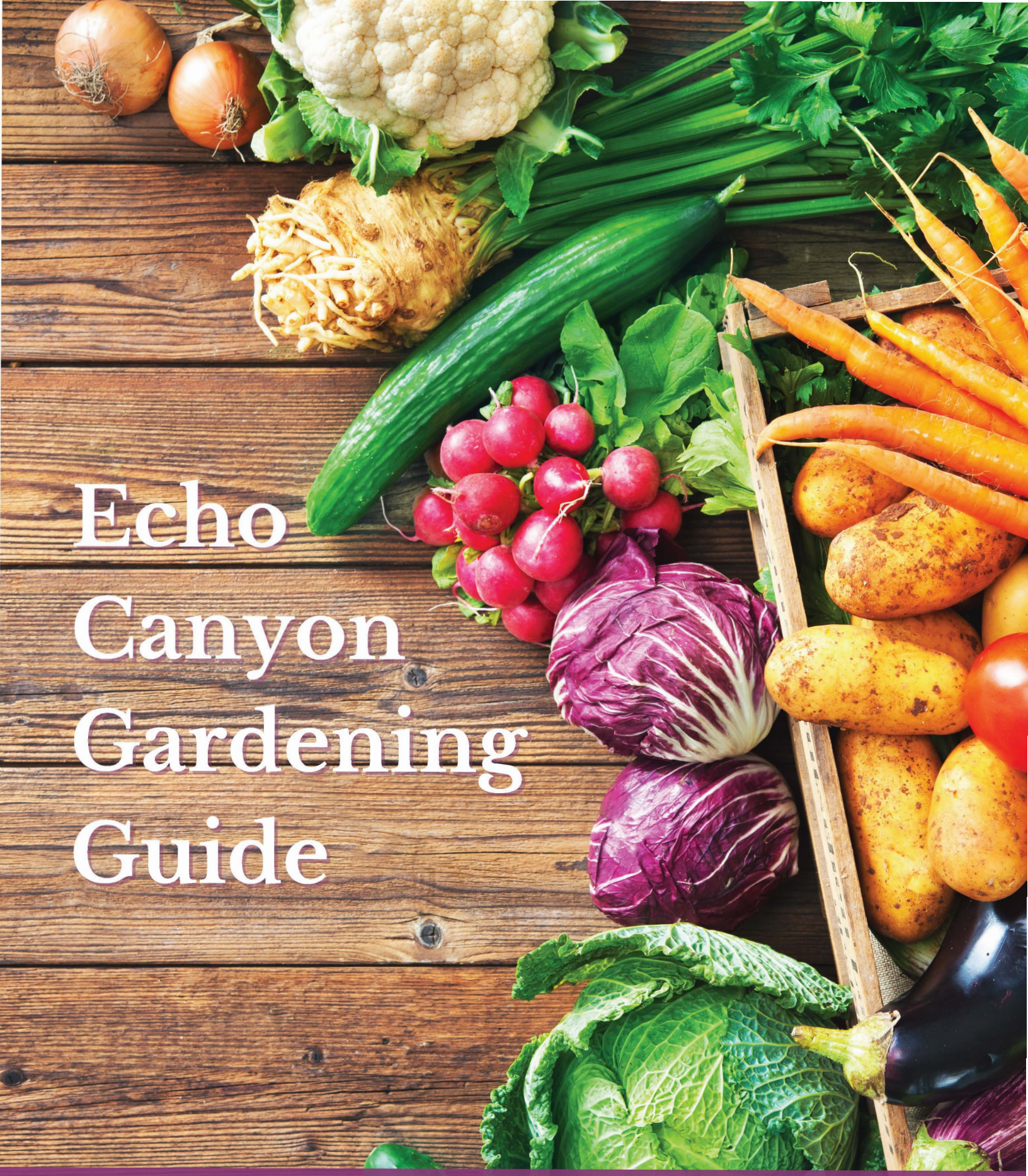


Echo Canyon Gardening Guide

How does your garden grow?

GLEAM 1 CULVERT GARDENS

The culvert gardens are large concrete storm drain pipes that were placed on end. These pipes are usually put underground sideways, and connected to storm drains, to catch rainwater from streets and carry it to retention basins or waterways. They are used to prevent flooding in cities. When you take a walk, look for storm drains on the sides of the curbs, and imagine the labyrinth of pipes under ground! People who work in construction, civil engineering or landscape architecture, use these culverts in their jobs!

The culvert gardens are community planters to be used between August and May. This guide is to help teachers and students plan their garden and enjoy the results during the school year. The guide will include organizing tips, plant suggestions and planting schedules. Happy gardening! ☺

A few considerations for your community garden:

- **limit "forever plants"** (these culverts are designed for class each year to have the opportunity to plant and harvest annually August - May, longer-lived shrubs will reduce the planting opportunity for future classes, some perennials are ok because kids stay with Gleam for 3 years.

- **no "ouch" plants** (plants with thorns or spines).

GARDENING VOCABULARY

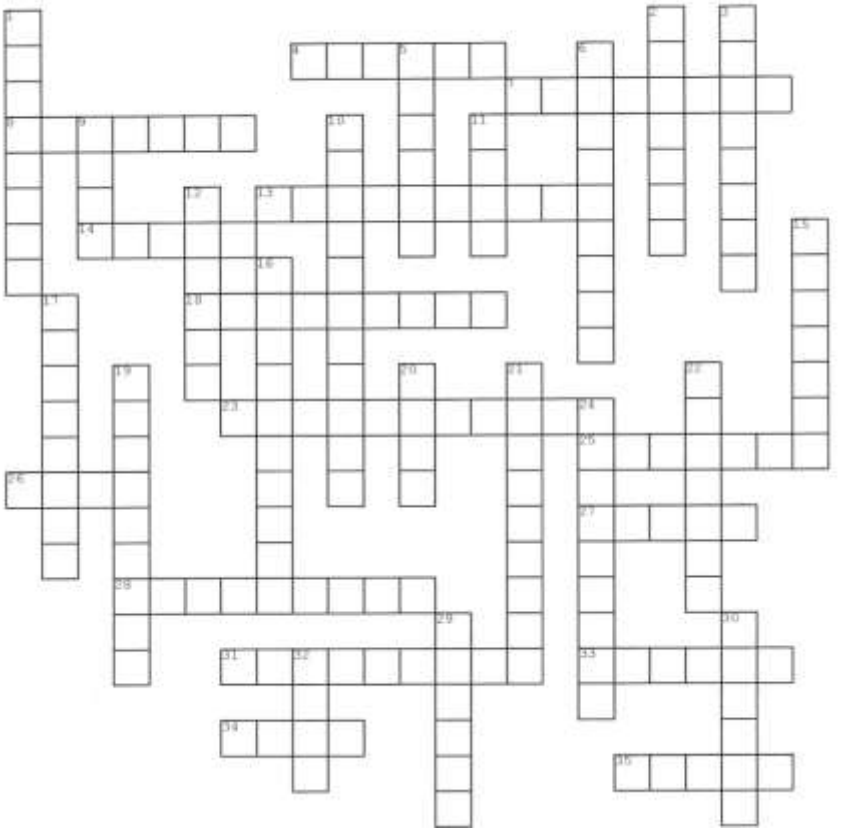
acid
agriculture
alkaline
annual
biennial
bipinnate
botany
bud
bulb
climate
compost
compound leaf
crop
cultivar
cultivate
cut
decompose
dig
drainage
ecosystem
edible
flower
fruit
germination
herb
herbaceous
hybrid
irrigation
leaf
palmate
perennial
petal
photosynthesis
pinnate
pistil
pollen
pollination
rhizome
riparian
root
seed
sepal
shoot
simple leaf
soil
stamen
stigma
style
sun
tuber
vegetable
vine
water
xeriscape

WORD SEARCH

a n n u a l e w b p h o t o s y n t h e s i s p l
n g v t t m h d w r r l m w f x d d r b b e t e a
k o s u o e c a b r e h q l r n e e i u u d a r i
e q i z p o r c y a q h o v u z c t p l d i w e n
d n i t c r h p f z e w y o i j z s a b b b f n n
e h i d a d y s d t e v p k t b n y r m j l n n e
r h e l p g e e a r t m w a t e r g i a l e d i i
c e q e a r i v k a o d i r b y h e a r n a o a b
s z t m e k i r a c s t a m e n x r n g e c p l w
e a x b d t l b r g s o i l l u t m r e l h p s w
l c u w l u n a v i r p l s w h j i m t l i y q b
v t o u e y m e y y q i p z u i v n o a o l j e e
l b c s t r g k a m i v c p c c p a a n p r a p t
j k o r y e r c i c a u q u x d v t q n y l o i a
j h t t t s l f e i i q f u l a r i j i x l d d n
s u l a a i t l g i d d l w v t x o l p l o c o n
p t b d m n p e p a c s i r e x u n c i v b e o i
b l i a r m y t m t s o p m o c j r n e t i g n p
e e t g i a l a p e s e c l j z n a e l v s n j i
t e d s m f i r q f e p q g h l t o f y i d i e b
p j m z k a b n d w g g u n t i n b c t i d d p y
q v n v i d s b a c o p i x o t r q f s p t n q m
c u l t i v a r c g e f u n n o r n y a o j r p t
g s q m y p p u d d e c o m p o s e u n f u r x h
e y e x o k t f m t j y v i z r f r g s c k c f p

Using the words on the previous page, see how many words you can find in the word search above.

