



Keeping Landscapes Working

A Newsletter for Managers of Bay Area Rangelands

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A newsletter provided by UC Cooperative Extension Natural Resources Program in the San Francisco Bay Area. This newsletter provides information to managers of both public and private rangelands. RANGELAND, which is land characterized by natural vegetation i.e., grass, forbs and shrubs and managed as a natural ecosystem, is the predominate source of OPEN SPACE in the San Francisco Bay Area.

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In This Issue

- Rangeland Vegetation and Animal Health
Page 1
- Occurrence of Animal Plant Poisonings in California
Page 1
- Managing Tree of Heaven in Pasture
Page 3
- Wildfire, Smoke and Livestock
Page 5

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Rangeland Vegetation and Animal Health

This issue of *Keeping Landscapes Working* considers three different aspects of vegetation on livestock health and well-being. The first article summarizes the occurrences of livestock poisoning in California. Although livestock poisoning is not typical when an adequate selection of forage is available, livestock poisonings are reported. It is interesting to note that in California, oleander is by far the most commonly diagnosed cause of livestock poisoning. The second article includes strategies to control the Tree-of-Heaven. This tree can impact forage quality for both livestock and wildlife. The third article considers the impact of fire on livestock. With fire season still upon us, understanding how smoke and fire may impact livestock as well as how to care for injured livestock is worth considering.

Occurrence of Animal Plant Poisonings in California

Birgit Puschner, Associate Professor, School of Veterinary Medicine, Art Craigmill, CE Specialist, Glenn Nader, Livestock Farm Advisor, and Larry Forero, Livestock Farm Advisor

The California Animal Health and Food Safety (CAHFS) Laboratory System Toxicology Laboratory has investigated numerous cases of suspected plant poisoning from 1990-2007. The CAHFS veterinary toxicologists have diagnosed plants as the cause of toxicosis in more than 600 submitted cases, most of these in livestock. The largest numbers of submissions were for cattle, followed by horses, pigs, goats, and sheep. Figure 1 shows the numbers of confirmed cases for the ten most frequent diagnoses.

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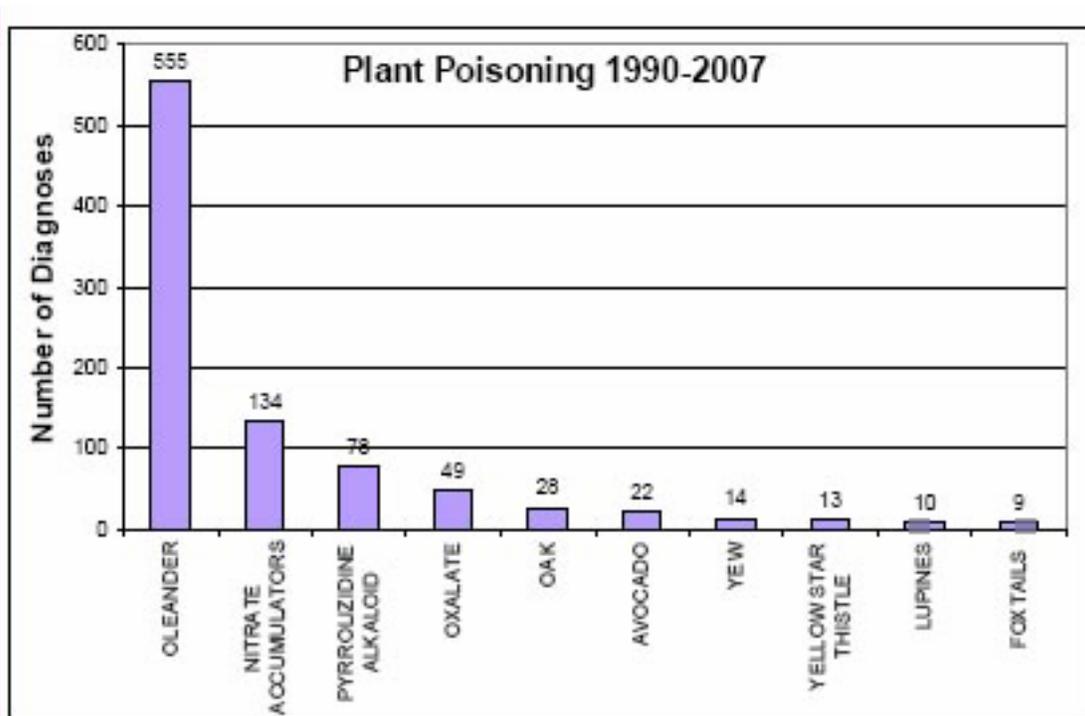


Figure 1.

