




Welcome to Desert Gardening 101 Virtual Workshop!



August 31, 2021

We appreciate you joining the virtual class. We will begin our class on time at 6:00pm.

Just Some Reminders:

- All attendees are automatically muted and will not be able to unmute or share video once joined in the class.
- Please place all comments or questions in the Q&A box. We will have personnel reviewing and answering questions as they are received. We will present the questions to the instructor at points within the presentation and at the end.
- Class handout material(s) are in the reminder emails that were sent leading up to this class. The attachment links to the handout documents are toward the bottom of the email.
- If you are having technical difficulties, feel free to email us at: conserve@chandleraz.gov or call 480-207-8294
- This workshop and the conversations in the Q&A chat box will both be recorded.

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Sound Check

You should be able to hear audio. If you do not hear any audio please type into the Q&A box.

-Thank you!

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Desert Gardening 101 Garden Prep & Raised Beds

Cathy Rymer
Master Gardener, U of A Maricopa County Cooperative Extension
former Water Conservation Coordinator, City of Chandler

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Class Materials

- Resources list
- Desert Soil Prep
- Garden Drip Irrigation
- Growing Tomatoes
- Warm/Cool Season
- Growing herbs

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Where We Live

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Basic Needs of Plants

Soil

Water

Sunlight

Nutrients

Air

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Soil Preparation Steps for Vegetable Gardens

What to do prior to planting
vegetable gardens to offset the
challenges of our soils.....
and why!

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Soil Preparation Steps for Vegetable Gardens

| | |
|----------------------------------|----------------------------------|
| 1) Physical manipulation of soil | Digging the garden |
| 2) Add soil amendments | Things we put into the soil |
| 3) Compensatory measures | Raised beds, irrigation, mulches |

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Physical Properties of Desert Soils

- Began as mountains made of rock
- Rock is made of minerals
- Eroded as different particle sizes



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Components of Soil



Parent Material

- Sand
- Silt
- Clay



TEXTURE (Particle sizes)

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Our Desert Soils ...

- Heavy clay or clay loam
- Sometimes compacted, resulting in poor drainage
- Sandy = drains quickly = poor water retention
- Very thin, overlaying rock or caliche

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Why is Texture Important?

- Will determine amount of water and fertilizer.
- You cannot significantly change soil texture.
 - If you have a clay soil, you will always have a basically clay soil.

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What's Missing?

■ Organic Matter

- Less than 1% percent in our desert soil.

■ Nitrogen

Difficult for non-desert plants

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Soil Structure

- Structure can be improved by:

■ Aeration

- Shovel, rototiller

■ Amendments

- Organic (compost, cover crop) Add 3-6 inches each planting year for veggies and flowers

- Inorganic (vermiculite, perlite, pumice, fertilizers)



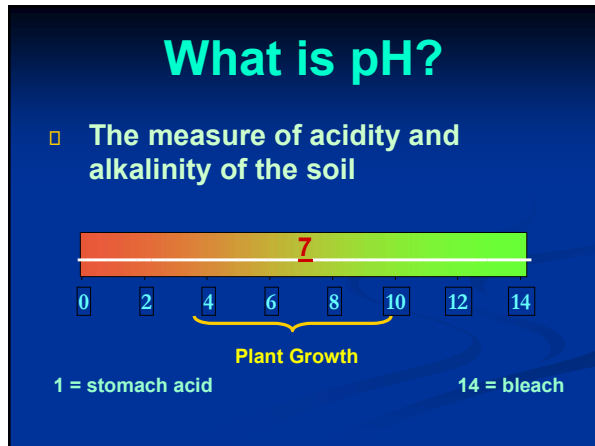
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Soil Amendments