Please complete the crossword puzzle below



Down

1. a leaf with two or more leaflets
2. a leaf that has leaflets branched off of a main stem (looks like a feather)
3. a system for removing water to prevent ponding or stagnant water
5. a plant with the entire life cycle completed in one year
6. low water using plants adapted to arid desert climates
9. a flat structure attached to a stem, used for plant photosynthesis and transpiration
10. to begin to sprout or grow
11. a ripened plant ovule that contains the capacity to grow into a new plant
12. a leaf with an undivided blade
15. an underground horizontal shoot that grows roots and spreads plant growth

16. a system for watering plants
17. environment near water where plants thrive with high water availability
19. a part of a plant that is eaten as food, that is not a fruit and does not contain the seed
20. underground fleshy growth with food stored for the shoot and leaves within it
21. to prepare soil for planting and take care of and nurture plants
22. a mix of decaying organic matter used to improve soil
24. a group of plants, animals and insects living in an environment
29. fine powder-like grains produced by the anthers of seed plants to fertilize seeds
30. the reproductive structure of a plant, a blossom
32. a group of plants cultivated and harvested, the yield of produce

Across

4. the scientific study of plants
7. a flowering plant that takes two years to complete its life cycle
8. a leaf in the shape of a palm
13. a green plant with soft stems that are not woody, which usually dies back at the end of each growing season
14. the ripened ovary of a plant, containing a seed
18. a plant that lasts throughout the year and several years
23. science of soil management for growing crops and farming
25. the weather, temperature and meteorological conditions of a specific region, ie. the Sonoran Desert climate
26. a climbing or trailing woody-stemmed plant
27. new plant growth
28. having leaflets that are subdivided into a pinnate (feather-like) arrangement
31. to cause to rot
33. able to be eaten
34. underground portion of a plants vascular system, used to get water and minerals from the soil for the plant
35. a thickened underground stem that stores energy for the plant (potato)

DEFINITIONS

acid: "sour" soil that has a low pH

agriculture: science of soil management for growing crops and farming

alkaline: "base" soil having a pH higher than 7

annual: a plant with the entire life cycle completed in one year

biennial: a flowering plant that takes 2 years to complete its life cycle

bipinnate: having leaflets that are subdivided into a pinnate (feather-like) arrangement

botany: the scientific study of plants

bud: small growth with a protective cover, where a new shoot, leaf or flower will occur

bulb: underground fleshy growth with food stored for the shoot and leaves within it

climate: the weather, temperature and meteorological conditions of a specific region, ie. the Sonoran Desert climate

compost: a mix of decaying organic matter (leaves, grass, manure) used to improve soil nutrients

compound leaf: a leaf with two or more leaflets

crop: a group of plants cultivated and harvested, the yield of produce

cultivar: a variety of plant that was chosen and bred for special characteristics

cultivate: to prepare soil for planting and take care of and nurture plants

decompose: to cause to rot

dig: to break up, turn over or remove dirt

drainage: a system for removing water to prevent ponding or stagnant water

ecosystem: a group of plants, animals and insects living in an environment

edible: able to be eaten

flower: the reproductive structure of a plant, a blossom

fruit: the ripened ovary of a plant, containing a seed

germination: to begin to sprout or grow

herb: a plant whose stem is soft, not woody and generally dies back at the end of each growing season

herbaceous: a green soft plant with herb-like characteristics

hybrid: a mix to two or more plants to create a unique species with special traits

irrigation: system for watering plants

leaf: a flat structure attached to a stem, used for plant photosynthesis and transpiration

palmate: a leaf in the shape of a palm

perennial: a plant that lasts throughout the year and several years

petal: a small leaf-like part of a flower

photosynthesis: plant conversion of suns energy into carbohydrates from carbon dioxide and water

pinnate: a leaf that has leaflets branched off of a main stem (looks like a feather)

pistil: The female, ovule-bearing organ of a flower, including the stigma, style, and ovary

pollen: fine powder-like grains produced by the anthers of seed plants to fertilize seeds

pollination: to fertilize ovaries of plants with pollen

rhizome: an underground horizontal shoot that grows roots and spreads plant growth

riparian: environment near water where plants thrive with high water availability

root: underground portion of a plants vascular system, used to get water and minerals from the soil for the plant

seed: a ripened plant ovule that contains the capacity to grow into a new plant

sepal: One of the separate, usually green parts forming the calyx of a flower

shoot: new plant growth

simple leaf: a leaf with an undivided blade

soil: the upper level of earth with nutrients, where plants grow

stamen: male fertilizing organ of a flower, typically consisting of a pollen-containing anther and a filament

stigma: sticky receiving pad for pollen to land on to fertilize the seed

style: a tube on top of the ovary

sun: a star that the earth orbits around that provides energy for plants

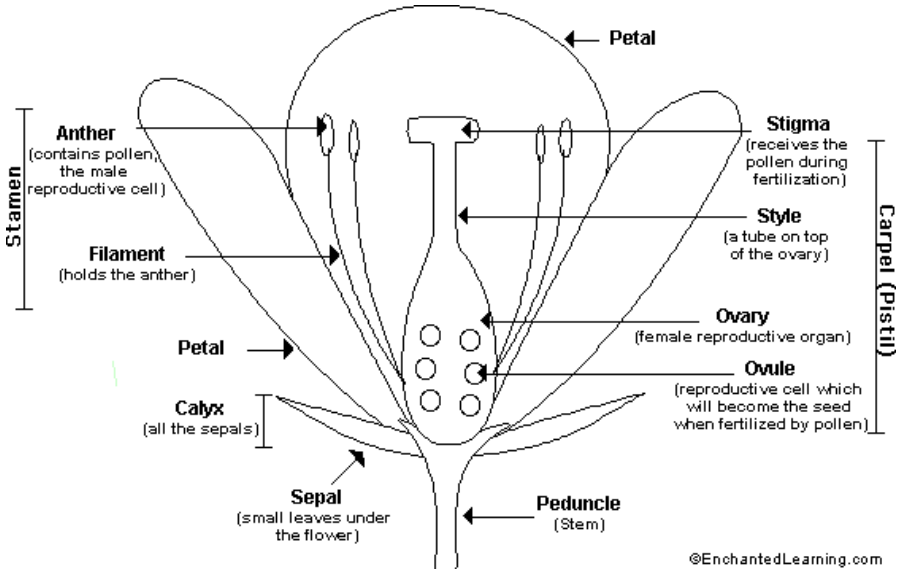
tuber: a thickened underground stem that stores energy for the plant (potato)

vegetable: a part of a plant that is eaten as food, that is not a fruit and does not contain the seed

vine: a climbing or trailing woody-stemmed plant

water: a clear liquid poured on plants to help them grow, we drink it also

xeriscape: low water using plants adapted to arid desert climates



Planning your garden:

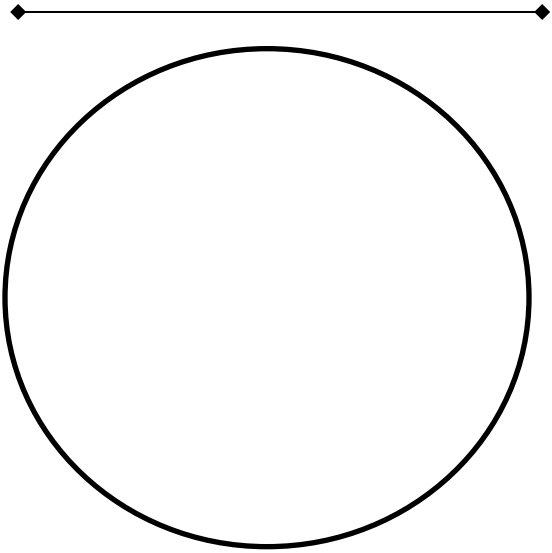
- Decide what kind of garden you want:
  - Vegetable/Fruit
  - Flower
  - Herb
  - Succulent
  - Sensory
  - Color garden (organized by color)
  - Mixed – a combination of the above
  - Themed gardens include:

ABC Garden (plants starting with different letters of the alphabet)
Ancient Roman/Greek
Bird Seed (to feed birds)
Bulb Garden
Butterfly (to attract butterflies)
Dinosaur
Fairy Tale (plants from literature)
Farmer's Market (things to sell)
Giant Garden (large plants)
Hispanic Heritage
Hummingbird (to attract hummingbirds)
Jack in the Beanstalk (bean varieties)
Kitchen Scraps Garden (from things collected while cooking)
Math Garden
Miniature Garden (dwarf plants)
Native American
Peter Rabbit
Pizza Garden (ingredients to make pizza)
Plant for the Hungry (things to donate)
Potato Variety
Rainbow (all colors of the rainbow)
Salsa Garden (ingredients to make salsa)
Vegetable Dye Garden (things to make dye with)
Wildflower

- Pick which plants you want to grow.
  Learn about the mature size of the plant (how much room does it need to grow)

- Draw a picture of your garden plot and show where your plants will be planted; this is called a garden plot plan.

3' diameter culvert



- Learn about the growing season; when is the best time to plant by seed or by starter plant?
- Either have students bring their own plants, *or contact the garden committee* who will help get seed or starter plants (<u>min. 1 week notice</u>).
- Dig a hole; follow directions on seed packet or on plant tag. Make sure plants are given a large enough hole for the roots to spread out.
- On the next page is a list of plants that grow in the Phoenix Arizona area, based on our elevation above sea level. If we lived in Flagstaff, we would have a

different list; because our climate is affected by how far above the ocean our topography is. (ECS is approximately 1,200 feet above sea level; the top of Camelback Mountain is 2,704 feet asl.) Use the list to plan when to plant.

- If you plant at the beginning of the growing season, you will have more time to observe your plant grow and change, and more likely to harvest the results of your hard work. Farmers who plant too late in the season may have to wait longer to get their crops, and sometimes the sun gets so hot, or the rain comes too hard, and the plants die. Knowing *when* to plant is important!

Fruit and Vegetable Garden

Vegetable	**Region 2**	**Plant Size** *(use ht.as space guide for mature plants)*	**Notes**
Asparagus	Oct. 1 - Mar. 1	1-3' tall	perennial
Bean (Bush, Lima) Bean, (Edible Soy) Bean (Bush, Pole)	Feb. 15 - Mar. 15 Mar. 15 - June 1 July 25 - Aug. 15	1'tall 14" tall 4' tall	annual
Beet	Sept. 1 - Mar. 15	1' tall	Eat leaves & root
Broccoli, Brussel Sprouts	Sept. 1 - Dec. 1	2-3' tall	Aphids love
Cabbage (seed)	Aug. 15 - Dec. 1	14" tall	Takes a long time to grow
Cabbage, Cauliflower(plant)	Sept. 15 - Jan. 1	14" tall	Starter plants are easier
Cantaloupe	Feb. 15 - Apr. 1	3-4' round	Vine fruit
Carrot, Parsnip	Sept. 1 - Mar. 1	10" tall	Eat root
Celery	Aug. 15 - Oct. 15	20" tall	Eat stalk or root
Chard	Sept. 1 - Mar. 1	20" tall	Easy to grow, eat leaves
Chinese Cabbage, Collard	Sept. 1 - Jan. 1	20" tall	Eat the leaves
Corn, sweet	Feb. 15 - Mar. 15 July 20 - Aug. 20	10' tall	Plant a lot to pollinate kernels. Corn needs
Corn, Mexican June Corn, Hopi Blue	June 20 - July 20 April 15-June 30	10' tall 7' tall	Room and nitrogen; plant with beans.
Cucumber	Mar. 1 - Apr. 1 Aug. 15 - Sept. 15	4' round	Needs space or climbing trellis, or hang over planter
Eggplant	Feb. 1 - Apr. 1	2-3' tall	Needs space
Endive, Escarole	Sept. 1 - Jan. 1	10" tall	Shade it to keep it white
Garlic, Kale, Kohlrabi	Sept. 1 - Dec. 1	1-3' tall	Garlic gets tall flower stalk
Leek, Lettuce (head) Lettuce (leaf)	Sept. 1 - Jan. 1 Sept. 1 - Mar. 1	1-2' tall	Will bolt and seed fast when hot weather comes!
Loofah	Feb.15-Mar.15	5' tall	Vine fruit, eat small or make sponges w/ large
Mustard	Sept. 1 - Jan. 1	1' tall	Eat leaves or seeds
Okra	Mar. 1 - June 1	3-4' tall	Eat pods or make crafts
Onion (green, bunch)	Sept. 1 - Feb. 1	20" tall	Eat greens and bulb
Onion, dry (seeds)	Oct. 15 - Jan. 1	20" tall	Eat greens and bulb
Onion, dry (sets)	Nov. 1 - Feb. 1	20" tall	Eat greens and bulb
Pea, fall Pea, spring	Aug. 15 - Sept. 15 Oct. 15 - Dec. 15	2-4' tall	Needs trellis to grow on.
Pepper (seed)	Feb. 1 - Mar. 1	2' tall	Bush fruit
Pepper (plants)	Mar. 1 - Apr. 1	2' tall	Bush fruit
Potato, Irish	Feb. 1 - Mar. 15	18" tall	Eat tubers
Potato, sweet	Mar. 1 - June 1	2' tall, 5' round	Vine tuber, needs room
Pumpkin	July 1 - Aug. 1	10' round	Large vine, fun to grow
Radish, Rutabaga, Spinach	Sept. 1 - Feb. 1	1' tall	
Squash, summer	Feb. 1 - May 1	2' tall, 5' round	Vine fruit, needs room
Squash, winter	July 1 - 31	2' tall, 10' round	Vine fruit, needs room
Strawberry	Sept. 1-Nov.30	10" tall	Protect from birds
Tomato (seed)	Jan. 1 - Mar. 1	2-4' tall	Vine fruit
Tomato (plants)	Feb. 15 - Mar. 15	2-4' tall	Vine fruit, needs staking
Turnip	Sept. 15 - Feb. 1	10" tall	Root vegetable
Watermelon	Feb. 15 - Apr. 1	18" tall, 5' round	Vine fruit, needs room

