

Herb Garden Pests & Diseases

Growing Fresh Herbs

for Cooking



Presented by:
Carolyn Kinnon



HEALTHY GARDEN
HEALTHY HOME



The Path to a Healthy Garden...

- Begins with growing healthy plants.
- Healthy plants are less likely to suffer from pests and diseases. This results in less pesticide use in home gardens.
- Using less pesticide at home reduces watershed contamination from residential properties!

**...leads to a Healthy Home
and a Healthier Community!**

**We can Reduce the Use of
Pesticides that Pollute our
Water Resources by
practicing...**

**Integrated Pest
Management!**



Integrated Pest Management

IPM utilizes several strategies for pest management rather than relying on only one!

- Scientifically based
- Effective for the long term
- Reduces or even eliminates the need for pesticides
- Saves time and money



IPM's **KEY** Strategy

**Proper Planting & Cultural
Care of your Garden Plants
Yields Vigorous Growth and
Maximum Resistance to
Diseases and Tolerance for
Insect Damage!**

8 Culinary Herbs

- Fresh from the Garden to your Dish -



Annuals – live for a single growing season and die after flowering once.

- Basil
- Cilantro
 - Coriander
- Dill*
- Parsley*

*Biennials - grow for two years but are often treated as annuals

Perennials – live from year to year and may flower many times.

- Mint
 - Peppermint or Spearmint
- Oregano
- Rosemary
- Thyme



All 8 can be grown in containers, singly or mixed together, and in garden beds!

Learn what Herb Plants Need & Don't Need...

It's the First Step on the Path to Proper Planting & Cultural Care for a Healthy Garden

- ✓ Many herbs need a minimum of 6 hours in full sun each day
 - ❖ Some prefer part-shade in the afternoon.
- ✓ Annual herbs can be grown indoors, with plenty of light.
- ✓ Perennial herbs should be grown outdoors in So Cal.
- ✓ Herbs do not require heavy amounts of fertilizer.
- ✓ Herbs do not tolerate heavy, wet, soggy soils.
 - Once established in the ground, some perennial herbs are drought tolerant and should not be watered too frequently in summer.
- ✓ Herbs can grow well with minimal maintenance.



- Some Species Specifics -

BASIL



...is frost tender



Invasive... best grown in pots or "sink pots" in garden beds



seeds may take 3-6 weeks to germinate



Coriander (seed) may need to be cracked or scarified

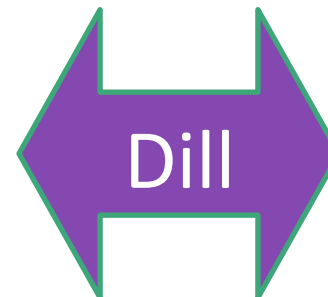


Plants may "bolt" to seed at temps above 85°



drought tolerant once established

Does not transplant well



direct-seed with 12" soil depth for root development

Proper Planting for a Healthy Start

- Start annuals & perennials from seed, or purchase in nursery containers

– Direct Seeding into Pots or Garden Beds

- Follow directions on seed packet
- Keep soil **moist** during the germination period
- Fertilize seedlings with ½ strength water soluble fertilizer when “true leaves” have opened

» Do NOT allow runoff of this fertilizer water!

- Before transplanting into pots or garden beds, home-grown seedlings and purchased plants should:
- Have strong 6-8” stems, well covered with healthy green leaves
- Be acclimated to full sun & outdoor temperatures



Plan Ahead for Proper Planting In Pots



- Pots **must** have good capacity for drainage
- Use a planting mix that drains well
- Pot Size – Provide Room to Grow!
 - Put single annual-plants in pots 2” larger than root ball
 - Plant multiple annuals, or mix annuals & perennials in large pots with tallest perennials in the center, low growing plants toward the rim, and medium-tall plants in the middle.
 - Transplant perennials to pots 2-4” larger than root ball
- Water plants 2 hours before transplanting **and** immediately after transplanting to settle the soil around the roots!
- Place pots in full sun for **6** hours each day



