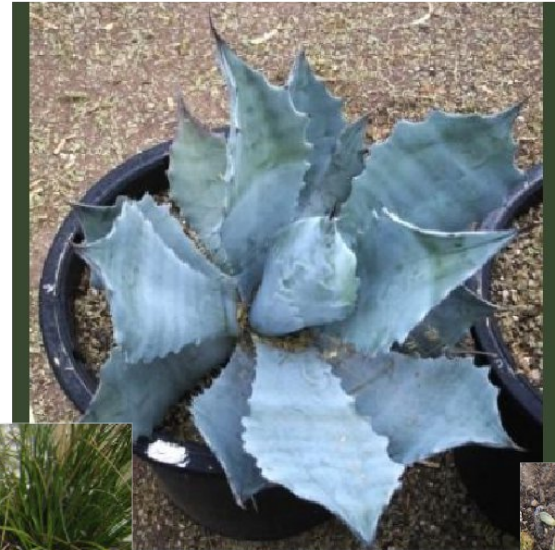


Agave

CR/Mx



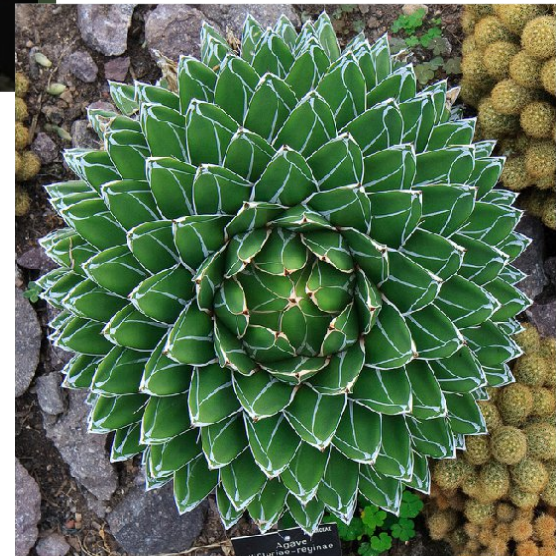
Agave parryi



Agave colorata



Agave neomexicana



Agave victoriae-reginae

Echeveria

Mx/Arg

Echeveria imbracta



Echeveria imbracata – in bloom

Sempervivum

Alp/Pyr



A myriad of colors and leaves!

Aeonium

Cnyls



Euphorbia

Afr/Mad/Mrco/Cnyls



Aloe

Afr/Mad/ArbPen

Aloe nobilis



Aloe striata



Aloe polyphylla



Sedum

Sedum



Mx

Sedum 2



Sedums go on and on!



Crassula



Crassula ovata



Crassula corymbulosa 'Red Pagoda'

SoAfr



Senecio Afr/Mad/Mx/Cnyls

Senecio peregrins



Thank you!



Care and Maintenance

Tips: dos and don't

Succulent Basics

- Seasonal Care: Winter vs. summer dormant
- Drainage
- Soil
- Water
- Hardiness
- Fertilizer
- Troubleshooting pests & disease

Seasonal Care – opportunistic growers

Summer Dormant = grow mostly in fall, winter, spring

Winter Dormant = grow mostly in spring, summer, fall

Aeonium

Aloe

Crassula (Jade family)

Haworthia

Sanseveria

Bulbine

Kalanchoe

Agave

Echeveria

Sempervivum

Euphorbia

Adenia

Pachypodium

Tillandsia

Know your plant's growth cycles as these will be the ideal times to repot, fertilize, and propagate

*To determine if your particular succulent is winter dormant, or summer dormant a few sites such as <https://www.ucanr.edu/garden-help/succulent-growing-seasons/>
Or <https://www.succulentsandsunshine.com/succulent-dormancy-table/>*

Grow mostly in the fall, winter, spring

Summer dormant succulents

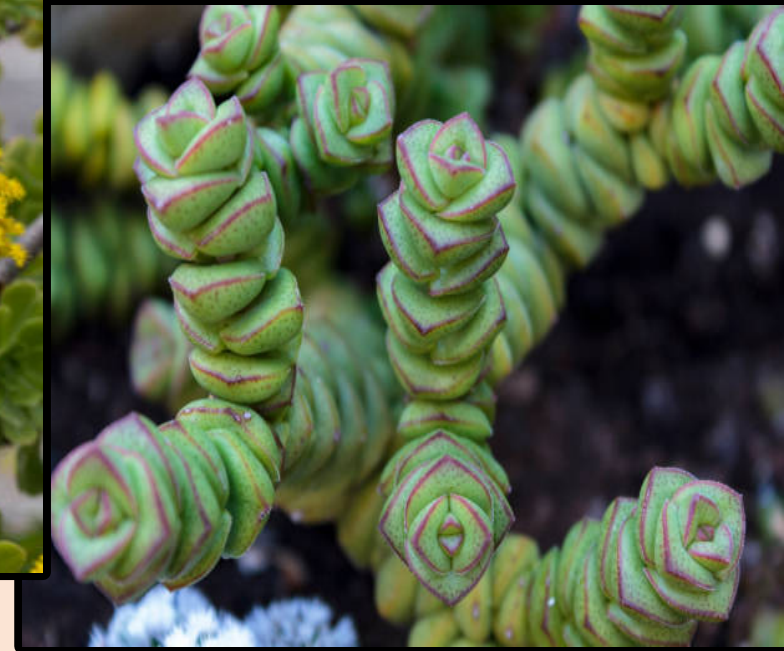
Aeonium



Haworthia



Crassula



Grow mostly in spring, summer, fall

Winter dormant succulents

Agave



Echeveria



Sempervivum



Drainage



pixabay.com

Succulents do not like wet feet

Waterlogged roots will rot

Containers: pick one with a drainage hole



alamy.com

Soil

Amend potting mix or garden soil with: white pumice, or crushed red lava rock, organic matter, coarse sand

Suggested medium from UC

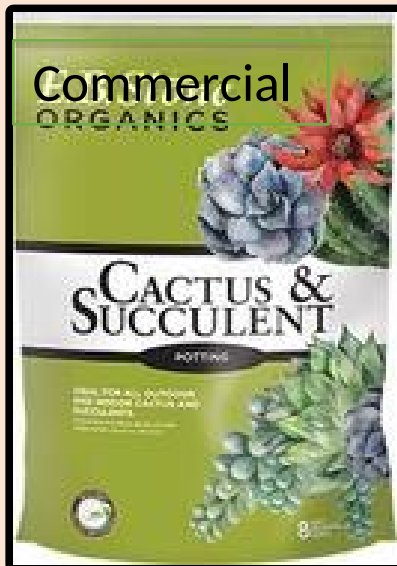
1 part coir or ground sphagnum peat**

1 part coarse sand

2-5 parts white pumice

1 part redwood compost

** Sphagnum peat is not a renewable resource – consider coir.



Or buy commercial cactus mix
Important factor is that it provides
good drainage



Watering Tips



[unsplash.com](#)



[gettyimages.com](#)

Point to remember: once/week in summer, 2x/month spring & fall
1x/month in winter.

When your succulent is in dormancy slow down on water.