Find Your Fruits & Veggies!

l s j d p k h o c c s x e l z z l h c t o m a t o
c e l e r y w q a a u d r n e a e p o m a v u q c
c s s q r s f n y l g s p w d e p q l v q h t h h
z e l s g j t s t c a s q d l i k b l c u f t c o
d x v g u a o i e i r t e c d e v p a a w y u a w
y e y n l r l e e x a c u c u m b e r u y t l n r
h o a o i o b l b x p l s b n p n d d l n o b i e
l l u c c k e m o o s r e p p e p o n i o a k p s
j p z c b t p b l k a c u w g h n r y f l q e s e
e p o y t z t m n r o h n f e i o a a l s z j b m
u r q u r t d k u a j a e o o c q h x o t w j m b
b q c o o o o g e p r r s n l e d x k w u u g q a
h e s r d h w a y v a d c c l e g h f e o g a h c
j z r y l d y r r e b w a r t s m g y r r f r s r
c a a r a g a b a t u r r k y f h r p f p s l i t
c h a o e r m u v j r v o h v s b s e l s s i d j
g b i t t y y h y s h j l j a t s g r t a w c a d
i b n n u a k a l e b l e u p v a x e y a n l r e
h d e c e r t h y q m e q j m b u x p b p w t a y
c i o j s s n o d h v s s h b p a r s n i p w i a
l q t o i o e i p m g d r a t s u m x f s e i h l
g p f m v e b u p u v o c b w b r p b k b h m d f
z g s i h d y y r o z h s n i v j a u a n l w q j
l o s a x v m z c c s t s u i a w p g n t e f s h
y r s r m d t e e w s f j s n x d l q c g z l q b

Use the words from the plant list on the last page to find all the plants you have learned about!

Definition of Fruit

Fruits are the fleshy ripened ovaries of flowering plants that contain seeds, such as pineapples bananas, apples, avocado, and tomato. This part gives nutrients to the seed so that it can grow. If it has a seed in it, then it is a fruit. The U.S. Government considers tomatoes a vegetable, although this is botanically incorrect.

Definition of Vegetable

Vegetables are edible parts of a plant, such as the leaf of the lettuce or spinach, the tuber of sweet potato, the bulb of onion or the root of the beet. If it is edible and does not have a seed in the part that is eaten, then it is a vegetable.

Nuts

Nuts are technically a fruit as well as a nut because they are the matured ovaries of a plant. But we eat the seed and not the fleshy casing that surrounds it. Walnut, pecan, pistachio, almond and coconuts are the seeds. Peanuts are not nuts; they are seeds related to bean and pea plants in the Legume Family.

Scientific classification of plants

Your garden is part of the Kingdom of Plants! Each plant is classified or grouped by characteristics that make it similar to or different from other plants. The organization of the groups is called taxonomy. Within the Kingdom of Plants are Phyllum, Class, Order, Family, Genus and Species. All plants belong to a family with special features, such as the Legume or Rose families. The Legume family is very large, it includes all plants that produce fruit that comes in a pod with two sides; this includes trees and shrubs. See if you can find family members around school! The plants are named common names in English and scientific names in Latin. Some plants use the same common names, which is why the specific species name in Latin is important.

HERB GARDEN

Herbs are green plants with leaves and stems that die at the end of the season. They are non-woody plants (rosemary is a woody plant, and technically not an herb). Herbs are used for cooking, medicine and perfume. They add a flavor to many of your favorite foods. Basil and oregano are used in Pizza for instance!

Basil *Ocimum basilicum* 1-3 feet tall Annual with pungent scent and taste. Beautiful green leaves. PLANT IN FALL

Borage *Borago officinalis* 1-3 feet tall Annual edible flowers taste like cucumber, add to salads or put in ice cubes for fancy drinks. PLANT IN SPRING

Burnet *Poterium sanguisorba* rose family native to Europe and Asia, leaves taste like cucumber and are nice in salads. PLANT IN SPRING

Chamomile *Chamaemelum nobile, Matricaria recutita* 6-24 inches tall Annual,Perennial (depending on variety) Chamomile's dainty daisy like blooms are used to make tea. PLANT IN FALL

Chervil *Anthriscus cerefolium* 1-2 feet tall An annual plant popular in French cuisine, chervil is used in eggs, soups or on salads. PLANT EARLY SPRING OR LATE SUMMER FOR 2 CROPS

Chives *Allium schoenoprasum* 8-18 inches tall perennial, Chives grace the garden with bright green stems and pinkish-purple pom-pom blooms -- all of which offer a mild onion flavor. PLANT IN SPRING

Cilantro, coriander *Coriandrum sativum* 5-18 inches tall annual with bright green, fern-textured stems, cilantro has a flavorful stem and leaf used in salsas and salads, popular in Mexico, India & Thailand. PLANT IN SEPTEMBER

Dill *Anethum graveolens* 1-3 feet tall Annual plant with tall showy fern-like appearance, use all parts of plant in soups, salads, or pickling. Loves sun, reseeds easily (dill weed). PLANT IN FALL

Fennel *Foeniculum vulgare* 2-4 feet tall perennial with unique shape and licorice taste. Used in salads, soups or sauteed base growth. Likes a bit of shade. PLANT IN FALL

Lemon Balm *Melissa officinalis* 2 feet tall perennial, Lemon balm's leaves release a delicious lemony aroma when brushed. PLANT IN SPRING

Lemongrass *Cymbopogon citratus* 3-6 feet tall perennial clumping grass makes rustling sound in wind. Leaves can be sharp edged (papercuts possible). Lemon scented leaves used in Thai cooking. PLANT IN SPRING

Marjoram *Origanum majorana* 12-18 inch annual, marjoram has a spicy-sweet flavor in its bright green leaves. PLANT IN SPRING

Mint *Mentha* (many variety) 1-2 feet tall Perennial plant with sweet refreshing fragrance will take over garden by spreading rhizomes. Will require thinning every few years. Suggest container separation from other plants. PLANT IN SPRING

Oregano *Origanum vulgare* 1-2 feet tall Perennial from the Mediterranean has a pungent scent, great for sauces and soups. PLANT IN SPRING

Parsley *Petroselinum* selections 8-24 inches tall annual. PLANT IN EARLY SPRING AND FALL FOR 2 CROPS.

Patchouli *Pogostemon cablin* 3 feet tall tender tropical herb from India that does not like direct sunlight. Strong scent used in perfumes. PLANT IN SPRING

Sage *Salvia officinalis* 12-24 inches Perennial. Make sure you get the herb species, not the woody shrub that has the same common name. Beautiful savory for meats, or to dry in bouquets. PLANT IN SPRING

Salvia *Salvia* selections 1-3 feet tall Annual herb, there is also a more woody shrub variety. Many types with different flower colors, all attract butterflies. PLANT IN SPRING

Savory *Satureja* species 6-16 inches tall, has a flavor similar to dill with a hint of thyme. There are two types of savory: summer savory and winter savory. Summer savory is an annual. Winter savory is a perennial.

Stevia *Stevia rebaudiana* 30 inches, this plant will be hard to keep growing only because the kids will want to eat all the leaves! Stevia has sweet-tasting foliage that's an alternative to sugar or artificial sweeteners. Use in sun tea or lemonade. PLANT IN SPRING

Tarragon *Artemisia dracunculus* 1-3 feet tall Perennial French tarragon creates a shrubby presence in the garden border, combining fine texture with wonderful green-to-gray foliage. PLANT SPRING OR FALL

Thyme *Thymus* selections 3-12 inches tall

Perennial used in French cooking, great for soups, meats or salads. PLANT IN FALL

FLOWER GARDEN

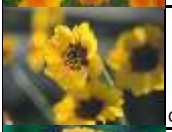
Photo	Common Name	Scientific Name	Plant Size	When to Plant	Notes
	African Daisy	Arctotis	1-2' tall	fall	reseeds easily, collect seeds
	Alyssum	Lobularia maritima	8" tall	spring	
	Amaranthus	Amaranthus	2-6' tall	spring	native plant, collect seeds
	Aster	Aster	1-3' tall	Spring	
	Baby's Breath	Gypsphila	2' tall	spring	cut/dried flower arrangements
	Bachelor's Buttons	Centaurea cyanus	18" tall	fall	cut flower arrangements
	Black Eyed Susan	Rudbeckia hirta (Asteraceae)			
	Butterfly Milkweed	Asclepias tuberosa	2' tall	fall	perennial that attracts butterflies
	California Poppy	Echscholzia californica	1' tall	spring	reseeds easily, collect seeds, when pods are dry they will burst open to scatter
	Calliopsis	Coreopsis tinctoria	2-3' tall	spring	
	Calendula	Calendula officianalus	2' tall	fall	cut arrangements, edible, attracts butterflies