Plan Ahead for Proper Planting In Garden Beds

- Garden Space

- **Location**

- Full Sun
 - Direction of Sun
 - Avoid excessive heat

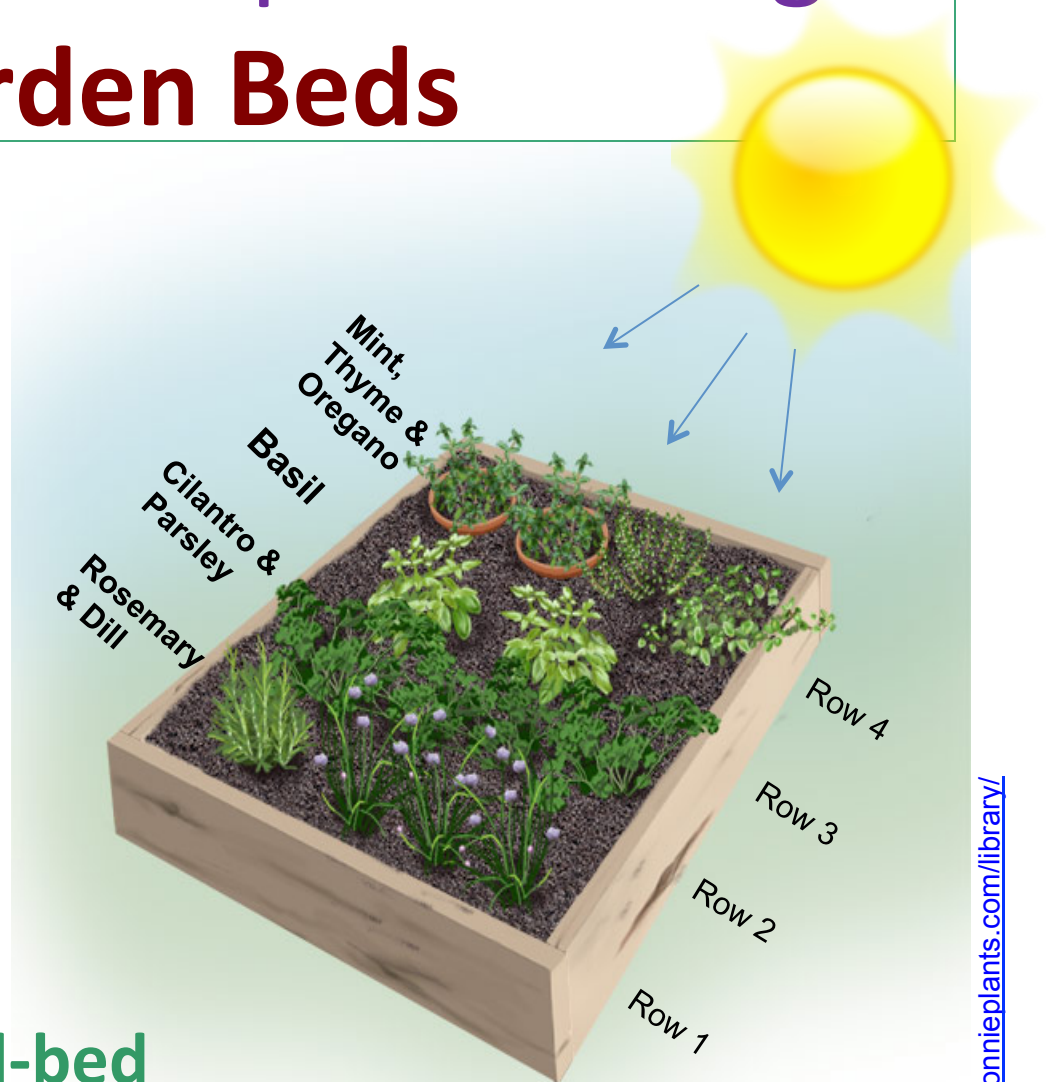
- **Size of growing bed**

- Mature Plant Size
 - Number of Each Plant

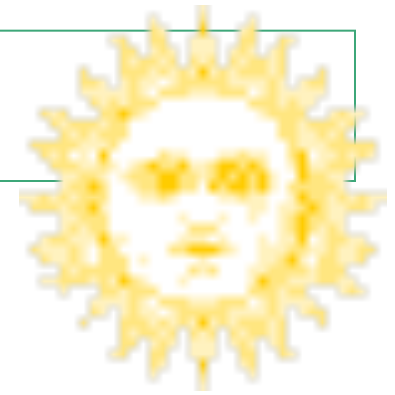
- Soil Preparation

- **In-ground or Raised-bed**

- Water plants 2 hours before transplanting



Garden Space



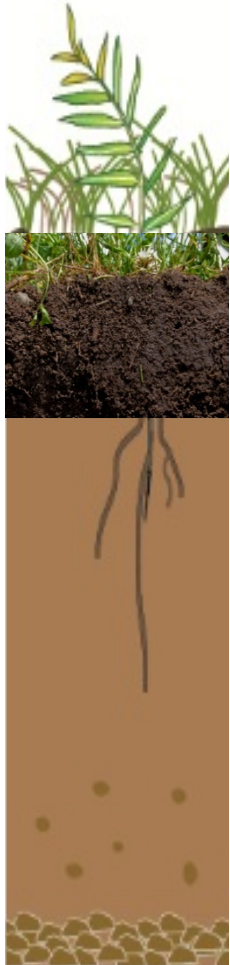
- Location
 - Full sun for **6** hours each day
 - Plant larger plants “behind” smaller ones to avoid shading smaller plants
 - Avoid planting near structures that face south or west to avoid excessive heat reflection to herbaceous plants
- Size of garden bed determines number of plants
 - A **4'x4'** bed should accommodate **4 rows** of plants:
 - Including upright growing plants: (1) Rosemary, (2-3) Dill, (2) Cilantro, (2) Parsley, and (2) Basil
 - Low-Growing Herbs in any number combination: Oregano, Thyme & Mint* (*keep plants in pots and sink pots into soil)



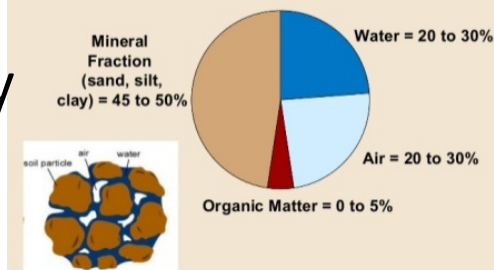
Garden Soil

Raised Beds or In-Ground Beds

- Medium-textured (sandy-loam), soft, well-drained soil is best for most herbs
- Light sandy soils or heavy clay soils make it harder to provide appropriate water & oxygen to roots, but can be made better with organic amendments
 - Break through soil compaction and hardpan
 - Well composted organic materials
