



Integrated Pest Management (IPM) for Gophers, Birds and Deer

UC Master Gardeners of Monterey & Santa Cruz
March 2020



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What You'll Learn Today

- **Basic IPM principles**
- Systematic approach to any “pest”
- How to diagnose a problem
- Management strategies
- Where to get help
- Fieldwork to set gopher traps



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What is IPM?

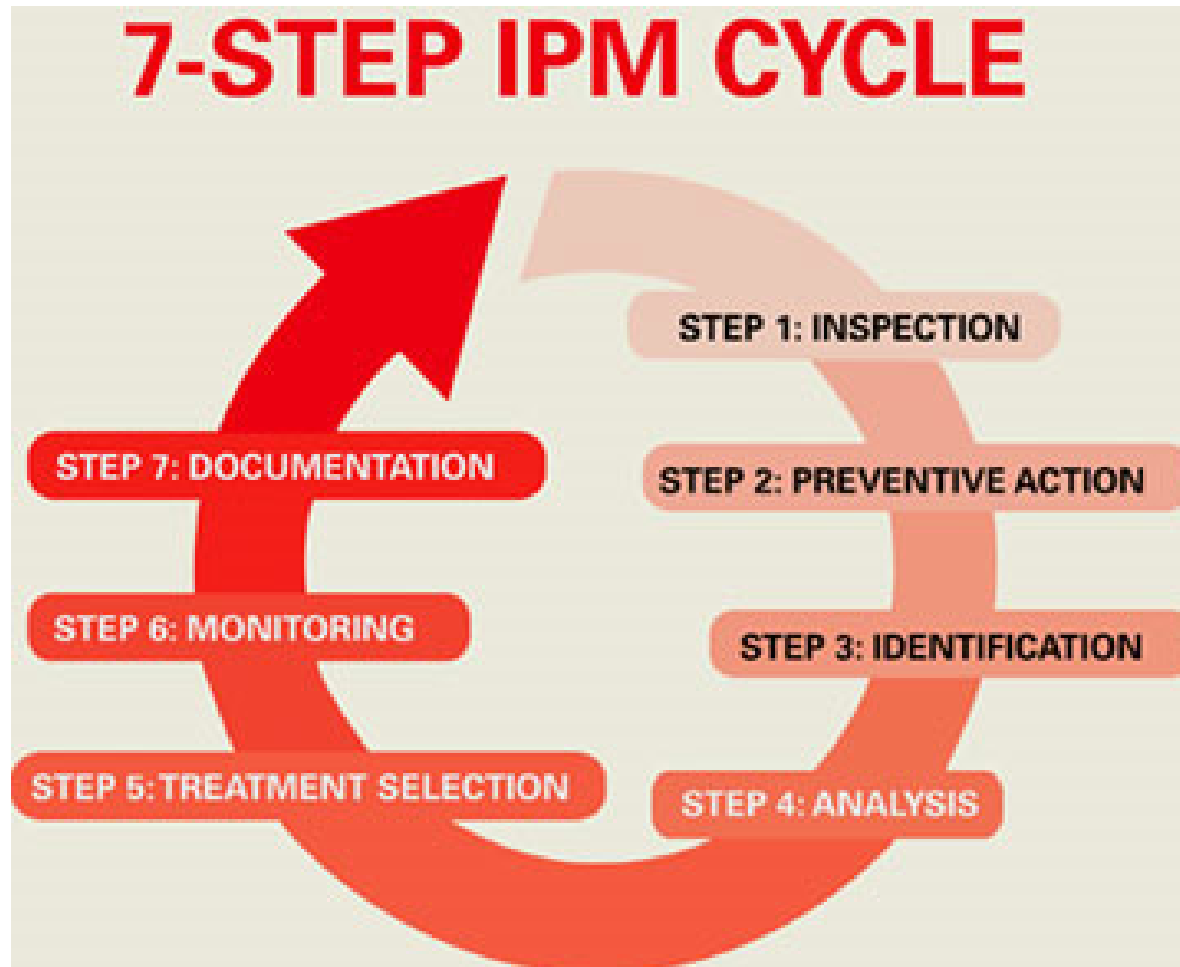
Integrated pest management (IPM) is an **eco-system based strategy** of pest control that focuses on **natural control factors** through **a combination of techniques** that are **minimally disruptive**, using chemicals only as a last resort.



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IPM Process



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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?



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Identify the Pest

Look for clues

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



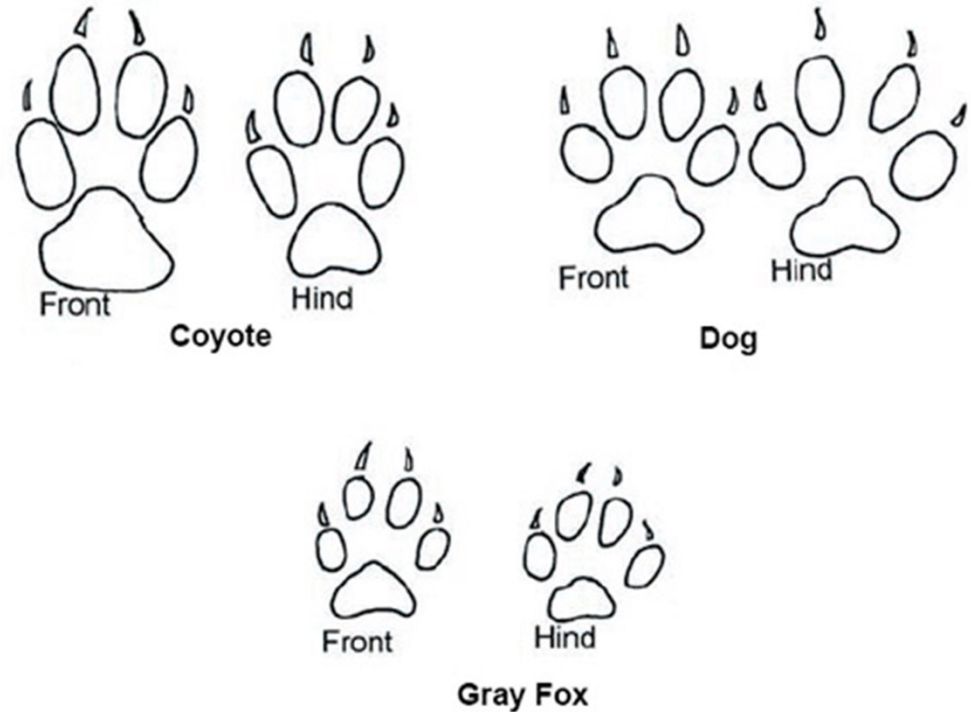
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Learn about the Pest

Knowledge is key to identification and management.

- Biology
- 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



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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?



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Cultural Controls

Change your own gardening practices to reduce pests' impact.

- Grow plants they don't eat or infect
- Provide alternative host crop (trap crop insects)
- Remove favored habitats; create buffer zone
- Practice good garden hygiene



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Physical Controls

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



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Biological Controls

Natural Enemies

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



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Chemical Controls

- Repellants
- Baits
- Fumigation

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

Finding active ingredients on a pesticide label:

Active Ingredients	
Bifenthrin.....	0.1%
Other Ingredients.....	99.9%

KEEP OUT OF REACH OF CHILDREN
CAUTION See back panel booklet for additional precautionary statements
NET WT 10 lb (4.53kg)

Pesticide labels show the active ingredient in a product.



GOPHERS



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Gopher – Know Your Pest

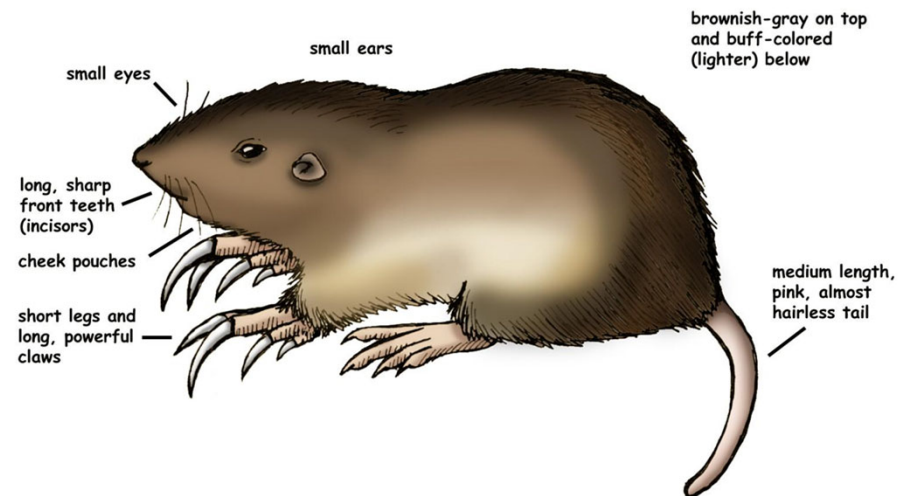
Lifestyle

- 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

Northern Pocket Gopher
Thomomys talpoides



- 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 – Plant Damage



Plant Damage

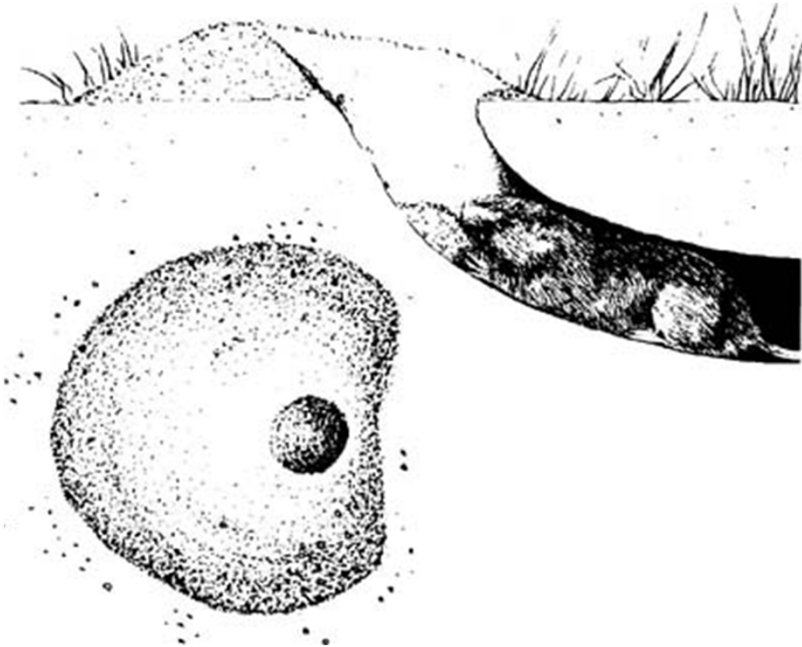
- Plant missing
- Plant wilted, root gone



Gopher – In Action

Mounds

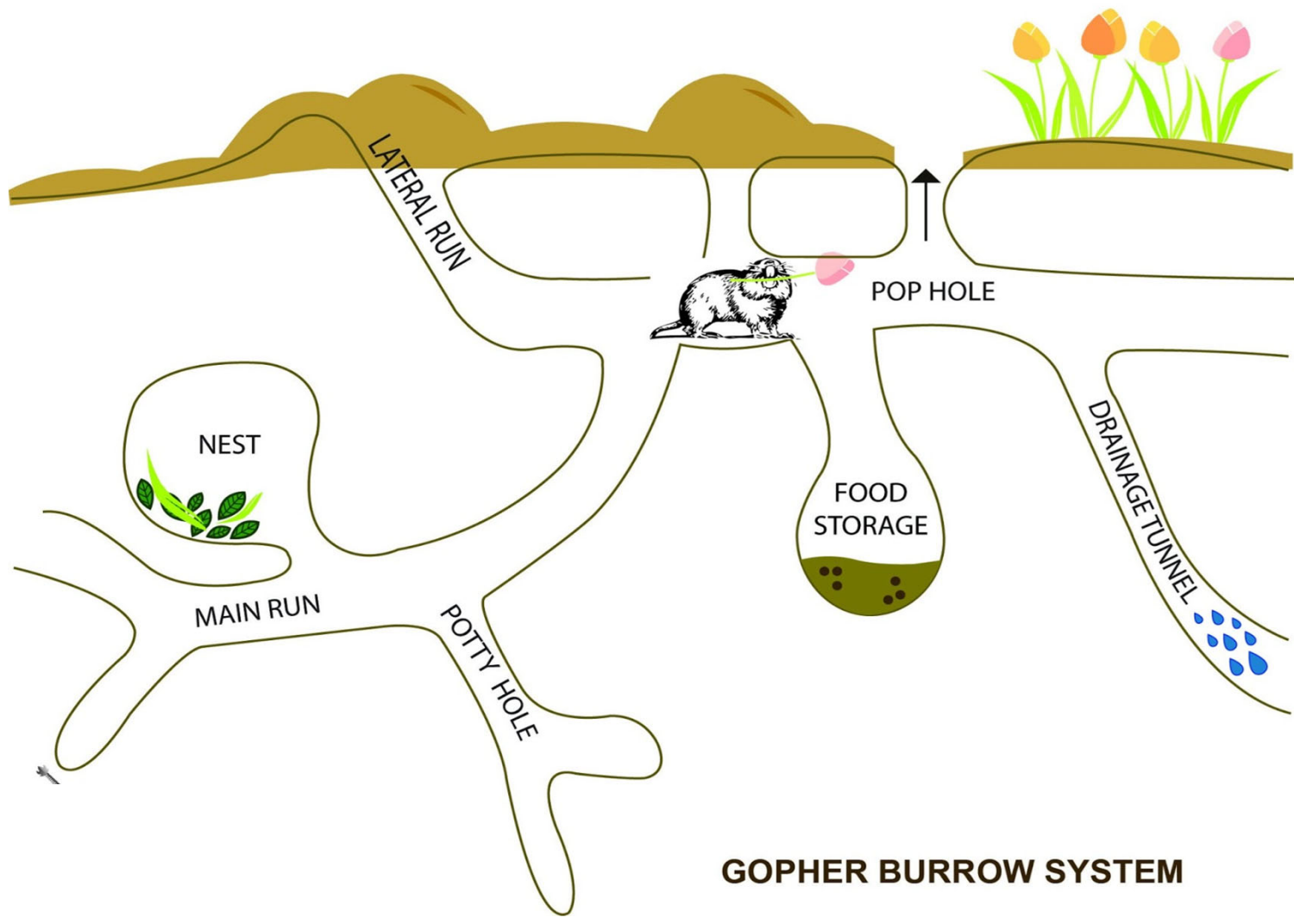
- Crescent or fan shaped mounds
- Hole is capped with soil



Pop Holes



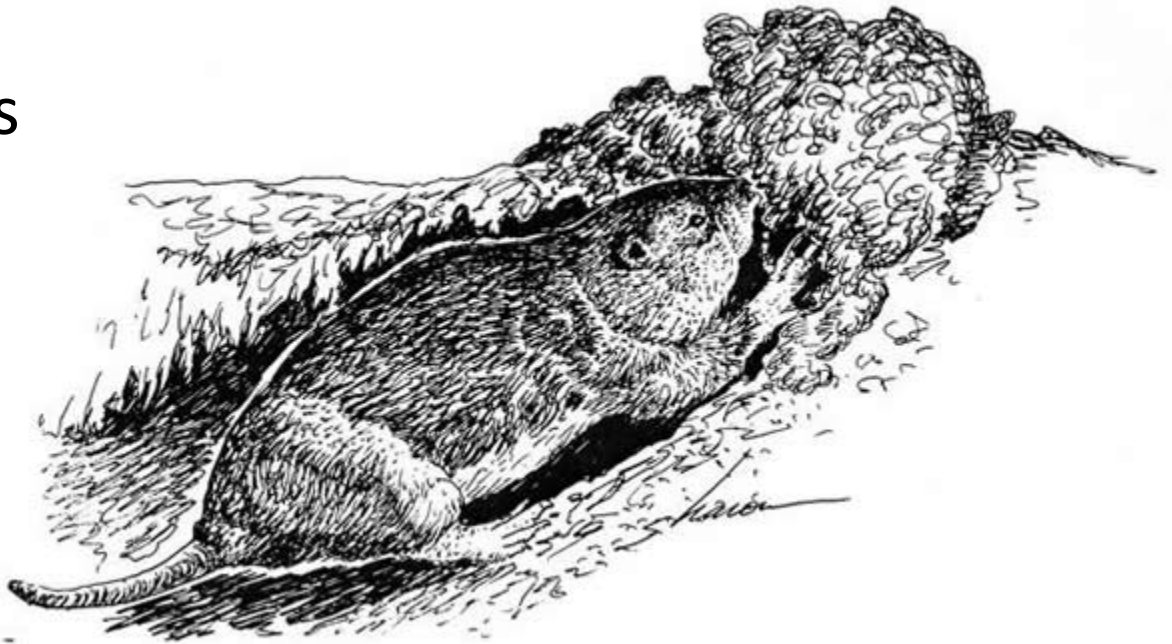
Gopher Run Diagram



Gopher Management

Low Impact Management

- Cultural – gopher resistant plants?
There are none.
- Plant in containers
- Physical exclusion
- Traps
- Biological control



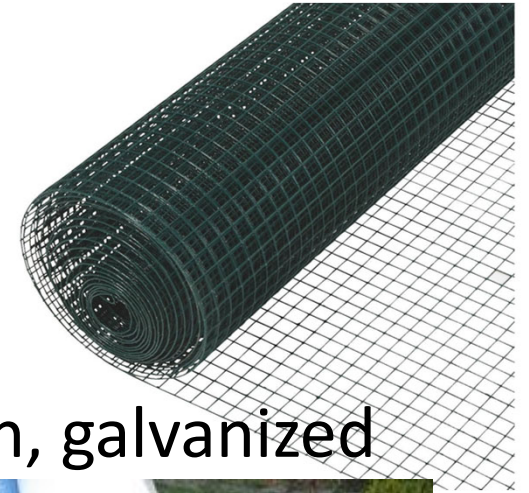
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Gopher Management

Physical Exclusion/Barriers

- Underwire beds with 19 gauge, ½" mesh, galvanized or plastic coated hardware cloth
- Gopher baskets
- Underground fence



Gopher Management

[How to find the tunnel](#)

Trap, but First Find the Run

- Probe between 2 mounds or a mound and a hole to feel run
- Use a digging hand tool to open the run

Probes



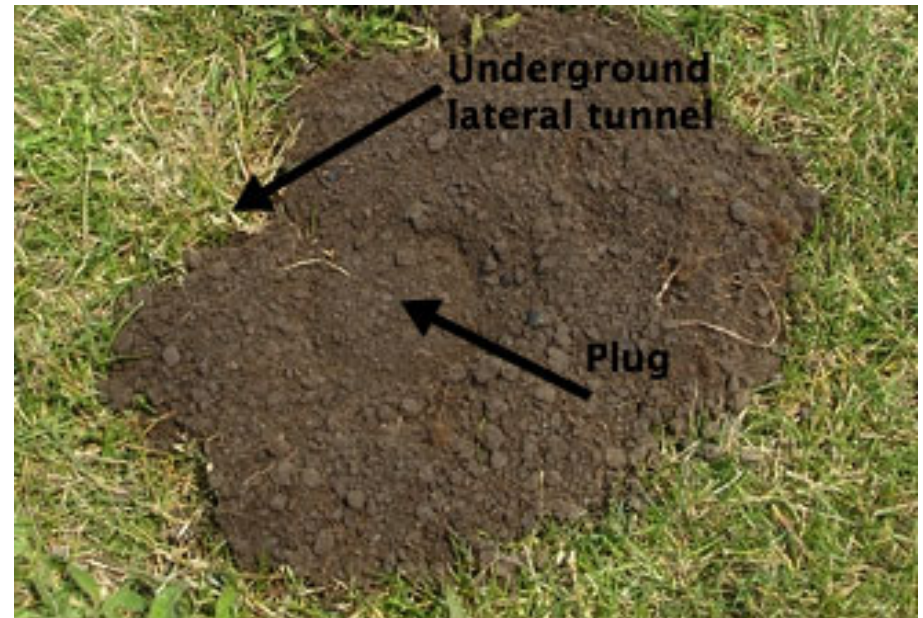
Weeder



Gopher Hawk
Probe



Bait applicator



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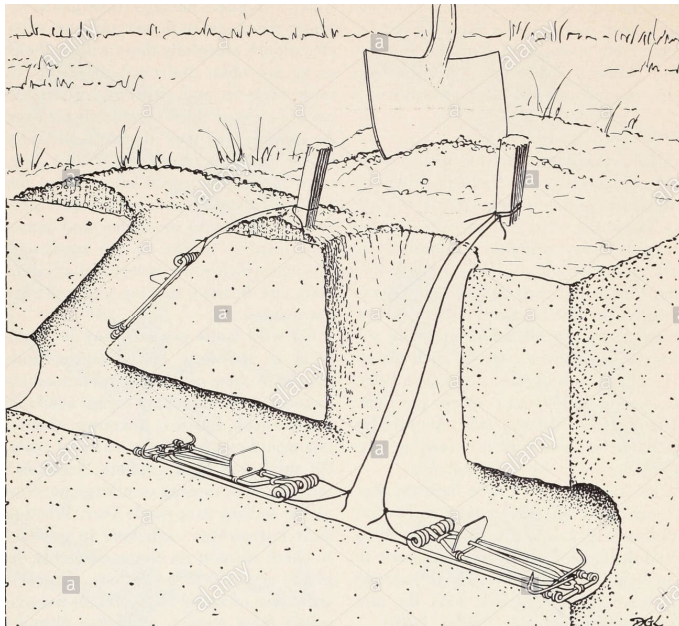
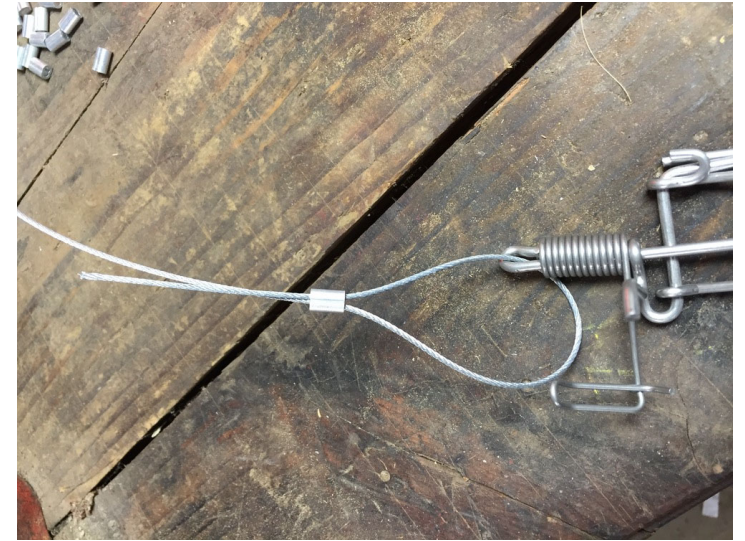
Gopher Management

Low Impact Management - Trap

	Cinch	Gophinator	Gopher Hawk	MacAbee	Box Trap
					
PROS	Used by the pros. Can set in pop hole. Easy gopher removal	Also used by pros. Small, fits in run, lots of success, easy removal	No digging, very quick kill. Clear indicator when gopher is caught	Design over 100 years old. Tried and true	VERY easy to set,
CONS	Requires some strength to set. Danger to pets. Rusts	Tricky to set, required digging into the run	Quite expensive and tend to break	Dangerous to set and for pets. Messy to extract gopher	Bulky, doesn't fit in hole.
VIDEO	<u>How to set a cinch trap</u>	<u>How to set a gophinator</u>	<u>How to set a gopher hawk</u>	<u>How to set a MacAbee trap</u>	<u>How to set a box trap</u>

Gopher Trapping Tips

- Use post hold digger to get to run
- Set traps both directions
- Stake the traps so you don't lose them
- Cover with a galvanized pail
- Check morning and evening



Gopher Management

Low Impact Management – Biological Control



Gopher Management

High Impact Management

- Bait –anti-coagulant, multiple dose
Warfarin, Diaphacione, Chlorophacione
- Bait –anti-coagulant, single dose
Brodifacoum, Bromadiolone, Difenacoum
- Bait – non-anticoagulant, single dose
Bromethalin, Cholecalciferol, Zinc phosphide, Strychnine



Not recommended
due to risk of
secondary
poisoning

Other Methods, Not Recommended

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

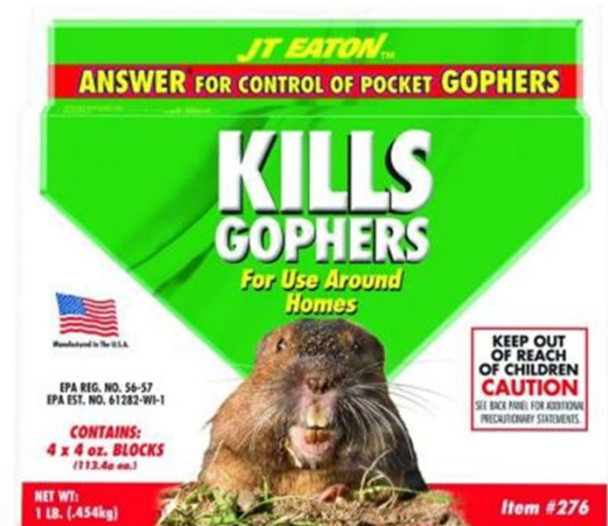
Rodenticide Fact Sheet

<http://saferodentcontrol.org/site/wpcontent/uploads/2013/04/rodenticides.pdf>

Gopher Management – Lowest Impact Bait

Anticoagulant Bait Blocks





- Wax impregnated grain bar won't rot in the soil, lasts for the next gopher resident
- Gophers drag it to nest burrow for repeat feeding, they die deep underground
- Low risk to pets & wildlife, 1st generation anticoagulant = low toxicity volume,
- If a pet is affected, it's treatable with Vitamin K from the vet
- But...





Other 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
	Ground Squirrel	Eats plants above and below ground	Trap, exclude, bait

Mole - Identify the Damage

Mounds & Runs

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



Plant Damage

- Cosmetic:
Soil disturbed

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



Ground Squirrel - Identify the Damage

Holes & Runs

- Multiple connected burrows with large, open 3-4" holes in dry, open spaces
- Active, squirrel like critters with fluffy tails, retreat to burrows



Plant Damage

- Eats plants, roots, tubers – below and above ground
- Stripped bark at ground level
- May undermine tree roots
- May gnaw watering systems



Quiz - 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



Activity – Let Set Some Traps

- Always wear gloves



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DEER



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Deer in your Garden?

Their natural habitat



In your garden



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Deer Behavior-Know your Pest

- Travel in familial groups for generations
- Range of 3-5 miles, sleep within 1 mile of water
- Eat 5 pounds of vegetation per day
 - 90% leaves and stems
 - 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



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



Physical Controls - Frighten Them Away

A dog is a very
effective deterrent



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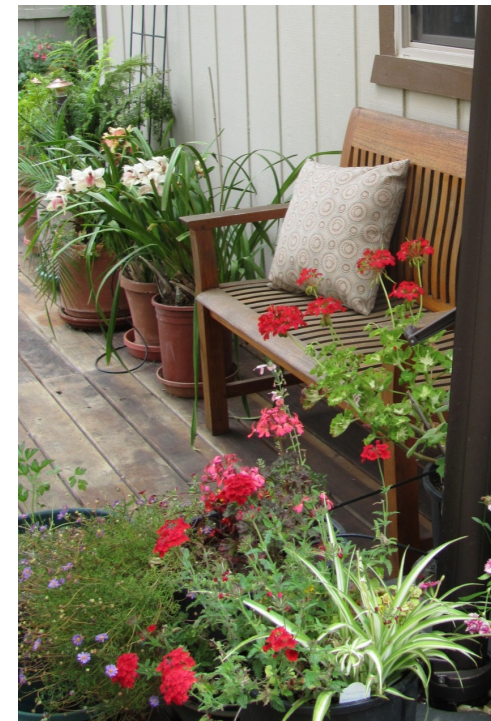
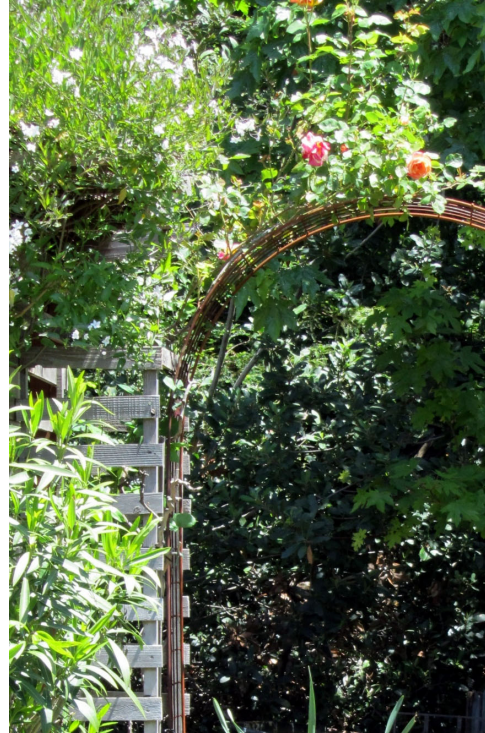
Physical Controls - Frighten Them Away

- Starling devices
 - Motion-activated lights, sounds, sprinklers
 - Deer will habituate



Physical Controls-Placement Up High, Out of Reach

- Roses on arbor
- Pots on Decks
- Hanging baskets



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Odor Repellants

- Require frequent application after rain or irrigation
 - Sprays-Not Tonight Deer, Liquid Fence
 - Urine of dog, puma, human
 - Home remedies-found in the literature but not scientifically proven



Tree Tips

- Choose tree with tall trunk
- Prune lower branches
- Wrap trunk
- Cages



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Physical Controls-Fences

- Effective but costly
- Need to be 7-8 feet high
- Tight to the ground
- Double fencing on slanted fencing on hillsides



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Small Area Fencing and Barriers

- Wire cages
- Row covers in vegetable gardens

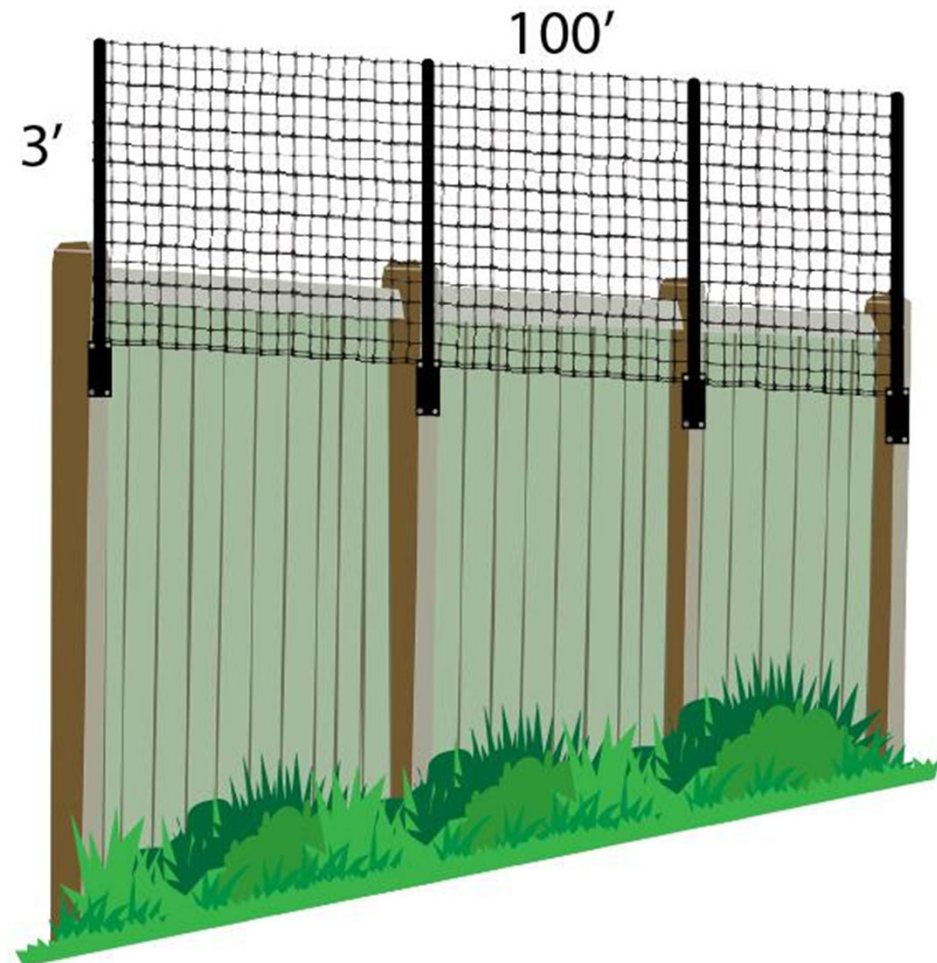


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Large Area Fencing -

Fence extensions deliver height at reduced cost



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Fencing on slopes

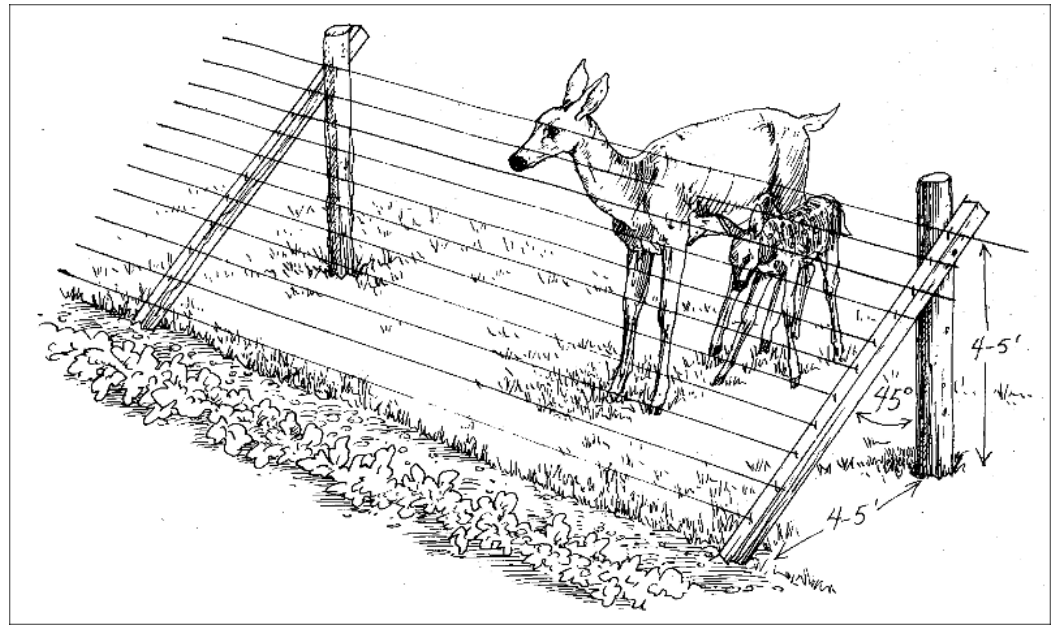
Double fence

4ft. high, 4ft. of separation



Slanted fence

Height and width defeat deer



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Cultural Controls-Plant Selection

Plant what they don't like to eat

- **Pungent Plants**

Herbs

Lavenders

- **Fuzzy Plants**

Scented geranium

Woolly Lamb's Ear

- **Poisonous Plants**

Brunnera

Digitalis

Oleander

- **Fibrous, Spiky,
Distasteful Plants**

Euphorbia

Cactus-succulents

Gravellia

Phormium



Cultural Controls-Plant Selection

Plant what they don't like to eat

Type of plant	Examples
Pungent Plants	Herbs Lavenders Scented geranium
Fuzzy Plants	Woolly Lamb's Ear Brunnera
Poisonous Plants	Digitalis Oleander Euphorbia
Fibrous, Spikey or Distasteful plants	Cactus/succulents Grevillea Phormium



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



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More info at

<http://ipm.ucanr.edu/PMG/PESTNOTES/pn74117.html>

Deer Resistant Plants are Beautiful



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Good Luck

Living in harmony with the deer



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BIRDS



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Birds – Identify the Damage

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



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Birds – Identify the Damage

Typical feeding
damage from small
birds



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Birds – Know Your Pest

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



More info at

<http://ipm.ucanr.edu/PMG/PESTNOTES/pn74152.html>



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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.



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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 fruits & veggies
- Leave open for pollination



Birds – Physical Controls

Scare them away:

- Shiny things
- Moving things
- Balloons with eyes
- Noisemakers
- Best used only when most needed
- Move them 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



Stumped? Ask a Master Gardener

Ask the UC Master Gardener Hotline

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



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Questions?



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Help Us Better Serve You!

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



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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/1oDzqtEkdhdLU_A9nVErTuzxba_aY5ZDmMUa4dP9-BSVg/edit?usp=sharing



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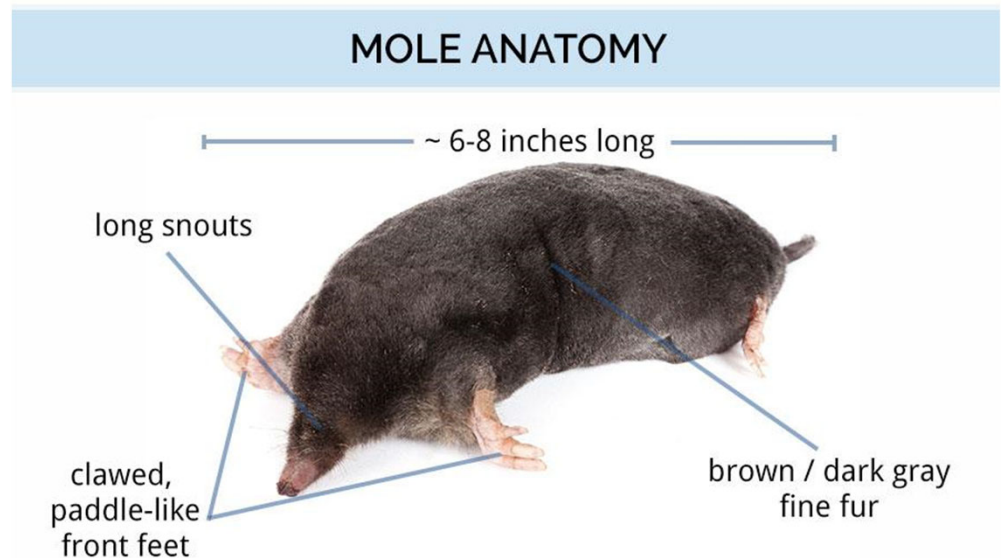
Mole - Know Your Pest

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

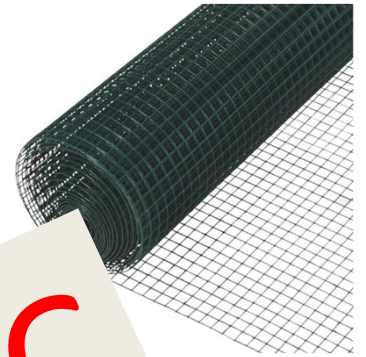
More info at

<http://ipm.ucanr.edu/PMG/PESTNOTES/pn74115.html>

Mole Management

Low Impact Management

- Physical Exclusion – underground fences
- Repellents– castor oil spray, vibrators
- Traps – cinch trap in the deep surface tunnel “harpoon”
- Biological Control – cats, dogs, and cover crops
- Cultural – mow frequently



DAMAGE COSMETIC

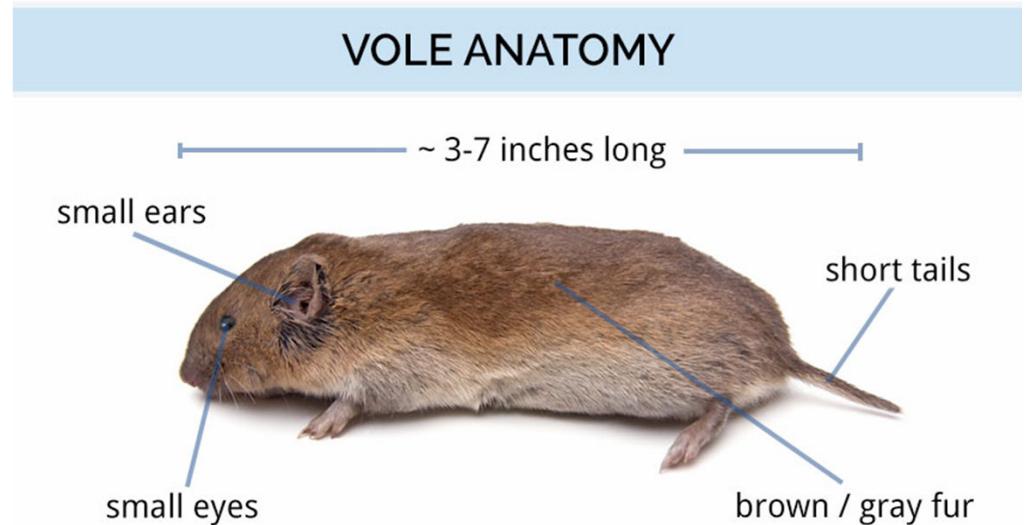
Vole – Know Your Pest

Lifestyle

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

Vole Fun Facts

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



Common Name: Field Mouse

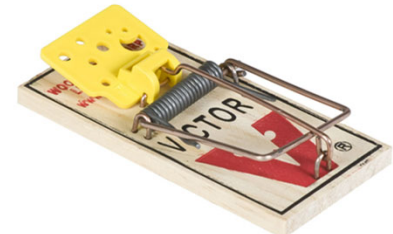
More info at

<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 – 10-50
- Biological Control – owls, snakes, cats, dogs, and coyotes



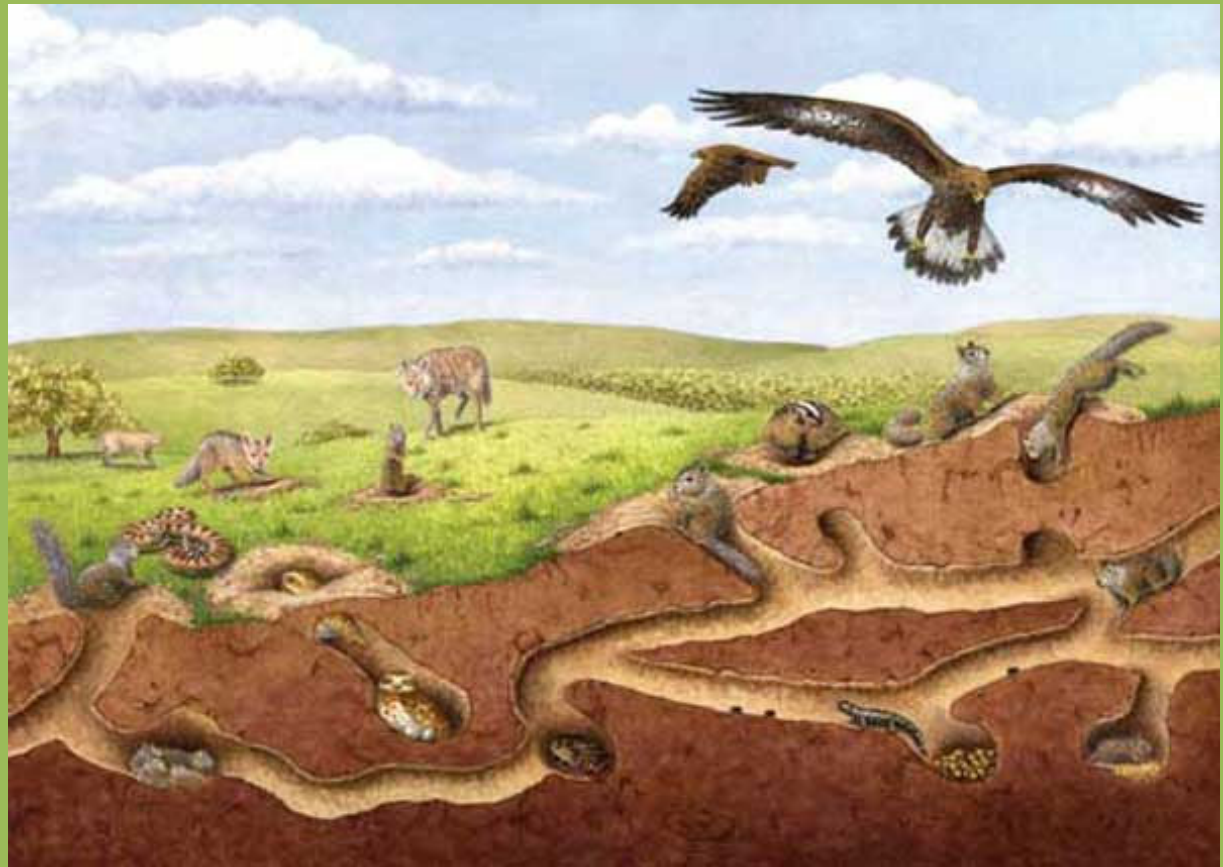
Higher Impact Management

- Bait – multiple feeding anticoagulant



Ground Squirrel - Know Your Pest

Keystone
Species
in
California
Grasslands



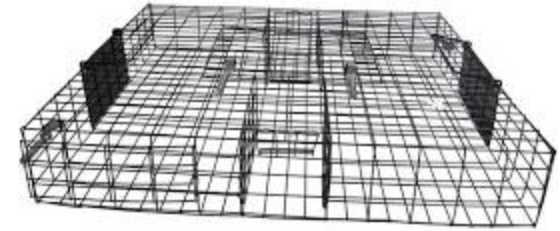
More info at

<http://http://ipm.ucanr.edu/PMG/PESTNOTES/pn7438.html>

Ground Squirrel - Management

Low Impact Management

- Habitat modification– cultivate to destroy burrows. Repellents don't work
- Physical Exclusion – difficult and expensive
- Traps – box traps, repeating live traps, or Conibear 110 near burrow opening
- Biological Control – owls & hawks, snakes, cats, dogs, and coyotes. Dogs may dissuade



Higher Impact Management

- Bait – multiple feeding anticoagulant, best used in summer & fall
- Fumigation