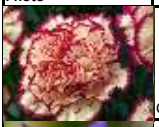
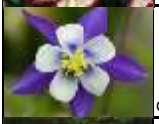
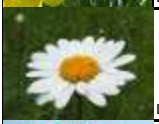
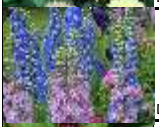
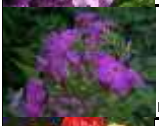
Photo	Common Name	Scientific Name	Plant Size	When to Plant	Notes
	Carnation	Dianthus caryophyllus	1-2' tall	fall	sweet spiced scent, cut arrangements, edible
	Columbine	Aquilegia	1-3' tall	fall	blooms early spring, yellow flowers also, native to AZ, attracts butterflies
	Cone Flower, Echinachia	Echinacea pupurea	2-3' tall	fall	cut/dried flower, medicinal tea, attracts butterflies
	Cosmos	Cosmos bipinnatus	3' tall	spring	cut arrangement, attracts butterflies
	Daffodil	Narcissus	2' tall	early fall	bulb perrennial, mark location after the leaves grow back
	Daisy, English, Shasta	Bellis perennis or Chrysthanemum maximum (2 different varieties)	18" tall	spring	cut flower arrangement, can take color from water w/ food coloring to change petal color
	Dahlia	Dahlia	1-2' tall	spring	cut arrangments
	Delphinium	Delphinium cultorum	3' tall	fall	cut arrangements
	Dianthus, Sweet William	Dianthus barbatus	1' tall	fall	sweet spiced scent, cut arrangements, edible
	Flax, Scarlet or Blue	Linum grandiflorum or Linum perenne lewisii	2' tall	fall	cut/dried arrangements, collect seeds
	Gazania	Gazania hybrida	8" tall	fall or spring	
	Geranium	Pelargonium hortorum	12-18" tall	fall or spring	scented varieties (lemon, rose) have pungent leaves

Photo	Common Name	Scientific Name	Plant Size	When to Plant	Notes
	Gladiola		3' tall	early fall	bulb perrenial, mark location after the leaves die back
	Hollyhock	Alcea rosea	5' tall	fall or spring	reseeds easily, collect seeds
	Ice Plant		8" tall		succulent
	Impatiens	Inpatiens wallerana	12" tall	spring	
	Iris				bulb perrenial, some will multiply underground, producing more each year, eventually needing to be thinned.
	Larkspur	Consolida ambigua	3' tall	fall	cut arrangement
	Lisianthus	Eustoma grandiflorum	2' tall	spring	cut arrangement, roselike look without the thorns
	Lobelia	Lobelia erinus	8" tall	fall	great border plant
	Lupine	Lupinus	10" tall	fall	early spring blooms
	Marigold	Tagetes patula	10" tall	fall or spring	
	Nasturtium	Tropaeolum majus	18" tall	fall	edible peppery flavor for salads, bush and vine variety
	Pansy	Viola wittrockiana	10"	winter (Nov-Feb)	edible for salads, no distinct flavor, just colorful

Photo	Common Name	Scientific Name	Plant Size	When to Plant	Notes
	Penstemon Firecracker, Parry's, Desert Beardtoungue (3 varieties)	Penstemon eatonni, parryi, pseudospectablis (3 varieties)	24"	fall	many varieties, native plant, attracts hummingbirds, reseeds easily, collect seeds
	Petunia	Petunia hybrida	12"	fall / winter / spring	strong sweet spicy scent
	Phlox	Phlox drummondii	18"	fall	cut flower arrangement
	Ranunculus	Ranunculus hybridus	18" tall	fall	tuber perennial, poisonous (do NOT eat), cut flower arrangment (wash hands after handling cut stems)
	Snapdragon	Antirrhinum majus	18" tall	fall/winter	cut arrangement
	Statice	Limonium sinuatum	2' tall	fall	cut/dried flower arrangement
	Stock	Matthiolo incana	2' tall	fall/winter	cut flower arrangement
	Strawflower	Helichrysum bracteatum	2' tall	fall/winter	cut/dried flower arrangment
	Sunflower	Helianthus annus	2-12' tall	spring	cut flower arrangement, attracts bees and birds, cooking/science/geography lessons regarding use of plant!
	Verbena	Verbena peruviana	10" tall	fall	low water use, will carry through summer
	Vinca	Vinca major & Vinca minor	1' tall	fall	can take over entire pot, snails love it
	Zinnia	Zinnia elegans	2' tall	spring	cut arrangements, attracts butterflies

SENSORY GARDEN

(Focus on the five senses, plant things you can see, smell, taste, touch and hear)

Chocolate Daisy (Berlandiera lyrata) 18-24" mounding perennial plant. Flowers smell like chocolate in the morning! New flowers open every day (pick them for classroom, they close up at night). It blooms from spring until frost. Collect the large seeds when they turn brown and feel dry. Label and store in a dry place for next season. PLANT AFTER FROST.

Provence Lavender (Lavandula x Intermedia) 18-24" shrub. Learn geography by studying where lavender is grown in France. All parts of the lavender are fragrant and can be used in cooking or crafts. Lavender wands can be gathered at anytime. To dry, hang upside down in small bunches or just place upright in a small vase with no water. Once dry, buds are easily jostled lose. Place in several layers of cheesecloth and tie with a ribbon. Cut back flowers and about a third of the bush in late summer. This is a forever plant, but can be cut back to leave room for other plants. You may want to remove old woody growth to keep the herbaceous parts. PLANT ANY TIME

German Chamomile (Matricaria chamomila) 8-12" tall annual herb grows quickly and can be harvested once or twice during the growing season. Light apple scented mass of tiny white daisies quickly become lemony cones perfect for picking. Flowers can be used fresh or dried and can be brewed up into tea (which soothed Peter Rabbit's tummy) or added to ice cubes and used in summer time teas. Seeds left behind bring new plants, harvest seeds and save for next year! Seed should germinate in 7 to 14 days. PLANT IN OCTOBER

Chocolate Mint (Mentha x piperita cv.) or any variety of mint (lemon, spearamint, peppermint) 12" herb. Grows by rhizome and is invasive. It will take over a culvert in several years unless you keep it in a contained pot separate from the garden. You will need to thin this plant out or start over if you want room to plant. The reddish-green stems of mint grow upward for most of the summer and can be cut at any time. As fall approaches, the mint may bloom, which can attract butterflies. Before winter hits cut back the remainder of the mint and dry it. PLANT IN FALL

Wild Watermelon Salvia (Salvia microphylla cv.) 3' shrub. This is a forever plant with bold fruity fragrance and large watermelon colored flowers. Decorate cupcakes or add the flowers to salads, soups, egg dishes or drinks. Flowers are attractive to hummingbirds. Cut back about a third of the bush in fall.

Lamb's Ears (Stachys lanata) 24" herbaceous perennial. Soft fuzzy leaves make fun little wash cloths on a hot day or can be used as a soft bookmark. Lamb's Ears take almost no care as long as they are not over watered. Tall spikes of pink fuzzy flowers appear in spring. Leave these on and new plants will pop up in new places the next year.

Rosemary (Rosemarinus officianalus) 3' woody shrub. This is a forever plant that will attract bees. In the spring you can sit and listen to the plant hum with activity. The leathery leaflets are used in cooking meats, savory breads and hearty stews. It symbolizes friendship.

Ruellia (Ruellia peninsularis) 2-3' shrub. Spreads by rhizome and will take over. After purple flowers die off, small brown seed pods form. Stand back 5' feet from plant and spray it with water. Listen for the pods to burst open like popcorn as seeds explode from the pod in all directions.

Artichoke 5' shrub needs LOTS of space. Large leaves radiate from center, plant sends shoots up with large thistle heads that can be steamed and eaten, or left to bloom into spectacular flowers that can be dried. The life of the plant is a great observational tool. PLANT IN SPRING

Rattlesnake Grass *Briza maxima* is a quaking grass that produces sound when the wind blows. The seed heads look like large hanging rattlesnake tail ends that are used in dried flower arrangements. If this plant can't be found, substitute **Blue Grama** *Bouteloua gracilis* is 2' tall and has distinctive curved "comblike" seedheads, which appear during the summer. The leaves are light green, drying to a tan color in the winter.

Scented Geranium

Like the varieties of mint plants, geraniums come in many colors and scents. Originally from Africa, they were imported to England during the Victoria era of gardening. Rub the leaves of different varieties and see how many different scents you can identify: nutmeg, lemon, rose, peppermint, chocolate, apple. The petals are edible also!

Sun Tea: Chocolate Daisy, German Chamomile, Scented Geranium and Wild Watermelon flowers and Chocolate Mint leaves can all be used to make sun tea. Pint size mason jars are best for small children. Wash the leaves, stems or flowers. An easy way to do this is to swish them in the jar and then drain. Add fresh water and let the jar sit all day in the sun. It will turn a rich golden brown. Strain out the leaves and add a touch of sweetener (optional). Refrigerate. Start your tea in the morning and have your party in the afternoon. Integrate art and have the kids decorate their own tea cups or glasses!

GLEAM 2 ARIZONA OVAL GARDEN

Arizona's climate has been a valuable resource for agriculture.

From A.D. 600 to 1450, the Hohokam "Those who came before, or ancestors" developed sophisticated irrigation systems, allowing them to harvest what was native to the desert: mesquite pods, agave, saguaro fruit, cholla buds and the greens of wild plants. By 1,200, hundreds of miles of waterways served a complex network of farmland worked by the expansive community throughout most of what is now the Valley of the Sun.

The Upper Pima Indians who called themselves "Akimel Oodham" or "River People," were another agricultural community. They strategically planted along the mudflats of the Gila and Lower Colorado Rivers. Salt River Pima Community east of Scottsdale, grow crops on land they lease to farmers. One internationally known crop is named after them: Pima Cotton. One of the best cotton fibers used for making clothing, towels and bedding. Egyptian Cotton and Pima Cotton plant fibers are grown in hot desert climates with longer growing seasons; the fibers are longer and stronger, making thicker, softer and stronger fabrics.

The Hopi Indians, in northern Arizona, successfully grew crops in the mantle of sand along their mesas. The sand trapped rainfall and snowmelt, allowing the Hopis to practice dry farming on a land averaging 7-13 thirteen inches of rain per year. Hopi corn is a blue corn used for making piki bread traditionally, but today, you can get blue corn tortilla chips. Corn is a very important crop for the Hopi, they have special festivals and ceremonies celebrating the planting and harvest of the crop. They also grow squash, beans adapted to the desert climate, and sunflowers.

The Navajo Indians "Dine People" also in northern Arizona, were livestock farmers, specializing in sheep raised for wool used in traditional blankets. They also raise goats, cattle and wild horses. They also grow beans and grains. The Navajo have a long history of ranching and land management for livestock.

