

Developing a management plan for burrowing rodents in organic production

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Species Identification (Ground Squirrels)

- Gray-brown fur with semi-bushy tail.
- Are social.
- Damage includes girdling of trees, consumption of forbs and grasses, chewing of irrigation lines, and abundant burrow openings.



Species Identification (Ground Squirrels)

- Squirrels are active throughout the day and are frequently visible.
- They prefer to burrow next to buildings, on field edges, and alongside fencerows and roadsides.



Species Identification (Pocket Gophers)

- Burrowing rodent about 6-8 in long; rarely seen above ground.
- Gopher mounds are plugged and often fan-shaped.



Species Identification (Pocket Gophers)

- They feed on taproots weakening and/or killing plants.
- Then can girdle trees, particularly below ground.
- Mounds can also kill plants and can create weed seed-beds.



Species Identification (Meadow Voles)

- Have dark grayish brown fur and are 4-6 inches in length.
- Populations tend to cycle, exhibiting irruptive growth patterns.



Species Identification (Meadow Voles)

- Dig shallow burrows and leave well-worn trails. Fecal pellets are often present.
- Primary damage caused by girdling of stems, consumption of vegetation, and gnawing of cables, pipes, etc.



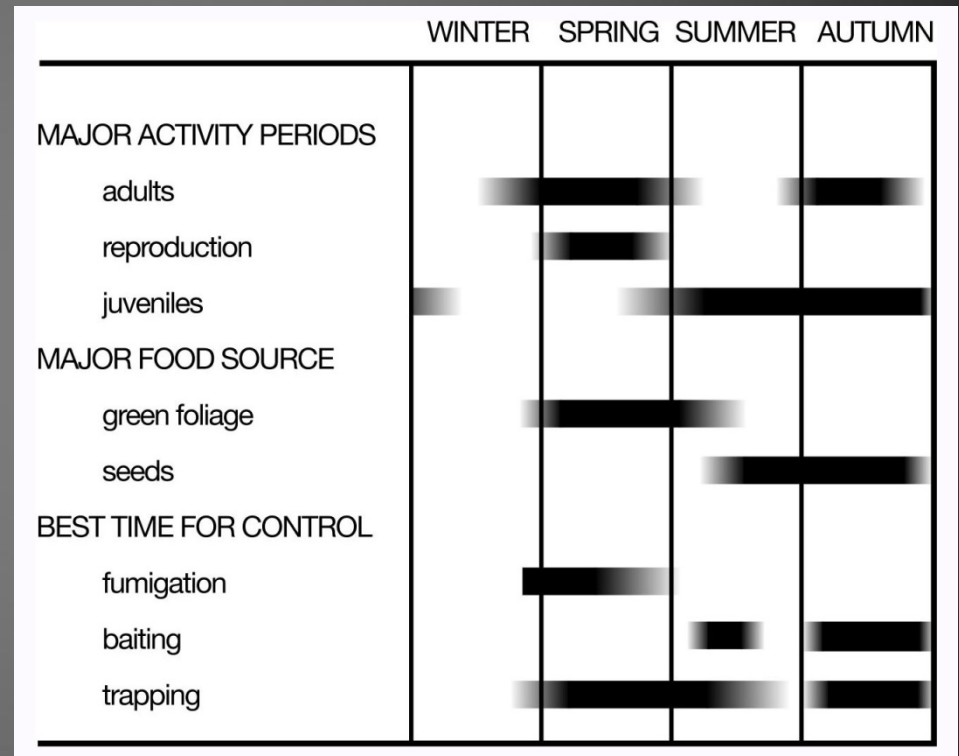
Current Control Strategies

- Currently, we focus on an integrated approach that utilizes a number of strategies and tools to control vertebrate pests.