Hardiness



Try to replicate
your plant's
native habitat

Most succulents do well
in USDA zones 9-11 –
but there are some cold
tolerant succulents

Sunset Western Garden Book lists
Napa as 14-15-17 (see Sunset
Western Garden Book)

Fertilizer



Dos

- Consider fertilizing annually if succulent is older
- Feed during warm growth months
- Use a balanced liquid fertilizer (15-15-15)
- Know your plant's native habitat and growth pattern

Don'ts

- Don't fertilize when newly planted or repotted
- Don't over fertilize
- Don't feed more than twice yearly, at most
- Do not use concentrated liquid fertilizers (always dilute)

Troubleshooting pests & disease

Problem	Cause	Solution
Plant is getting leggy	Too far away from light source	Put in better light as soon as possible
Dry and shriveling	Too much light	Move it further away from light
Drying quickly after watering	Needs to be repotted	Get a larger pot and transplant
Brown, green, or beige bumps on stems, often accompanied by a sticky nectar	Scale insects	Isolate plant from other plants, outside if possible. Spray it down with isopropyl alcohol and scrape off the scales gently with your thumb. Repot with fresh soil
White clumps at the base of the leaves	Mealybugs	Use cotton swabs and either isopropyl alcohol or a neem oil spray to clean them off. Repot with fresh soil
Holes in leaves	Snails or slugs	Find and remove the pests. If the problem persists, wrap the planter with copper slug tape (available at most garden stores). The pests won't cross the copper and can't get to the leaves they want to eat
Wet spots on the stems	Overwatering	Take cuttings from the plant above the mushiness and propagate those pieces. Throw away the infected plant, including the soil
Colorful leaves turning green	Not enough sun, too much attention (meaning water, nutrient-rich soil, and fertilizer).	Give it less attention to bring back those pretty colors
Drying bottom leaves	Not a problem. This is how the plant interacts with the earth to protect itself and create detritus, which will decompose and add to the soil.	You can leave alone, or remove the leaves if you wish.
Brown marks on the tops of the leaves	Sunburn	Succulents can get sunburned at times. Move your plant away from direct sun. The burns won't heal, but your plant will eventually replace those leaves

Mealy Bug



Gardenknowhow.com



Aphids

Busy in the
spring

Small
numbers not
a problem

Infestations
can cause
distortion



Snail/slug Damage

One of the most common
pests in the garden

Active at night or drizzly
days

Can be quite destructive

<http://ipm.ucanr.edu/PMG/PESTNOTES>



Debra Lee Baldwin

Rot

Roots turn
dark brown
or black

Stems/leaves
mushy



Debra Lee Baldwin

Plant is getting
leggy

What's going on here?



Debra Lee Baldwin

Drying Bottom Leaves

Bottom leaves
look untidy

Good or bad?



Debra Lee Baldwin

Frost damage and hail damage



Debra Lee Baldwin



Nielsen-Berruezo

Severe frost damage

Not salvageable



Debra Lee Baldwin

Pot Bound

Time to repot your
succulent



Tips for repotting

Not recommended to repot during the plant's dormancy

- Choose a pot with one or more drainage holes
- Choose a container that is wider and deeper than the current one
- Choose a container whose color and shape will compliment your succulent
- Assemble materials and find a suitable location to work
- Clean your new container
- Prepare your new container with a few inches of dry succulent/cactus soil
- Remove the old plant from its container
- Place your plant in it's new container. (to water or not to water...)

Tools



Debra Lee Baldwin



madalinebrush.com



Istockclipart.com

Succulent Propagation

The fun of succulent propagation

- Cuttings
- Leaves
- Division
- Chicks
- Seeds

Propagation by cuttings

- Cut succulent stem
- Allow cutting to dry on tray
- Once calloused – it's ready to plant
- Do not water for the first 2 weeks



Aeonium from cutting



Aeonium start

My cutting dried on a tray
with no soil for a week

The cutting was moved to a
small clean pot with fresh
succulent soil

No water for almost 2 weeks

Dry lower leaves are natural
process



Propagation by leaves

- Separate leaf from mother plant
- Allow leaf to scab on tray in a bright environment
- Place leaf on a bed of soil on a tray (curved side down)
- Watch for tiny root like hairs to sprout



Propagation Prep



Allow
cuttings to
callous



Leaf Propagation

The small
hair like
roots have
formed on
the leaf
cuttings



Leaf Propagation

- Watch for rosette to sprout at base of leaf
- The mother leaf will begin to wither
- When rosette is at least an inch wide, it's ready to repot