Each group contributed to the foundation of what would become one of Arizona's primary economic industries, agriculture. The irrigation techniques, planting methods and the types of plants planted are still used today, over one thousand years later.

Planning an Arizona Crop Garden

The large oval planter in the Gleam 2 courtyard is planned for plants common in Arizona's farming history. The tallest plants should be planted in the center, and the shortest plants out towards the edges. Over the years, the soil will need to be changed out or amended, or crops rotated so that the soil is not depleted of valuable nutrients. Traditionally, corn and beans and squash were planted together, some Native Americans referred to these three crops as the three sisters. Corn provides a natural pole for bean vines to climb. Beans fix nitrogen on their roots, improving the overall fertility of the plot by providing nitrogen to the following year's corn. Bean vines also help stabilize the corn plants, making them less vulnerable to blowing over in the wind. Shallow-rooted squash vines become mulch, preventing weed growth and preventing soil moisture from evaporating. Improving the overall crops chances of survival in dry years. Spiny squash plants also help discourage predators from approaching the corn and beans. The large amount of crop residue from this planting combination can be incorporated back into the soil at the end of the season, to build up the organic matter and improve its structure.

Diagram of 10' x10' Square Of Corn, Beans, and Squash Showing Spacing Of Mounds

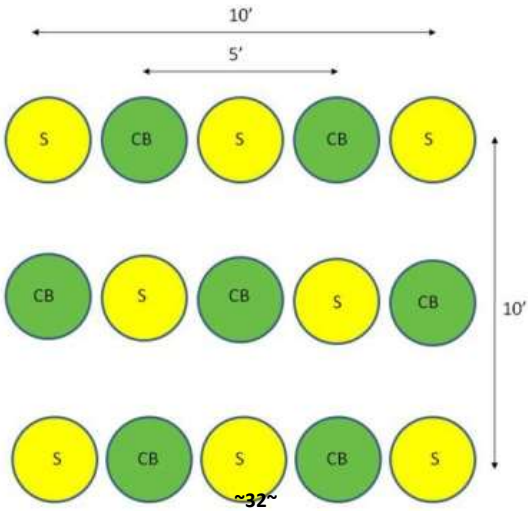


Diagram 2

Spacing of corn plants within corn/bean mounds

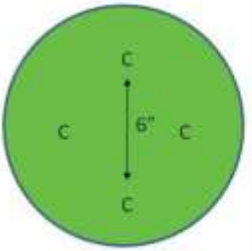


Diagram 3

Planting beans in corn/bean mounds

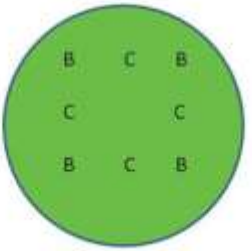
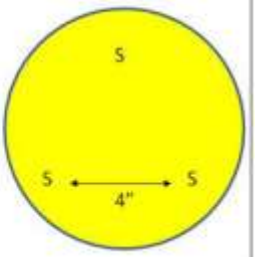


Diagram 4

Planting squash in squash mounds



Triticum aestivum. An Old World native, wheat was introduced to the Southwestern U.S. by Father Kino as he moved north from Sonora. This wheat was grown by the Pimas in between other crop seasons.

White Sonora Wheat is another grain introduced Arizona by Spanish missionaries in the late 17th century. Drought-tolerant, disease-resistant, highly adaptable, nutritious, grain was responsible for the invention of the wheat flour tortilla! The winter crop is a soft round grained glutinous wheat.

Hopi Red Dye Amaranth *Amaranthus cruentus* is a high protein gluten free grain with beautiful color. The Hopi used it as a food coloring as well as a food staple. It grows to 5-6' tall, or taller in nitrogen and phosphorus rich soil. Plant seeds in spring after frost.

Hopi Corn –*Zeas mays* plant in spring after last frost and air temp is at 70 degrees, harvest in late fall, 6' tall plant should be planted 4-6" apart for cross pollination. Corn needs well drained soil and nitrogen.

Tepary Beans –*Phaseolus acutifolius* cultivated by Native Americans for thousands of years, this is a xeric plant (drought resistant) with a high protein value. 1-3' tall bushing variety with equal spread, or vining variety up to 12'. April planting results in July produce, July planting results in October produce. Frost sensitive, thrives in heat.

Lima Beans - *Phaseolus lunatus* includes Calico, Hopi Yellow, Hopi Red, Hopi White, Pima Beige, and Pima Orange, plant in February, provide climbing trellis, grows 3-6' tall.

Note: there are many varieties of beans, including introduced seeds from other arid climates, students can research arid farming and experiment with bean varieties such as *Vigna unguiculata* from Africa and compare growth patterns and harvest results. Planting a rotation of crops throughout the school year, staggering by the month, provides opportunity for scientific observation of plants, to see how seasons affect growth.

Pumpkins –*Cucurbita maxima* plant mid-June for an October crop, the maturation of the plant from seed to fruit is approximately 90 days, if planted in February early, you'll have pumpkins by the end of the school year! For additional entertainment, pumpkin molds can be purchased that will shape a fruit into different forms as it grows into the void of the mold.

Winter Squash – *Cucurbita moschata* and many variety of winter squash, such as the Carrizo, Magdelena Big Cheese, Mayo Kama, Butternut, Hubbards, Turbans, Rio Conchos and Navajo Hubbard grow impressively large plants (15' vine spread) and some, very large fruits (18" diameter fruit). Plant in May for a fall/winter harvest.

Summer Squash - Cucurbita argyrosperma and many variety of summer squash, such as the Apache Giant, Calabasas (many varieties), Cuares Mera, Navajo Cushaw Tail Squash, Conchos, Tohono O'odham Ha:l, Valarde, and Pepita can be eaten when fruit is young during summer months. The fruit are colorful, striped, spotted, and uniquely shaped. The fruit get harder as they mature. Plant in after last frost for end of school year squash harvest. Blossoms are also edible, and can be battered and fried. The squash blossom is an iconic image in Native American art and jewelry. This is a great opportunity to introduce art into a garden lesson plan.

Gourds – vary in shape, color and size and had many uses in Native American life. As carrying vessels for water, they were used as canteens for hikes, and jugs for storage and serving. They were eaten when young, carved out as cooking tools such as ladles and spoons, used as rattles for ceremonies and infant toys, they also used the pulp for medicinal uses such as a poultice. Students will enjoy watching the vines grow, pollinating the flowers, watching the plant die, harvesting the fruit, drying the fruit, and then making decorative objects to keep or to sell at a school fair (rattles, bird houses, tree ornaments are a few suggestions). Many varieties grow in Arizona: students can research this to determine which to plant. Cucurbitaceae (Cucurbit) family includes many types of squash and pumpkins. The bright, multi-colored, thick-shelled, sometimes warty types are of the Cucurbita genus (C. pepo). Cucurbita gourds include such colorful types as the 'Shenot Crown of Thorns,' smooth and warted pear, egg types, and winged gourds. As a group, Cucurbita gourds have hard angular stems, but a few winter squash types used as ornamentals have soft corky stems, such as the 'Turks Turban' variety, and belong to the Cucurbita maxima species. In general, the types with hard stems tend to keep longer. The Cucurbita have prickly leaves and stems, and yellow flowers. The second group includes the hard, thin-shelled "utility" bottle/birdhouse gourds belonging to the Lagenaria genus. The Lagenarias have smooth stems; soft, large leaves; and white flowers. The Lagenaria gourds are tan to brown when mature with long, narrow hard stems and have many distinct shapes and sizes. This includes such unique types as the caveman's club, calabash, dolphin (maranka), swan gourd, Corsican flat, apple, drum, bottle, and small and large dipper types.

Luffa or Loofah – *Luffa aegyptiaca* and *Luffa acutangula* are native plants to Asia, and not an historic plant for Arizona agriculture. This vine is related to the cucumber family and can grow on the trellis fence in the oval garden. The fruit ripens and dries, and then can be skinned and cleaned out to use as a natural sponge, like the ones sold in beauty kits. Combine this with lessons in making homemade soap and product marketing (package design)and the loofah is a fun opportunity to grow a product students could learn to process and sell as a fund raiser!

Octopus Agave – *Agave vilmoriana* is a safe alternative to traditional agaves such as the century plant. The century plant was used by Native Americans for needles and thread, and roasted the roots for food. The Octopus Agave is native of Mexico. This soft sided giant does not have spines and grows to 4-5' in diameter (so don't plant too many!) It is very sculptural and would be a focal point of the garden. The plant takes 8-15 years to mature, depending on conditions and irrigation. At the end of its life cycle, it sends up a shoot 9-16' in the air, covered in flowers. Students can measure the growth of this stalk daily, at beginning and end of school day, and track stalk growth (as much as 5" in 6 hours of sun, or as little as 2" on a colder cloudy day). This is a great opportunity for math and science observation and documentation.

Pima Cotton *Gossypium barbadense* - Cotton seeds require warm soil conditions, and cotton planting can start as soon as soil temperatures are warm enough, to establish a healthy crop of seedlings. An optimum soil temperature condition is 65° F at seeding depth at 8:00 A.M. for three consecutive days, with a favorable five day forecast. Soil temperatures are acceptable for planting as they approach 60° F, and the forecast is good. Planting into soil conditions with temperatures less than 55° F will provide a high probability for poor vigor and seedling disease problems. A favorable five day forecast is dry weather with highs above 80 oF and lows in the upper 40s or higher. Here is a meteorological opportunity for students to monitor soil temperatures and determine ideal planting time at ECS! The plant takes approximately 25 weeks, planted in April, will produce cotton in the fall. Students can see cotton grown in agricultural fields at the Salt River Pima Maricopa Indian Community, along Pima Road to the east. Bolls of cotton are fun to harvest, and can be used for crafts.

Grains – Wheat, Barley, Alfalfa and Grain Sorghum could all be rotated crops in the Arizona Agriculture garden. Species of plants introduced to Arizona that thrived in the hot sunny climate are now staples in the agricultural industry.

Citrus – One of the five C's of Arizona's historic economy (Copper, Cattle, Cotton, Climate & Citrus) grapefruit, lemons, limes, tangelos, Arizona Sweet Oranges are all grown here.

