

## Vetebrate Damage

In response to a call regarding tree decline, a six-year old W. Murcott orchard was evaluated for causes of the decline. A high percentage of the trees demonstrated damage to the bark of the tree generally from the soil line up 6-8 inches. (Fig.1) In some instances the tree had been almost totally girdled. On close inspection of the trunk, an open hole 4-5 inches in diameter was found at the base of the tree. (Fig.2)

Meadow Mice (Voles) can produce serious damage in a citrus orchard resulting in partial or complete girdling of trees. Five species belonging to the genus *Microtus* are found in California, two of which *Microtus californicus* and *M.montanus* are reported to cause damage. Damage has been reported in permanent pasture, alfalfa, hay, artichokes, Brussels sprouts, carrots, cauliflower, potatoes, sugar beets, tomatoes, grains, nursery stock and the bark of apple, avocado, citrus, cherry and olive trees.

*Microtus* are often found where there is grass cover. They generally do not invade cultivated crops until the crop is tall enough to provide food and shelter. Meadow mice are active all year round. They forage at any time during the day or night but are chiefly nocturnal. They are usually found in colonies marked by numerous 2--inch wide surface runways though matted grass. Small piles of brownish feces and short pieces of grass stems along the runways are evidence of activity. The burrows consist of extensive underground tunnels, nest chambers and storage chambers. Home range is typically small, less than a 60 foot radius in the case of *M.californicus*. All meadow mice swim well. Therefore, irrigation ditches will not serve as effective barriers against meadow mice movement into fields. Meadow mice may forage beyond the sheltered runways. Food consists of tubers, roots, seeds, grain, and succulent stems and leaves.

Females breed at 4 to 6 weeks of age with litter size of *M.californicus* averaging around 4. Under natural conditions a female *Microtus* may produce from 5 to 10 litters a year. The major breeding season corresponds with the season of forage growth. *Microtus* populations build up to a peak every 3 to 4 years, followed by a rapid decline during the next breeding season. The exact causes of the cycle of buildup and decline are not known, though disease, food shortages, physiological stress from overcrowding, and other factors may be involved. It is assumed that in cultivated areas *Microtus* populations are permanently based in favorable habitat such as roadsides, canal banks or adjacent noncultivated land. Invasion of cultivated cropland occurs when the population builds up or when the wild habitat becomes unfavorable. Coyotes, badgers, weasels, snakes, hawks, owls, herons and gulls are among the principal predators. It is believed that predators are not able to prevent or control a population eruption because of the birth rate of the fast breeding *Microtus* population. Meadow mice are classified as nongame mammals by the California Fish and Game Code. Nongame mammals, which are found to be injuring growing crops may be taken at any time or in any manner by the owner. Management: The most effective management options in an orchard situation are a reduction in ground cover and the use of toxic baits. Meadow mice are cover dependent. If cover is the management of choice - typically weed or grass, the cover can be removed from around the base of a tree, this often solves meadow mice problems. In situations where cover removal is not possible or is insufficient to solve the problem, the next best option is the use of toxic baits. Many bait carriers are used (e.g., oat groats, wheat bait). Baits: Crimped oat groats is the most

satisfactory bait although crimped whole oats are used (e.g., oat groats, wheat grains, pelletized formulations, etc., but crimped oat groats have typically been most effective). The primary toxicants used for meadow mouse control include zinc phosphide, diphacinone, and chlorophacinone. Directions for management including baiting can be obtained by contacting the Agricultural Commissioners Office. \* Portions taken from J.P.Clark Vertebrate Pest Control



Figure 1 Bark Damage



Figure 2 Entrance to Vole Chamber

# What Do New Changes in Aluminum Phosphide Labels Mean for Burrowing Mammal Control?

By Roger A. Baldwin  
UC IPM Wildlife Pest Management Advisor

The California ground squirrel (*Spermophilus beecheyi*) and pocket gopher (*Thomomys* spp.) are widely considered to be the two most damaging wildlife pests in California agriculture. Numerous techniques are available for controlling ground squirrels and gophers including trapping, anticoagulant baits, acute toxicant baits, and burrow fumigants. Trapping can be an effective method to remove small to medium size populations of gophers and ground squirrels but often becomes too time consuming for large acreage. Both anticoagulant (e.g., diphacinone and chlorophacinone) and acute toxicant baits (e.g., zinc phosphide) can be quite effective at controlling ground squirrels when used appropriately. These rodenticides are less consistent but can still be effective when baiting for pocket gophers. Baiting is typically considered the cheapest and least time-consuming method for controlling both gophers and ground squirrels. However, there are potential concerns for non-target poisonings when using rodenticides which can limit their applicability in some situations.

Burrow fumigants, such as gas cartridges and aluminum phosphide, do not typically pose as great of a concern for non-target exposure as baits, and usually involve shorter application times than trapping. Aluminum phosphide is particularly effective at controlling gophers and ground squirrels. Recent studies on ground squirrels and gophers indicated excellent control for both species (reduction in ground squirrel population = 97–100%; reduction in gopher population = 100%). Aluminum phosphide is a restricted use material; specific guidelines must be adhered to when using this material. Additionally, fumigation is generally only effective when soil is moist. Therefore, fumigation is restricted to late winter and spring or following irrigation. Nonetheless, aluminum phosphide fumigation is a very valuable part of an IPM program for controlling gophers and ground squirrels; its continued availability to growers is needed to maximize control efforts in many situations.

Unfortunately, recent changes in aluminum phosphide labels have been implemented due to the gross misuse of this product that led to the death of two young girls in Utah. These changes include the following:

1. Use is strictly prohibited around all residential areas, including single and multi-family residential properties, nursing homes, schools (except athletic fields, where use may continue), day care facilities, and hospitals.
2. The products must only be used outdoors for the control of burrowing pests, and are for the use on agricultural areas, orchards, non-crop areas (such as pasture and rangeland), golf courses, athletic fields, parks, and other non-residential institutional or industrial sites.
3. Products must not be applied in a burrow system that is within 100 feet of a building that is or may be occupied by people or domestic animals. This buffer zone for treatment around non-residential buildings that could be occupied by people or animals has been increased from 15 to 100 feet.
4. When this product is used in athletic fields or parks, the applicator must post a sign at entrances to the treatment site containing the signal word DANGER/PELIGRO, skull and crossbones, the words: DO NOT ENTER/NO ENTRE, FIELD NOT FOR USE, the name and EPA registration number of the fumigant, and a 24-hour emergency response number. Signs may be removed 2 days after the final treatment.
5. When this product is used out of doors in a site frequented by people, other than an athletic field or park (such as agricultural fields), the applicator shall post a sign at the application site containing the signal word DANGER/PELIGRO, skull and crossbones, the name and EPA registration number of the fumigant, and a 24-hour emergency response number. Signs may be removed 2 days after the final treatment.

Because of these changes, I have developed a questionnaire designed to develop accurate facts on various methods, including fumigation with aluminum phosphide, for controlling burrowing mammals in California. The information will be provided to registrants, the U.S. EPA, and others to help develop use policies, labels, etc. My primary objectives are to:

1. Identify the level of use of aluminum phosphide for various burrowing mammals in agricultural areas prior to the new aluminum phosphide label restrictions.
2. Identify how new aluminum phosphide label restrictions will alter use of a variety of control methods.
3. Identify the potential impact of the new aluminum phosphide label restrictions on burrowing mammal populations.
4. See if there is support to further increase safety for residents and other public bystanders by requiring a new Certified Applicator Category for use of aluminum phosphide fumigants for burrowing pest control if such a category would ease restrictions set forth in the most recent aluminum phosphide labels.

The data collected should provide a much clearer picture of use patterns and importance of several methods, including aluminum phosphide, for controlling agricultural populations of burrowing pests in California. The survey can be accessed at the following web address:

<http://ucanr.org/sites/AluminumPhosphideSurvey/>

Two surveys are found at this website; one is for agricultural users, the other is for rodent control professionals who control burrowing mammals in urban/residential areas. Be sure you complete the appropriate survey. Once completed, the survey can either be: 1) saved and e-mailed to me, or 2) mailed to me via USPS. My e-mail address, mailing address, and phone number are provided at the end of this article. If you do not have internet access, give me a call or send a letter and I will mail a copy of the survey to you.

I must emphasize the importance of your participation in this survey if you use aluminum phosphide for burrowing mammal control. Data needs to be collected and subsequent results provided to the pertinent regulatory agencies to show the importance of aluminum phosphide for burrowing mammal control. Otherwise, there is a real possibility that we may completely lose aluminum phosphide for burrowing mammal control.

Roger A. Baldwin, Ph.D.  
UC Kearney Agricultural Research & Extension Center  
9240 South Riverbend Ave.  
Parlier, CA 93648  
Phone: 559-646-6583  
E-mail: [rbaldwin@uckac.edu](mailto:rbaldwin@uckac.edu)

## California AgrAbility Program

University of California, Davis  
Dept. of Biological &  
Agricultural Engineering  
One Shields Avenue,  
Davis, CA 95616-5294

Program Director:

**Martha C. Stiles**

[mcastiles@ucdavis.edu](mailto:mcastiles@ucdavis.edu)

## CalAgrAbility Bilingual Outreach Representatives

530-752-1613

[calagra@ucdavis.edu](mailto:calagra@ucdavis.edu)

OR

## Call Toll Free

**1-800-477-6129**

<http://calagrability.ucdavis.edu>

*CalAgrAbility is a partnership  
between the University of  
California Farm Safety Program  
(Cooperative Extension) and the  
California Arthritis Foundation  
Pacific Region Sacramento/  
Central Valley Office.*

## Arthritis Foundation

Pacific Region: Sacramento/

Central Valley Office

3040 Explorer Drive, Ste 1

Sacramento, CA 95827

916 368-5599



## Pterygium! Don't Just Wing It!

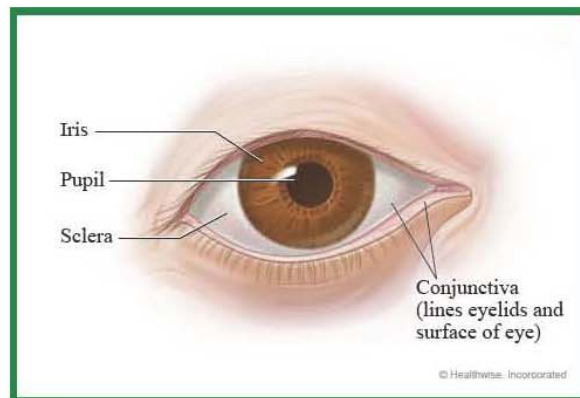
Over the past few years CalAgrAbility has received a number of calls from farmers regarding an unusual-sounding condition affecting the eyes. It is a non-cancerous growth of the clear thin tissue that lays over the white part of the eye or conjunctiva ([nih.gov/medline](http://nih.gov/medline)) (Fig. 1). A pterygium commonly grows from the nasal side of the sclera.

*Pterygium* is from the Greek word, *pterygos*, which means "little wing." A *pterygium* in one's eye resembles the wing of a small insect or bird (Fig. 2). Pterygium is pronounced "ter ig' ee um" and the plural is *pterygia*.

CalAgrAbility has seen mild cases, which also show redness, dryness, and irritation in the eye. We have also seen farmers with severe cases affecting the cornea causing impaired vision, and even blindness in the affected eye.

In many cases, pterygia cause no major problems and are treated topically with eye drops. The treatment for severe cases is surgical removal of the growth. Once removed, sometimes pterygia can grow back; and, in some cases, can return more than once.

The exact cause of a pterygium is not known. However, it is thought to be caused by ultraviolet-light exposure (e.g. sunlight), low humidity, and dust. Farms are ideal places to develop it. It occurs most frequently in people exposed to excessive sun, dust, and wind. Farmers, ranchers, agricultural workers, fishermen, etc. are



Figures 1&2: Eye anatomy showing conjunctiva and an eye with Pterygium. ([healthline.com](http://healthline.com))

especially susceptible to developing pterygia, as are those living near the equator. Some research shows that more men than women get pterygia, which is most prevalent in individuals over 40 years old. <sup>(1)</sup>

There has been little research documenting the disease among farm populations. However, a study of 304 Latino farmworkers in North Carolina confirmed the presence of pterygia in at least one eye in 23+ % of those workers. The study showed age was significantly associated with this condition. <sup>(2)</sup>

<sup>(1)</sup>Coroneo, MT, 1993, British J of Ophthalmology, 77 (11): 734-9

<sup>(2)</sup> Taylor S.L; Coates, M.L., et al. Archives of Environmental & Occupational Health, V 61:1: 27-32, 2006

## Pterygium! .... Continued

### Resources

#### Eye Wear Lingo

**UV protective** sunglasses should block 100% of UVA & UVB rays and **should be labeled** as such.

**Polarized** lenses cut reflected glare when sunlight bounces off smooth surfaces, i.e. pavement or water. Polarization is not related to UV protection. **You need to ensure UV absorption of the lenses.**

**Mirror Coatings** are thin metallic coatings that can reduce the amount of visible light entering the eyes. Wrap-around types can provide protection to the skin around the eye.

**Gradient** lenses are permanently shaded from top to bottom or from top and bottom toward the middle. They are useful for driving or specific sports.

**Photochromic** lenses automatically darken in bright light and become lighter in low light. They must specify UV-absorbency. It takes a few minutes to adjust to different light conditions.

**Impact Resistant:** no lens is truly shatterproof. But plastic lenses are less likely to shatter upon impact than glass lenses. Polycarbonate plastic is even more impact resistant than regular plastic but scratches easily.

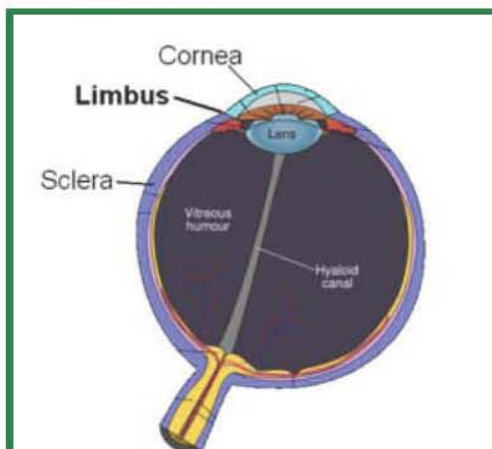


Figure 3: Sunlight passes sideways through the limbus <http://en.academic.ru/dic.nsf/enwiki/>

#### Rays Catch a Ride on Your Limbus!

The **corneal limbus** is the border of the cornea and the sclera, the white of the eye (Fig. 3). Some researchers believe that most pterygia develop on the side of the eye nearest to the nose because the sunrays are passing laterally, or sideways, through the cornea. Sunlight is, then, refracted, or redirected, toward the limbic area. Sunlight passes unobstructed from the lateral side of the eye to the medial side next to the nose after passing through the cornea. <sup>(1)</sup>

The likelihood of damaging sunrays causing that “winged growth,” pterygia, in farmers can be reduced by using everyday inexpensive devices, what CalAgrAbility calls, assistive technology (AT). Simple AT like UV-protective sunglasses, lenses and large-brimmed sun hats can shade farmers’ eyes (Fig. 4). Farms are industrial worksites, so use **safety** sunglasses. Some are designed to filter out 98-100% of UVA and UVB rays. In addition to sunglasses and protective coatings on contact lenses, use face shields, hats, and clothing made of materials that absorb harmful UV-rays and protects from impacts.



#### UV or not UV... That is the Question!

UV, or ultraviolet, light is electromagnetic radiation. It is found in sunlight and in indoor light sources, i.e. black and fluorescent lights. The earth’s ozone stops 99±% of the UVB & C radiation from penetrating the atmosphere. However, UVA rays get through, causing cancer as well as cataracts, macular degeneration, and pterygium. UVs are classified according to **wavelength**. UVC has the shortest wavelength and is the most harmful. UVA, with the longest, is most responsible for tanning, burning and cancer. Although UV rays are harmful, they also help produce Vitamin D, which promotes the growth of teeth and bone (World Health Organization, [www.who.int/uv/](http://www.who.int/uv/)).

Most CalAgrAbility farm folks understand the link between UV radiation and skin cancer but are less aware of potential eye damage. A 2005 farmworker health study showed less than 3% *ever* used sunscreen and less than 20% knew what it was. More than 90% did not use sunglasses or any protective equipment. Around 75% did not wear wide-brimmed hats, exposing ears, necks, and faces to UV rays (National Center for Farmworkers Health).



Figure 4: Wide-brimmed hats offer some eye protection, but farmers in California’s sun-drenched fields should also use UV-protective safety sunglasses.

## RESOURCES

### According to the Glaucoma Research Foundation



Sunglasses should screen out 75-90% of visible light. If you can see your eyes in a mirror, the sunglasses are too light.



Look for uniform tint. To check for imperfections, hold the sunglasses at arm's length, and then look through them at a straight line (such as the edge of a door). Slowly move the lens across the line. If the straight edge distorts, sways, curves or moves, the lens is flawed.

*The UV Index*, developed by the National Weather Service (NWS) and EPA, shows the strength of solar UV radiation on a scale from 1 (low) to 11+ (extremely high). Everyday the NWS predicts the Index. EPA publishes it on [www.epa.gov](http://www.epa.gov) and UV Alerts on unusually high UV days (Fig. 5).

*Cloudy Days!* 80% of solar UV radiation can penetrate light cloud cover. Haze in the atmosphere can increase UV radiation exposure (World Health Organization, 2002).

## Pterygium! .... Continued

### Look Out For The Wide Open Spaces

Farm and ranch families be aware that UV levels are greatest in the wide-open spaces like farms and ranches. Wear hats, shades, and shields, especially between 10 a.m. and 4 p.m., when UV levels are at peak levels and it only takes about 1 hour to develop skin damage (Fig. 5) ([www.allaboutvision.com](http://www.allaboutvision.com)).

When working around the farm, don't take off sunglasses in the shade. UV rays reflect off other surfaces. Eyes are still at risk even if not directly exposed to the sun.

Snow and water reflect 80% of UV rays; use protective eyewear in the winter and on lakes and ponds. Start eye safety with your kids now! Their eyes are more sensitive than adults'. Kids should always use protective eyewear on the farm or at play.

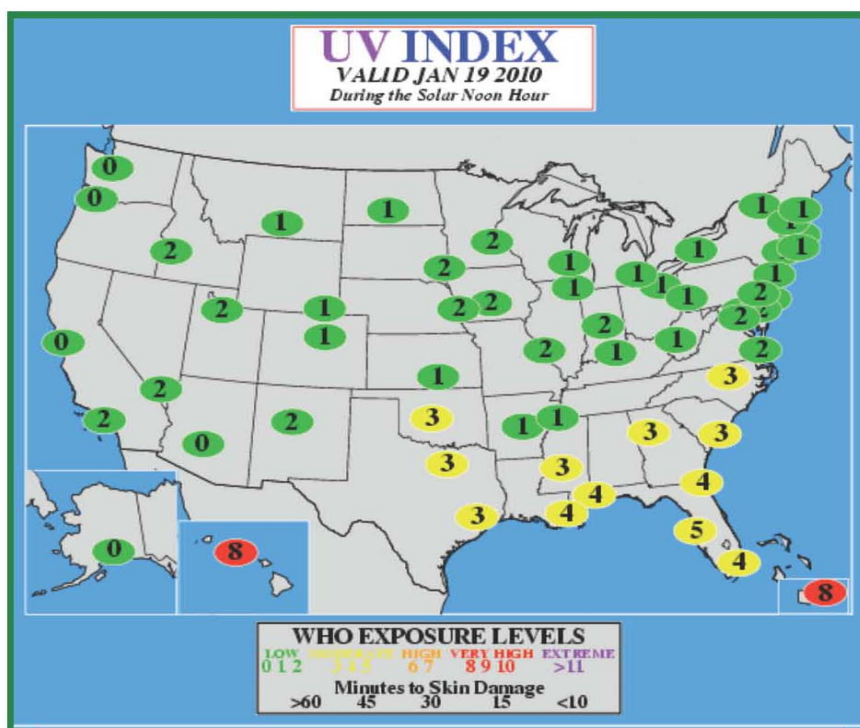


Figure 5: *UV Index Forecast Map Example* showing number of minutes it takes to develop skin damage in various parts of the US

### About CalAgrAbility ...

The California AgrAbility Program's primary goal is to help farmers, agricultural workers, ranchers and their families to continue working in agriculture regardless of physical limitations, impairments and disabilities. Staff will help conduct on-site assessments and identify appropriate assistive technologies to make the job safer and easier. Supported by the NIFA under special project number 2010-415090-20751.

**1-800-477-6129**

## California AgrAbility Project



University of California  
Cooperative Extension  
Tulare County  
4437B S Laspina St  
Tulare, CA 93274-9537

Nonprofit Org  
US Postage Paid  
Visalia, CA 93277  
Permit No. 240

# *Citrus Notes*

---

*June 2011*



Neil O'Connell  
Farm Advisor

The University of California prohibits discrimination or harassment of any person on the basis of race, color, national origin, religion, sex, gender identity, pregnancy (including childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services (as defined by the Uniformed Services Employment and Reemployment Rights Act of 1994: service in the uniformed services includes membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services) in any of its programs or activities. University policy also prohibits reprisal or retaliation against any person in any of its programs or activities for making a complaint of discrimination or sexual harassment or for using or participating in the investigation or resolution process of any such complaint. University policy is intended to be consistent with the provisions of applicable State and Federal laws. Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action/Equal Opportunity Director, University of California, Agriculture and Natural Resources, 1111 Franklin Street, 6<sup>th</sup> Floor, Oakland, CA 94607, (510) 987-0096.