Echeveria

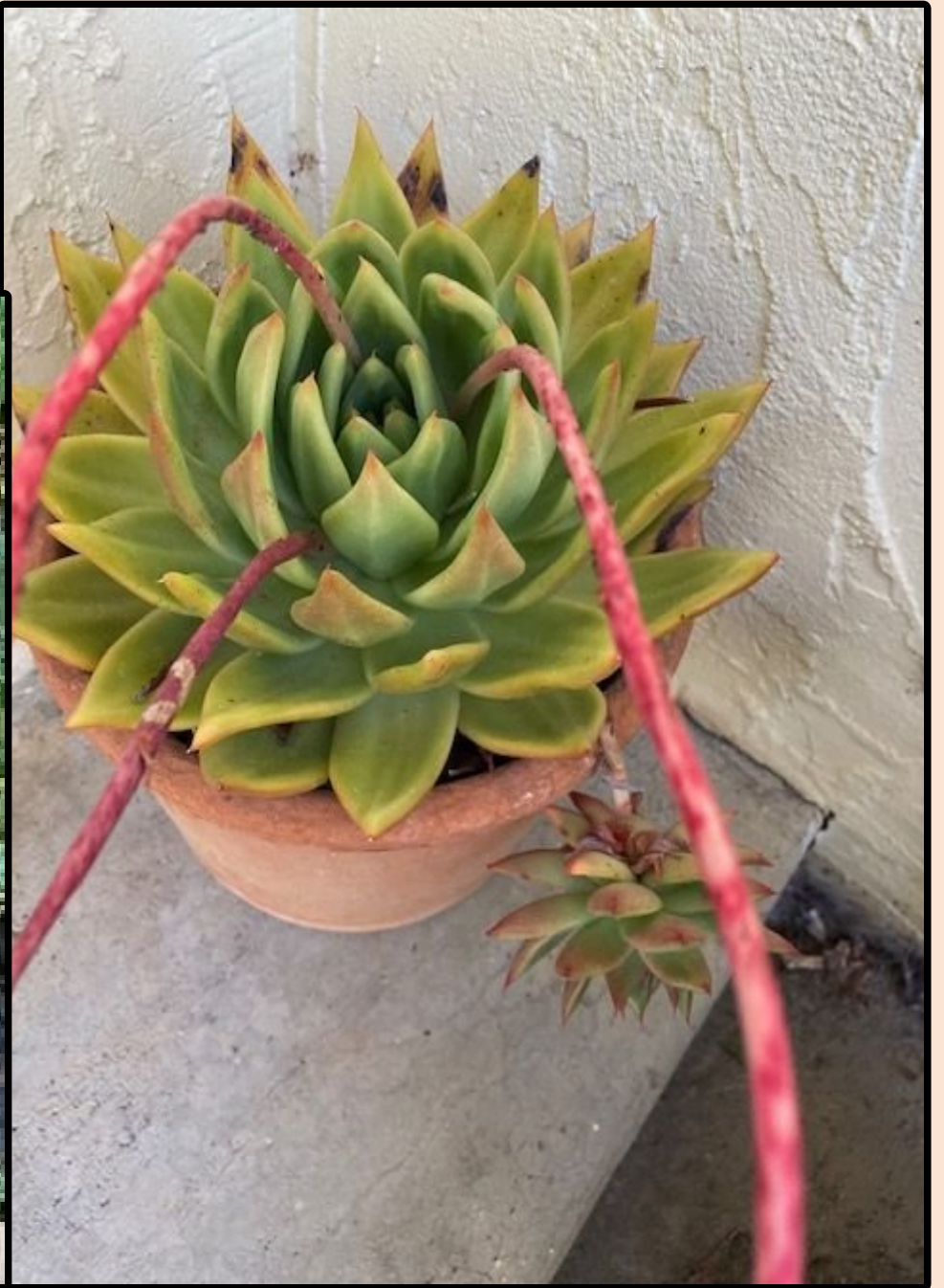
Rosette sprout on
echeveria

Propagation by Division

Stem and root Division of Tiger Haworthia

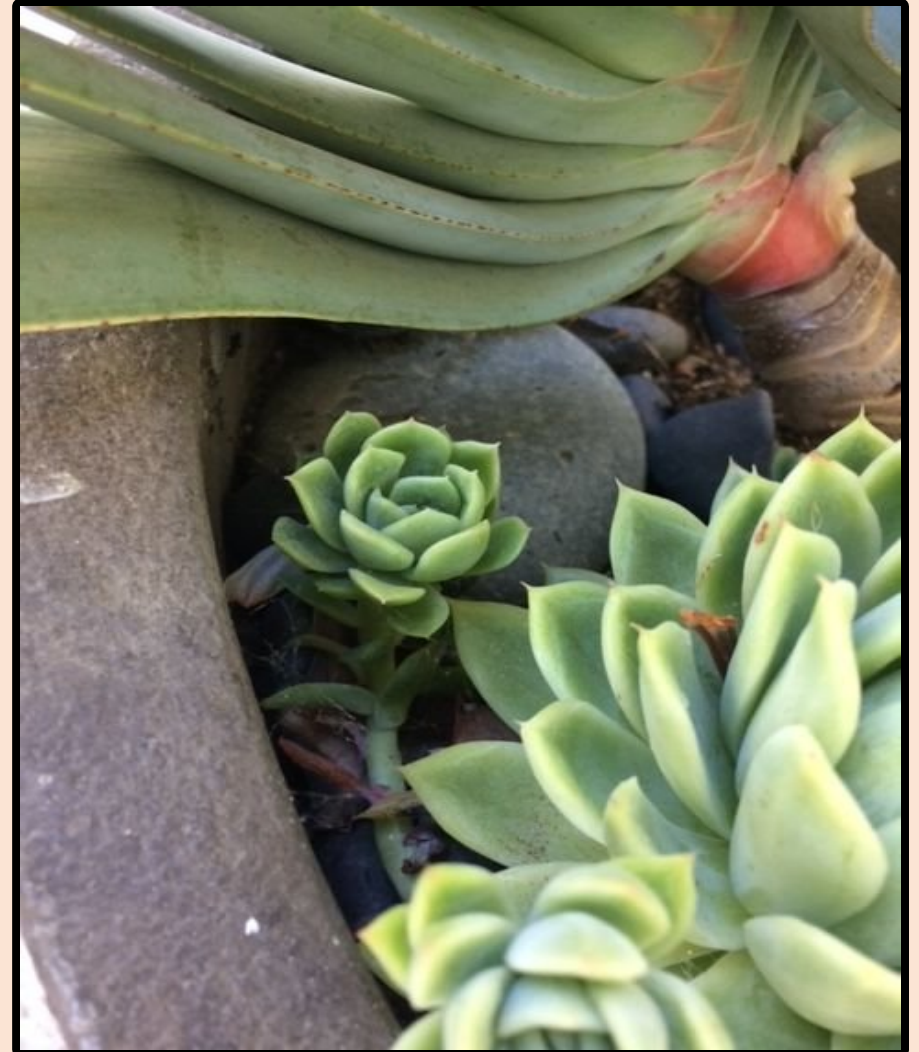


Propagation with “chicks”

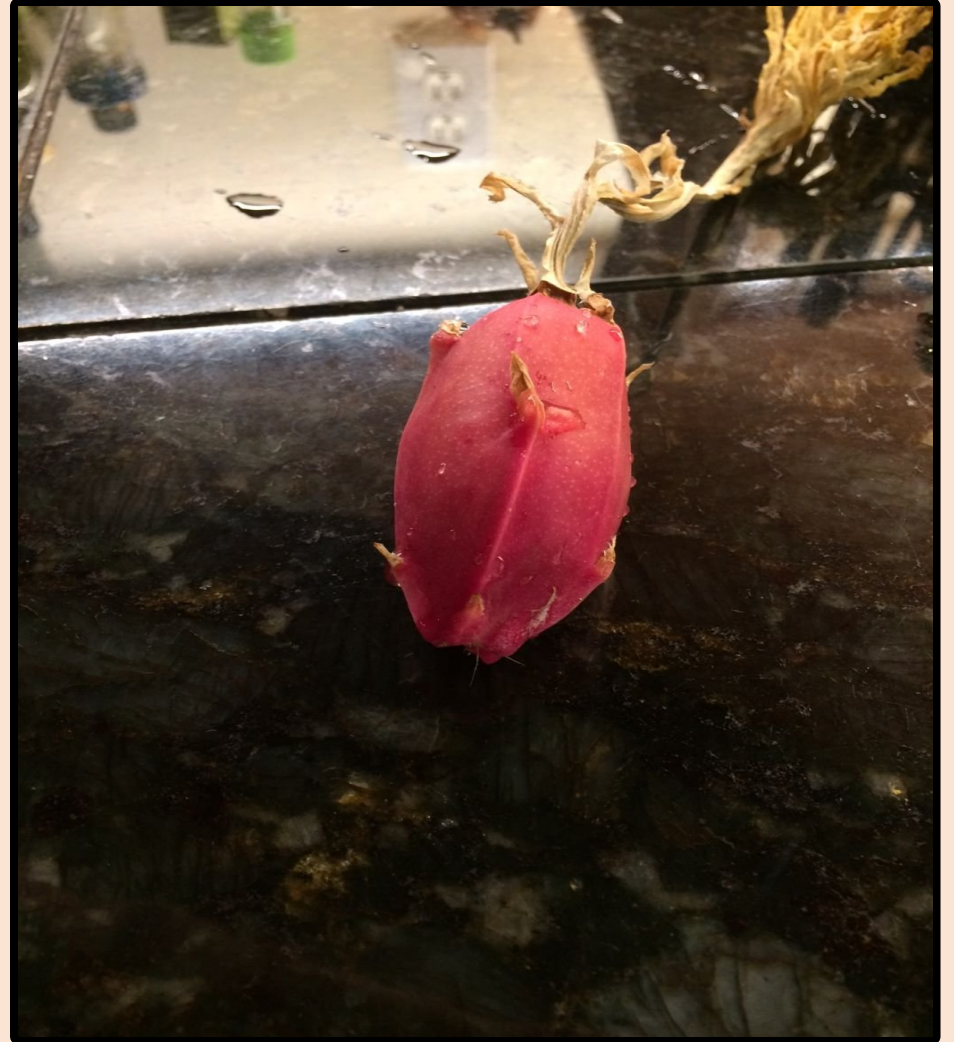


Propagating with chicks

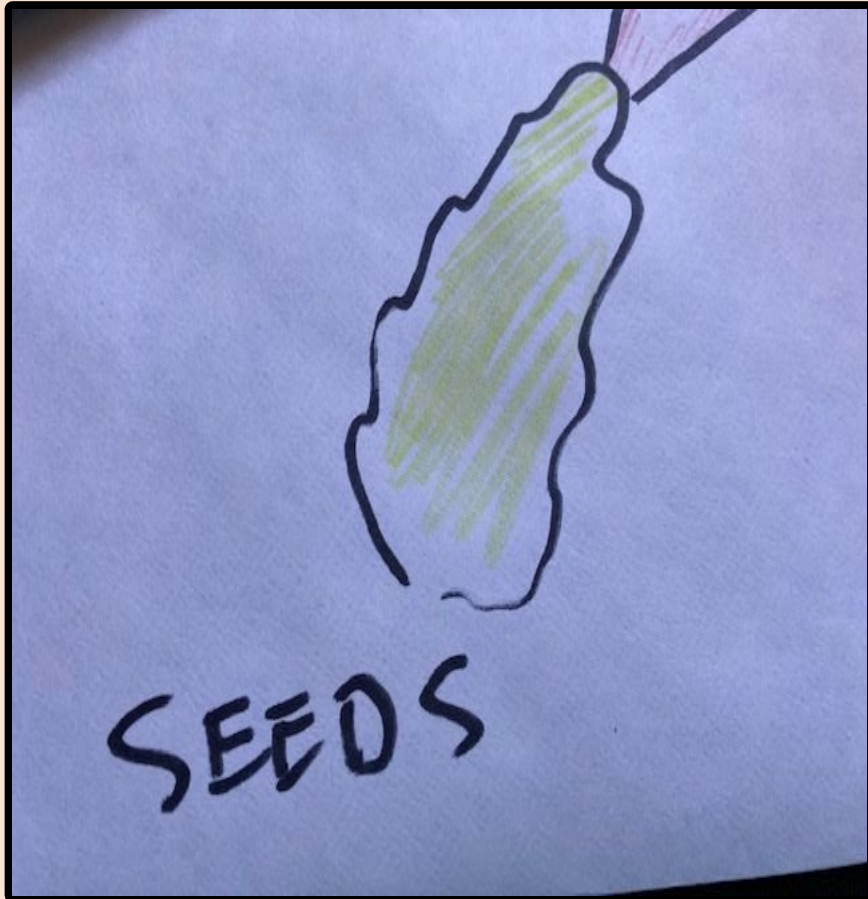
- Separate the chick from the hen
- Let the chick stem callous
- Place the small stem in rooting hormone (optional)
- Place in cactus/succulent soil
- Watch it grow



Propagation by seed



Queen of the Night seeds



Which is which?