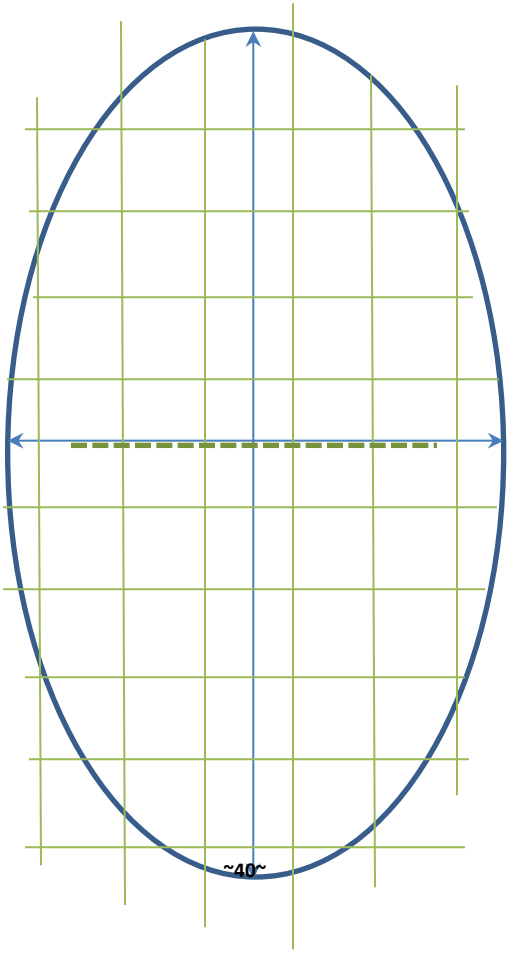
Currently, Arizona is one of the top 4 producers of citrus nationally, but only produces 4% of the national citrus crop. Graphing trees has even created cocktail trees, with lemons and limes growing on one tree! There is not much room to plant these thorny trees in the Gleam 2 courtyard, but citrus is worthy of note for its significant role in Arizona agricultural history. Serve oranges for lunch and raise a peel to the shady flood irrigated groves of Arizona that once filled the Arcadia neighborhood!

Lettuce – A high water using plant that has thrived in the warm winters of Arizona. In Yuma, every field is laser-leveled and graded using GPS technology, making Yuma's irrigation network one of the most efficient in the world. Yuma County is first in the state - and third in the nation for vegetable production. In fact, about 90 percent of all the leafy vegetables grown in the U.S. from November through March are grown in and around the Yuma area. Yuma produces nine salad varieties for bagged lettuce and salad mixes. During peak production months, each of those plants processes more than two million pounds of lettuce per day. While other states are shoveling snow, Arizona is growing food served around the country.

I'itoi Onion *Allium cepa var. aggregatum*, the Tohono O'odham I'itoi Onion or Papago Onion was an endangered vegetable. These small spicy red multipliers were grown by the O'odham native peoples of the US Southwest for centuries, I'itoi (pronounced "etoy") onions are believed to have been brought from Spain by Jesuit priests in the seventeenth century and was rescued in 1980 in the Papago community and is coming back into common use. The onion top is edible as chives or green onions are, the bulb is similar to a shallot, only a more intense flavor.

GARDEN MATH

- Measure the distance across the widest points of the oval
- Calculate the square footage of area of the oval, this is your planting area.
- Calculate the cubic yardage of soil needed to fill the 12" deep curb, allowing for 4" of "freeboard" (open area) on top, to contain water within the oval.
- Using string and sticks, lay out a 2' grid pattern for planning your planting. Center the grid from the growing fence in the middle and work out to both elongated sides.
- Research what crops you want to grow and make a list.



- After making a list, categorize the plants by ground cover (12" high plants), vine, bush (2-3' high plants), tall plants (over 3' in height). Group them in a list and draw symbols for each plant to create a planting legend. Here is a sample of a legend from the ECS landscape plan:

- The legend should include the common and scientific name of each plant. With common names each word is capitalized. With scientific names the first word is the Genus of the plant and is capitalized, the second name is always lowercase. When you study plants in botany, if you see var. it means variety, cv means cultivar.
- The legend should include the size of the plant you are starting with (or write seed if you use seeds). For instance, seed, seedling, 3" pot, 5" pot, ½ gallon, 1 gallon, 5 gallon.
- The legend should include the mature growth dimension, for instance agave would be 5' dia., corn would be 7' tall, squash might be 12' dia. It is helpful when you start planting to understand how big something will get, and not plant things too close together.
- Your legend might include a season column, with an F for fall planting, W for winter and S for spring; since all of your plants will not be planted at one time, you need to leave room for the next crop as the seasons change.

- Students either bring the plants to class, or contact the garden committee (*at least 2 weeks in advance, some of these may be harder to find!*)

Here is a sample garden legend:

Symbol	Common Name	Scientific name	Plant size at time of planting	Mature plant size	When to plant
	Pima Cotton	*Gossypium barbadense*	1 gallon	3' tall	Spring

- Next is the irrigation plan. Students will need to research how much water and how frequently plants need to be irrigated. Some plants may need more at the beginning of germination, others at the end during fruit maturation. The Arizona Oval Garden does not have an irrigation system! Just like the Native Americans, they will need to design an irrigation plan and schedule so that each plant gets the kind of water it needs. Here are the types of irrigation they might explore:
- **Flood** irrigation with a schedule to fill a section of the oval on a regular basis, experiment with how long it takes to fill and how fast it drains into the ground.
- **Drip** irrigation with a section of pipe that can be connected and disconnected to a hose bib, providing water pressure to spaghetti tubing that is placed by specific plants. Experiment with water pressure and find the ideal amount of time for the plants to get enough water. Timing can be measured in a gallon jug to see how long it takes for a plant to get 1 gallon of water.

- **Soak** irrigation with a soaker hose that is left on for a specific amount of time on a regular schedule. Experiment with how long it takes for the soil around the hose to get wet, measure the distance and calculate the time to reach all the plants in an area.
- **Spray** irrigation with a fan sprinkler that imitates rainfall. Some crops rely on waterfall on the leaves, in some cases the rain triggers seed dispersal (poppies and ruellia). Experiment with measuring the depth of moisture in the soil and the timing needed to reach 4-6" below the surface.
- Irrigation and soil management are great ways to introduce science into gardening. Students can test the pH of the soil and learn about acidic or alkaline soils and how to balance the soil depending on the crops grown. Amending the soil with manure, ash, compost, lime, or other "amendments" will change the chemical composition of the soil. In some plants, it changes the color of the flowers and fruits produced.

GLEAM 3 ANCIENT GARDENS

Identifying where a plant originated from takes detective work using many disciplines of science.

- Fossil remains of plants such as palms, ferns or chrysanthemums help identify areas where they grew naturally.
- Amber contents of pollen and plant parts identify where plants were stuck in tree sap, possibly carried by wind or animals.
- Carbon dating of animal waste or body remains can tell when a plant was eaten by an animal, with an estimation of the range the animal might have travelled to forage for food.
- Artwork showing plant or plant forms on frescos, murals, mosaics, pottery, tapestries and textiles indicates when people used plants in a particular region. This is less accurate, as the plants may have been imported or traded from other locations along trade or migratory routes. The Egyptian, Greek, Roman, Indian and Asian cultures had expansive networks within their economy, affording opportunities for foods, flowers, herbs and spices from other regions.
- Literary reviews of documents such as the bible, referencing plants used during early written and spoken cultures of a region such as the Middle East or Africa.

The word Botany is derived from Ancient Greek βοτάνη Botane meaning pasture, grass or fodder and βόσκειν Boskein meaning to feed or to graze. It is the study of plants, including fungi and algae. As one of the oldest branches of science, Botany identifies plant relationships to organize them in taxonomic groups, documenting edible, medicinal and poisonous plants. Now it includes the study the plant parts and structure, internal systems such as vascular, photosynthetic and reproductive systems, species evolution, diseases, chemical properties and DNA compositions of species. Other branches under this science include agronomy, horticulture, paleobotany, and ethnobotany.

Ethnobotany is the study of cultural relationships to plants through analysis, documentation and description of relationships between plants and people, how they are used and managed for food, clothing, currency, ritual, medicine, dye, construction and cosmetics. In A.D. 77, the Greek surgeon Dioscorides published "*De Materia Medica*", a catalogue of Mediterranean plants and how they were used, especially for medicinal purposes. The illustrated publication had information on how and when each plant was gathered, whether or not it was poisonous, its actual use, and whether or not it was edible (with recipes). Dioscorides emphasized the economic potential of plants. The Egyptian, Greek and Roman civilizations traded for plants; in some cases the plants had such high market value that the native species were over-collected to the point of extinction for profit.

Gleam 3 will embark on a study of the plants of ancient civilizations; as ethnobotanists they will have the opportunity to research, study, plant, cultivate, harvest and use the products of their studies in this outdoor laboratory of scientific exploration!

WARNING: Before planting any imported plant from another region, *research the ecological impacts of the plant on our environment*. Some plants are prohibited from being sold here, to protect our desert ecology. Some species are highly invasive, such as the Tamarisk, Vine Morning Glory (Convolvulus arvensis), and Bamboo varieties. Other plants are high pollen producers such as Mulberry and Olive, which were once popular yard plants, and are now banned from most cities due to allergies.

The following pages are a list of plants from different continents or countries. The origin of some species is difficult to determine if the plant is native to a large area. Some plants will require experimentation for cultivation in the desert climate. Rice for instance is being studied at the University of Arizona for desert varieties suitable to changes in climate and drier environments. Research on plants as food staples and sources of medicine are ongoing.