These data show that the most commonly diagnosed plant poisoning is that of the ornamental oleander, a non-native species. The data from CAHFS are from samples submitted for diagnosis, thus they do not necessarily represent the actual occurrence of plant poisonings in California.

Cattle	Horses	Sheep	Goats
Oleander	Oleander	Oleander	Avocado
Nitrate/Nitrite	Pyrrolizidine Alkaloids	Oxalate	Nitrate/Nitrite
Oxalate	Yellow Star Thistle	Nitrate/Nitrite	Oxalate
Pyrrolizidine Alkaloids	Dogbane (Apocynum)	Lupinus Sp.	Lupinus Sp.
Tannic Acid - Oak	Setaria Sp. (Foxtails)	Perennial Ryegrass	Cyanide

These toxic compounds are contained in the following plants:

NITRATE/NITRITE - Sorghums - like Johnson Grass and Sudan grasses, Oat hay, other grass hays, Lambs quarters (Chenopodium), Pigweed (Amarathus).

PYRROLIZIDINE ALKALOIDS - Fiddleneck, Tansy Ragwort, Groundsel.

OXALATE - Greasewood (Sarcobatus), Sorrels (Oxalis), and Dock (Rumex sps), Pigweed, and Lambs Quarters.

Landscape plants have also become a bigger risk of plants poisonous to livestock animals. Some are due to planting of poisonous ornamentals in or near the pasture or livestock facilities while other poisonings are caused by yard trimmings that are offered to livestock by unknowing neighbors.

Managing Tree-of-Heaven in Pasture

Joe DiTomaso, Vegetable Crops/Weed Science,
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Tree-of-Heaven (*Ailanthus altissima*) is an invasive ornamental tree that can limit livestock access to forage and reduce pasture production. It is native to central China and was brought to California by Chinese workers during the gold rush.

This invasive plant reproduces by seed as well as sprouts, from both the stump and the root. These root sprouts create dense thickets that displace vegetation and can make some sites inaccessible to both livestock and wildlife.

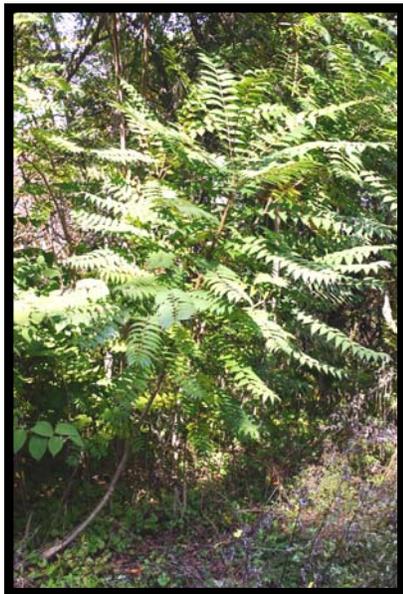
Understanding the biology of Tree-of-Heaven will help you better manage this pest:

1. Prolific seed producer—a single tree can produce over a million seeds. These seeds are readily spread by wind and wildlife. They have a high germination rate but generally are only viable for a year. However, the plants are dioecious, which means that many are male and produce no seed.
2. The plant stump sprouts following cutting.
3. Tree-of-Heaven will readily root sprout.

The standard “toolbox” for managing any weed pest typically includes burning, mechanical, grazing, and herbicides.

The tools available to help manage Tree-of-Heaven include:

1. **Burning**
 - A. Burning Tree-of-Heaven can reduce canopy short term. It is not a good long-term strategy because this plant responds vigorously to fire by re-sprouting.
2. **Mechanical**
 - A. Tree-of-Heaven can be controlled by REPEATED hand pulling. Young seedlings should be pulled



after a rain when the soil is loose. This will allow removal of the root system. Any root that is left in the ground could result in re-sprouting. This technique is only effective on young plants that have not developed an extensive root system.