 - low in salt or bagged commercially



“Ideal” composition of a soil



Garden Soil Preparation

In-Ground Bed

Water-Wait-Cultivate

- Prior to cultivation, make sure the soil is moist to avoid destroying structure:
 1. Cultivate the top 2 inches of soil, rake the area to remove weeds and old crop debris, dig out roots
 2. Irrigate the plot deeply to encourage germination of weed seeds... WAIT!
 3. Cultivate to kill germinated weed seedlings – REPEAT!
 4. Amend soil with Organic Matter to improve water percolation

Raised-bed

From In-ground or Bagged Soil

- After preparation of ground soil:
 1. Form soil into raised bed
 - Avoid compacting soil
 - Plant while soil is still moist
 - Bagged Soil
 1. Empty pre-bagged soil into raised bed, leave room to plant & apply water without spilling soil over sides.

Be sure to break up the clods in all soils - seeds planted in cloddy soil will germinate poorly. Roots and seeds will not live long because the soil dries too quickly!

Proper Cultural Care Maintains Healthy Plants

- Water Properly
- Fertilize Properly – if needed
- Proper Pruning or “pinching”



Healthy plants will have maximum resistance to diseases and greater tolerance for insect damage!

Watering & Fertilizing Herbs in Pots

- Water when upper 1"- 2" of soil is dry
 - Maintain even soil moisture



Watering too frequently is the #1 cause of poor plant health!

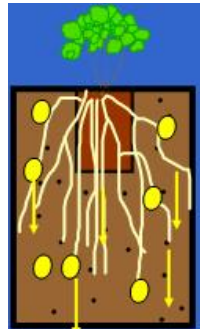
- Increase watering frequency as roots fill out the pot
 - Perennials should be moved to increasingly larger pots until mature size is reached
 - Plants need more frequent watering in pots than when grown in garden beds

- Soil dries more quickly in clay pots

- Water to drainage every time
- Never let plants sit in saucers of water

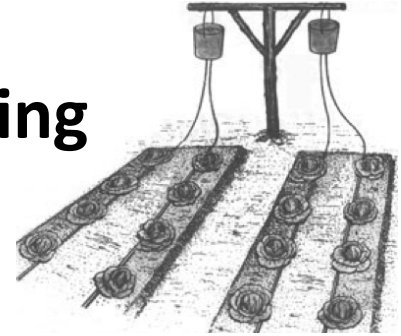
- Fertilize at transplant with slow release fertilizer

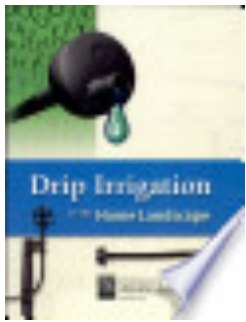
- Some Annuals and all Perennials need repeat applications
 - 3-4 month intervals



Watering Herbs in Garden Beds

- **Water plants immediately after transplanting**
 - Apply enough water to settle soil around roots
- **Maintain even soil moisture**
 - Do not fluctuate between heavy watering and drying out
 - Course mulch, 3-4 inches thick, will minimize fluctuations in soil moisture
- **Avoid “Fixed Schedule” Watering**
 - Water as Needed – deeply rather than frequently!
 - Do not stress plants by allowing them to wilt before watering
 - Determine soil moisture with a meter or a “feel test”
 - If water can be squeezed from a handful of soil – its too wet!
 - If soil does not hold together (loosely) after squeezing – its too dry!





Apply Water Properly In Pots & In Garden Beds

- In pots or in garden beds
 - Water in the early part of the day
 - Apply water to the soil, not over the top of plants
 - Use drip irrigation in garden beds
 - Plan ahead to accommodate growth
 - Do not apply more water than can be absorbed by soil during the irrigation period
 - **May need to use “Water Cycling” or “Pulse” method**
 - Use a water breaker on hoses to avoid splashing soil, soil compaction, and exposing roots



Proper Application of Fertilizers

For your Herbs & a Healthier Community

- Most herbs in garden beds need little fertilizer
 - Rich garden soils, or soils amended with well decomposed compost before planting, should have sufficient nutrients
 - Low nitrogen (organic) fertilizer can be applied in spring to new annuals or existing perennial herbs
- Harvesting foliage frequently & large quantity harvesting may increase need for fertilizer
- Apply the appropriate fertilizer at the appropriate time
 - Fertilizers can be leached with water percolation/drainage
 - May flow to underground aquifers & into watershed



Wilting, yellow leaves, brown leaf edges, leaves dropping, small leaves, stunted or slow growth...

Is it Water
Or
Is it Nitrogen?



✓ Too much water

- Watering too often
- Prolonged moisture
- Poor drainage

✓ Not enough water

- Not watering often enough
- Repeated shallow watering

✓ Lack of nitrogen

❖ Too much nitrogen produces excessive, succulent, dark-green, weak growth that is more susceptible to insect pests & diseases!



Prune Herbs for Good Health

- Prune or pinch herbs regularly
 - Maintain shape and promote foliar growth
 - Avoid heavy pruning prior to freeze/frost
 - May expose tender new growth to damage
- Cut or “pinch” just above a bud (or buds) to promote new foliar growth
 - Pruning reduces flower production
- Use sharp, clean pruners on woody herbs to avoid wounds that do not heal properly
 - Reduces exposure to pests & disease



IPM's Goal & Strategy for Management of Plant Pests

- Prevent Pests & Disease
- Correct Identification of Pest or Disease
- Reduce Population Numbers
 - Apply Appropriate Management Measures
- Recognize Natural Enemies of Pests
 - Encourage Natural Enemies to visit your plants

Foliar Diseases

Identification, Prevention & Management Measures

Powdery Mildew & Rust Diseases

Basil - Cilantro - Parsley - Dill - Mint

Powdery Mildew

- Water does not typically help to spread Powdery Mildew.
- Moderate temps (60°- 80°) and shade encourage Powdery Mildew fungi

Rust Disease

- Water is necessary for Rust infection...
- Overhead and splashing water should be avoided when Rust is a problem!



On Leaf Surface



On Leaf Underside



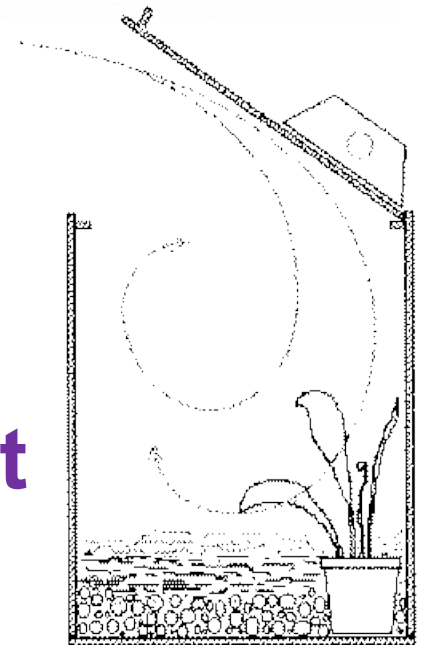
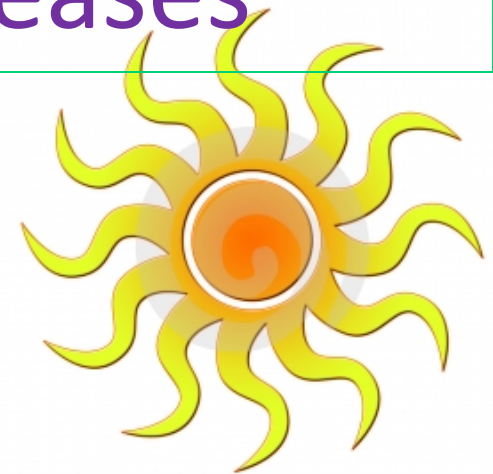
Basil Downy Mildew



- Disease produces lavender, brownish, gray, or white spores on the lower surfaces of leaves
 - May occur at same time as other foliar diseases
- Angular yellow spots develop on the upper leaf surfaces
 - **Check basil leaves at least weekly and remove diseased plants!**
 - Turn leaves over to check undersides for signs of mildew. This disease prefers cooler temperatures (45 to 70°F) and humidity above 85%, and is dependent on the presence of water on the foliage.

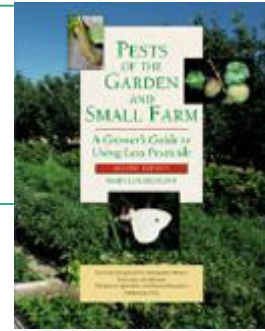
Preventing Foliar Diseases

- Follow good cultural practices
 - ✓ Place plants in full sun
 - ✓ Do not water overhead
 - ✓ Provide good air circulation
 - ✓ Remove plant debris
 - ✓ Avoid excess fertilizing
 - Use slow-release fertilizer



The best method for management of foliar diseases is prevention!

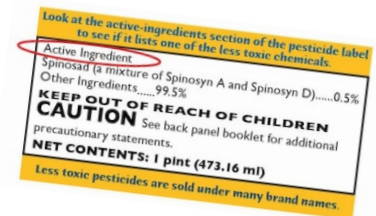
Managing Foliar Diseases



- Remove infected foliage or entire plants
 - Careful not to spread by hand or tools to unaffected plants
- Manage mild to moderate infections with least toxic fungicides
- horticultural oil, or one of the plant-based oils such as neem or jojoba oil
- Sulfur, and some biological fungicides are primarily preventive.



- Follow label directions for effective management
 - Avoid burning foliage by NOT apply during warmest temps



Soil-borne Diseases

Identification, Prevention & Management Measures

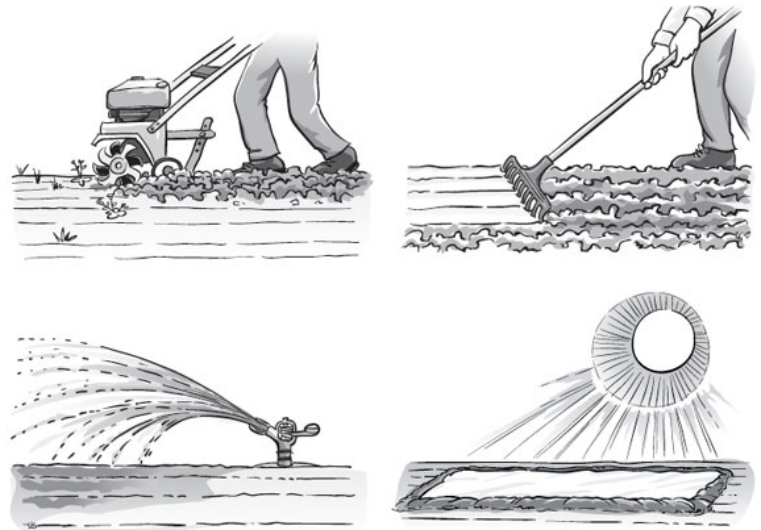
Root Rot & Damping Off Diseases

- Different types of disease organisms can cause these disease symptoms
 - Require an environment favorable to infection
 - Poor soil-moisture management
- Damping-Off Symptoms
 - Germinating seedlings shrivel and may have decayed, darkened, stem tissue near the soil line, usually causing plants to topple and die
- Root Rot symptoms
 - Plants often *wilt* and die rapidly
 - Roots may look water-soaked (dark & soft)



Preventing Soil-borne Diseases

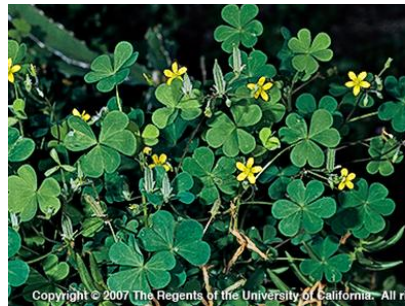
- Plant at proper depth
- Proper Water Management
- Good Drainage
- “Clean” Compost!
- Avoid applying excessive fertilizer
 - Avoid “green compost”
- Dry-out Soils
- Soil Solarization
 - Clean plastic over moist soil; 4-6 weeks in summer
- Sanitation
 - Clean soil and debris from tools and shoes
 - Remove and discard diseased plants & sterilize containers before re-using.



Weeds

- Rob potted plants of nutrients and water
- Can quickly shade out young plants in garden beds
 - Management is essential, especially when herb plants are young
- Are hosts for diseases & insect pests
 - Spittlebugs move into Rosemary from nearby weeds
 - Aphids & Thrips on many weeds readily move to garden plants

Sowthistle



Creeping Woodsorrel

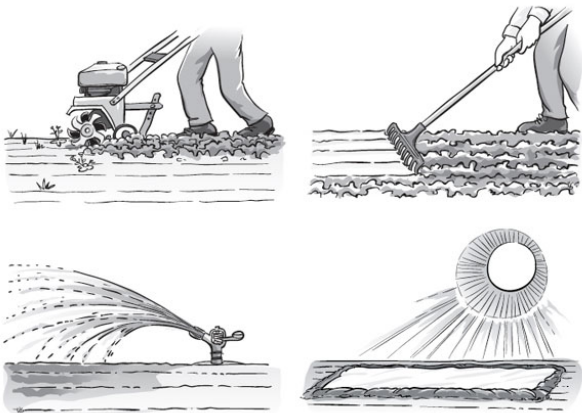
Petty Spurge



Chickweed

Managing Weeds

The primary methods for weed management in gardens include:



- Exclusion & Prevention
 - Never let weeds go to seed in your garden or in areas surrounding your garden
 - Water-Wait-Cultivate
- Hand-weeding and Hoeing
 - **The most important weed management option in the home garden!**
- Mulching
 - use a coarse-textured mulch
- Solarization
 - With clear plastic



Insect Pests & Snails and Slugs

Identification, Prevention
& Management Measures

Be on the Lookout, Be a Scout!

Aphids and Sooty Mold



Snails



& Slugs



Spittlebug

Thrips



Armyworms and other caterpillars

Managing Insect Pests & Others

Focus on the Long-Term Goal vs. Short-Term Satisfaction

- **Manage Aphids, Thrips, Spittle Bugs**

- By identifying and allowing their natural enemies to prey on or parasitize them.
- Aphids can be picked off by hand.
- Knock them off with a strong spray of water!
- Manage weeds that serve as hosts

- **Use Insecticidal Soaps and Horticultural Oils**

- Other more toxic pesticides are not effective and may cause increased populations of these insect pests by killing their natural enemies!



Aphids killed by parasitic wasp – their natural enemies!

- **Managing Caterpillars**

- By hand picking
- with Microbial products like *Bt*
- with “Floating “ Row Covers

- **Trap, Collect and Dispose of Snails & Slugs**

- Use copper strips around upper edges of raised-bed
- Put hollowed-out cantaloupe rind upside down in garden



The New Kids in Town

Asian Citrus Psyllid (ACP)

<http://ipm.ucanr.edu/QT/asiancitruscard.html>



Yellowish nymphs with red eyes and distinguishing white waxy tubules.

- A tiny sap-sucking insect, about the size of an aphid.
- The nymphs feed on soft, young plant tissue and are found on immature leaves, stems and flowers of citrus and related plants.
- Flying adults transfer a bacterial pathogen (disease) from infected trees to healthy trees.
- The disease is the most serious threat to citrus trees worldwide—including those grown in home gardens and on farms.

- ❖ **Purchase trees from local reputable nurseries to avoid bringing ACP or HLB into your yard.**
- ❖ **Don't move citrus plants or clippings out of your area since this can spread ACP or HLB.**
- ❖ **Manage the ants running up citrus tree trunks.**
- ❖ **Call the CDFA Exotic Pest Hotline at 1-800-491-1899**



Adult with mottled brown wings, a pointed front end, red eyes, and short antennae.

Feeds with its head down, its back end in the air, with body raised at an almost 45-degree angle. No other insect pest of citrus positions its body this way.

Beneficial Natural Enemies of Herb Pests

Focus on the Long-Term Goal vs. Short-Term Satisfaction



Lady Beetle adult & larva



Green Lacewing adult & larva



Minute Pirate Bug



1/4 inch long



1/8 to 4/5 inch long



Predators of Snails & Slugs



Devil's Coach Horse & Decollate Snails

❖ Herbs attract beneficial natural enemies when plants are in flower!

Short-Term Satisfaction *costs* everyone!

Besides not being effective over the long-term:

1. Pesticides are expensive.



2. If applied incorrectly, pesticides can have toxic affects on non-target organisms.



•Children



•Pets

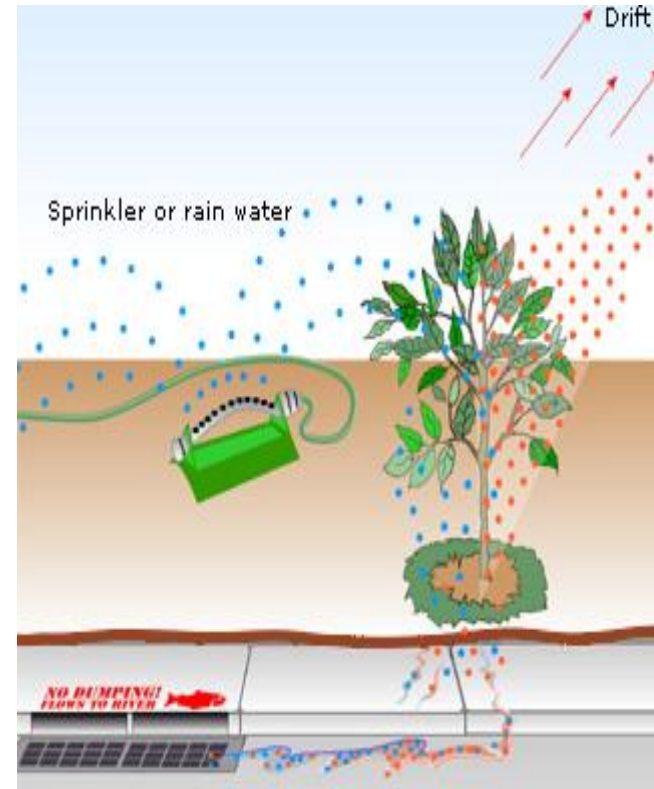
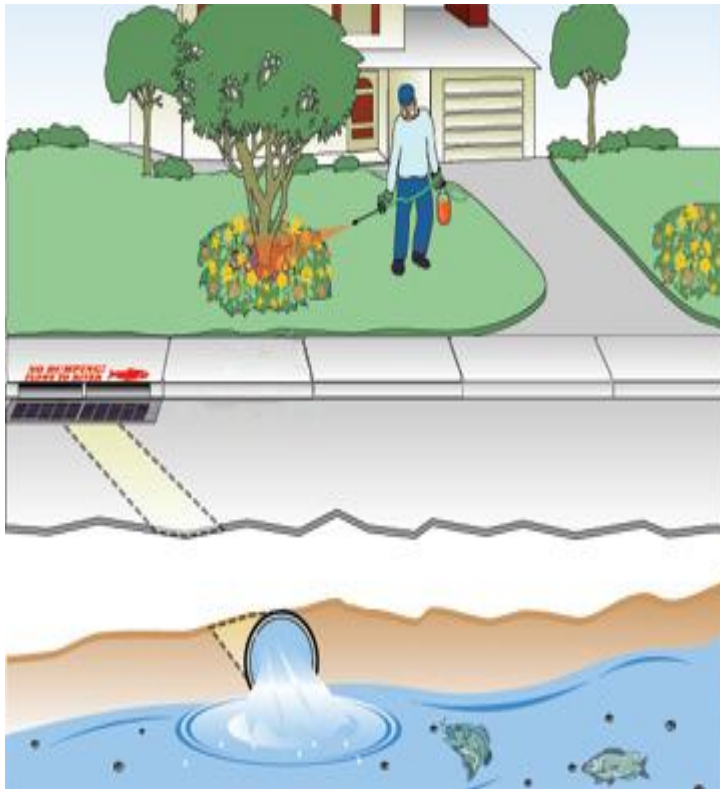


•Beneficial Insects



•Plants

3. Application of broad spectrum pesticides often makes pest problems worse, creating the need for repeated applications of pesticides and the potential for increased watershed contamination.



Our Watershed

Provides Water Resources

- Municipal & Domestic Water Supply

- Recreation



San Diego River Watershed
<http://www.projectcleanwater.org>

- Wildlife and Estuarine Habitat

Use Pesticides Correctly & Safely

- Use the least toxic chemical that will reduce the pest population
 - Insecticidal Soaps and Horticultural Oils
- READ THE LABEL to make sure the target pest is listed
- READ THE LABEL for possible toxicity to plants and effects on beneficial organisms
- Spot spray
- Avoid Drift

Reading a Pesticide Label

Look for the A.I.

Active Ingredient

Azadirachtin.....4.38%

Inert Ingredients.....95.62%

KEEP OUT OF REACH OF CHILDREN

CAUTION

See back panel for
additional
precautionary
statements.

NET CONTENTS 32 FL OZ (1QT) 946mL

Azadirachtin is derived from seeds of the neem tree.

It's The Water That Connects Us!

- Read Pesticide Labels and Follow Directions to the Letter!
- Store Pesticides in a safe location, out of reach of children and pets, and in original containers.
- Dispose of Unused Pesticides Properly!



<http://www.projectcleanwater.org>

Useful Phone Numbers:

- Unused Pesticide Disposal: 1-800-CLEANUP
- UC Master Gardener Hotline: (858) 822-6910
- UC Cooperative Extension: (858) 822-7711
- Agricultural Commissioners'
Office: (858) 694-2739

Resources for this presentation include:

UC IPM Online. Statewide Integrated Pest Management Program. University of California, Agriculture and Natural Resources. <http://ipm.ucanr.edu>

Herbs in Containers, <http://bonnieplants.com/library/herbs-in-containers/>
http://ucanr.edu/sites/sacmg/Herbs_831/

Culinary Herb Profiles, Environmental Horticulture Notes, Pub. EHN70, UCCE Sacramento, UCANR. <http://ucanr.edu/sites/sacmg/files/116768.pdf>

Basic Herbs for a Kitchen Garden, UCCE Tulare/Kings Master Gardener Program
https://ucanr.org/sites/UC_Master_Gardeners/files/139132.pdf

GROWING HERBS FOR THE KITCHEN, Dean Donaldson, Farm Advisor; L.M. Bauer, UCCE Master Gardener. 2010. <http://ucanr.edu/sites/ucmgnapa/files/153880.pdf>

Use and Culture of Culinary Herbs, UCCE Master Gardeners of Orange County
<http://ucce.ucdavis.edu/files/datastore/530-99.pdf>

Edible Plants, UCCE Master Gardeners of Orange County
http://uccemg.com/Edible_Plants/?uid=99&ds=530

<http://www.projectcleanwater.org>

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