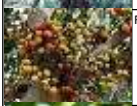
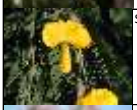
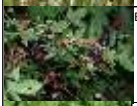
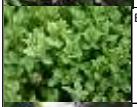
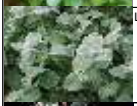
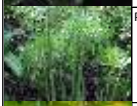
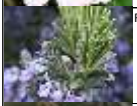
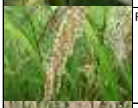
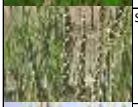
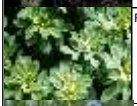
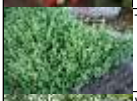
Photo	TREES: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Acacia, Egyptian Thorn, Thorn Mimosa, Gum Tree	Acacia nilotica/arabica	20-60' tall	don't	Africa, Middle East	Invasive species, medicinal uses, thorny
	Acacia, White	Acacia albida	19-90' tall	don't	Africa, Middle East	hightly thorny tree
	Almond	Prunus amygdalus	10-33'	spring	Middle East	May need pollinizer (male & female plants), needs winter chill, must research best variet and may need to plant more than one. Need water to procude well.
	Apple, Anna var.	Malus domestica 'Anna'	30' tall	spring	Isreal	The Anna was not ancient, it was discovered in the 1950's in Isreal. But the apple tree has been around for centuries, and is referenced in the oldest book in the bible. The Anna is a desert fruit that ripens in June before extreme heat.
	Cacao	Theobroma cacao	15-20' tall		South America	Used to make chocolate, 4-5 yrs before first fruit, needs humid environment and water.
	Citrus, varieties - Sweet Orange, Sour Orange, Naval, Grapefruit, Key Lime, Lemon, Lime, Tangerine, Kumquat, Pomelo, Mandarin	Citrus (each has a different Latin name)	10-20' tall	spring	Southeast Asia	Thorned tree, use caution when trimming or picking fruit. Scented flowers may be allergen. Ripening season is through school year. Ties to AZ History/Economy.
	Cypress - Italian, African, Chinese, Siberian, Arizona, Juniper	Cupressus (each has a different Latin name)	10-80' tall	spring	Egypt, Mediterranean	Arizona native cypruss available. Used for medicine and mummification
	Date	Phoenix dactylifera	70' tall	spring-early summer	Iraq	Used for the fruit, taller trees become hard to trim, leaflets are very sharp. Bag fruit prior to ripening.
	Fig, Sycamore	Ficus sycomorus	60' tall	spring	Africa, Middle East	Used for the fruit and timber, not related to the Sycamore tree, the fig has a unique pollination process that relies on a wasp.
	Fig	Ficus carica	30' tall	spring	Middle East, Asia	Mentioned in the Bible, uses wasp for pollination of fruit, highly prolific producer of fruit, sap and hair on leaves may be a skin irritant that can be severe if allergic to latex. Use caution when trimming, picking or eating!
	Jujube	Ziziphus jujuba	30' tall	spring	Southern Asia	thorned tree.
	Laurel	Lauris nobilis	up to 55' tall	spring	Mediterranean	Used for seasoning food, funary preparation, room air freshener, insect repellant, laurel wreaths for awards, great evergreen shade tree
	Oak (600 varieties) AZ White Oak is native to AZ	Quercus (many varieties) arizonica is native to AZ	up to 60' tall, varies by type	spring	Northern Hemisphere	Many varieties, there is one native to AZ, Heritage Oak, Emory, Gambel, Shrub, Dunn, and Cork oaks all do well in AZ. Wood is used in furniture, bark of cork oak used for wine corks.

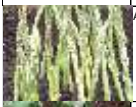
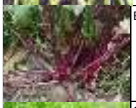
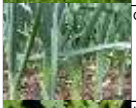
Photo	TREES: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Olive	Olea europaea	20-50'	spring	Mediterranean	ONLY PLANT SWAN HILL HYBRID (Pollen free) to avoid allergies. Unfortunately, these won't produce fruit, making olives is a great processing lesson. Native plants are dioecious, requiring male & female trees.
	Pears	Pyrus communis	10-25'	winter bare root	Africa & Asia	Culivated in Rome, used in China and western Europe. Member of the rose family. Likes cooler climates and needs water.
	Pistache	Pistachia chinensis	15-30'		China	Wood used in furniture & yellow dye, seeds used for oil for biodeisel production. Shade tree in summer, colorful leaves in fall, dormant in winter, great seasonal tree.
	Pistachio	Pistachia vera	33' tall	spring	Middle East	Mentioned in the bible, seeds are a nut used in food. May not fruit in Phx; needs lower temperature exposure. Plants are dioecious, there are separate male & female plants.
	Sesbania	Sesbania sesban	25' tall		Asia, Africa	Used as a medicinal tea in some countries
	Tamarisk	Tamarix aphylla, or chinensis		DON'T	Eurasia, Africa	Originally planted for firewood, soil stabilization, salt mining, ornamental, wind screen. DO NOT PLANT, highly invasive species!
	Walnut	Juglans regia (Common walnut) Juglans major (Arizona walnut)	20-100' tall		Middle East, Asia	Arizona walnut is native plant, not the same seeds as common or old world plant. Wood used for furniture, seeds used for food and medicinal uses, hulls used for dye. Chemical properties of plant also used.

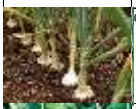
	BUSHES/REEDS: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Acanthus	Acanthus mollis	3' tall		Asia, Mediterranean, Africao	Likes shade
	Bamboo (many varieties)	Bambusa beecheyana	6-100'		Asia	Used for construction, piping, fishing poles, food, ornamental, wind/privacy screen. Can be invasive, plant in containers or in area where it cannot spread. Very fast growing, could measure it in a few days.
	Blackberries	Rubus: Roseborough, Black Satin	4-10' long canes, tie up to fencing		Mediterranean	Berries used for fruit, leaves used for medicinal tea. Most have thorns. Black Satin is thornless.
	Boxwood	Buxus sempervirens	3'-15'		Africa, Asia	Many varieites. Good evergreen shrub for topiary.
	Capers	Caparis spinosa	3' tall		Mediterranean	Flower buds pickeled and eaten, roots, shoots and leaves all used for medicinal purposes.
	Henna	Lawsonia inermis	10-15' tall		Middle East, Africa	Used for medicine, oil for perfume, mummification, body ornamentation, hair and fabric dye, medicine, art, ritual/spiritual ceremonies.
	Licorice	Glycyrrhiza glabra	3' tall		Europe, Asia	Herbaceaous plant, root is used for medicine, candy, tobacco additive. Large consumption of licorice can be toxic to liver, has strong chemical properties.
	Myrtle	Myrtus communis, boetica, compacta	3-15' tall		Mediterranean	Mentioned in the bible, used for medicine, mummification, rituals, liquor, ornamental topiary plant, hedge.
	Natal Plum	Carissa grandiflora, Carissa macrocarpa	3-5' tall		Africa	Flowers pungent scent, fruit may be used in jams, has thorns and a latex sap that may be allergen, wear gloves when harvesting fruit, evergreen shrub.
	Papyrus	Cyperus papyrus	5-15' tall		Egypt	Rituals, garlands, food, bowls, utensils, fuel, paper. Riparian plant that needs water.
	Pommegranite	Punica granatum	10-25' tall		Iran	Related to roses, has thorns, fruit used as food, alcohol, juice and medicine, also had symbolic and ritual meanings. Found in artwork of Egypt and Greece.
	Rose (Rosa richardii, historic significance) 100s of varieties	Rosa	3-20' tall depend-ing on variety		varies with variety	Ornamental, floral, tea, food, medicine, perfume, art, literature. Rosa Banksiae is a Chinese native thornless vining rose that grows well in AZ and has a history in Tombstone.
	Rosemary	Rosmarinus officianalis	2-5' tall		Mediterranean	Mythology, decoration, spice, medicine, mummification, perfume, incense, rituals
	Sedge	Scirpus inclinatus	3-4' tall		Asia	Aquatic plant, soil erosion control, herbal rememdies, fiber, decoration

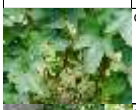
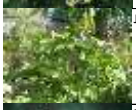
	GRAINS: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Alfalfa	Medicago sativa	2' tall	spring	Mediterranean	Medicine, cultivation for cattle/horse food, nitrogen fixing soil plant, insect attractant for other crops.
	Amaranthus	Amaranthus	2-6' tall	spring		native plant, leaves, roots and seeds all consumed. Seeds are high protien source. Used as a dye, used in mythology, art and literature.
	Barley	Hordeum vulgare L	1-3'	spring	Asia, Africa	Making alcoholic beverages and bread, eaten as grain.
	Corn, Black Aztec, Hopi Blue, Smoke Pop Corn	Zea mays	4-12' tall	spring	South/Central America	Food, ritual, bread, animal fodder, art.
	Rice	Oryza sativa	2-4' tall	spring	Africa, Asia	Used as food and beverage. Needs a lot of water. UofA working on a desert variety that withstands low water, high heat conditions.
	Spelt	Triticum spelta	2' tall	spring	Europe	Mentioned in the bible, an early grain.
	Wheat	Triticum aestivum (winter wheat) Triticum turidum durum (durum wheat)	2' tall	spring	Mediterranean	Used to make bread and cereal.

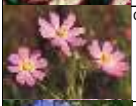
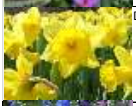
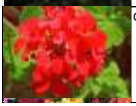
	HERBS: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Anise	Pimpinella anisum	3' tall	Spring	Asia, Africa, Mediterranean	Seeds used in cooking and to make an oil, candy, cookies, liquor, medicinal uses, anticeptic, digestive aid, breath freshener.
See Gleam 1 Herbs	Basil	Ocimum basilicum		Spring		
	Bee Balm, Bergamot	Monarda didyma	1-4' tall	Spring	North America	Used in drinks, salads, oil, anticeptics, attracts butterflies and bees.
See Gleam 1 Sensory	Chammomile	Matricaria chamomilla	1' tall	Spring	Egypt	
See Gleam 1 Herbs	Chive	Allium schoenoprasum	1' tall	Spring	Asia, Europe	
See Gleam 1 Herbs	Corriander	Coriandrum sativum	1' tall	Spring	Egypt	medicine & mummification, is mentioned in the bible, was used in China and India also
See Gleam 1 Herbs	Dill	Amethum graveolens	3-4' tall	Spring	Mediterranean	
	Fennel	Foeniculum vulgare	2-3' tall	Spring	Mediterranean	medicine, muumification, food, spice
	Fenugreek	Trigonella foenum-graecum	2' tall	Spring	Mediterranean	Medicinal, seasoning, food, seeds and leaves used. Used to feed cattle, and in funary preparation.
	Flax	Linum usitatissimum	1-2' tall	Spring	Egypt	Seeds used as food, stems used to make linen cloth, shown in early artwork and used in mummification.
	Hairy Willow Herb	Epilobium hirsutum	6' tall	Spring	Europe, Asia	Invasive to natural riparian environments, needs high water location.
	Jamaica, Roselle	Hibiscus sabdariffa	6-8'	Spring	South America	food coloring, infusions for tea and medicine, fiber, jelly
See Gleam 1 Herb & Sensory	Lavender	Lavandula x Intermedia	3'	Spring	Middle East	mummification, seasoning, medicinal, air freshener, soaps, mentioned in bible under different name
See Gleam 1 Herbs	Marjoram	Marjorana hortensis	2'	Spring	Mediterranean	seasoning, medicinal, mythology, soaps, funary preparation, wreaths
See Gleam 1 Sensory	Mint	Mentha piperita, Mentha spicata	1'	Spring	Asia, Mediterranean	seasoning, drinks, medicinal, cosmetic, insecticide, stomach ailment, air freshener
See Gleam 1 Herbs	Oregano	Origanum vulgare	2'	Spring	Mediterranean	seasoning, medicinal, anticeptic, antiviral
See Gleam 1 Herbs	Parsley	Petroselinum crispum	1'	Spring	Mediterranean	salad, seasoning, medicinal
	Safflower	Carthamus tinctorius	1-5' tall	Spring	Egypt	used for red dye and oil