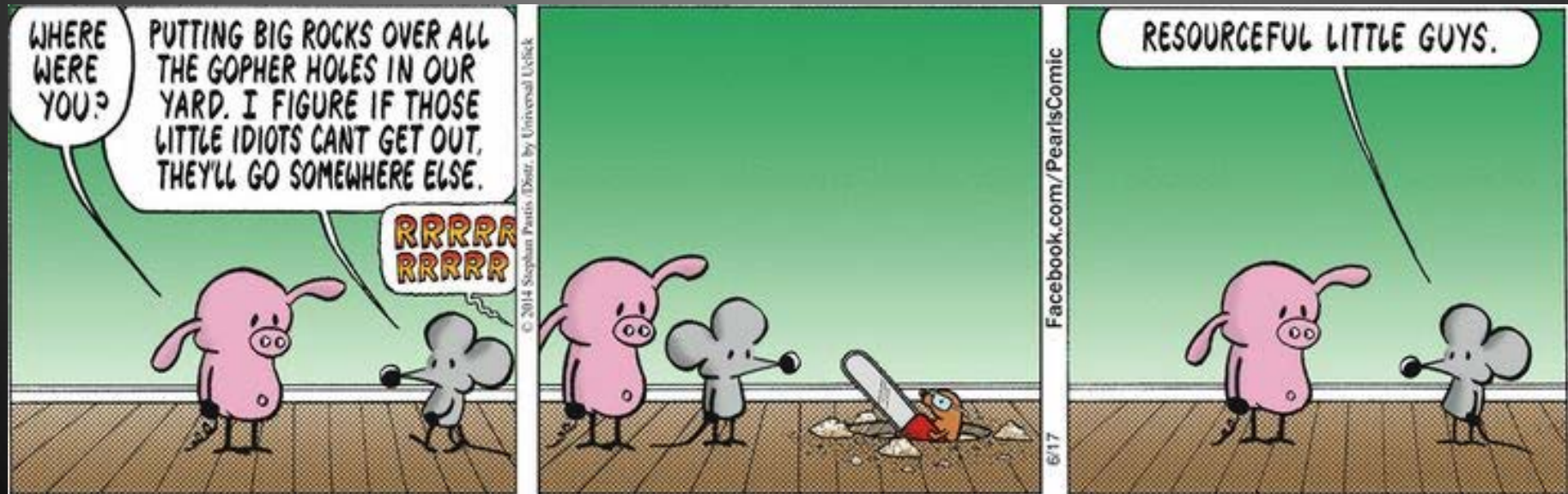
Importance of Biology/Ecology

- Understanding the biology and ecology of vertebrate pests will guide management decisions.
- Example:
 - ground squirrels



What Control Options are Available?

	Habitat modification	Baiting	Burrow fumigation	Trapping	Exclusion	Repellent	Frightening	Shooting
Ground squirrel	X			X				X
Pocket gopher	X			X	?			
Vole	X			?	X			



Control Options—Biocontrol

- Natural predators have been used to control vertebrate pests.



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- Owl boxes are inconclusive for gophers; raptor perches appear ineffective for ground squirrels.
- Gopher snakes kill a few gophers but are unlikely to control populations.



Control Options—Habitat Modification

- Involves altering habitat to reduce the desirability for pests.
- Example:
 - remove brush piles to control ground squirrels



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- Example:
 - remove brush piles to control ground squirrels
 - reduce cover for voles
 - control weeds to reduce food for gophers



Control Options—Cultural Practice

- Deep ripping to remove burrow systems



Control Options—Cultural Practice

- Deep ripping to remove burrow systems
- Irrigation strategy



Control Options—Exclusion

- Gopher fencing ineffective.



Control Options—Exclusion

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- Raised flower beds and wire baskets.



Control Options—Exclusion

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- Raised flower beds and wire baskets.
- Tree protectors for voles.



Control Options—Exclusion

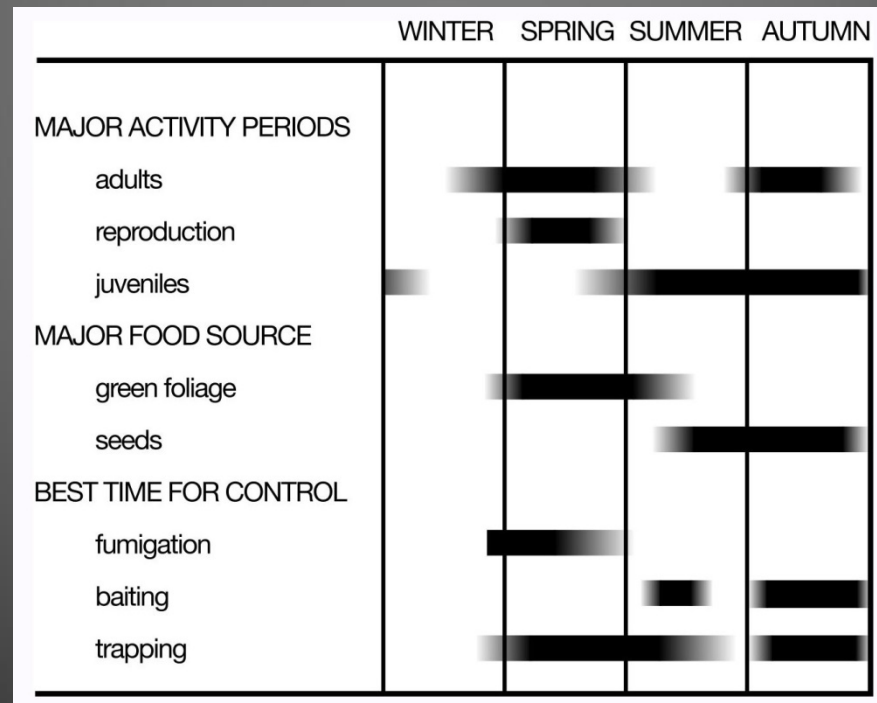
Voles

- Plastic mesh-style fencing has been effective at slowing movement of voles into artichoke fields.
- Fencing should be buried at least 6 inches below ground and extend 8-12 inches above ground.
- Aluminum flashing may provide more long-term functionality.
- Must consider equipment movement into and out of fields.



Control Options—Trapping

- Control of small populations of ground squirrels is possible with traps.
- Trapping for ground squirrels is effective year round except during middle of summer.



Control Options—Trapping

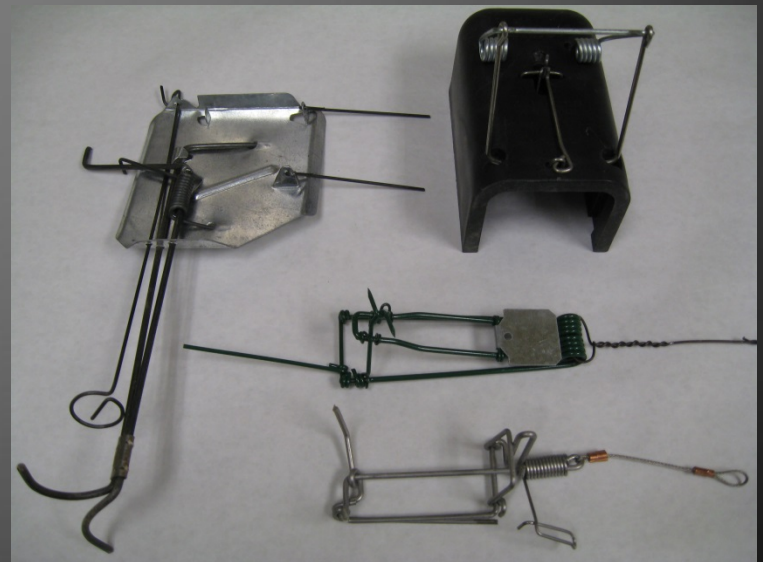
- Body-gripping traps, tube traps, and box-type squeeze traps are common kill traps.
- Wire cage traps are common live traps.
- Live traps require euthanasia.



Control Options—Trapping

Pocket gophers

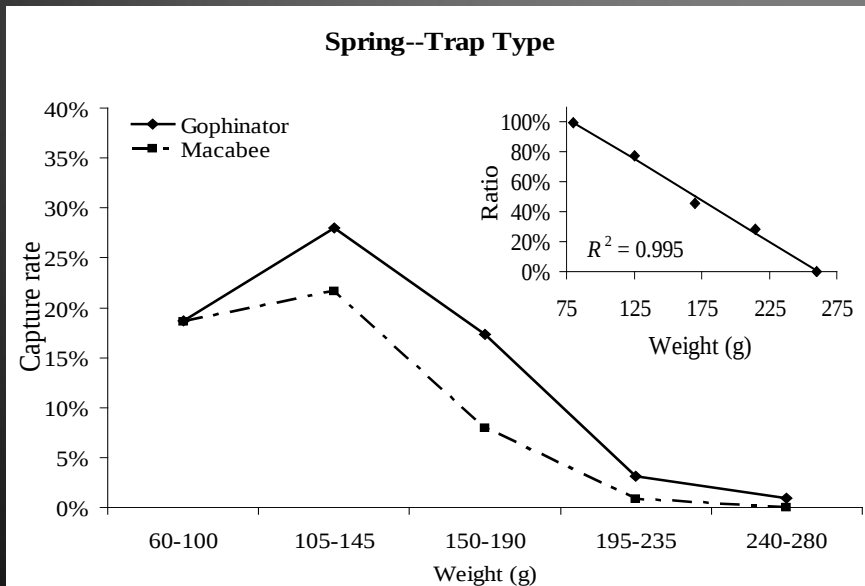
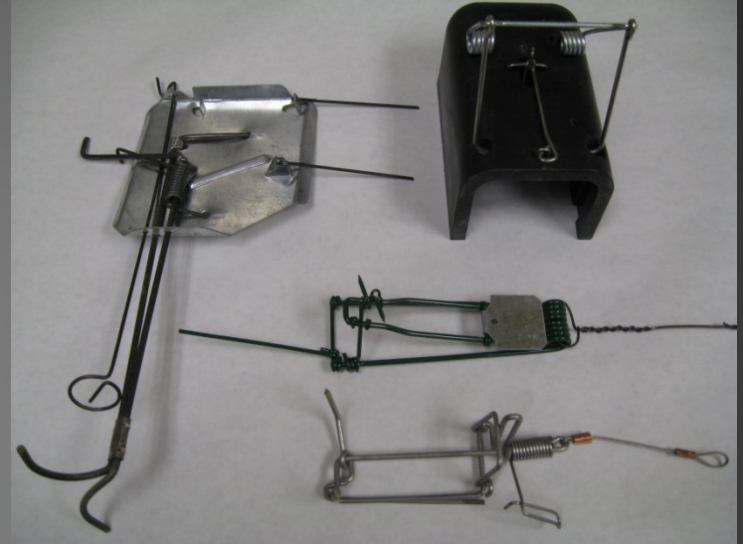
- Has many positive attributes including:
 - knowledge that you've removed the target animal.
 - no use of toxic chemicals.
 - available for use in organic setting.
 - can be efficient and economical once user becomes proficient at trapping.
- Two main kinds of traps: pincers and squeeze-type box traps.



Control Options—Trapping

Pocket gophers

- Gophinator trap was more effective than Macabee trap.
- Captured heavier gophers at a greater rate.



Control Options—Trapping

Pocket gophers

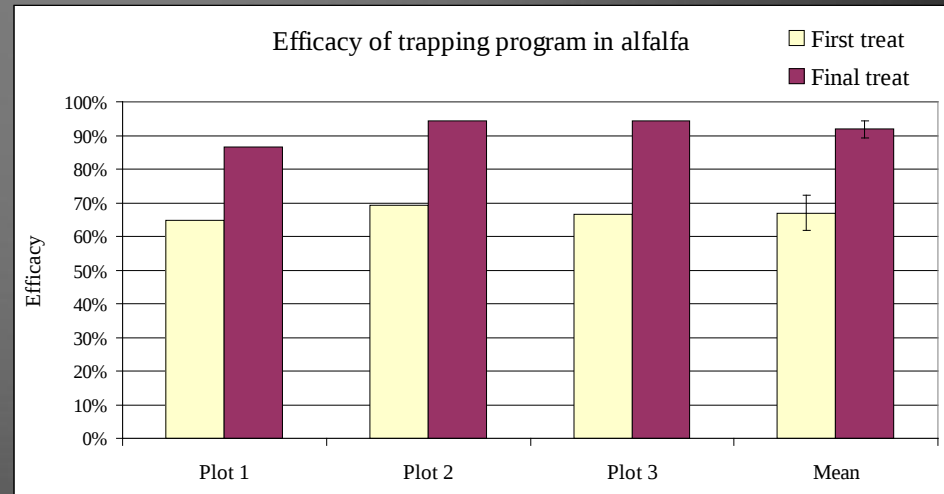
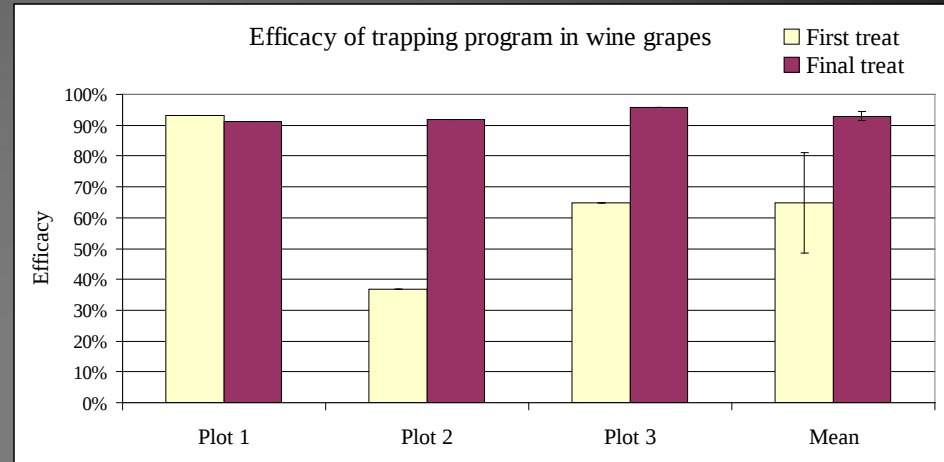
- Covered sets yielded slightly higher capture rates in spring-summer, but not autumn.
- Efficacy was offset by setting time.
- We did not observe a difference in the number of captures across attractants.
- Human scent had no effect.



Trapping—Efficacy

Pocket gophers

- Exhibited high efficacy in wine grapes after two treatments.
- Exhibited high efficacy in alfalfa after two treatments.



Control Options—Shooting

- Shooting can be effective for controlling ground squirrels although it is labor intensive.
- Lead bullets are no longer allowed in many areas in CA and will be banned statewide starting 2019.



Ground Squirrel BMP website

<http://www.groundsquirrelbmp.com>



Biology

Identification

Management

Regulations

Resources

FAQs

Search



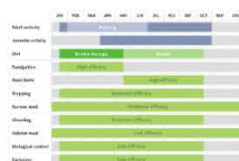
Ground squirrel management for California



Adult CA ground squirrel in an agricultural field

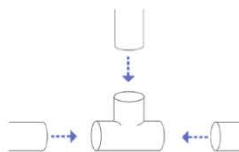
What are BMPs?

What is IPM?



Timing and Efficacy

Compare management methods for:
California Ground Squirrel
Belding's Ground Squirrel