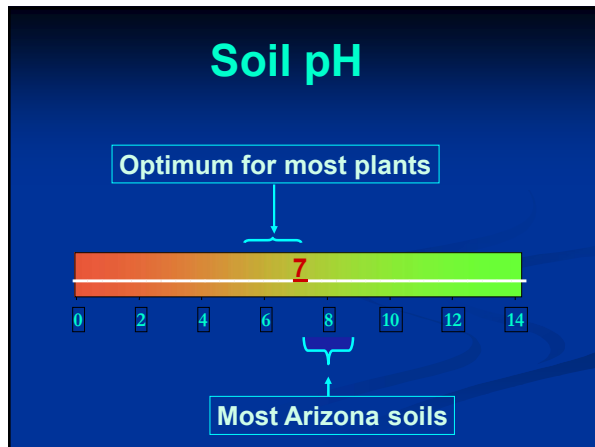
In small areas you can....

- Change the physical structure of the soil
- Increase porosity
- Improve drainage and water retention
- Mitigate high pH levels
- Increase the amount of organic matter
- Increase biological components of a living soil
- Increase nutrient levels and fertility

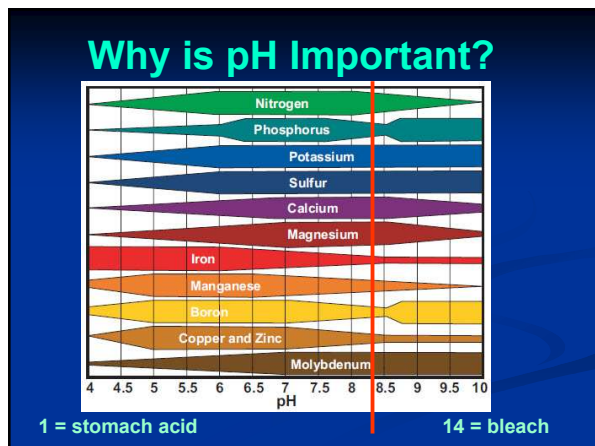
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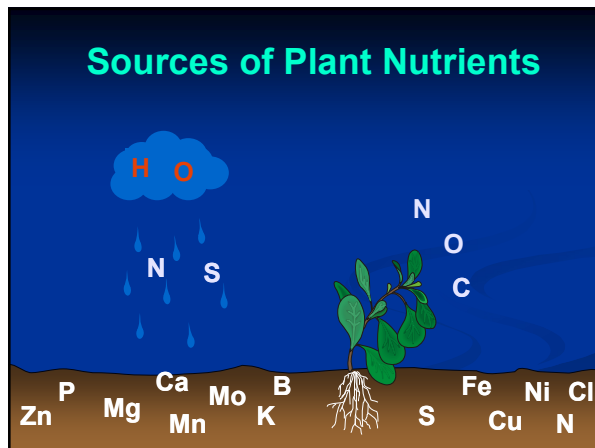
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Nutrients

N - P - K

- Nitrogen
- Phosphorous
- Potassium
- Micronutrients

• How & When

The image shows a white bag of fertilizer with the text 'Fertilizer' and '16-8-8' printed on it. An orange arrow points from the 'N' in the 'N - P - K' list to the bag.

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Fertilizers

Source of Nutrients

| Organic | Synthetic (Inorganic) |
|--|---------------------------------|
| Derived from plant or animal by-products or natural minerals <i>(cottonseed meal, blood meal, bone meal, manures)</i> | Derived from chemical processes |

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Biological Components of Soil

Healthy Soil is ALIVE!

Organic Matter

- Insects
- Bacteria
- Fungi
- Nematodes
- Algae
- Worms



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Creating Your Garden

- Plants absorb water by roots
 - Loosen soil
 - Add organic matter



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Creating Your Garden

Plan Before You Plant

- Sun
- Design the space
 - paths and planting spaces
- Design and install an irrigation system
- Start small
 - grow the garden to meet your needs

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Creating Your Garden

Plan Before You Plant

- Afternoon shade in summer
- Group plants with like water needs
- Close to water source
- Wheelbarrow access
- Compost access



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Tools You Will Need

- Spade (fork)
- Flat Spade Shovel
- Rake
- Hoe (push-pull)
- Watering Can?






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Tools You Will Need

- Gloves
- Hat
- Sunscreen
- Glasses or goggles




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Preparing your Beds

Recipe for Success



- Moisten soil
- Use 4" native soil
 - usually clay loam in the Valley
- Add organic matter 3 - 6 inches
 - Composted manure, composted mulch
- For heavy clay soil 3 – 4 inches of sand
- Till or blend well

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Preparing your Beds

What Else?

- Nitrogen (*leaf growth*)
 - Ammonium sulfate (21-0-0)
- Phosphorous (*root, flower & fruit growth*)
 - Ammonium phosphate (18-46-0)
- Gypsum (CaSO_4)
 - Counteracts excessive salt build up
 - Doesn't work for compaction or caliche
- Don't use lime or ash
 - Our soils are alkaline, this increases it

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Remember!

- Rotate Crops or leave beds fallow for 1 season, turn crop under
- Valley soils are heavy, often densely compacted
- Full of nutrients
- Alkaline
- Add amendments for vegetable/flower garden
- Replenish organic matter annually

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Raised Beds

- Many different types
- Easy to use
- Mix organic matter easily



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Raised Beds

Penn State Pointers ► Construction and Installation of Raised Beds

Secure corners
with wooden reinforcing blocks or metal braces and screws when using boards.

Till soil
6 to 8 inches deep before building raised bed to promote more root growth.

Fill frame
with good-quality lightweight soil mix. Add a generous amount of compost to allow for proper drainage.

Best Materials...

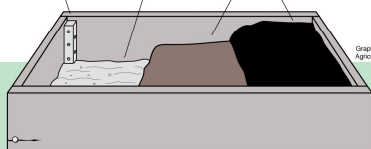
- Stone
- Cinder blocks
- Bricks
- Untreated wood

Do not nail corners.
Ends of boards may split.

Minimum height 12 to 16 inches.

Graphics / Illustration: Tom Land, College of Agricultural Sciences. Copyright Penn State.

Visit us at "<http://agininfo.psu.edu/news/psp/index.html>"



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Raised Beds



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Raised Beds



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Raised Beds



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Raised Beds



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Raised Beds

Be Creative!



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Raised Beds

Be Creative!



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Raised Beds

Be Creative!



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Raised Beds

Be Creative!



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Raised Beds - Rail Road Ties

- Treated with Creosote
 - Wood preservative
- Creosote can volatilize into the air
- May leach into the soil near the ties
 - **NOT** absorbed by the roots –
 - **WON'T** get into plant tissues

*Research conducted by Texas Cooperative Extension found **no** evidence that toxins impregnated into railroad ties leached into the soil.*

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Raised Beds - Alternatives

- ACQ - Ammonical Copper Quarternary
 - no evidence of hazard
- CBA- Copper Boron Azole, sold as Wolmanized Natural Select
 - Salt preserved



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Raised Beds - Untreated

- Linseed oil
- Water seal
- Paint
- Use naturally resistant redwood or cedar

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Raised Beds - Plastic Lumber

- Made from recycled plastic
- Use like ordinary wood
- UV resistant
- Long lasting
- Expensive



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Square Foot Gardening



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Mulching

- ORGANIC
 - Chopped leaves, bark, straw, etc.
- 3 inches of mulch to top of soil
- Reduces evaporation
- Smothers weeds
- Insulates soil temperatures
- Mix into soil at end of season



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Getting Water to Your Edibles

Water Harvesting

- A w
tha
- No
- salt
- Sav



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Getting Water to Your Edibles

Drip systems

- 90% of water delivered gets to your plants
- Keeps areas between plants dry - eliminate weeds
- Soaker hoses
- Micro tubing
- Bubblers
- Hoses



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Getting Water to Your Edibles



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How to Water



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How to Water



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When to Water

- Early morning
- No sprinklers
- Rainy days
- New transplants daily
- Under 80 degrees - once a week
- Over 80 degrees - twice a week
- Water DEEPLY

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Container Gardening



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Container Gardening

- At least 3 gallon capacity
- Clay, wood or insulated plastic are best
- Soil mix
 - 1/3 potting soil
 - 1/3 peat moss (or compost)
 - 1/3 pumice or perlite
- Keep roots cool
 - Styrofoam trick

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Container Gardening

Peat Moss

- Somewhat acid
- Very inert, does not decompose quickly
- No nutritive value
- Once dry it is very difficult to re-hydrate!

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Container Gardening

- Fertilize regularly
 - Slow release (pelletized) when planting
 - Liquids
- Adequate drainage
 - Don't let it sit in water
- Sun but not heat
 - Rotate plant

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Watering Containers

- Water more often
- Schedule varies with the seasons
- Watering wand
- Soil moisture meter
- Flush salts
- Can be added to drip system

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Sowing Seeds vs. Transplants

- Protect seedlings from wind / birds
- Fabric row covers
- Successive plantings for longer harvest



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- Tulle



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Planting Tips

- Seeding depth
- Loosen roots of transplants so they grow into garden soil more quickly
- Remove weeds when small – water thieves
- Mulches
- Don't overfertilize

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Labels







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Saving seed

- Beware of hybrids
- Open pollination
- Self-pollinated



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Overview of Edibles

- Vegetables
- Herbs
- Landscape Plants



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Fruit vs. Vegetable

- What's a Fruit?
- What's a Vegetable?



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Vegetables - What to Grow

- Make a list
- Decide what to grow
 - What does your family like to eat?
- Select a location
- Growing seasons
 - Note planting time and times 'till harvest
- Be "Water Wise"



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Vegetables Growing Seasons

- Cool Season (October – February)
- Warm Season (February – June)
- HOT Season (June - September)



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Fall Planting



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Fall Planting

Brassicas




Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Kale, Mustards, Pak Choi, Turnip, Radish, etc.

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Fall Planting

Lettuce

- Leaf, Bibb, Crisphead (Iceberg), Romaine
- Plant in succession – ensures continual harvest
- 40 – 80 days to maturity, depending on type



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Spring Planting




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Tomatoes


Spring Planting

- Plant when soil or air temp is 65 degrees
- Start seed indoors in January
- Set transplants through March
- Desert varieties = short Maturity
 - *Early Girl, Celebrity, Champion, Heat Wave, Sweet 100 (cherry-type)*
- "VNFT" indicate a plant's resistance to Verticillium Wilt (V), Nematodes (N), Fusarium Wilt (F), and Tobacco Mosaic Virus (F).



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Tomatoes





- Planting
- Staking
- Shake stems to pollinate
- Shade – 50% shade cloth
- If frost is late will have fall harvest

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Peppers

Spring Planting

- Chili do much better than bell
- Start seeds in ground
- Deep roots
- Plants like cool nights

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Onions

- Sweet onions – Grano 1030, Granex (Vidalia, Walla Walla, Texas Sweet, Grand Canyon Sweet, etc.)
- Use Nitrogen/Phosphorus fertilizer
 - Before planting
 - Apply nitrogen after
- Plant seeds in October
- Buy small onion plants (“sets”)
- Plant sets in February for May harvest
- No sulfur – will make onions hot!



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I'toi Onions

- Nearly native
- Easy to grow
- Shallot-like
- Use tops like chives
- Uses 1/3 less water than other onions
- Multiplies (~120 plants from one bulb / year)
- Sharp, peppery flavor



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Mix It Up!

- Add flowers



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Mix It Up!



Alyssum



Dianthus



Lobelia



Marigold

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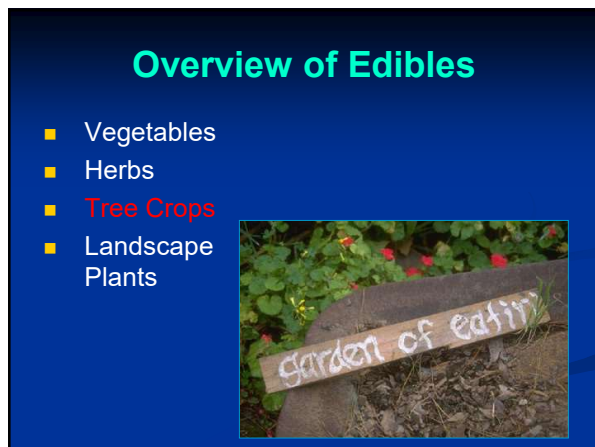
Overview of Edibles

- Vegetables
- Herbs
- Tree Crops
- Landscape Plants

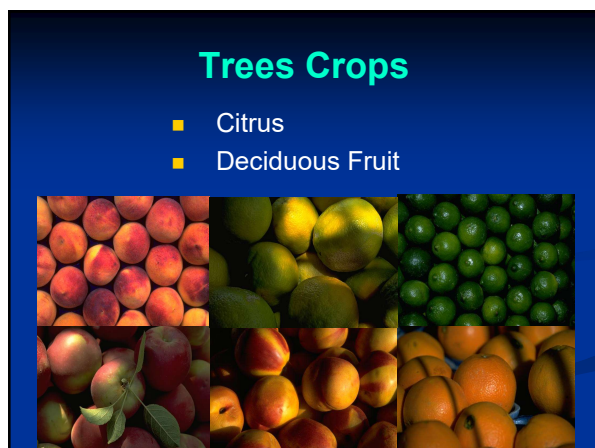
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Citrus


- Varieties
- Grafted
 - Scion vs. variety
- Plant what you enjoy
 - Taste test at Citrus Clinic (every January Greenfield Citrus Nursery)
- Dwarfs
 - "Flying Dragon" rootstock



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Citrus - Watering

- Watering guide
- Hose, multiple drips or bubblers
- Deep & infrequent
 - Down to three feet



- See U of A publication - [Irrigating Citrus Trees](#)

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Citrus - Fertilizing



- Nitrogen most important nutrient
- Micronutrients only if needed
 - Iron, magnesium, boron
- February – May –September
(holidays = Valentine's, Memorial, Labor)
- Divide recommended amounts

- See U of A Pub AZ1671 – [Fertilizing Citrus](#)

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Citrus - Fertilizing

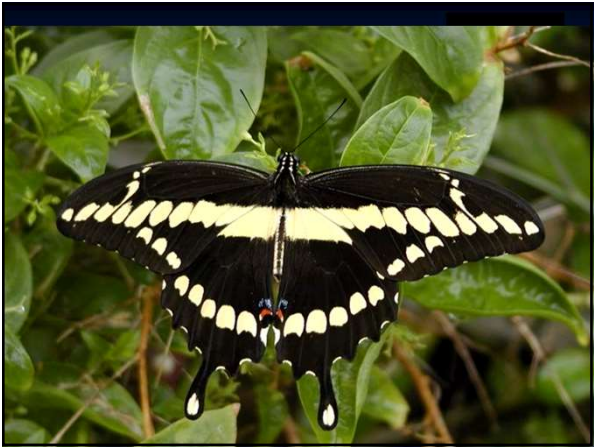
ANNUAL Fertilizer Requirements for Citrus Trees

• For oranges, tangerines, and grapefruit, apply 1/2 of the total in January-February, 1/4 in March-April and 1/4 in May-June.
• For lemons and limes, apply 1/2 of the total in January-February, 1/4 in March-April and 1/4 in August-September

| | Lbs. of Actual Nitrogen Required for the Year | % Nitrogen in Fertilizer (First number written on fertilizer container - See illustration) | | | | | | | | |
|---|---|---|--------------------|---------------------|---------------------|---------------------|--------------------|-------------------|----------------------------|-------------------|
| | | 4% | 5% | 6% | 8% | 10% | 13% | 16% | 21%* (Ammonium Sulfate) | 46%* (Urea) |
| Oranges, tangerines, tangelos, and other exotic citrus. For grapefruit, pummelo, lemons and limes, see note below. | | | | | | | | | | |
| Newly Planted Tree You may apply small amounts of nitrogen after tree is established and new growth has emerged | None to 0.13 lb. | None to 3.0 lbs. | None to 2.5 lbs. | None to 2.0 lbs. | None to 1.5 lbs. | None to 1.2 lbs. | None to 0.9 lb. | None to 0.75 lb. | None to 0.6 lb. | None to 0.25 lb. |
| Small Tree 2 to 3 feet tall, up to 1.25" trunk diameter and up to 9 sq. ft. of ground area covered by the canopy | 0.25 to 0.50 lb. | 6.25 to 12.50 lbs. | 5.00 to 10.0 lbs. | 4.20 to 8.40 lbs. | 3.10 to 6.25 lbs. | 2.50 to 5.00 lbs. | 1.90 to 3.80 lbs. | 1.60 to 3.20 lbs. | 1.20 to 2.40 lbs. | 0.50 to 1.10 lbs. |
| Medium Tree 4 to 8 feet tall, 1.25" to 4.0" trunk diameter and from 16 to 64 sq. ft. of ground area covered by the canopy | 0.75 to 1.00 lb. | 18.75 to 25.0 lbs. | 15.00 to 20.0 lbs. | 12.50 to 16.75 lbs. | 9.40 to 12.50 lbs. | 7.50 to 10.0 lbs. | 5.80 to 7.70 lbs. | 4.70 to 6.50 lbs. | 3.60 to 4.80 lbs. | 1.60 to 2.20 lbs. |
| Large Tree 10 feet tall or more, 6 to 10" trunk diameter and more than 64 sq. ft. of ground area covered by the canopy | 1.25 to 1.50 lbs. | 31.25 to 37.5 lbs. | 25.00 to 30.0 lbs. | 20.00 to 25.0 lbs. | 15.60 to 18.75 lbs. | 12.50 to 15.00 lbs. | 9.60 to 11.50 lbs. | 7.60 to 9.40 lbs. | 6.00 to 7.10 lbs. | 2.70 to 3.30 lbs. |

◆ **Note:** For grapefruit and pummelo trees small adult or larger: use 1/2 of the amounts shown. For lemons and limes, use about 10% more than the amounts shown.

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Citrus - Pruning

- Very thin bark
- Sunburn
- Produce most fruit on lower branches
- Latex paint

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Citrus – Trouble Shooting

- Yellowing / dropping of leaves winter
- Fruit drop
- Dry fruit sacs
- Thick skin



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Deciduous Fruits

- Apples, Peaches, Grapes, Figs, Pomegranates, etc.
- Loose leaves in winter
- Short life span
- Choose varieties that do well here
- Chilling hours
- See U of A Pub AZ1269 [Deciduous Fruits & Nuts for the Low Desert](#)



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Deciduous Fruits - Water

- High water needs
- Deep, infrequent watering



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Deciduous Fruits - Pruning

- Prune when dormant
- Know your plant
 - Where does it produce fruit
- Open canopy vs. Central leader



Try www.youtube.com – Look for "edu" sites
like North Carolina State University

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Overview of Edibles

- Vegetables
- Herbs
- Trees
- Landscape Plants

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Yucca elata
Soaptree Yucca



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Yucca sp.



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Justicia californica Chuparosa



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Rosmarinus officinalis 'Prostratus' Prostrate Rosemary



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Nasturtium



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Pansy



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Common Purslane (*Portulaca oleracea*)



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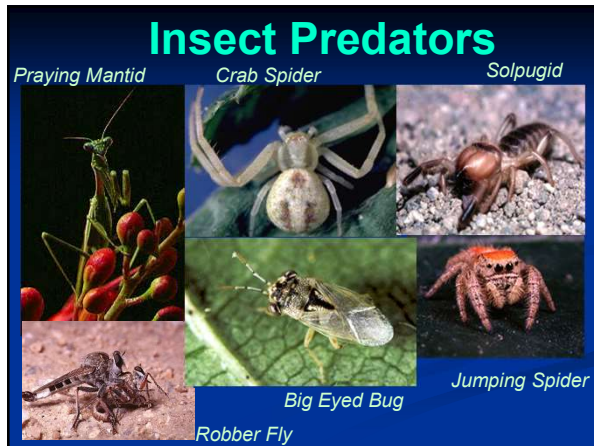
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Neem - azadirachtin

- Common tree in tropical Asia
- Antifeedant in some
- Blocks synthesis and release of molting hormones = incomplete molt
- Targets aphids, various caterpillars, borers, leafhoppers, mealy bugs, psyllids, scale, weevils, whiteflies and more

The image shows a green bottle of Safer BioNEEM product. The label features the Safer logo and the product name 'BioNEEM'. It also includes a picture of a basket of fruit and some text about the product's uses and safety.

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Soaps

- Very effective
- Best on soft bodies of arthropods, aphids, psyllids, spider mites
- Contact only, no residual
- May cause phytotoxicity, particularly household soaps
- 1-4% dilution (1-4 tsp/pint)

The image shows a green bottle of Safer Insect Killing Soap. The label features the Safer logo and the product name 'Insect Killing Soap'. It also includes a picture of a flower and some text about the product's uses and safety.

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Horticultural Oils


- Suffocant, antifeedant
- Very effective against soft bodied arthropods
- High risk of phytotoxicity
- 2% dilution
- Do NOT use when temps > 100° F
- Do not apply to actively growing shoots



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On Line Resources

<https://cals.arizona.edu/maricopa/garden/html/pubs/press.htm>



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Seed Sources

- Native Seed Search
- Seeds Trust
- West Coast Seeds
- Gurney's Seeds
- Park's Seed
- Johnny's Selected Seeds
- Burpee Seeds
- Shepherd's Seeds
- Territorial Seeds

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Gardening Books

- Desert Gardening for Beginners
- Desert Landscaping for Beginners
- Desert Gardening - George Brookbank
- Gardening in the Desert Southwest - Mary Irish
- Native American Gardening - Michael Caduto and Joseph Bruchac

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References

<https://www.chandleraz.gov/water>



CHANDLER
arizona

Public Works & Utilities
Water Conservation



<https://www.queencreek.org/waterguide>

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Water Conservation

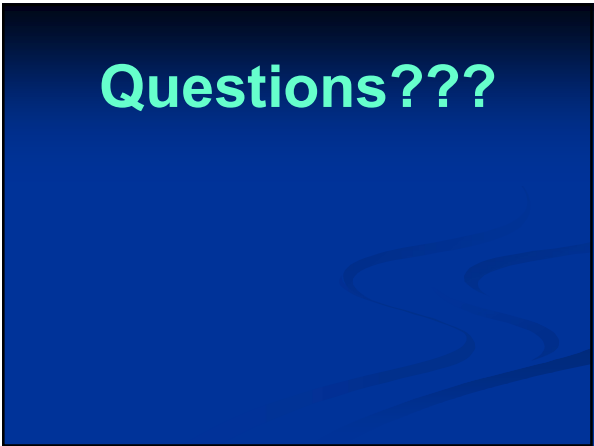
Thank you for joining us!

Additional Resources



| | |
|---|---|
| <p>City of Chandler</p> <p>Water Conservation chandleraz.gov/water Email: conserve@chandleraz.gov Ph# 480-782-3580</p> | <p>Town of Queen Creek</p> <p>Water Conservation QueenCreek.org/ReducetheUse e Email: ConserveTheQC@queencreek.org rg Ph# 480-358-3455</p> |
|---|---|

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