**Assigned Readings for Plant List 2**

Read p. 437 on Cacti, Succulents and Related Plants in your textbook

Read the pages in your textbook associated with the family descriptions and individual taxa covered on Plant List 2 that was distributed in lab. These plant lists are also available on the course website.

[http://aggie-horticulture.tamu.edu/syllabi/308/home/frameset.htm](http://aggie-horticulture.tamu.edu/syllabi/308/home/frameset.htm)

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**Specialized Arid Region Plants**

- Hundreds of possible plants
- Use a few as representatives of xeric adapted taxa
- Many taxa are adapted to extreme drought, but respond poorly to wet soils and high atmospheric humidity
- Unique growth forms and textures need careful placement in conventional mesic landscapes
- El Paso, TX, & Savannah, GA, are both in USDA zone 8, illustrating the importance of factors other than mean winter minimum temps

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**Sustainability Issues With Xeric Landscapes**

- Western USA deserts differ in rainfall patterns, winter cold, and soil origins
  - Chihuahuan → W. Tex. & NM, cold winters, mostly summer monsoonal rains
  - Sonoran → Hottest, few frosts, bimodal rainfall
  - Mohave → Winter rains, freezes
  - Great Basin → most N, very cold winters
- Elevations impact temperature, rainfall & water infiltration, soil composition
  - West Texas elevations 1,000 to 8,749 ft.
- Cannot assume plants from can be transferred
Vegetation Types Important

- Chihuahuan → Lechuguilla (Agave lechuguilla) and Creosote Bush (Larrea tridentata)
- Sonoran → Desert tropicals / subtropicals
- Mohave → Joshua Tree (Yucca brevifolia)
- Great Basin → Big Sagebrush (Artemisia tridentata)

Soil Issues in Deserts

- Clays
  - May retain Na, slow infiltration
- Sands
  - Poor water retention, caliche pans
- Talus
  - Rock with clay, lacks soil for planting
- Salinity
  - Evaporation concentrates salts
- Alkalinity common in many soils

Conserving Resources in Xeric Landscapes

- Oasis effects
  - Use structures to mimic mountain runoff
  - Rainfall capture techniques
  - Avoid narrow mow strips
- Zone plantings
  - Minimize turf areas → Pros & Cons
- Irrigation modifications
  - Drip irrigation
  - Tertiary water sources → elevated salts
  - Mulches → avoid plastic & dark colors
- Plant selection
  - Natives may be well adapted, but avoid excess N & H₂O

Cactaceae Cacti

- New world counterpart to many of the Old World arid region Euphorbiaceae
  - Large taxonomically confused family
  - 85 to 125 genera contain over 2,000 species
- Most are small shrubs to small trees with waxy thickened water storing photosynthetic stems & often lack leaves
  - Stems are globular, cylindrical, hemispherical, fluted, ribbed, or flattened and pad-like
  - Photosynthesis is via Crassulacean acid metabolism (CAM)
  - Combinations of spines, glochids, woolly hairs or bristles
- Highly tolerant of heat, drought, salts, & alkalinity, but usually intolerant of wet soils or high RH
  - Variable cold & shade tolerance
**Cacti cultural requirements**

- Cacti are typically not cuddly
- Many are surprisingly shade tolerant
- Some are very cold tolerant
- All require well drained soils
- May need acclimation to sun when transplanted
- Rain shelters may help in humid regions
- Rots from cold damage to trunks / pads
- Piercing sucking insects can be problematic

**Bloody fingers?**

**Cactaceae**

- Central spines
- Radial spines
- Glochids
- Woolly hairs / bristles

**Cacti**

- Central spines, radial spines, & glochids originate from areoles

**Opuntia spp. Prickly Pear Cacti**

- Large variable genus of cacti with pad-like quickly deciduous / leafless stems, < 1’ to 10’+ tall
  - Subtropical only to very cold hardy (z. 4-13)
- Yellow occasionally red / orange flowers (spring / summer) & red to red-purple fruit
**Opuntia spp.**

Prickly Pear Cacti

- Require sun & good drainage
  - Root & stem rots, cochineal scale, & squash bugs can be problems
  - Central / radial spines are bad, but glochids are the real hazard
- *Opuntia* provide uniquely Southwestern landscape flavor
  - Interesting but may appear out of place outside xeric landscapes
  - Very effective barrier plants

**Opuntia engelmannii**  
Engleman’s Prickly Pear

- Commonly encountered & widely distributed example of *Opuntia* with segmented pad-like stems
- Typically sprawling succulent shrubs, 2’- 4’ tall
- Several closely related species - groundcovers to trees

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**Cylindropuntia spp.**

Cholla

- Formerly included with *Opuntia*
- Jointed tubular segmented stems, variable in height from 2’ to 10’+
- Similar cultural conditions as *Opuntia* spp., but maybe even more drought tolerant and very intolerant of poorly drained soils

**Cylindropuntia imbricata**  
Tree Cholla

- Example of cylindrical jointed stem *Cylindropuntia*
- More upright growing, tubular jointed stems
- Shrub to small tree, 4’ - 8’ tall, purple/pink flowers, yellow fruit
- One of most cold hardy *Cylindropuntia* spp.
- USDA z. 6 (5b) - 13
- Requires very, very well drained soils
**Echinocactus spp. Barrel Cacti**

- Classic examples are *Echinocactus grusonii*, Golden Barrel Cactus, & *Echinocactus texensis*, Horse Crippler
- *Echinocactus* are heavy fleshy-bodied cacti from few inches to 8 ft. tall
  - Barrel, ball, or half hemispherical-shaped
  - Spines on vertical to twisted ridges
  - Most are solitary plants

**Carnegiea gigantea Saguaro**

- Giant cactus living 100’s of years
  - Protected species, rustling occurs, buy nursery grown or landscape rescued plants
  - 60 to 100 years to form branches in wild
- Southwestern signature plant, living classic
- Limited cold tolerance, USDA z. 9 (8b)-13, and intolerant of wet soils or high RH

**Echinocereus spp. Hedgehog Cacti**

- Several important regional species including *Echinocereus stramineus* Strawberry Cactus
- Most are smaller, 3” to 12” (24”) erect or reclining cacti with oval, conical, or cylindrical stems
  - Solitary or more often colony-forming
  - Tubercles more or less fused to form ribs, 5 to 20 spines per tubercle
Echinocereus spp.  
Hedgehog Cacti
- Flower buds erupt through epidermis above areoles, showy pink, yellow, purple-pink, orange, or red
- Need hot dry sunny locations with excellent drainage
- Exclude rain in mesic areas; variably hardy z. 5 (4) - 13

Mammillaria spp.
Nipple Cacti
- Very small ovoid to cylindrical non-jointed tubercled cacti
  - Solitary or forming small colonies, no defined ridges
  - Individuals most <1" to 4" tall, may mound to form taller clumps

Mammillaria spp.
Nipple Cacti
- Flowers on old growth stem, ½" - 2" funnel-form, white, salmon, yellow, pink, purple or red, often showy
- Full sun to part shade
- Very well drained soils only
- Variable cold tolerance among species from USDA zones 4 - 13

Agave & Yucca relatives
- Monocotyledonous genera variously segregated into the families Asparagaceae, Agavaceae, Amaryllidaceae, Liliaceae, Aloeaceae, or Nolinaceae
  - Taxonomic debates rage: lumpers versus splitters
- Contain predominantly warm temperate to tropical xeric species, however several are also adapted to colder and/or more mesic regions
- Most grow as rosettes or tight clumps of succulent sword-like to nearly grass-like foliage
- Inflorescences are often large and spectacular; some are monocarpic, others recurrently bloom
- Several are of economic/cultural significance
**Agave spp.**  
*Agaves*

- Variable in size and texture
  - Cabbage to pincushion looks
  - Solitary to colony-forming
- Most all spiny tipped
- Most limited in cold tolerance
- Drought, heat, & wind tolerant

**Agave americana**  
*Century Plant*

- Large fleshy rosette of keeled ovate leaves
- Blue-green & variegated forms are available
- Spiny leaf tips are maintenance liabilities
- Inflorescence is huge woody panicle up to 30' tall, borne only after several to many years

**Dasylirion spp.**  
*Sotol*

- Similar to lower growing *Yucca* species, but finer textured in foliage, arching sword-shaped leaves
  - Some prickly margins, but not on tips as in *Agave spp.*
- Spectacular narrow candle-like panicles to 15' tall, upper half covered in dense slender racemes of small creamy white flowers

**Agave americana**  
*Century Plant*

- Very coarse textured, best in western southwestern style landscapes, hard to work into conventional mesic landscapes
- Very heat, wind, & drought tolerant, cold hardy USDA zones 8b (8a) - 13
- Other similar species vary in size and foliage color
**Dasylirion spp.**

*Sotol*

- Dioecious, female flowers are more showy
- Prickly species can be used as barriers
- Similar cultural conditions as *Yucca spp.*
- Closely related to *Nolina spp.* (Beargrass)

**Yucca spp.**

*Yuccas*

- Variety of sparsely branched shrubs, small trees, or rosette-like subshrubs
  - Variable cold hardiness, subtropical or some to USDA hardiness zone 4
  - Sword-like leaves, green, blue-green, silver-green
  - Tolerate a wide variety of soils as long as well drained

**Dasylirion and related plants are often a pollen and nectar source for pollinators in xeric regions.**

**Yucca spp.**

*Yuccas*

- Most with large gaudy spikes / panicles of waxy white to creamy pendent 1" - 3" flowers
- Attracts hummingbirds / moths / butterflies
- Classic xeriscape plants, but seldom work effectively in mesic landscapes; very effective barrier plants; very few insect / disease problems
- Favorites for creating Southwestern look
**Yucca brevifolia**  
Joshua Tree

• Similar foliage but softer textured & more succulent than *Yucca spp.*
• 1’-2’ tall evergreen shrub with spike-like foliage
• Recurrent flushing 3’ to 5’(6’) tall red-pink or pale yellow spikes or panicles

**Hesperaloe parviflora**  
Red Yucca

• Tolerant of most soils as long as they are well drained, full sun to part shade, very heat and drought tolerant; hardy in USDA z. 6 (5) - 13
• Outstanding xeriscape plant, mixed border, accent, hummingbird plant

**Hesperaloe parviflora**  
Red Yucca

• Similar foliage but softer textured & more succulent than *Yucca spp.*
• 1’-2’ tall evergreen shrub with spike-like foliage
• Recurrent flushing 3’ to 5’(6’) tall red-pink or pale yellow spikes or panicles

**Aloe vera**  
Aloë Vera

• Mostly seen as an interiorscape, medicinal or cosmetic plant
• Grown commercially in the Rio Grande Valley
• Agave-like succulent growth habit, dark green, with juicy sap
• Small red-orange to orange-yellow tubular flowers in 2’-3’ racemes, late fall to spring
**Aloe vera** | **Aloë Vera**
---|---
- Heat, drought, wind, & very salt tolerant; hardy USDA z. 9b (9a) - 13
- Rots in wet soils; suckers to form colonies; recovers poorly from cold
- Excellent in containers, xeriscape, medicinal / kitchen gardens

**Bulbine frutescens** | **Bulbine**
---|---
- Blue-green to green succulent toothless *Aloe*-like foliage
- Slow expanding clump-forming rosettes of foliage
- Flexible 1’ - 2’ racemes of yellow to orange flowers, fall to spring, sometimes in summer
- Tolerates droughty high pH soils, wind, heat, salt exposure
- Limited cold tolerance, hardy in USDA zones 9a (8b) - 13
- Xeriscapes, containers, bulb gardens, rock gardens, massing, perennial borders, edging

**Beaucarnea recurvata** | **Ponytail Palm**
---|---
- A close relative of *Dasylirion* and *Nolina* with clusters of strap-like leaves on long thin sparsely branched trunks radiating from a swollen base
  - 5’ to 10’ tall, rarely taller
  - Often thought to be a palm by lay persons
- Used in Rio Grande Valley landscapes, patio containers, and interiorscapes, outdoors in USDA z. 10 (9b) - 13

**Beaucarnea recurvata** | **Ponytail Palm**
---|---
- Slow grower, branches with time; best with afternoon shade; apply micronutrients in very high pH soils
- Heat, drought, & wind tolerant; flowers only in tropics
- Particularly susceptible to trunk rots if cold damaged
**Sansevieria trifasciata**
Snake Plant

- Evergreen herbaceous perennial used as a shrub 2’ - 5’ tall in USDA z. 10(9b) - 13
- Clumps of stiff erect to arching sword-shaped leaves; rarely more rosette-like
- Green with mottled, blotched, banded or vertical shades of green, white, or yellow
- Popular interiorscape plant; tropical xeriscapes; patio pots; coastal plantings
- Tolerates most well drained soils and incredibly low light levels; low input plant
- Root / crown rots, spider mites, thrips; periodic removal of old leaves is required

**Succulents**

- Widely diverse group of plants from several families having thick water-filled stems and / or leaves, often with waxy surfaces
  - Not a botanical classification
  - Some represent convergent evolution with cacti, example Old World and climate Euphorbia
- Variable in growth habit, mat-like to tree form
- Highly variable in cold and heat tolerances, but most are drought and wind tolerant
- Many tolerate a variety of soil pH & salinity levels, but most taxa are intolerant of poor drainage
- Xeriscapes, coastal plantings, bright interiorscapes, western accents, arid landscapes, container plants, living walls, green roofs in appropriate climates

**Sedum spectabile**
Showy Stonecrop Sedum

- Herbaceous dieback perennial (USDA z. 4 - 9), succulent-like foliage
- Rounded 1’ - 2’ tall mound of suckering sparsely branched thick fleshy stems
- Tiny white to pink-red flowers in 3” - 6” diameter umbels, effective mid-summer to late fall
**Sedum spectabile**  
**Showy Stonecrop Sedum**  
- Wide variety of soils, moderately well drained, sunny spot  
- Heat, drought, salt, & alkaline soil tolerant  
- Aphids can be troublesome, avoid dense shade  
- Mixed borders, rock gardens, xeriscapes, cut / dried flowers

**Euphorbia milii**  
**Crown-Of-Thorns**  
- Cactus-like succulent with long whip-like stems covered in nasty gray thorns to 1”  
  - Retains ½” to 4” leaves until drought stressed, then stems are primary photosynthetic source  
  - 1’ to 3’ (5’) sprawling subshrub / shrub  
- Beautiful ½” or larger flowers with red, pink, orange, salmon or yellow bracts  
- Sunny / partly sunny site, well drained soils; heat, drought, salt, & wind tolerant  
- Outdoors z. 10 (9b) - 13, bright interiorscapes

**Euphorbia antisyphilitica**  
**Candelilla**  
- Xeric small 1’ - 3’ shrub with cylindrical evergreen photosynthetic stems  
- Horsetail (*Equisetum*) look-alike for xeric landscapes; vertical accent  
- Effective in USDA hardiness z. 8 – 13  
- Best in hot, dry sunny exposures  
- Very drought, heat, salt, & wind tolerant

**Fouquieria splendens**  
**Ocotillo**  
- Thorny drought deciduous succulent shrub, z. 7a (7b) - 13  
- Stiffly upright nearly unbranched arching stems  
- Arching 3” - 6” long terminal racemes of scarlet red tubular flowers with recurving lips, spring / early summer
**Fouquieria splendens**  Ocotillo

- Hummingbird plant, barrier, xeriscape specimen, naturalizing, historical / educational plantings
- Avoid use of large plants unless documented as reclaimed from old landscapes, as they may be rustled from wild stands
- Rots in wet soils, high humidity

**Bromeliaceae**  Bromelia Family (Pineapple Family)

- Mostly of tropical / subtropical taxa, but increasingly grown as summer annuals or container plants with succulents
- Many tolerate variable light exposure and are also used in interiorscapes
- Flowers are often inconspicuous, but bracts or new foliage may be colorful
- Unique textures / forms
- Drought & heat tolerant

**Tillandsia usneoides**  Spanish Moss

- Long pendent rootless evergreen herbaceous perennial epiphyte
- USDA hardiness z. 8 (7) - 13
- Typically 4' to 10' (100') long branched plants forming gray-green to silver-gray curtains
- Full sun to dense shade
**Tillandsia usneoides**

**Spanish Moss**

- Needs regular rainfall, high relative humidity or heavy morning dews
- Not parasitic, but can inhibit photosynthesis with excess shade & increase storm damage due to wind sail
- Plantation effects; perhaps as screen on trellises; packing and decorative material

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**How Would You Have Improved On This Arid Climate Landscape Design?**

Additional images may be viewed on plant picture pages on
http://landscapeplants.tamu.edu

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