Step-by-Step Guides

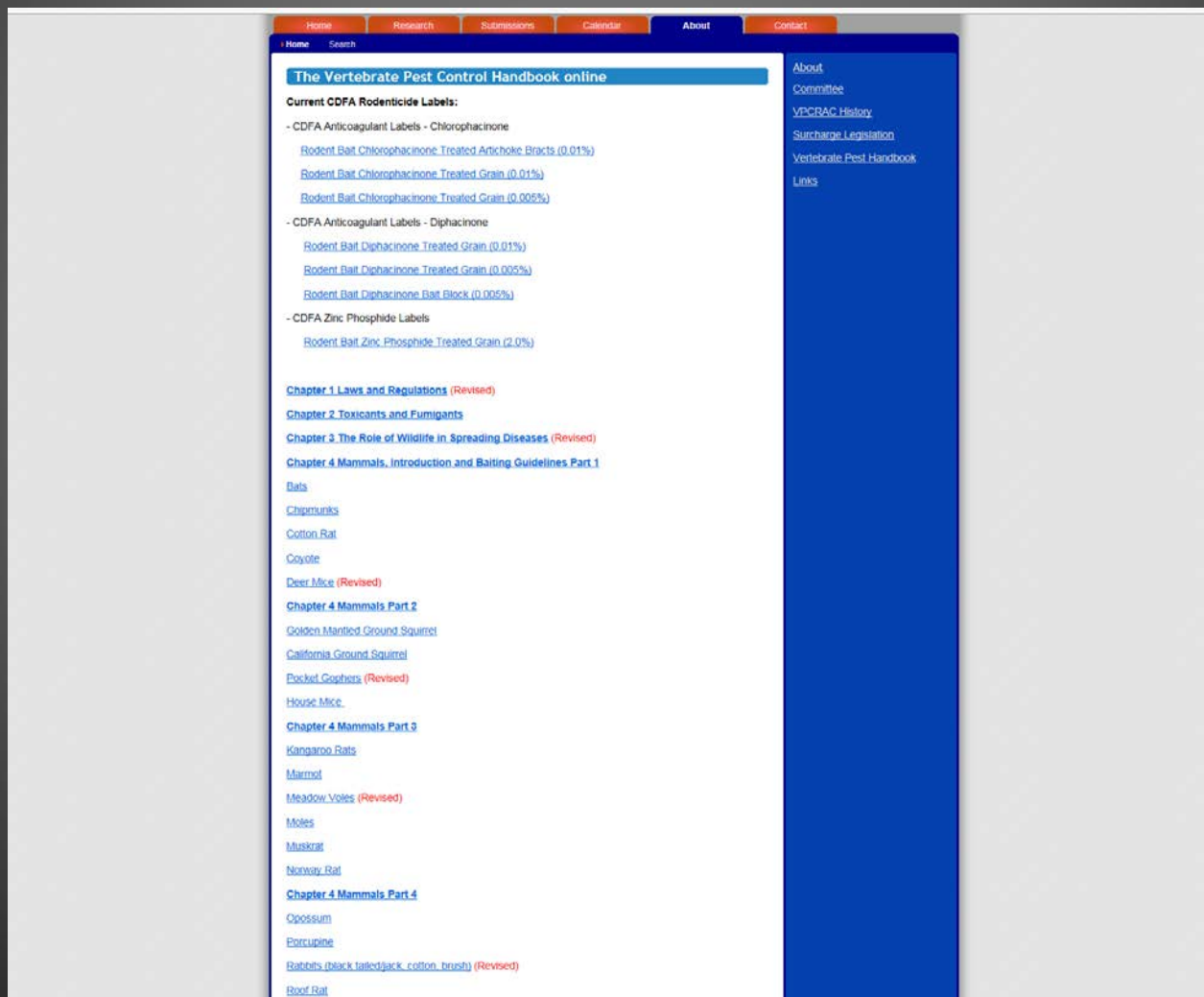
Visual how-to's for:
Bait Station Construction
Calculating CO₂ Flow
Spreader Calibration

Protecting Wildlife

Avoid harm to non-target wildlife:
[Range Maps for Endangered Species](#)
[Range Maps for Non-Pest Ground Squirrels](#)
[Legislation and Best Baiting Practices](#)

Vertebrate Pest Control Handbook

<http://vpcrac.org/about/vertebrate-pest-handbook/>



A photograph of a squirrel sitting on a bed of dry grass and twigs. The squirrel is facing left, holding a small object in its paws. To its right is a large white PVC pipe. A speech bubble with a grey background and a white outline points towards the squirrel. The word "Questions?" is written in yellow text inside the speech bubble.

Questions?