Succulents

Holly Scoggins, Virginia Tech

Schedule:

Download the PDF of the slide set for note taking
*(under **Materials** tab).*

12:55 Introductions
1:00 Begin
1:50 Questions
2:00 End

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Coming Up:
1:00 to 2:00 Eastern

Succulents – Easier Than You May Think!

Holly Scoggins
VirginiaTech
College of Agriculture and Life Sciences

e-GRO Electronic Grower Resources Online

1:00 to 2:00 Eastern

SUCCULENTS – EASIER THAN YOU MAY THINK!

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What's my story?

Succulents from an East Coast perspective…
Lowe's in February from big growers out west…for 10+ years
- 3" unlabeled pots, $2.50 each
- Collect 'em all!

Liners in 2009 for my floriculture class
- Very little growing information

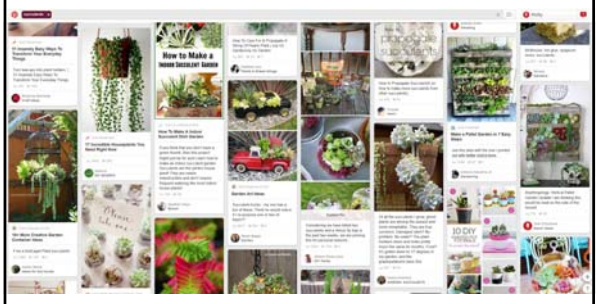
"High light levels, do not overwater. Fertilize lightly."
Or else what?!
Do they really need special treatment?

Succulents - rapid rise to stardom

Beloved by millennials, designers, crafty-types (and more)
EASY to maintain
For those in Zone 7 and colder, we are growing them for windowsills, garden containers, collectors, the craft market
4" to 7" pots (occasional large specimens).

And MANY can grow right next to your regular spring crops

Succulents are everywhere.



Succulents

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"For the brown thumb in your life…"

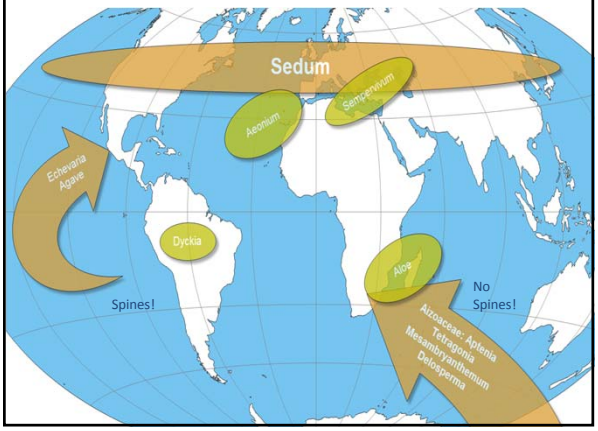
Diversity of the group

46 families - Asteraceae to Xanthorrhoeaceae

Geographic generalities:

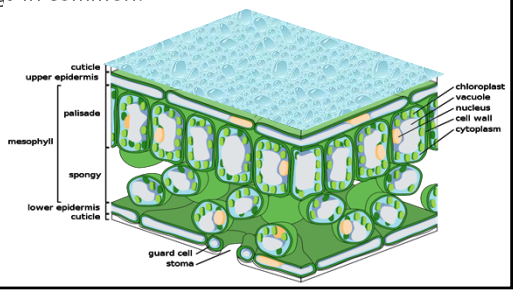
- High elevation, low precipitation, high temperatures
- Poor soils - alkaline/saline/sandy/mineral soils
- Temperate (hardy – *Sempervivens*, *Sedum* etc.) and tropical
- Many fairly cold-hardy species (Z 8ish)

Cacti are succulents. Not all succulents are cacti.

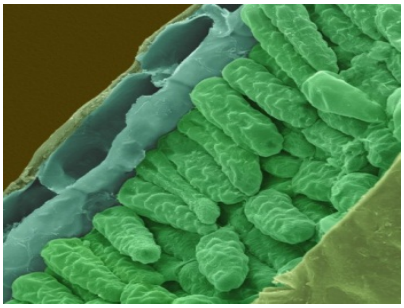


Succulents in a nutshell

Extremely diverse families and species, with a few things *in common*:



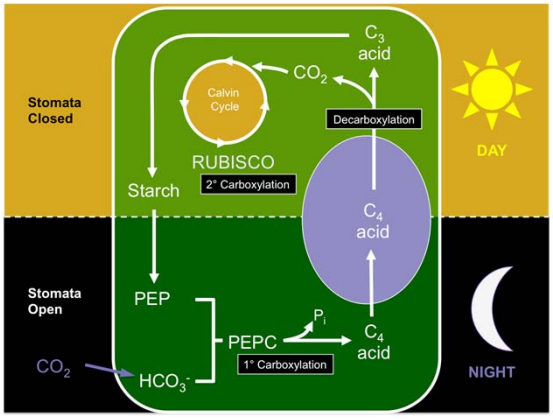
Thickened or waxy cuticle



Crassulacean acid metabolism

CAM

- metabolic adaptation to environmental stress (moisture deficit)
- stomata close during the day and open them at night when transpiration rates decline
- take up CO_2 from the atmosphere predominantly at night, and then assimilate that CO_2 into carbohydrates during the following period of light
- **Improves the ability of plants to assimilate carbon in water-limited environments.**



Greenhouse culture of succulents

Succulent propagules

Stage III microcuttings
Rooted liners

- 32, 50, 72, 84, 92 cell trays
- $0.39 - $1.75 ea
- Mixed trays

Unrooted cuttings (URCs)
DIY Vegetative propagation (pups, cuttings)

Succulent propagules

Euroamerican Propagators
Pleasant View Greenhouses (Savvy Succulents® program)
Rancho Tissue Technologies
Southwest Perennials
and MANY MORE

Combo/mixed trays are great!

NOTE: they may all be similar in size in liner tray

Does NOT mean they will finish at similar times or sizes

Aloe 'Gator'

Dyckia 'Burgundy Ice'

84 cells

Very "stabby," even at a young age…

Sempervivum - 17 more plants!

Sedum makinoi 'Ogon'

Who did what

Succulent Division of the Floriculture Team at Virginia Tech
Graduate researcher - J.B. Snelson
Undergraduate researcher - Colleen Beard
Technical assistance - John Freeborn and Margaret Aiken
Evil mastermind - Holly Scoggins
Plants - EuroAmerican Propagators
Media - Fafard and Premier Tech

Our research facility – Blacksburg, VA

Effects of basic growing components

Variables (Inputs)
- Media
- Fertilizer (N rate)
- Volumetric soil moisture content [how wet?]

Parameters of interest
- Height
- Average Width
- Offsets or branches
- Dry weight
- Weeks to "finish"

Finish time?

Many species
Didn't include "slow growers" like Agave
Time on bench was variable - grew most to "marketable" size (relative to size of pot)

Data taken

Many species
Time on bench was variable - grew most to "marketable" size (relative to size of pot)

General culture

Studies took place early-mid spring and mid-late fall (not summer)

Temperature set points 18°C min - 27°C max (64-80F)

Fungicide drench of Banrot and Subdue MAXX upon potting

- (Etridiazole 15%, Thiophanate-methyl 25%) + (Mefenoxam)

Media tested

Peat-lite

Premier ProMix BX (80% peat + perlite/vermiculite)

"Perennial" mix

Fafard 52 (65% bark/35% peat)

Whole Tree

Fafard *Timba Tek* 60% WT 40% peat/bark

Bark

100% Composted Pine **Bark (amended)**

Bark/Permatil (expanded slate)

(80% Composted Pine Bark / 20% Permatil (V:V))

Study 2 and 3 – Eliminated Bark/Permatil due to poor performance

Media physical properties

Media physical properties

Substrate	Total Porosity (%)	Container Capacity (%)	Air Space (%)	Bulk Density (g/cm³)
Bark+Perm	75.7	53.4	22.2	0.34
Bark	83.7	59.4	24.5	0.20
Fafard 52	80.4	67.6	18.8	0.18
Fafard Timba-Tek	85.7	61.7	23.9	0.16
Pro-Mix BX	87.4	61.6	19.8	0.11

NCSU Porometer method

Volumetric moisture content

VMC is the volume of water associated with a given volume of dry solids - basically a percent of total pore space that is filled by water.

Study 1: 10%, 20%, 30%

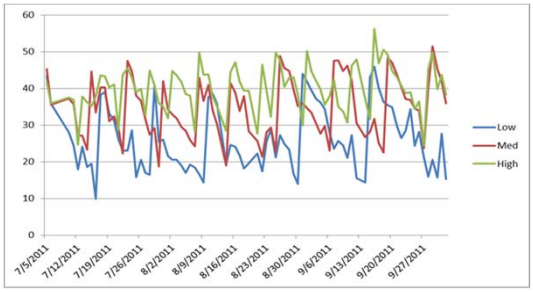
Study 2 & 3: 15%, 25%, 35%

Fertilizer applied:

- 20-10-20, 150 ppm
- Clear water when needed
- Maintain EC 1.0-1.35 ds/m

Media moisture v. time

Aloe 'Grassy Lassie' volumetric soil moisture content (VMC) (%) over time (12 weeks). VSM readings were taken from three plants per rate per day and averaged



Fertilizer rate

Study 1

- 15-5-15 Ca + Mag (Jack's Professional, JR Peters Inc.)
- **0, 50, 100, 200 ppm N**

Studies 2 & 3

- 20-10-20 (Jack's General Purpose, JR Peters Inc.)
- **50, 150, 250, 350 ppm N**

All potted in Fafard 52 (bark/peat)

Fertigated at media volumetric moisture content <25%

Our findings

(Combined results by species)

Aeonium 'Kiwi'

VMC, fertilizer rate didn't matter

Much smaller plant in straight bark

Finished in 8-10 weeks (5" pot) (50 cell tray)

8 Weeks - Media

Pro-Mix BX Fafard 52 Timba-Tek Bark

Aeonium arboreum 'Zwartkop'

VMC, fertilizer rate didn't matter

"Finished" in 17 weeks (trade gallon pot – came in as large liners)

Little rooting. Difficult to handle.

18 Weeks – Fertilizer rate

0 ppm 50 ppm 100 ppm 200 ppm

Aloe 'Fire Ranch'

Aloe 'Fire Ranch'

Low VMC did make a difference = much smaller plant

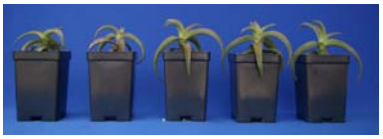
Greatest shoot growth in **peat mix**

Fertilizer rate didn't matter

Slower – "finished" in 17 weeks (5" pot)

17 Weeks – Growing Media

Bark Bark+Permatil Fafard 52 Pro-MixBX Timba-Tek



Aloe 'Grassy Lassie'

Fertilizer rate, growing media didn't matter
Low VMC = much smaller
Finished in 10-13 weeks (5" pot)

12 Weeks – Media Volumetric Moisture Content
15% 25% 35%

Aloe 'Gator'

Aloe variegata 'Gator'

Growing media, fertilizer rate didn't matter
Higher VMC = larger plants
Gave up after 17 weeks (5" pot)
[Note variability within one genus!]

4 Weeks
35% VMC

13 Weeks
35% VMC

Dyckia 'Burgundy Ice'

Higher fertilizer rates = larger plant
Did well in all media except straight bark
VMC didn't matter
Finished in 12 weeks (5" pot). Crowd favorite.

8 Weeks – Fertilizer Rate
50 ppm N 150 ppm N 250 ppm N 350 ppm N

Echeveria 'Afterglow'

Growing media didn't matter. Even bark/permatil
VMC didn't matter in study 1; study 2 – largest at 25% VMC (too big??)
Largest with 200 ppm N.
Smoking fast. Finished in 6-7 weeks (trade gallon) from 32 cell tray) in DECEMBER

6 Weeks – Fertilizer rate
50 ppm 100 ppm 200 ppm

Echeveria 'Afterglow'

Echeveria 'Blue Atoll'

Higher VMC = larger plant

Media, fertilizer - little effect

Nice. Finished in 10 weeks (5" pot) (84 cell tray)

7 Weeks – Media Volumetric Moisture Content

15% 25% 35%

Echeveria 'Violet Queen'

Interesting. VMC (2 studies), fertilizer rate didn't matter

Much smaller plant in straight bark, no diff among other media

Finished in 10-12 weeks (5" pot)

8 Weeks – Fertilizer Rate

50 ppm N 150 ppm N 250 ppm N 350 ppm N

Graptovaria 'Fred Ives'

Graptopetalum x *Echeveria* hybrid - very vigorous

Fred…does not care. Inputs had little/no impact on growth.

Finished in 9 weeks (6.5" pot!)

Senecio 'Blazin' Glory'

Low fertilizer rate = smaller plant

Growing media = awful in bark, bark + permatil

Higher VMC = much larger plant

Super fast finish – 6-7 weeks from 32 cell (5" pot)

7 Weeks – Volumetric Moisture Content

10% 20% 30%

Lots of differences, but some generalities

Just a sample of the **numerous** species/cultivars available

Some taxa are as fast as bedding plants, and can **be grown under*** the same regimen (media, fertilizer, watering frequency).

- *either thrive OR tolerate

A few are slow, no matter the inputs

Thank you!

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Questions?