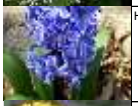
	HERBS: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Sage	Salvia officianalis	2' tall	Spring	Mediterranean	seasoning, funeral preparation, medicinal
	Savory	Satureja hortensis	2' tall	Spring	Mediterranean	seasoning, medicinal, wine
	Sesame	Sesamum orientale	3' tall	Spring	Asia, Africa	seeds for food, oil
	Strawberry	Fragaria × ananassa	1' tall	Spring	Mediterranean	food
	Thyme	Thymus vulgaris	1-2' tall	Spring	Mediterranean, Africa	mummification, seasoning, medicinal, air freshener, soaps, used in cheese & wine for flavoring
	Wormwood	Artemesia absynthium	2-3' tall	Spring	Greece	medicinal use, seasoning, brewing/fermentation for alcoholic beverages, insect repellant, strong aromatic scent

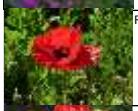
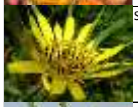
	VEGETABLE: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Asparagus	Asparagus officianalis	4' tall	early spring	Mediterranean, African	food, medicinal use
	Beets	Beta vulgaris	1.5' tall	fall	Mediterranean, Asia	greens and roots used as food, dye
	Celery	Apium graveolens dulce	2' tall	fall	Mediterranean	medicine & mummification
	Endive	Cichorium endivia	1.5' tall	fall	Egypt	food
	Fava Beans	Vicia faba	4' tall		Middle east	food, ritual, voting, folklore
	Garbonzo Beans, Chickpeas	Cicer arietinum	1.5' tall		Middle east	food
	Garlic	Allium sativum	2-3' tall	fall	Egypt	medicine & food, anti-viral
	Lentils	Lens culinaris	1.5' tall		Near east	food, ritual
	Lettuce	Letuca sativa	1.5' tall	fall	Egypt	oil from seeds, festivals, food
	Kale	Brassica oleracea	1.5' tall	fall	Middle east	food, decoration
	Kohlrabi	Brassica oleracea var. gongylodes	1.5' tall	fall	Europe	food
	Leek	Allium ampeloprasum var. porrum	2-3' tall	fall	Egypt	seasoning, food

	VEGETABLE: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Onions	Allium cepa	1-3' tall	fall-winter	Asia, Middle East	food, seasoning, ritual
	Parsnip	Pastinaca sativa	1.5' tall	fall	Eurasia	food, source of sugar. Sap can be irritant, use caution harvesting.
	Shallots	Allium cepa var. aggregatum	1-2' tall	fall	Asia	seasoning
	Sorrel	Rumex acetosa	3' tall	fall		food (limited amounts), medicinal uses

	VINES: Common Name	Scientific Name	Plant Size	When to Plant	Origin of Plant	Notes
	Grape	Vitis vinifera	20' long vines	fall	Eurasia	fruit and leaves for food, wine, oil from seeds, medicinal, ritual
	Ivy	Hederz	10' long tendrils		Eurasia	berries are poisonous, plant used for aesthetic purposes and floral arrangements, ritual. Some varieties need shade, all need water.
	Jaicama	Pachyrhizus erosus	20' long vines	spring	South American	food
	jasmine	Jasminum sambac	10' long tendrils	spring	Asia	Poisonous plant, very fragrant flowers, tea. Used in mummification process, rituals. Must know species before planting, other commonly called "Jasmine" are toxic.
	Vanilla Bean	Vanilla planifolia	300' in humid environment		South American	seasoning

	FLOWERS: Common Name	FLOWERS: Scientific Name	Height:	Planting Time:	Origin:	Notes:
	African Daisy	Arctotis arctotoides	1-2' tall	fall	Africa	reseeds easily, collect seeds
	Artichoke	Cynara cardunculus var. scolymus	3-4' tall	fall	Mediterranean	food, floral, medicinal, liquor
	Chrysanthemum	Chrysanthemum coronarium	2' tall	fall	Asia	ornamental, culinary, insecticide, ritual
	Calendula	Calendula officianalus	2' tall	fall	Mediterranean	medicinal, culinary, dye
	Carnation	Dianthus caryophyllus	1-2' tall	fall	Mediterranean	sweet spiced scent, cut arrangements, edible
	Cosmos	Cosmos bipinnatus	3' tall	spring	South America	cut arrangement, attracts butterflies
	Corn Flower, Bachelor's Buttons	Centaurea cyanus	18" tall	fall	Europe	cut flower arrangements, found in Greek mythology
	Crinum	Crinum	1-3' tall		Africa	mummification, medicinal. poisonous
	Crocus	Crocus sativus	.5' tall	fall	Mediterranean	production of saffron from stamens of specific plant is a valuable spice.
	Daffodil	Narcissus psuedonarcissus (a sub species)	2' tall	early fall	Eurasia	bulb perrennial, mark location after the leaves grow back
	Delphinium	Delphinium cultorum	3' tall	fall	Mediterranean	cut arrangements, medicinal, poisonous.
	Flax, Scarlet or Blue	Linum grandiflorum or Linum perenne lewisii	2' tall	fall	Egypt	cut/dried arrangements, collect seeds, fiber
	Gardenia	Gardenia	4' tall		Africa	Highly scented flower used in corsages.
	Geranium	Pelargonium hortorum	12-18" tall	fall or spring	Africa	scented varieties (lemon, rose) have pungent leaves

	FLOWERS: Common Name	FLOWERS: Scientific Name	Height:	Planting Time:	Origin:	Notes:
	Gladiola	Gladiolus communis	3' tall	early fall	Africa, Mediterranean	bulb perrenial, mark location after the leaves die back. Use for floral arrangements, ritual
	Honeysuckle	Lonicera caprifolium	15' tall		Asia	many plants use the common name. highly fragrant flowers can bother some people. Needs some shade in AZ.
	Hyacinth	Hyacinthus orientalus	1' tall	fall	Mediterranean	decorative, mythology, poisonous
	Immortelle	Helichrysum stoechas	2'		Europe	seasoning, cosmetics, aromatherapy, medicinal, oil
	Iris	Iris germanica		fall	Greece	bulb perrenial, some will multiply underground, producing more each year, eventually needing to be thinned.
	Lily	Lilium longiflorium	2' tall	fall	Asia	decorative, ritual, art, symbolic
	Lotus	Nelumbo nucifera	2' tall		Asia	Needs to float in a pond of water. Used for floral arrangements, food, rituals, symbolism, art
	Lisianthus	Eustoma grandiflorum	2' tall	spring		cut arrangement, roselike look without the thorns
	Lobelia	Lobelia erinus	8" tall	fall		great border plant
	Lupine	Lupinus	10" tall	fall	Mediterranean	early spring blooms. Grown for fodder, as well as food, companion plant that fixes nitrogen in the soil for other crops
	Lychnis	Lychnis coelirosa	2-3' tall		Eurasia	
	Marigold	Tagetes patula	10" tall	fall or spring	Central America	insect repellant, ritual, ornamental, medicinal
	Narcissus bulbs	Narcissus tazetta			Associated w/ Greece and Egypt	mummification
	Nasturtium	Tropaeolum majus	18" tall	fall	South America	edible peppery flavor for salads, bush and vine variety

	FLOWERS: Common Name	FLOWERS: Scientific Name	Height:	Planting Time:	Origin:	Notes:
	Petunia	Petunia hybrida	12"	fall / winter / spring	South America	strong sweet spicy scent
	Phlox	Phlox drummondii	5'	fall	North America	cut flower arrangement
	Red Poppy	Papaver rhoeas	18" tall		Europe	flower arrangement, seed to eat, medicinal, poisonous, literature
	Ranunculus	Ranunculus hybridus	18" tall	fall	Middle East	tuber perennial, poisonous (do NOT eat), cut flower arrangment (wash hands after handling cut stems)
	Salsify	Tragopogon porrifolius	18" tall		Mediterranean	food, medicinal
	Snapdragon	Antirrhinum majus	18" tall	fall/winter	Mediterranean	cut arrangement
	Statice	Limonium sinuatum	2' tall	fall		cut/dried flower arrangement
	Stock	Matthiolo incana	2' tall	fall/winter	Mediterranean	cut flower arrangement
	Strawflower	Helichrysum bracteatum	2' tall	fall/winter	Australia	cut/dried flower arrangment
	Sunflower	Helianthus annus	2-12' tall	spring	Americas	cut flower arrangement, attracts bees and birds, cooking/science/geography lessons regarding use of plant!
	Violets, African	Saintpaulia	1' tall		Africa	
	Water Lilly	Nymphaea	1-2' tall		Mediterranean	Needs to float in a pond of water. Used for food, decoration, symbolism, ritual

SUCCULENT GARDEN –POCKET PLANTERS

Another form of garden is a hanging garden. Many plants can be grown in small pockets of soil. Pocket planters can be hung on fences or walls, and may be connected to irrigation or hand watered, bringing living plants to hard to plant places.

These gardens are ideal for plants adapted to unique environments such as succulents, cacti, bromeliads and orchids. Succulents are thick fleshy plants that store water in the main part of the plant. Agave, Aloe, Euphorbia, Portulaca Jade plants and Kalenchoes are all succulents. Cacti are a specialized type of succulent, with interior skeletal structures, and often exterior areols. Bromeliads are monocotyledons and are often epiphytic, growing on other plants or objects, but are not parasitic. These tropical plants typically have long stiff leaves that collect and store water. Pineapples and Spanish Moss are both bromeliads. Orchids are a large family of approximately 26,000 species with unique resupinate flowers and bilateral symmetry. Most orchids are epiphytic. Vanilla is an orchid. Plants are classified by their reproductive systems, not by their physical features, although some common characteristics may exist within certain groups.

All of these plants are very sculptural; they may have large showy flowers, or small inconspicuous flowers. They tend to grow symmetrically in radial patterns and can be of many different colors, allowing for artistic plantings of combined plants.

Here are the succulent families:

Family or subfamily	Succulent #	Modified parts	Distribution
Agavoideae	300	Leaf	North and Central America
Cactaceae	1600	Stem (root, leaf)	The Americas
Crassulaceae	1300	Leaf (root)	Worldwide
Aizoaceae	2000	Leaf	Southern Africa, Australia
Apocynaceae	500	Stem	Africa, Arabia, India, Australia
Didiereaceae	11	Stem	Madagascar
Euphorbiaceae	> 1000	Stem and/or leaf and/or root	Australia, Africa, Madagascar, Asia, the Americas, Europe
Xanthorrhoeaceae	500+	Leaf	Africa, Madagascar, Australia
Portulacaceae	unknown	Leaf and stem	The Americas, Australia, Africa

The family Bromeliaceae is organized into three subfamilies:

Bromelioideae (32 genera, 861 species)

Pitcairnioideae (16 genera, 1030 species)

Tillandsioideae (9 genera, 1277 species)

Here's the ECS succulent gardens from 2011: