Integrated Pest Management (IPM) for Wildlife Pests in the Garden

UC Master Gardeners of Monterey & Santa Cruz
March 2018

University of California
Agriculture and Natural Resources

UCCE Master Gardener Program
Monterey and Santa Cruz Counties

What You'll Learn Today

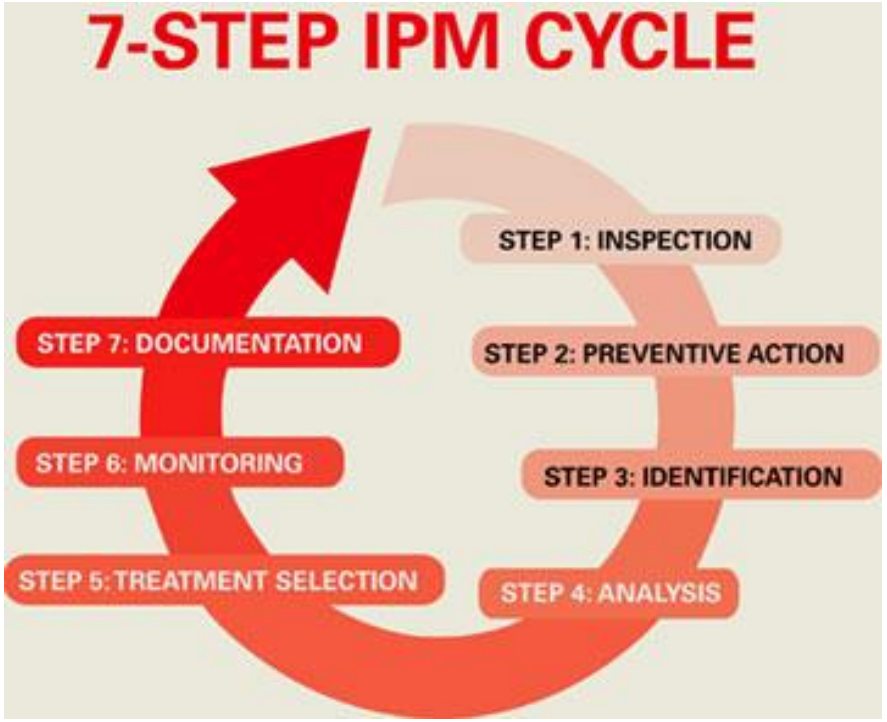
- **IPM principles**
- Systematic approach to any "pest" –
  insect, vertebrate, weed or disease
- How to diagnose a problem
- Common wildlife pests in our area
- Management strategies
- Where to get help
- Field studies in the garden?

What is IPM?

Integrated pest management (IPM) is an **eco-system based strategy** of pest control that focuses on **natural control factors** through **a combination of techniques** that are **minimally disruptive**, using chemicals only as a last resort.

IPM Process

1. Inspect regularly
2. Prevent problems before they're problems
3. Identify the pests
4. Analyze the situation
5. Determine and apply the least toxic strategy
6. Monitor success over time
7. Document



Inspect The Garden

Weekly at a minimum!

Hand watering is a good way to keep an eye on your plants' health.

Look for pest damage of all kinds. What do YOU see in your gardens?

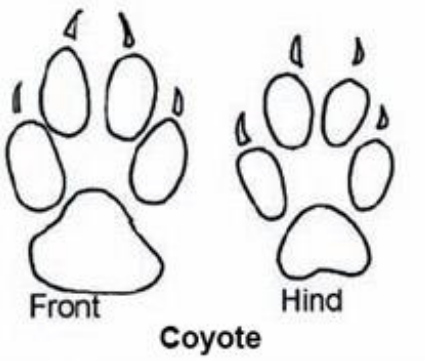
Identify the Pest

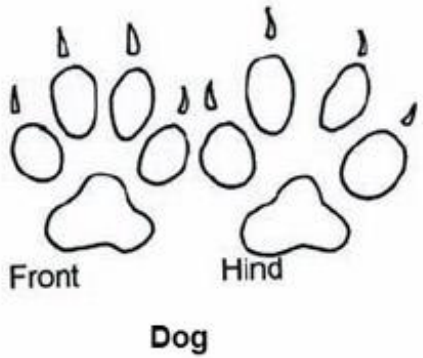
Look for clues

- Feeding damage
- Part of plant affected?
- Disturbed soil
- Holes in the ground
- Footprints
- Others?

Learn about the Pest

- Species
- Biology
- Geographic range
- Behavior
- Lifecycle
- Habitat
- Diet





University of California IPM Information

http://ipm.ucanr.edu/PMG/menu.house.html

- Search by different vertebrate pests
- Download **Pest Notes** and **Quick Tips**

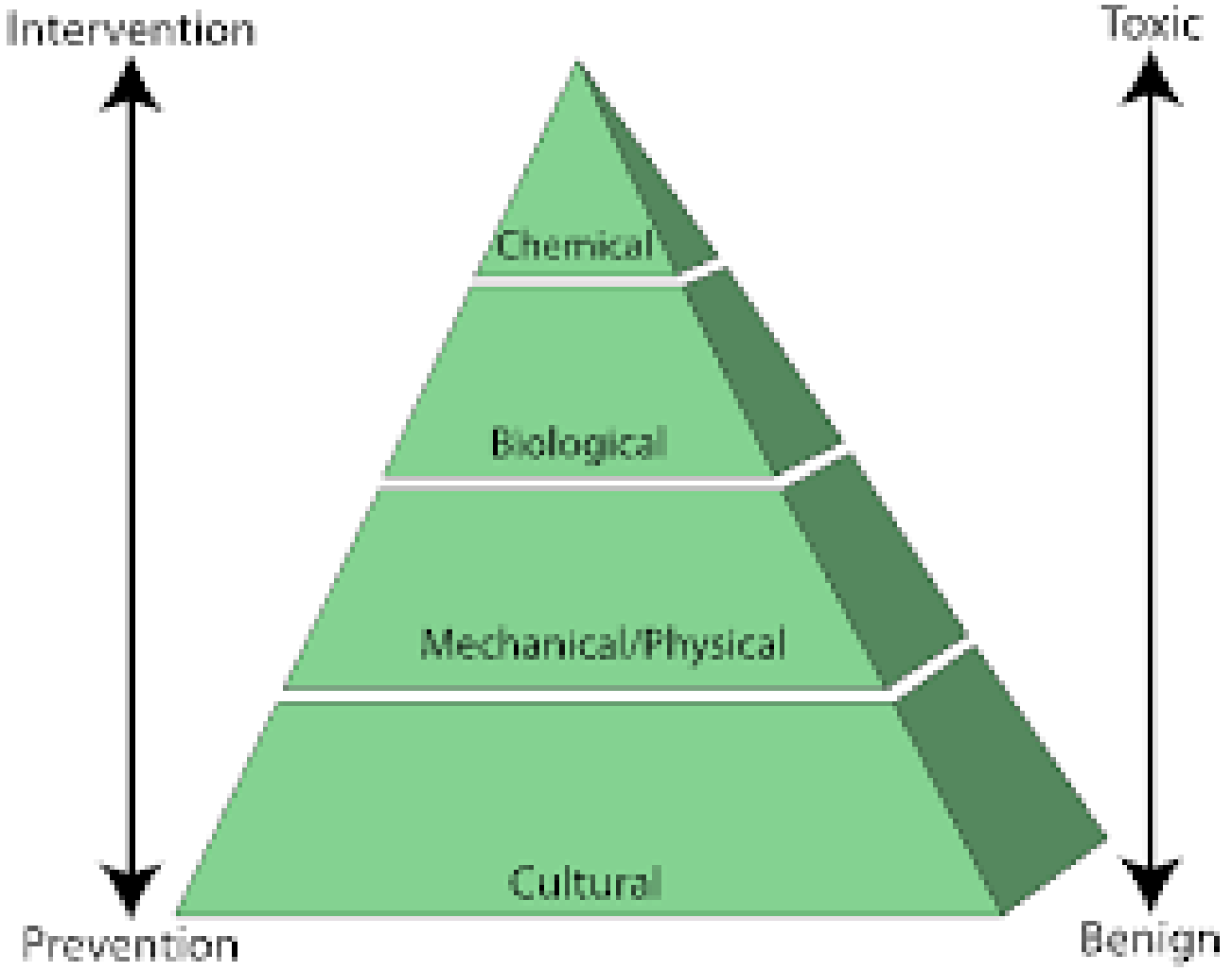
Many other sources on the web.
Focus on educational sites with .edu

Consider Your Tolerance Level

- How much damage is really being done?
- Are permanent plants being destroyed?
- Define your economic and aesthetic limits.
- Can you share? Plant more?

Methods of Control

In order of environmental impact



Cultural Controls

Changing the habitat - or your own practices - to reduce pests' impact.

- Growing plants they don't eat
- Providing alternative food sources in another location
- Creating a buffer of unsuitable habitat
- Sanitation practices
- Disrupting burrows

Physical Controls

- **Exclusion**
  - Fencing/Netting
  - Underground wire
  - Tree baffles, collars
  - Fruit bags
- **Trapping**
- **Frightening**

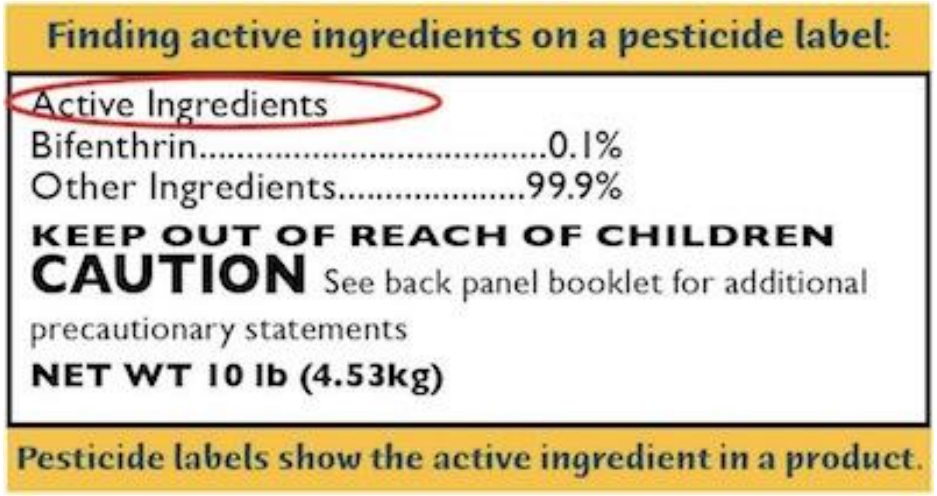
Biological Controls

Natural Enemies

- Birds of prey
- Snakes
- Cats
- Dogs
- Coyotes
- Mountain lions!

Chemical Controls

- Repellants
- Baits
- Fumigation



- Read the label!
- Learn its impacts
- Choose the least toxic
- Wear protective clothing
- Use as directed
- Dispose of properly

Deer in your Garden?

In their natural habitat

In your garden

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We Live in Deer Habitat

- Mule deer and blacktailed deer most common in CA
- Native to woodland and riparian settings with cover
- Adapt easily to urban and suburban areas near woods for food--loose fear of humans

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Deer Behavior - Know your Pest

- Travel in familial groups for generations
- Range of 3-5 miles, bed down within 1 mile of water
- Eat 5 pounds of vegetation per day
  - 90% leaves and stems of woody and herbaceous plants, vines, fruits, berries, acorns, nuts and garden vegetables
  - 10% grass
- Drink 2-4 quarts of water per day
- Feed in early morning or late evening
- Heavy feeding in spring and summer-metabolism slows in late fall and winter

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More info at
http://ipm.ucanr.edu/PMG/PESTNOTES/pn74117.html

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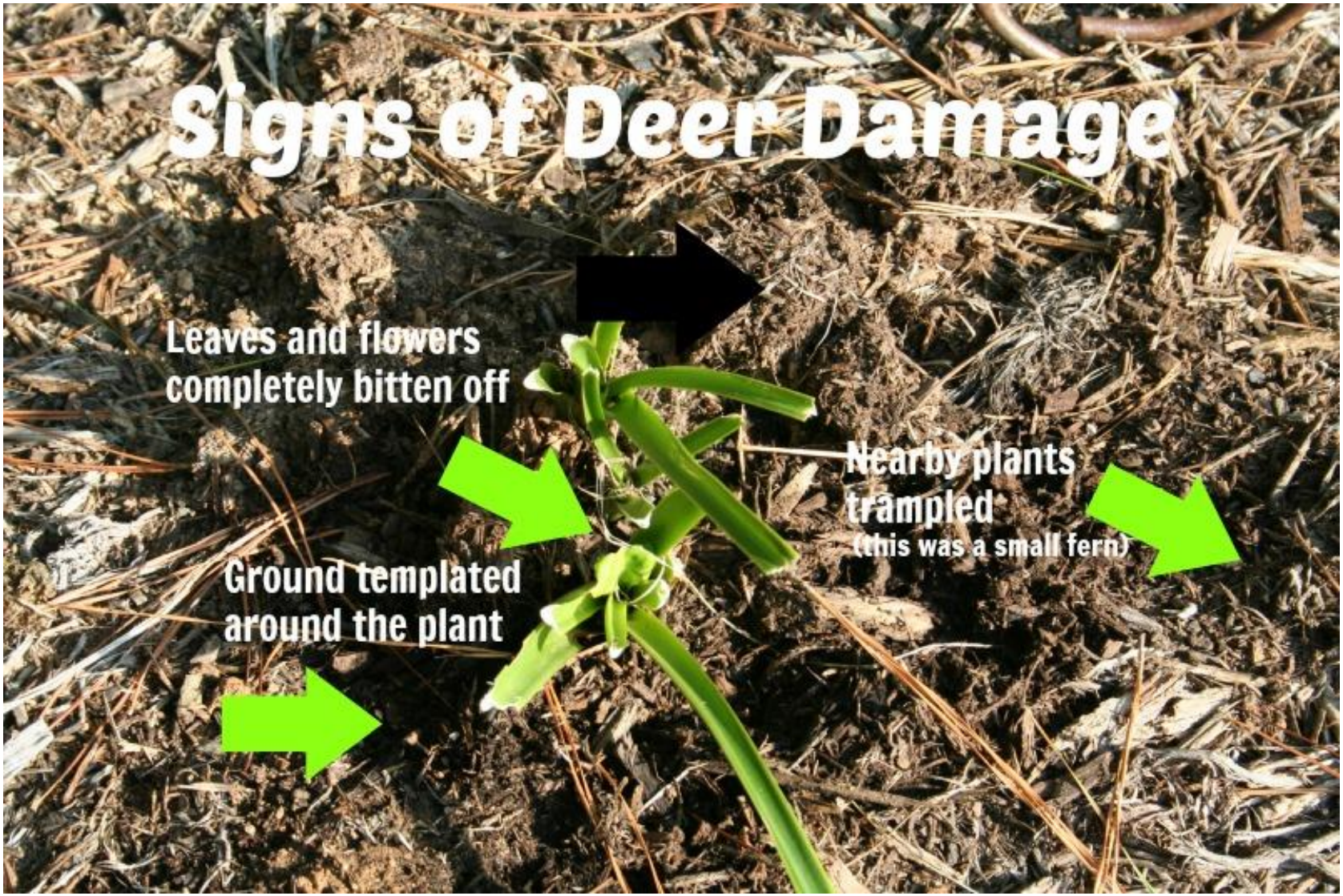
Identify Deer Damage

- Ragged torn vegetation from tearing action
- Trampled vegetation
- Plants pulled out of the ground
- Produce munched to the ground
- Rub marks on tree trunks



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Cultural and Physical Controls

- **Frighten them away**
  - Dog in the yard
  - Main predator is the mountain lion
  - Startling devices rarely work--deer habituate
    - Water cannons
    - Lights and sounds
- **Repellants -** Require frequent application, home remedies not scientifically proven

Physical Barriers - Fences

The most effective intervention

- Effective but costly
- Need to be 7-8 feet high
- Tight to the ground
- Fence extensions with smooth wire or plastic mesh
- Wire cages work for small areas
- Double fencing or slanted fencing on hillsides

Low Cost and Temporary Fences

Large Area Fencing

Fence extensions of smooth wire

Fence fortress

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Small Area Fencing and Barriers

- Container plants with wire barriers
- Wire cage over new plantings
- Row covers in vegetable gardens
- Wrap tree trunks

Fencing on slopes

Double fence

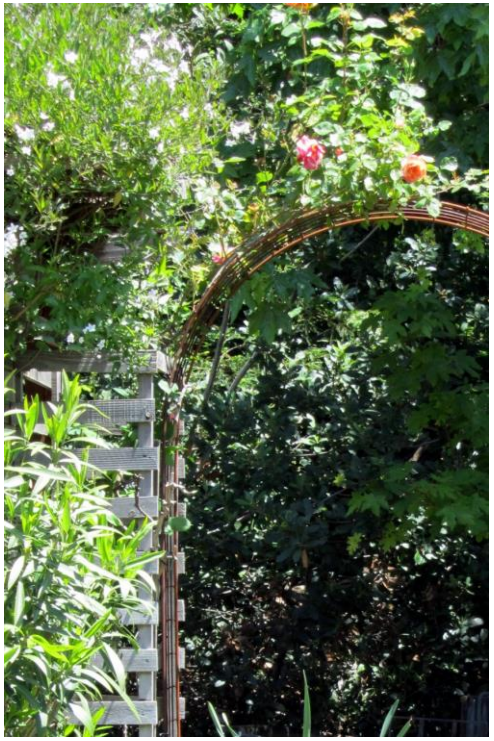
4ft. high, 4ft. of separation

Slanted fence

Height and width defeat deer

Placement Up High, Out of Reach

- Roses on arbor
- Hanging baskets
- Pots on decks
- Select trees with tall trunks, limb up lower branches



Deer Resistant Plants

- **Pungent Plants**
  - Herbs
  - Lavenders
  - Salvias (many, not all)
  - Alliums-Society Garlic
- **Fuzzy Plants**
  - Wooly Lamb's Ear
  - Jerusalem Sage
  - Lugwort
  - Brunnera
- **Poisonous Plants**
  - Foxglove, digitalis
  - Euphorbias
  - Oleander
  - Daffodils
- **Fibrous, Spiky, Distasteful Plants**
  - Cactus
  - Succulents
  - Gravelia
  - Manzanita

Adorn your Garden with Deer Resistant Plants

Jerusalem Sage

Oleander

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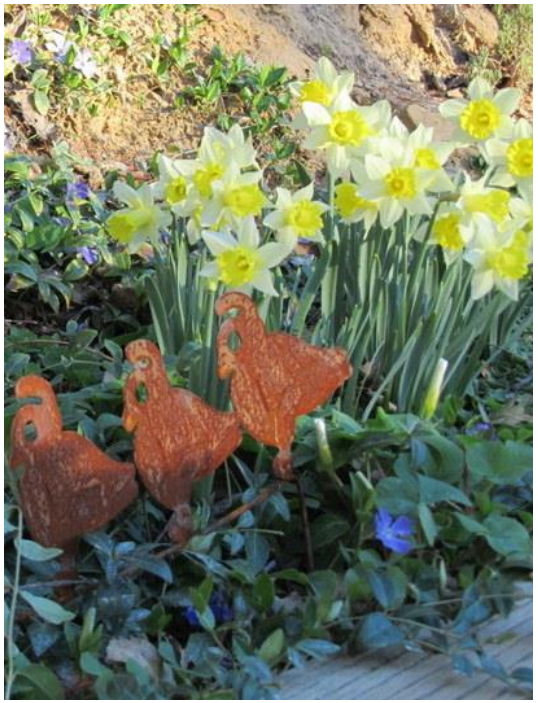
Deer Resistant Plants

Daffodil



Euphorbia

Deer Resistant Plants

- Brunnera

- Echinacea

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Deer Resistant Plants

Lavender

Lugwort

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Deer Candy

Avoid Them or Protect Them

- Roses
- Hostas
- Tulips
- Petunias
- Hydrangeas
- Orchard fruits
- Garden vegetables
- Azalea
- Clematis
- And many more...

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Refer to a Deer Resistant Plant List

- Inconsistencies from list to list--what works for some will not work for others
- No such thing as “deer proof”--only “deer resistant”
- What gets eaten often depends upon
  - The environment
  - Season
  - Presence of fawns which sample “everything”
  - Presence of predators which deter feeding

Good Luck

Living in harmony with the deer

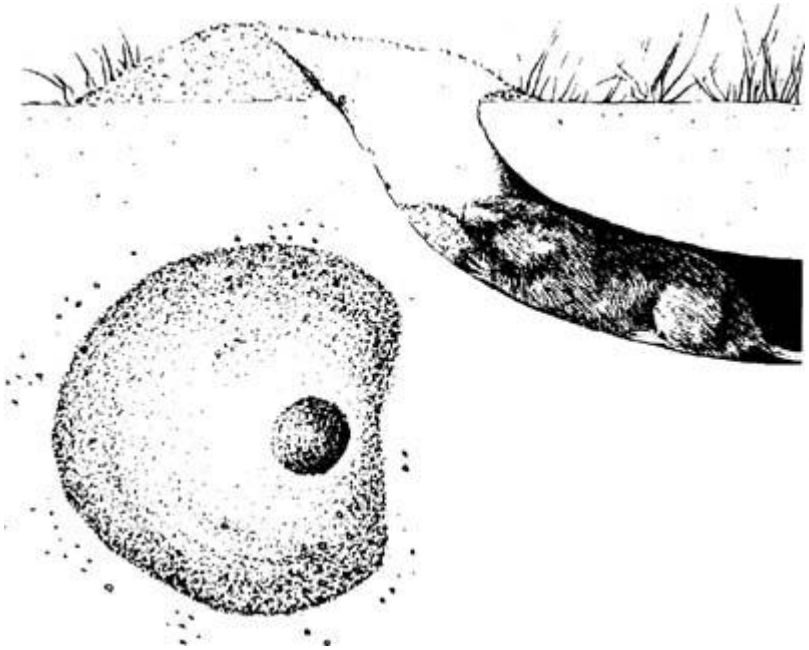
Burrowing Mammals

	Type	Damage	Management
	Gopher	Eats roots or takes whole plant	Trap, exclude, bait
	Mole	Eats grubs, disturbs soil surface	Trap, bait, ignore
	Vole (aka field mouse)	Eats flowers, leaves and fruit	Trap, exclude, bait

Gopher - Identify the Damage

Mounds

- Crescent or fan shaped mounds
- Hole is capped with soil



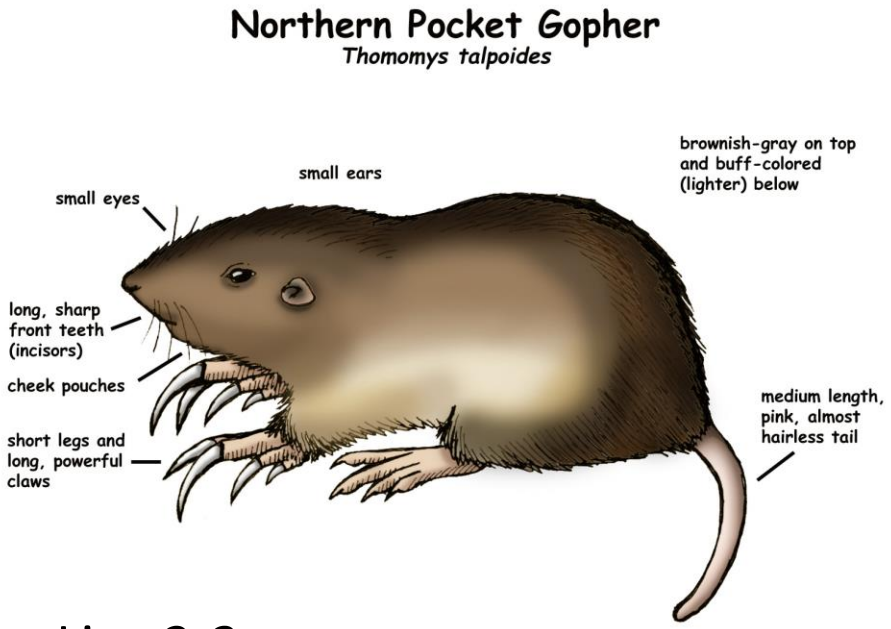
Plant Damage

- Plant missing
- Plant wilted, root gone

Gopher – Know Your Pest

Lifestyle

- Solitary, territorial
- Active spring and fall, morning and evening
- Re-use gopher runs



Pocket Gopher Fun Facts

- Eats 60% of body weight/day
- Range: up to 700 yards
- Navigate backwards in tunnels using their tails
- Breed in spring, 3-4 pups/year
- Live 2-3 years
- Naturally hemophiliac
- Gets moisture from food
- Nests up to 6’ deep

More info at
http://ipm.ucanr.edu/PMG/PESTNOTES/pn7433.html

Gopher or Ground Squirrel?

	Gophers	Ground Squirrels
Social	Solitary, territorial	Colonial, gregarious
Habitat	Soft, moist soil, tunnels may be re-inhabited	Dry open fields, networked burrows
Diet	Feed below ground, Plants, roots	Feed above ground, Leafy green plants, nuts, roots and fruit
Indicators	Distinctive crescent shaped mounds	Open, 4” hole at soil surface, multiple openings
Active	Evening and morning, spring and fall	Daytime, year around

Gopher Management

Low Impact Management

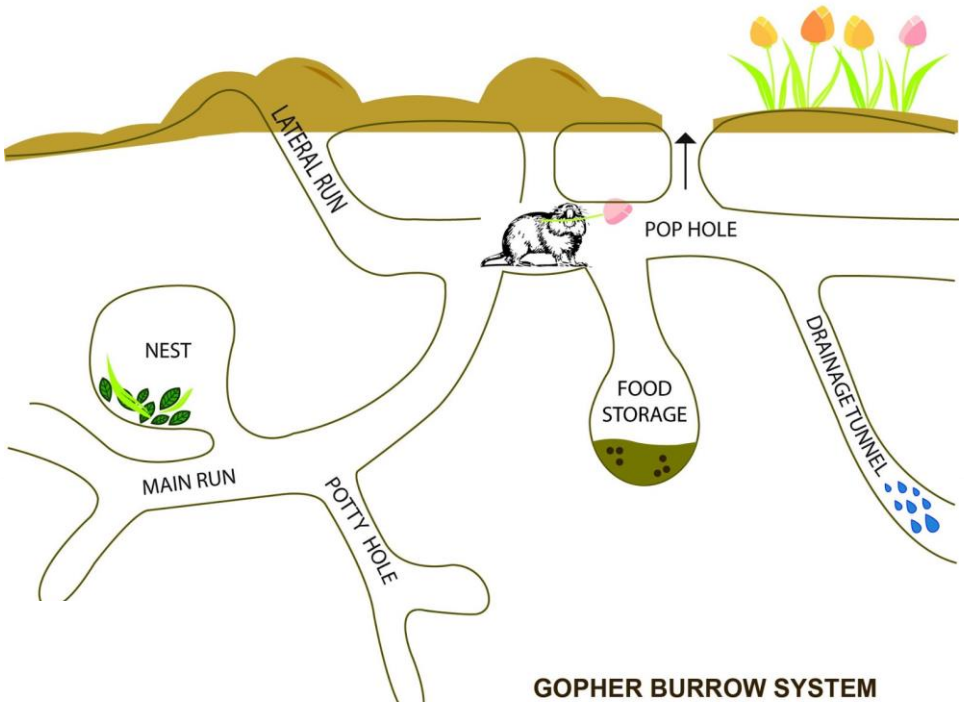
- Cultural – gopher resistant plants?
- Physical Exclusion – underwire beds, baskets, underground fence
- Traps – cinch, box, pincher
- Biological Control - owls, snakes, cats, dogs, and coyotes

Gopher Trapping Tips

Find the Run

- Probe between 2 mounds to feel run
- Use post hold digger to get to run
- Set & stake traps both directions
- Cover and check every 12 hours

How to find the tunnel



Traps

- Macbee
- Cinch
- Box
- **Gophinator**

How to set a gophinator

Gopher Management

High Impact Management

- Bait –anti-coagulant, multiple dose
  Warfarin, Diaphacione, Chlorophacione
- Bait –anti-coagulant, single dose
  Brodifacoum, Bromad[illegible]e, Dife[illegible]alone, Difenacoum
- Bait – non-ant[illegible]oag[illegible]lar, single dose
  Bromethalin, Cholecal[illegible]rol, Zi[illegible]hosphide, Strychnine

Not recommended due to risk of secondary poisoning

Other Methods

- Gassers, car exhaust
- Explosives
- Guns
- Chewing Gum, laxatives
- Vibrators, noise producers, repellents

Rodenticide Fact Sheet
http://saferodentcontrol.org/site/wp-content/uploads/2013/04/rodenticides.pdf

Mole - Identify the Damage

Mounds & Runs

- Volcano shaped mounds
- Raised track disturbs soil from their surface tunnels

Plant Damage

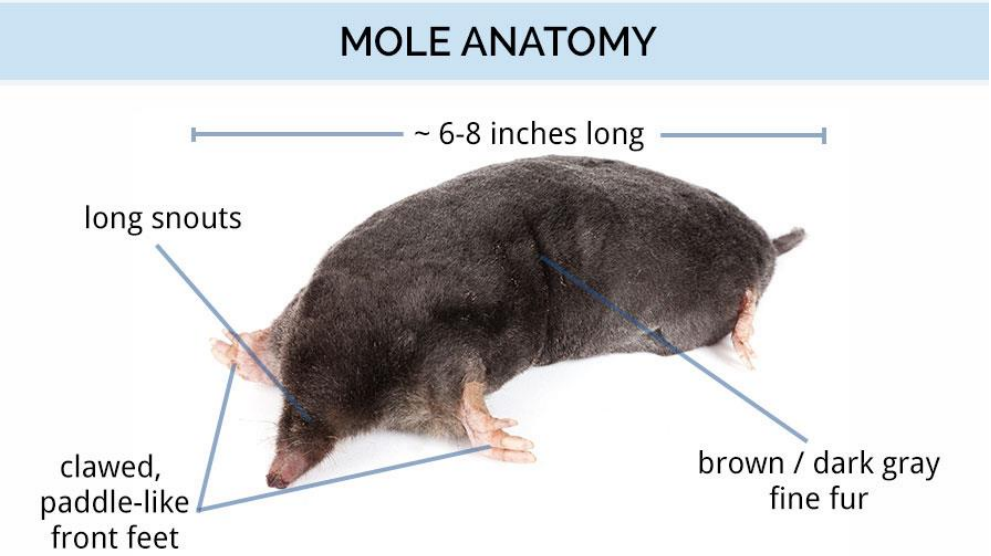
- Cosmetic:

  Soil disturbed

Mole - Know Your Pest

Lifestyle

- Solitary, territorial
- Active year round
- Feeding paths just under soil surface
- Not an herbivore
- Not a rodent

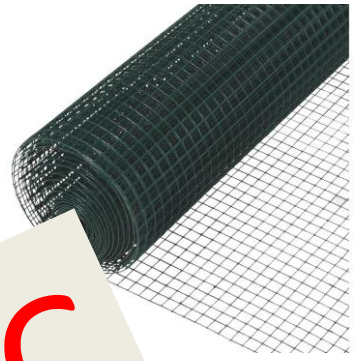


Mole Gopher Fun Facts

- Eat invertebrates; insects and grubs
- Territory up to ***2.5 acres*** (!)
- Active after rain or watering
- Lives for 6 years, produce 2-7 pups
- Blind and have 6 fingers
- Velvety fur allows them to move forward or back in tunnels

More info at
http://ipm.ucanr.edu/PMG/PESTNOTES/pn74115.html

Mole Management



Low Impact Management

- Physical Exclusion – underground fences
- Repellents– castor oil spray, vibrat
- Traps – cinch trap in the de
  surface tunnel “harp
- Biological Co ts, dogs,
  and co
- tively

DAMAGE COSMETIC

Vole- Identify the Damage

Holes & Runs

- Multiple connected burrows with open 2” holes
- Mouse-like creatures running around on the surface
- Worn tracks with droppings leading from holes

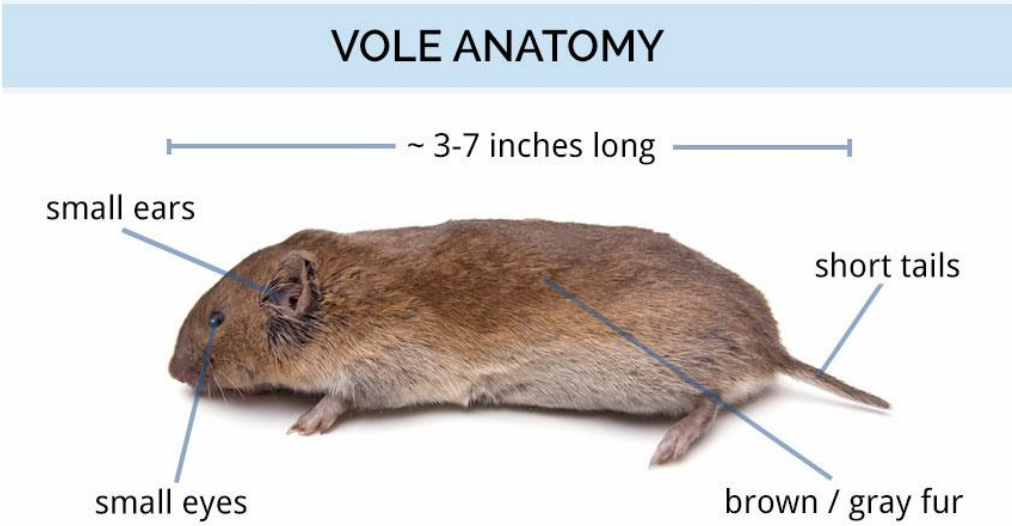
Plant Damage

- Eaten plants, roots, tubers – below and above ground
- Stripped bark at ground level
- Lawn damage

Vole – Know Your Pest

Lifestyle

- Gregarious, social
- Active day/night all year
- Appear above and below ground
- Eat grasses, plants and tree roots



Common Name: Field Mouse

Vole Fun Facts

- Rapid population changes – up to 1000's per acre
- Connected burrows with runways
- Burrow openings 1.5-2 inches
- Poor climbers

More info at
http://ipm.ucanr.edu/PMG/PESTNOTES/pn7439.html

Vole Management

Low Impact Management

- Habitat modification– reduce vegetative cover (grass)
- Physical Exclusion – ¼” mesh fence, 12” above ground, 10” below, wrap tree trunks
- Traps – cinch trap in in the deep tunnel
- Traps – wooden mouse traps on surface – 1
  50
- Biological Control – owls, snakes,
  cats, dogs, and coyotes

Higher Impact Management

- Bait – multiple feeding anticoagulant

Tree Squirrels – Identify Damage

- Bite marks on fruit
- Fruit, nuts disappearing
- Seedlings eaten, gone
- Gnawed bark
- Digging to bury nuts
- Chewing into buildings
- Diseases

Squirrels – Know Your Pest

4 kinds in California

- Eastern Fox Squirrel (or red squirrel)
- Eastern Grey Squirrel
- Western Grey Squirrel
- Douglas Squirrel

Tree Squirrels – Know Your Pest

- Live in trees; forage on ground
- Active year round
- Nest in tree holes or build tree nests
- Breed in late winter/spring; 1-2 litters of 3-5 young

More info at
http://ipm.ucanr.edu/PMG/PESTNOTES/pn74122.html

Tree Squirrels – Controls

Physical -

- Exclusion is best –
  - will chew through plastic net if motivated
  - wire screen
  - tree bands
- Trapping - only Eastern fox sq. can be killed w/o permit; if live trapped, can't be released.

Biological – dogs (ha!), coyotes, raccoons (little impact)

Chemical – some repellents, but not very effective

Live with them!

Birds – Identify the Damage

- Seeds not sprouting
- Seedlings disappearing
- Ragged holes in fruit
- Fruit missing
- Bird or squirrel?

- MONITOR!

Birds – Know Your Pest

- Need to identify species?
- Each has different tastes
- They also eat insects and snails/slugs; weight pros and cons
- Most are protected from harm

More info at
http://ipm.ucanr.edu/PMG/PESTNOTES/pn74152.html

Birds - Cultural Controls

- Not so many for birds.
- Grow other food sources like native berry plants. (Timing)
- Grow enough to share.
- Plan ahead. Think about exclusion before you plant.

Birds – Physical Controls

Keep them out:

- Frame and netting over seed beds and crops
- Inverted wire baskets on individual plants
- Grid of string
- Paper bags over fruit/veges

Birds – Physical Controls

Scare them away:

- Scarecrows
- Shiny things
- Moving things
- Balloons with eyes
- Noisemakers
- Best used only when most needed
- Move OFTEN!

Birds – Chemical Controls

Methyl anthranilate spray:

- From concord grapes
- Tastes bad
- Studies differ on efficacy
- Foliar burns on blueberries
- More study needed

What doesn't work:

- Mothballs
- Pepper spray
- Decoys

Rats

Troublesome pests both indoors and out

They eat, gnaw and contaminate

- Human and pet food
- Garden produce and ornamentals
- Fruits and nuts
- Seeds and grains
- Worms, spiders, slugs and snails
- Gnaw on structures, wire, plastic irrigation lines
- Can contaminate and transmit disease

What do roof rats eat?

ROOF RATS
ARIZONA.COM

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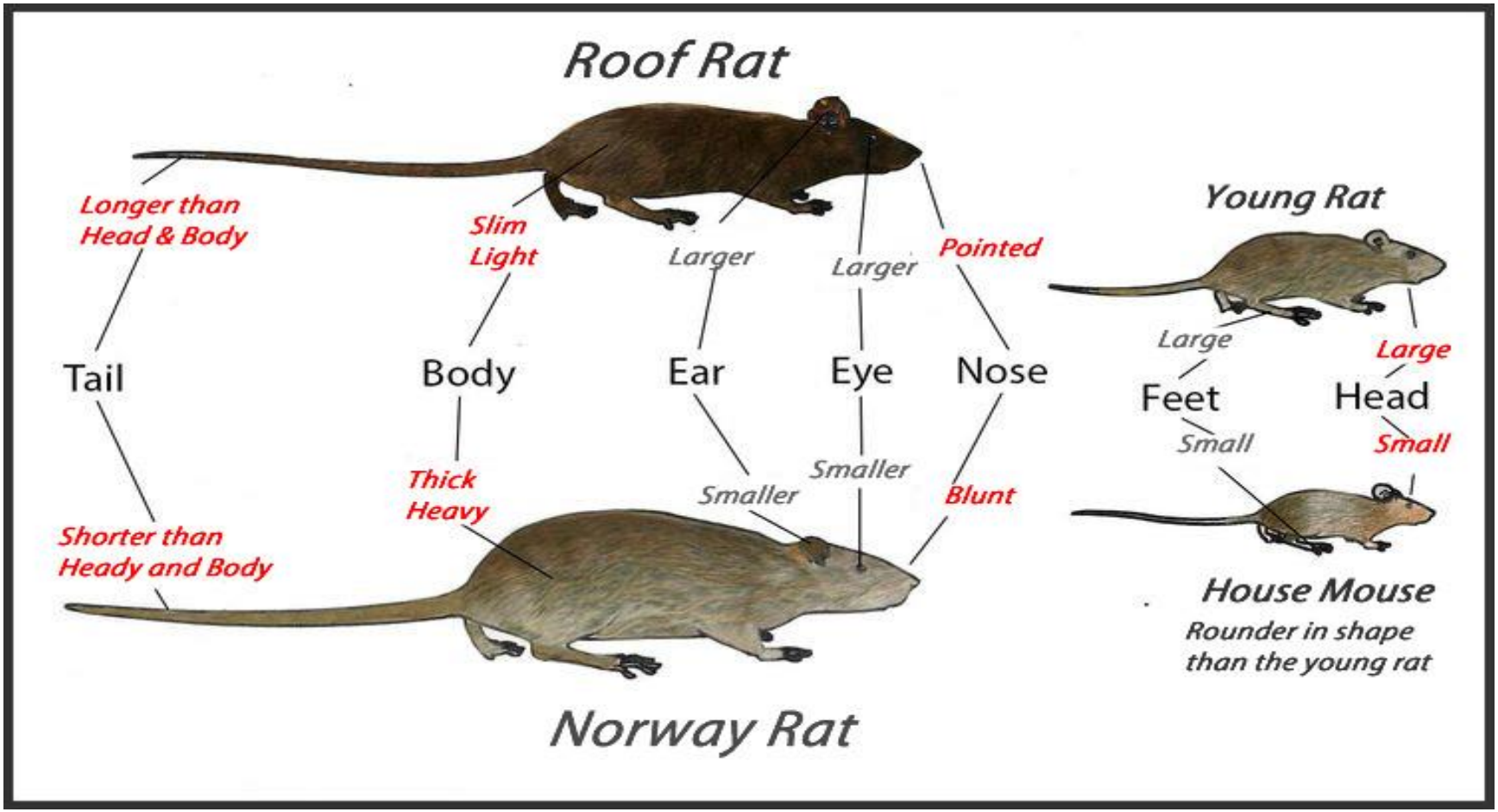
Know Your Rat



Know Your Rat

Norway Rat

- Stocky, shorter tail
- Lives low to the ground
  - On ground floor
  - In basements
  - In burrows along foundations, under wood and compost piles
- Stays close to home for feeding, within 100 ft.
- Inhabit the entire USA

Know Your Rat

Roof Rats

- Slightly smaller compared to Norways and have a longer tail
- Live above ground
  - Second stories or attics
  - Up in trees
  - Nest in bushes
- Stay within 300 Ft. when searching for food (larger range)
- Inhabit coastal areas

More info at
http://ipm.ucanr.edu/PMG/PESTNOTES/pn74106.html

Nesting Behaviors

Build nests in many places

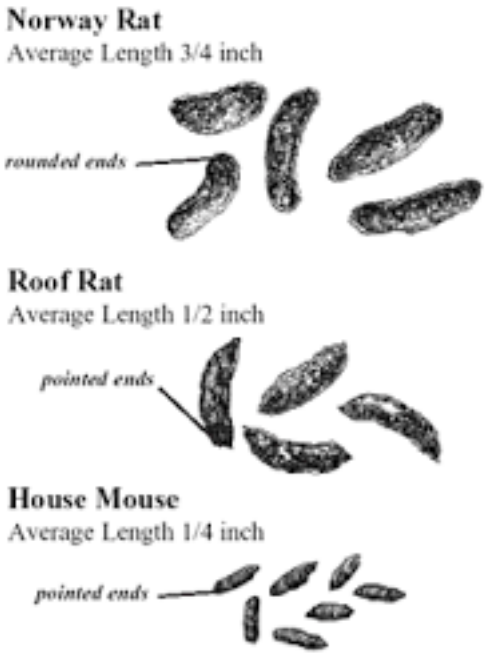
- Homes and garages
- Sheds
- Woodpiles
- Compost piles
- Burrow near or under structures
- Some nest in trees and among plants

Feeding Behaviors

- Venture out at night to feed
- Feed within 100-300 feet of their nest or burrow
- Forage together in teams
- Hoard food in their nest, wall spaces, under cabinets
- Walk along established paths, ledges, fence tops, wires and beams to feed

Signs of Rat Infestation

- Droppings
- Remnants of nests in wood piles, drawers in the garage
- Burrows among damaged plants, under compost piles, along foundations
- Chew marks on fruits and nuts on or off the tree
- Damaged vegetables



Rat Control

Cultural and Environmental Methods

- Tight lids on garbage cans
- Remove outdoor pet food and bird seed
- Remove vines from buildings
- Thin dense vegetation with 2 Ft. clearance in between plants and from walls
- Trim tree branches 3 Ft. from roof
- Seal cracks and openings in buildings

Natural Predators

Lots of them!

- Owls
- Hawks
- Eagles
- Cats
- Mountain lions
- Coyotes
- Foxes
- Snakes

Remove Rats by Trapping

Spring Traps

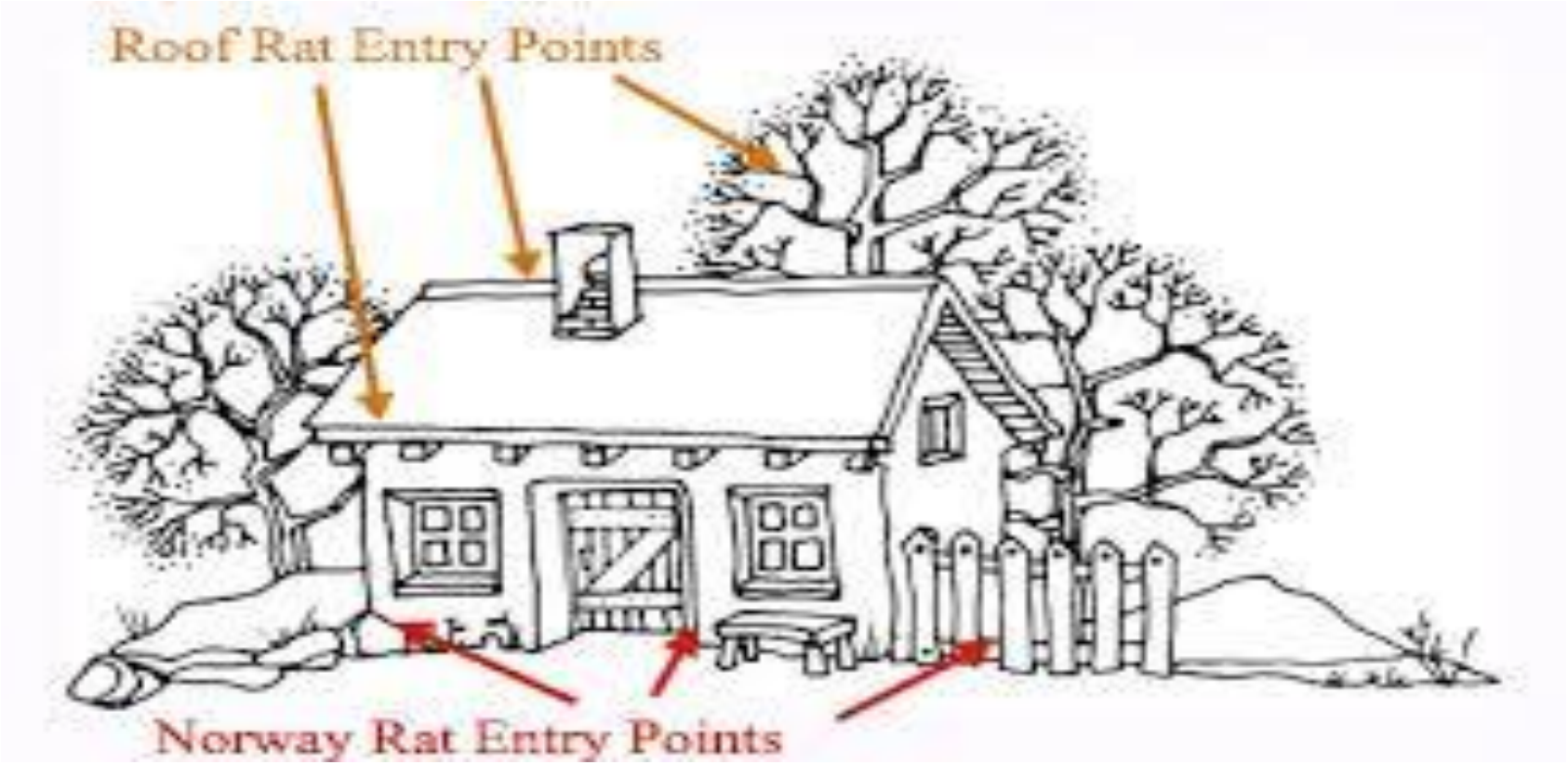
- Economical - can be used again and again
- Effective - usually kill immediately
- Safest for you and the food chain
- Safe bait using nuts, dried fruit, kibble pet food, bacon

Wide Variety of Rat Traps

- Many versions of the spring trap

- Electronic traps deliver electric shock

Different Trap Locations for Different Rats



Trap Location For Norway Rats

On the ground

- Close to walls
- Behind objects
- Dark corners
- Where you find droppings
- Out of reach of children and pets

Trap Location for Roof Rats

Up off the ground

- On roofs
- On ledges
- Overhead beams
- Fence tops
- On pipes
- Out of reach of children and pets

What About Toxic Baits?

- Avoid using baits indoors-dead rats cause odors
- Seal buildings before baiting so poisoned rats don't come inside to die
- Tamper proof bait stations can only be used within 50 ft. of a building
- All rodent baits are toxic to non targeted species-pets and wildlife

But Remember. . .

The IPM Approach is to always use the least toxic method.

The only **wildlife-safe** ways of killing rats:

- Snap traps
- Electric shock traps
- New natural bait called RatX

More Info:
http:/saferodentcontrol.org

Stumped? Ask a Master Gardener

Ask the UC Master Gardener Hotline

http://mbmg.ucanr.edu/hotline/

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APPENDIX

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Reference Links

- UC IPM Website – Vertebrate Pests
  http://ipm.ucanr.edu/PMG/menu.vertebrate.html

- Deer: http://ipm.ucanr.edu/PMG/PESTNOTES/pn74117.html
- Gophers: http://ipm.ucanr.edu/PMG/PESTNOTES/pn7433.html
- Moles: http://ipm.ucanr.edu/PMG/PESTNOTES/pn74115.html
- Ground Squirrels: http://ipm.ucanr.edu/PMG/PESTNOTES/pn7438.html
- Tree Squirrels: http://ipm.ucanr.edu/PMG/PESTNOTES/pn74122.html
- Birds: http://ipm.ucanr.edu/PMG/PESTNOTES/pn74152.html
- Rats: http://ipm.ucanr.edu/PMG/PESTNOTES/pn74106.html

Handouts for this Class

Deer Resistant Plant List:

https://docs.google.com/document/d/1oDzqtEkdhdLUA9nVErTuzxba_aY5ZDmMUa4dP9-BSVg/edit?usp=sharing

Help Us Better Serve You!

Our follow-up survey provides us the tools we need to grow and improve the quality of our program.

University of California
Agriculture and Natural Resources

UCCE Master Gardener Program
Monterey and Santa Cruz Counties