References

- Baldwin, Debra Lee 2017. Designing with Succulents, Completely Revised Edition. Timber Press.
- Shelf, Ken. 2018. essential succulents, The Beginner's Guide. Rockridge Press.
- Kelaides, Moore Gwen 2008. Hardy Succulents: Tough Plants for Every Climate. Storey Publishing.
- ucanr.edu/mgsantaclara/succulents
- Ucanr.edu/sites/mgalameda/succulents
- Devilmountainnursery.com/hardy-succulents-for-frost-prone-areas
- Succulentguide.com
- Succulentbox.com
- Gardeningknowhow.com
- Sublimesucculents.com
- Nationalgardeningassoc.com – garden.org
- <http://ipm.ucanr.edu/PMG/PESTNOTES/>

Designing with Succulents



Aloe polyphylla

Plant Requirements



Aloe arborescens

RIGHT PLANT,
RIGHT PLACE
Water
Light
Exposure
Drainage
Soil Aeration
Fertility
Protection
Space



Design Considerations

Location
Function
Form
Color
Repetition
Expression
Etc.

Advantages of Containers



- Drainage: Fast, no standing water
- Soil: Porous, coarse aggregate, low organic content
- Location: Sheltered from frost, harsh sun
- Mobility: Can be relocated with changing conditions
- Style: Size, shape, color, form to suit plants and preferred style

Planning Your Container

- **KNOW YOUR PLANT(S):** Research plants' needs: Water, light, exposure, drainage, fertility, eventual size.
- **GROUP PLANTS** with similar dormancy and requirements for moisture, light, shelter and drainage.
- **CHOOSE A CONTAINER** compatible with plants' shallow roots (or modify) and design style desired.
- **ARRANGE PLANTS** for size, color and growth habit.
- **PLANT GENTLY**, from tallest/largest to smallest/lowest.
- **PLACE** container where plants will receive appropriate light and shelter. Turn if needed to prevent elongating toward light.

Hydrology of a container: Field Capacity and Drainage

Capillary Action

1.



2.



After one minute

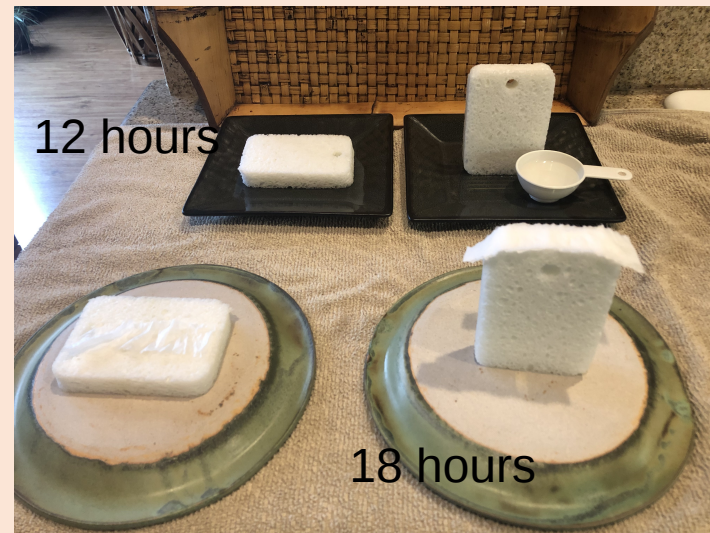
Gravitational Pull

3.



Gravitational outflow after saturation

4.



12 hours

18 hours

Form



Anything can be
a succulent
container...as
long as it drains





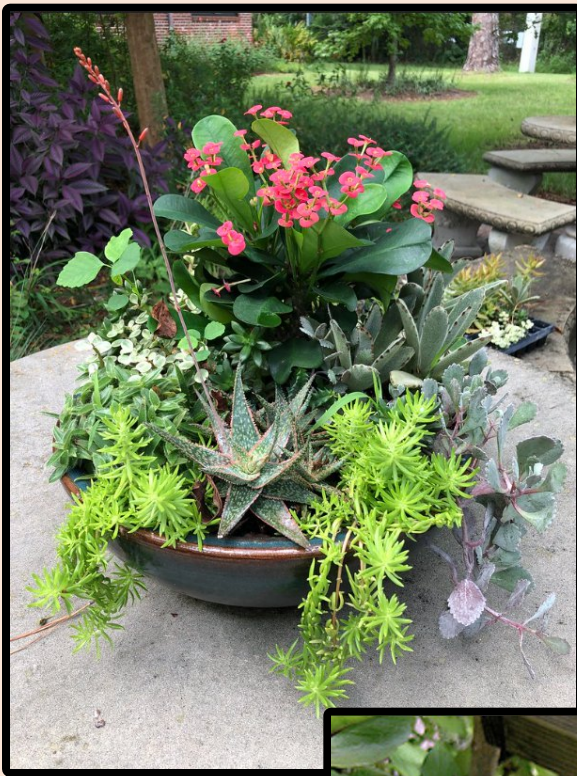


Function

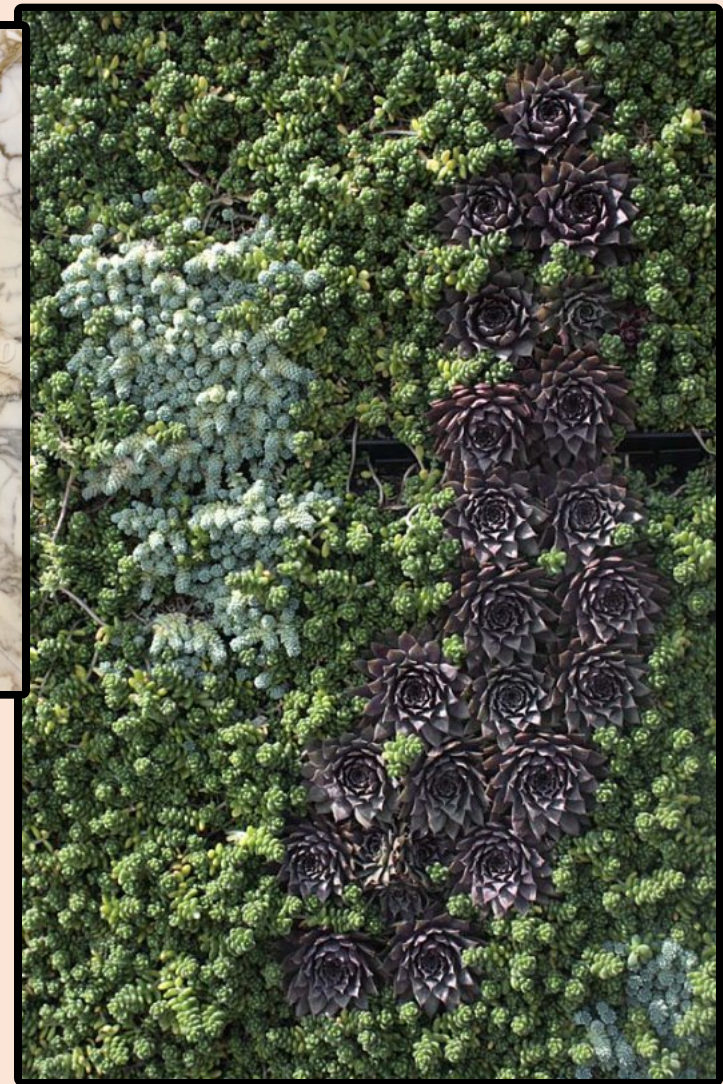


Centerpiece

Thriller
Filler
Spiller



Tapestry



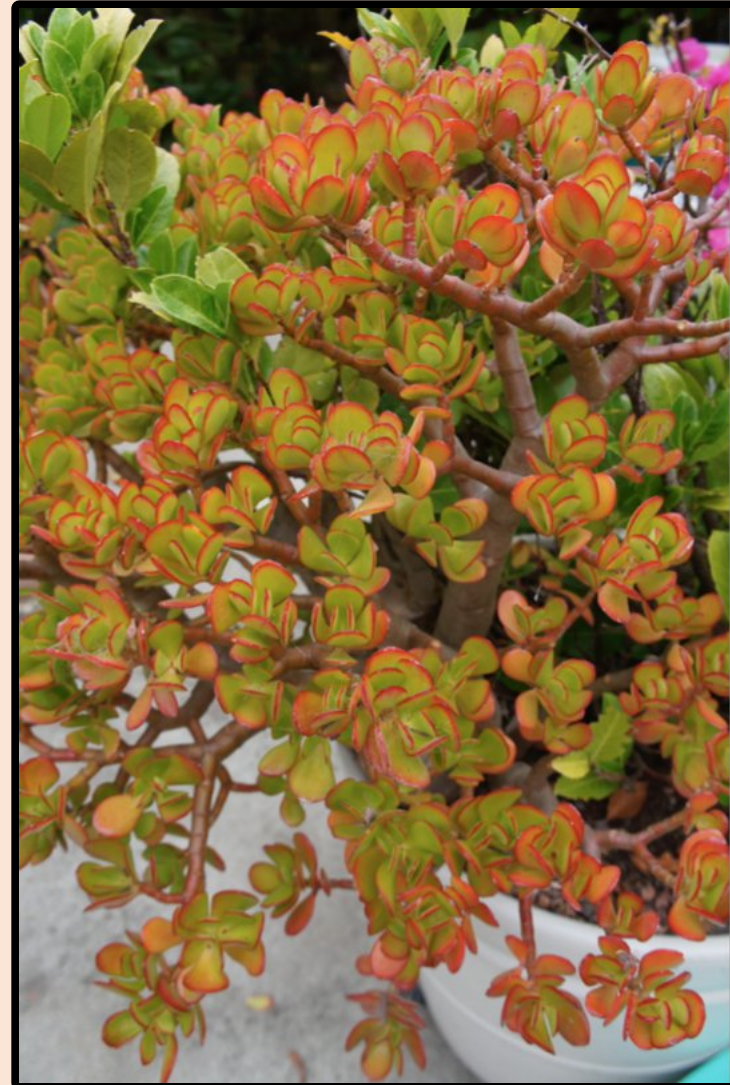
Low and tight

Color



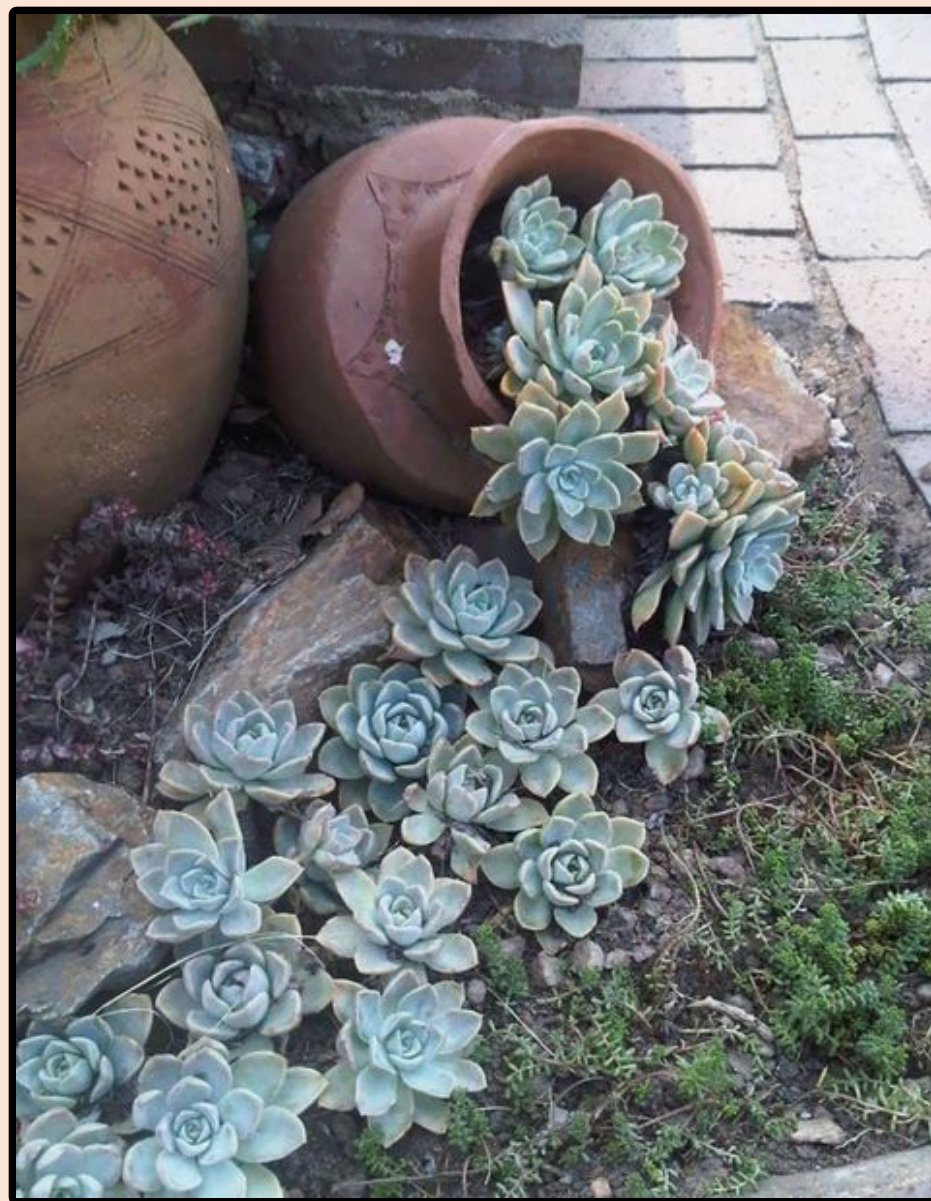


Warm





Cool





Color and Mood





Repetition

Designing in the Landscape

LOCATION

When those lovely succulents:

- outgrow their pots,
 - have so many offsets they look like the Old Woman in the Shoe,
 - your carefully planned design just doesn't look the same,
- it's time to find a place in the garden!

KNOW YOUR GARDEN:

Sun/shade direction, time of day,

Frost/wind exposure,

Reflected heat and light,

MICROCLIMATES

KNOW YOUR PLANT(S):

Research plant's needs: Water, light, exposure, drainage, fertility, eventual size. Plan ahead.

RIGHT PLANT. RIGHT PLACE:

Sunset Western Garden Book, 2012



Plant Requirements:

Location: Right Plant, Right Place

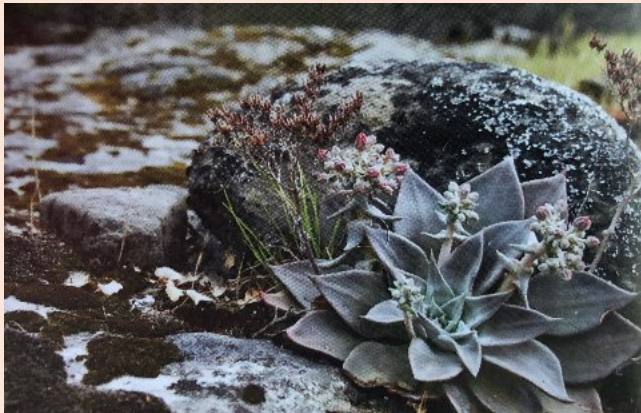
- Morning light or shelter from hottest sun (for most succulents. “It depends”)
- Bright light shade for Dudleyas and other plants from coastal areas.
- Generally, at least 2 hours of sun or bright indirect light to avoid elongation.
- Higher ground: Mounds or slopes for improved drainage and frost protection.
- Fast-draining soil, amended if necessary.
- Plant rosettes at an angle to allow centers to drain.
- Shelter from rain during dormancy (Best if bright, dry, and cool during dormancy.)

Function is a factor in placement:

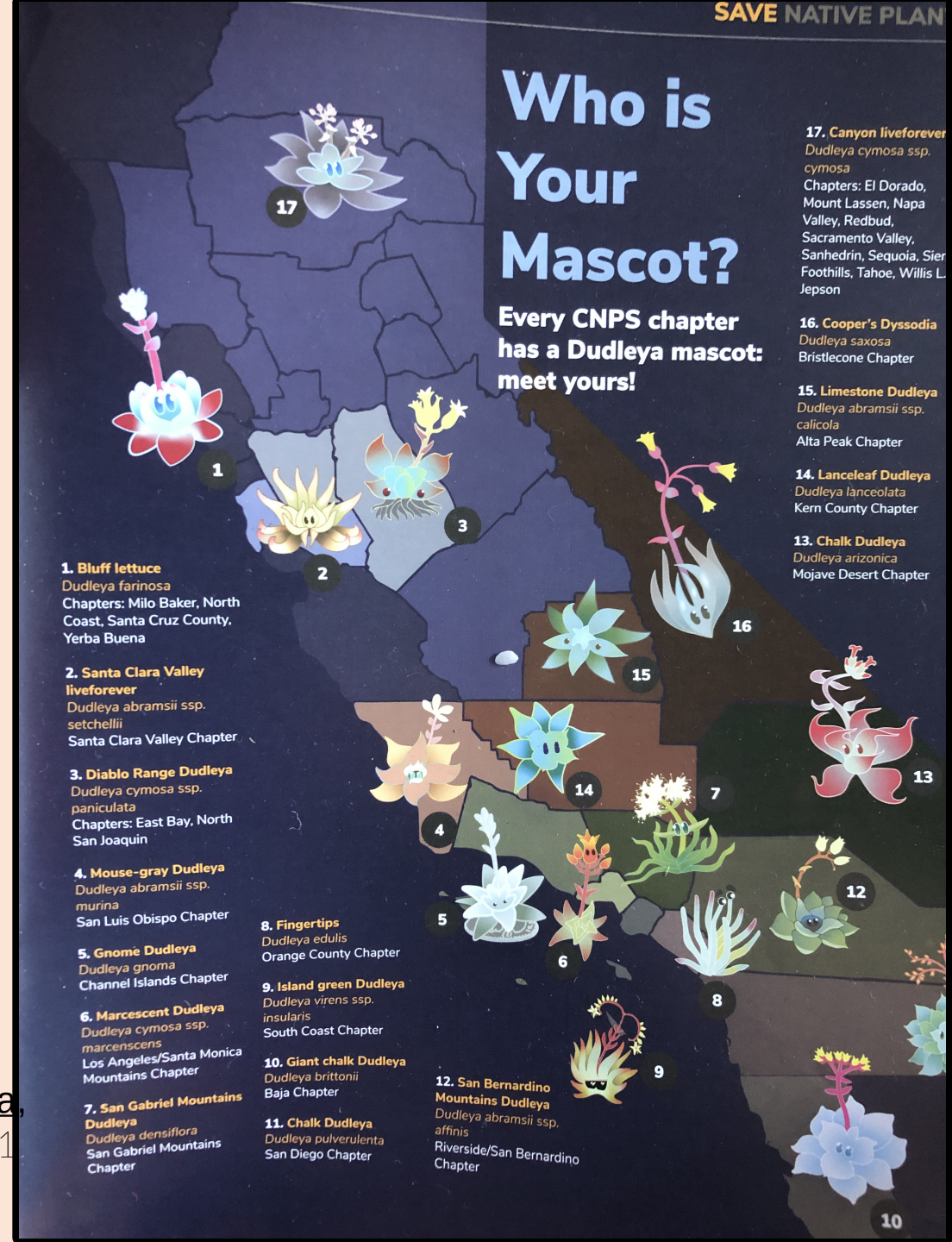
- Can add structure/”bones”, fill middle ground, or serve as ground cover.
- No sharp points near parking, path, pool, or play area!

Habitat of Origin

Dudleyas, for example, can come from many locations throughout the West.



From "New Protections for Dudleya?" Flora, California Native Plant Society, Spring 2021



Hydrozoning

Group plants by **water requirements** (as well as by requirements for light, space at maturity, exposure, aesthetics, etc.)

WUCOLS IV (Water Use Classification of Landscape Species)
Collections of plants by region, role and water requirements.

Consider dormancy periods for succulents when including them in the landscape or combining plants in a container.

[Return to Home Page](#)

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 SITE MAP



[GIVE](#)

WUCOLS IV

Water Use Classification of Landscape Species

Plant Search Database

If you know exactly which plant you are interested in, you may search for it by name (partial names are OK, too). Otherwise, consider searching by plant type and/or water use.

[See WUCOLS List for All Regions](#)

City

Search for a city:

— or —

[Find a city on the map](#)

Plant Name

Water Use







- ☐ Very Low
- ☐ Low
- ☐ Moderate / Medium
- ☐ High
- ☐ Unknown
- ☐ Not Appropriate for this Region

Plant Type

- ☐ **Gc** (Ground Cover)
- ☐ **P** (Perennial)
- ☐ **S** (Shrub)
- ☐ **T** (Tree)
- ☐ **V** (Vine)
- ☐ **Ba** (Bamboo)
- ☐ **Bu** (Bulb)
- ☐ **G** (Ornamental Grass)
- ☐ **Pm** (Palm and Cycad)
- ☒ **Su** (Succulent)
- ☐ **N** (California Native)
- ☐ **A** (Arboretum All-star)

[Looking for Turf Grass?](#)

[Search Plants](#)

P S Su		Crassula spp.	crassula	Low	<input type="checkbox"/>
P Su	N/A	Cremnosedum nutans	cremnosedum	Unknown	<input type="checkbox"/>
S Su A		Dasylirion spp.	desert spoon	Very Low	<input type="checkbox"/>
P Su N		Dudleya spp.	dudleya	Low	<input type="checkbox"/>
P S Su A		Echeveria spp.	hens and chickens	Low	<input type="checkbox"/>
S Su N		Echinocactus spp. (CA native and non-native spp.)	barrel cactus	Very Low	<input type="checkbox"/>
P Su		Echinopsis spp. (Trichocereus spp.)	torch cactus	Low	<input type="checkbox"/>
P Su	N/A	Euphorbia 'Ascot Rainbow'	Ascot Rainbow spurge	Moderate / Medium	<input type="checkbox"/>
P Su	N/A	Euphorbia 'Blackbird'	Blackbird spurge	Moderate / Medium	<input type="checkbox"/>

Hydrozoned landscape



Drainage

Check the Drainage

- Dig a hole about 1 foot deep
- Fill with water and allow it to drain completely
- Immediately refill the pit and measure the depth of the water with a ruler
- 15 minutes later, measure the drop in water in inches, and multiply by 4 to calculate how much water drains in an hour:



It's easy to check your soil's drainage; dig a hole, fill it with water, and time how long it takes to drain. Photo: San Diego Water Authority

Less than one inch per hour	Poor drainage, site may stay wet for periods during the year
One to six inches of drainage per hour	Ideal drainage
Faster than six inches per hour	Excessive drainage

Appropriate for drought-tolerant plants



Drainage, Air Flow

- mounds,
- boulders,
- rock gardens,
- “creekbeds”



Shelter from:

Hail



Frost



Heat



Afternoon sun



Stress



Function: Role in the Garden

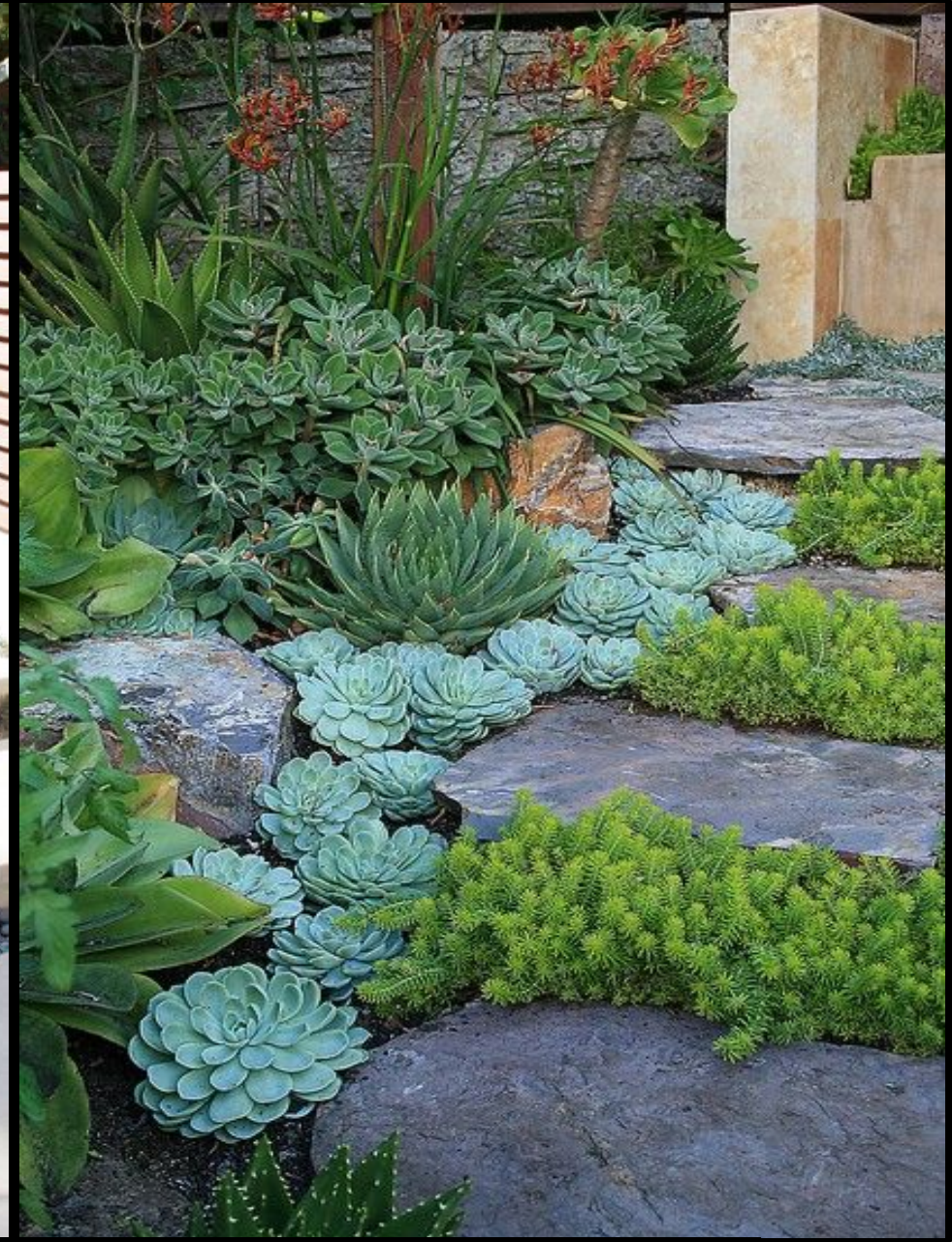


Vertical Walls

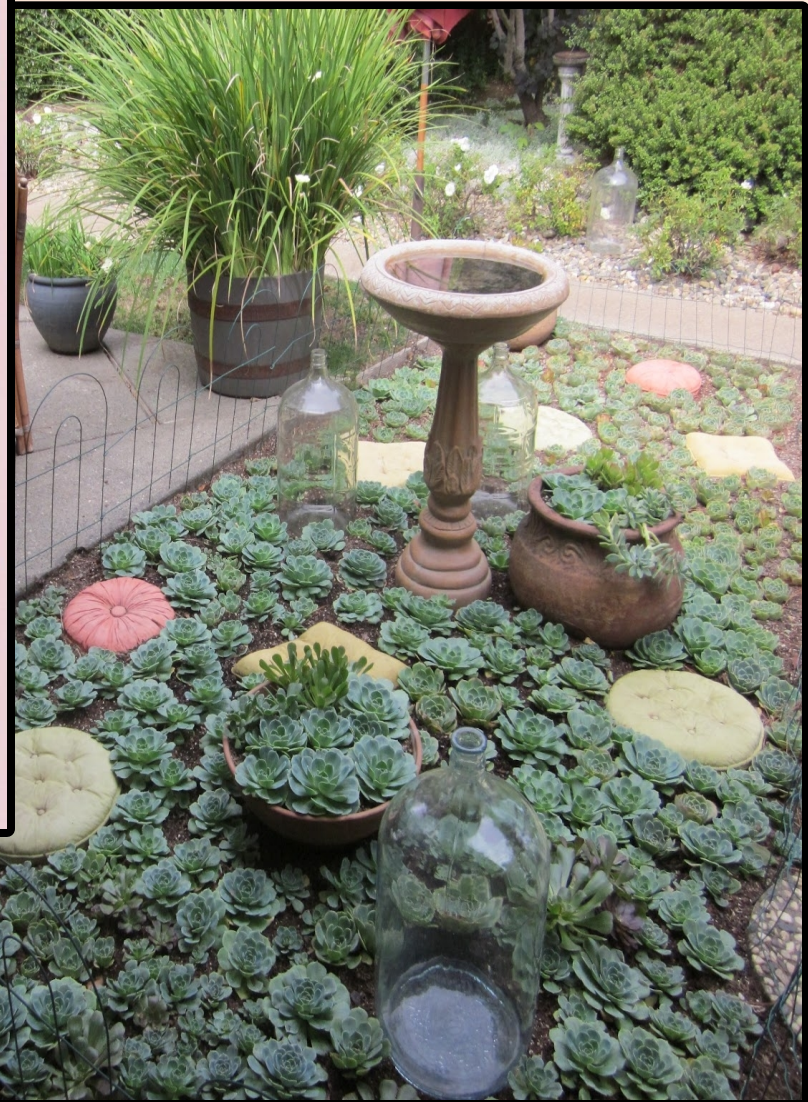


Rock Walls and Rock Gardens





Paths and Stairways



Pocket Gardens



Parking strips and other narrow spaces

Groundcover





Cacti considerations





Huntington Gardens, CA

San Ygancio, TX



Five Good Reasons to Landscape with Cacti and Succulents

1. Go on vacation! Your plants will be fine when you return, even in summer.
2. Tired of pruning and deadheading? These plants look great year round.
3. Cacti and succulents have been proven to retard fires in high risk areas!
4. Go green by gardening with less water, pesticides and fertilizer.
5. Collect plants as sculptural art and turn your garden into a living gallery!

Excerpt from UC Botanical Garden Landscape Cacti and Succulent Nursery blog, 2014



Mix with
climate-
adapted plants









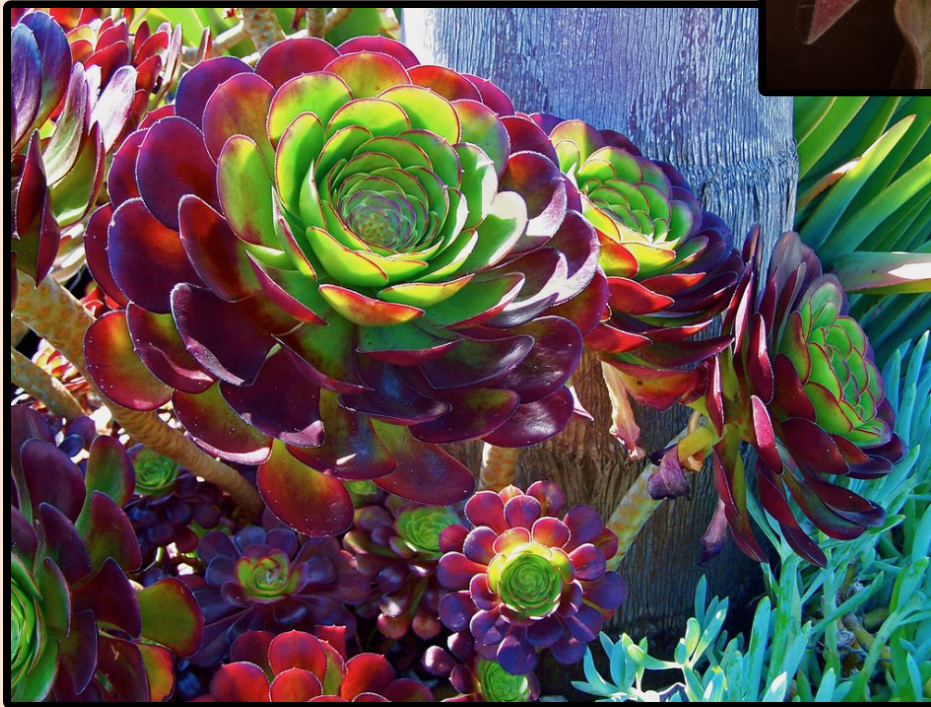


Form and
Repetition



Repetition,
Structure and
Texture

Color, Texture,
Contrast





Warm

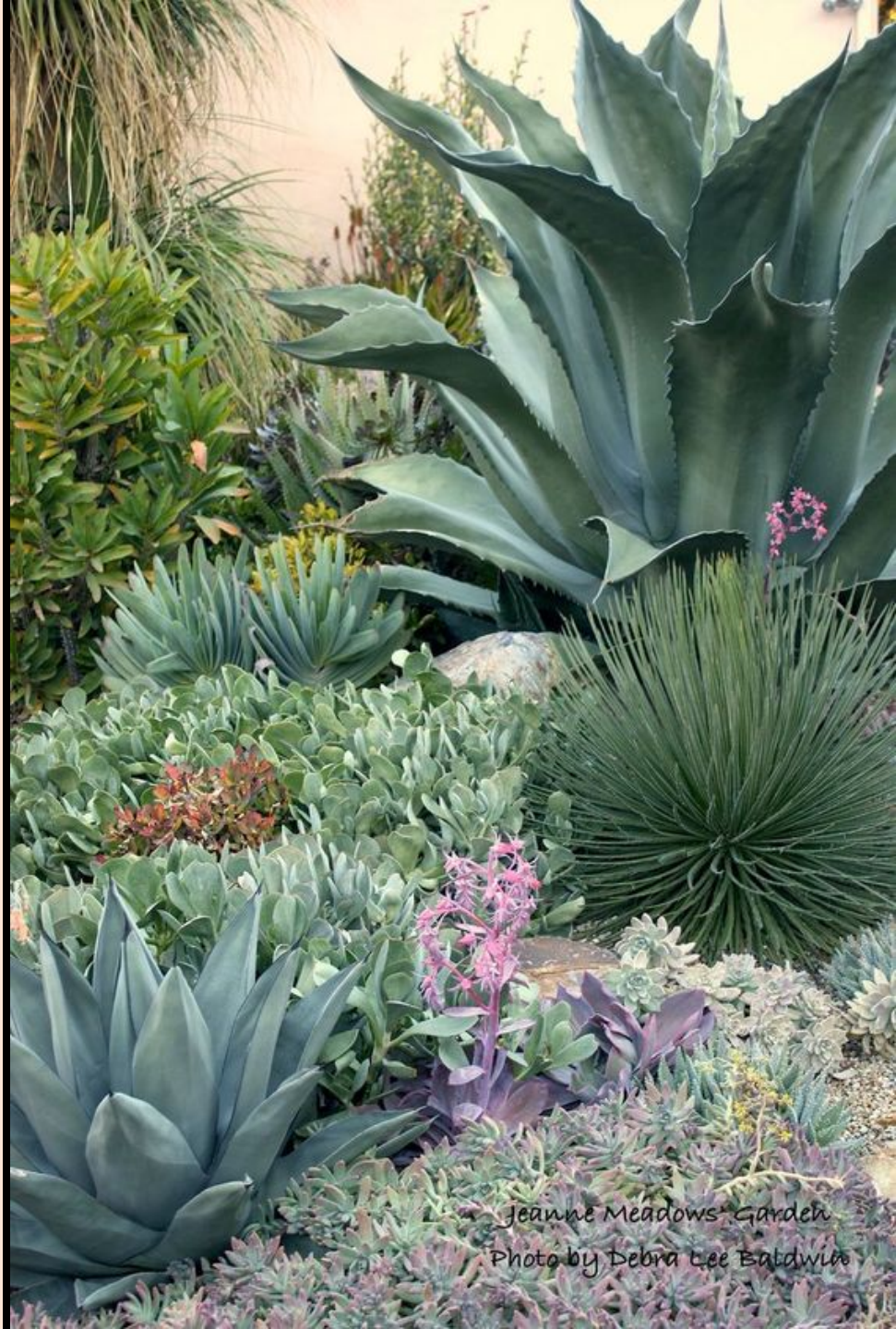
Billows of warm chartreuse and orange repeat in round forms.

Textural play of greens against a rough stone wall.



Cool





Jeanne Meadows Garden
Photo by Debra Lee Baldwin





Complementary colors









18 months
later...



Plan ahead
And be prepared to
redo!)

Photos and design by Robin Stockwell
Succulent Gardens, Castroville, CA



Tale of a Garden

March 2014



May 2016

Sen



June 2018

Life with Succulents: Easy, unthirsty, beautiful



Life with Succulents: Easy, unthirsty, beautiful



What are YOUR take-aways from today's presentation?



Resources for Plants and Inspiration

UC Davis Arboretum and Public Garden: Headquarters at Valley Oak Cottage (TB32), 448 LaRue Road, UC Davis campus, Davis, CA 95616
(530) 752-4880 <https://arboretum.ucdavis.edu>

UC Botanical Garden, Landscape Cacti and Succulent Nursery, 200 Centennial Drive, Berkeley, CA 94720
(510) 643-2755, <https://botanicalgarden.berkeley.edu>

Ruth Bancroft Garden, 1552 Bancroft Road, Walnut Creek, CA 94598
(925)944-9352, <https://www.ruthbancroftgarden.org>

WUCOLS IV (Water Use Classification of Landscape Species, Fourth Edition)
https://ucanr.edu/sites/WUCOLS/Plant_Search/



References

Stockwell, Robin. "Succulent Landscaping" Pacific Horticultural Society, January 2013.

http://smsf-mastergardeners.ucanr.org/Elkus/Planting_a_succulent_garden/

https://ucanr.edu/sites/MarinMG/PLANTS/SUCCULENTS_LOW_WATER/

UC Botanical Garden Landscape Cacti and Succulent Nursery, 2014 <http://ucbglcs.blogspot.com>

<http://mgsantaclara.ucanr.edu/files/264043.pdf>

<http://mgsantaclara.ucanr.edu/garden-help/succulents-care/>

<http://mgsantaclara.ucanr.edu/garden-help/succulents-care/succulent-growing-seasons/>

<http://ucce.ucdavis.edu/files/datastore/268-185.pdf> (Plant suggestions by use in home and garden)

http://marinmg.ucanr.edu/BASICS/SOIL_813/How_To_Evaluate_Soil/

<https://afghanag.ucdavis.edu/irrigation-natural-resource/files/soil-drainage.pdf>

<https://www.thecalifornian.com/story/life/2014/07/25/ernesto-sandoval-provides-tips-growing-succulents/13053495/>

<https://www.mercurynews.com/2012/11/07/master-gardener-how-to-care-for-succulents/>. (Interview with Ernesto Sandoval of the UC Davis Conservatory)



References, continued

ucanr.edu/mgsantaclara/succulents

Ucanr.edu/sites/mgalameda/succulents

Devilmountainnursery.com/hardy-succulents-for-frost-prone-areas

Succulentguide.

Succulentbox.com

Gardeningknowhow.com

Sublimesuucculents.com

The National Gardening Association: <https://garden.org>

UC IPM <https://ipm.ucanr.edu>

Books

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