- B. Hand digging is slow and painstaking and requires that the entire root be removed. Any portion of a root that is broken off may re-sprout and spread the pest by means of root fragmentation.
 - C. Mowing is not effective because it stimulates formation of suckers from stem base and lateral roots.
 - D. Cutting above ground portions of the plants can result in vigorous stump and root suckering if not followed up with herbicide treatment.
3. **Biological Control**
 - A. There are no biological control methods available in the United States.
 4. **Grazing**
 - A. The heavy browsing of Tree-of-Heaven by livestock and wildlife may result in some reduction of this pest, but it would be expected to rapidly recover.
 5. **Herbicide**
 - A. Common herbicide products that are effective in the management of Tree-of-Heaven include glyphosate (Round-up), triclopyr (Garlong 4 or Garlong 3A), and imazapyr (Habitat, Arsenal, Stalker). Imazapyr is not registered for use by homeowners.

These products behave differently and it is important to apply the product at the right time and at the appropriate rate and technique. Table A summarizes rate and timing for foliar applications:



(Continued on page 4)

Table A Foliar

Product	Rate	Water	Timing	Application
Glyphosate (Round-up)	1-1.5%	0.1-2 Oz/gallon of water	Spring or summer	Spray foliage to wet
Triclopyr (Garlon 4 or 3A)	1%	1.25 oz/gallon of water for Garlon 3A, use in 5% Hasten oil for Garlon 4	Spring or summer	“

Tree-of-Heaven is probably most effectively controlled by using basal or stump treatment. For basal treatment of smaller trees spray all the bark around the tree from ground level to about 12 to 20 inches above ground. For larger trees, the stem needs to have the bark removed prior to spraying. Applying herbicide directly to a cut stump is probably the most effective method.

Stumps/Basal treatment

Product	Rate	Carrier	Timing	Basal	Stump
Imazapyr (Habitat, Arsenal, Stalker)	20%	26 Oz/gallon of water or Hasten oil depending on herbicide formulation	Summer or Fall	Not as effective as triclopyr	Apply to freshly cut stump immediately
Triclopyr (Garlon 4)	20%	26 oz/gallon of water	Summer or Fall	Spray bark 12-20 inches from ground	Not as effective as imazapyr

A third method to manage Tree-of-Heaven is stem injection. The stem injection technique (also known as back-and-squirt) consists of making downward angled 1.5-3 inch hatchet mark (hack) in the bark 1 to 1.5 feet above the soil surface, then injecting 1 ml of undiluted imazapyr based on herbicide (Habitat, Arsenal, Stalker) into the mark. The standard rate is one hack and herbicide treatment for every 3 inches in trunk diameter. Using this recommendation, a tree with a 6 inch diameter will require two “jack and squirt” treatments.

Stem Injection Method

Product	Rate	Carrier	Timing	Basal	Stump
Imazapyr (Habitat, Arsenal, Stalker)	undiluted	N/A	Summer or Fall	Not as effective as triclopyr	Apply 1 ml of undiluted product per hatchet mark immediately

When herbicides are used it is critical to read and follow all label instructions—understanding the label improves efficacy and assures the product is being applied safely. Some products require a restricted materials permit where others only require an operator ID. If you have any questions about this—call your local agriculture commissioner’s office.

Table B summarizes the products outlined above.

Product	Operator ID	Restricted Materials Permit	Notice of Intent	Use Report
Round-up	Yes	No	No	Yes
Garlon	Yes	No	No	Yes
Habitat, Arsenal, Stalker	Yes	Yes No, labeled for ag use only	Yes No	Yes

If you are considering managing Tree-of-Heaven take some time to review and think about the following:

1. Think carefully about the goals for your property/operation.
2. Control and management of this pest requires persistence—be sure you commit the time it takes.
3. Try to work on projects with measurable objectives that move you along towards your goal.
4. Remember the rules—check with your agricultural commissioner locally to make sure you understand the process for obtaining permits, operator ID and submission of reports.

Wildfires, Smoke, and Livestock

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Figure 1. Sheep with mild burns and sore feet from wildfire.

Severe wildfires expose humans and animals to injuries both from burns and inhalation of unhealthy air containing smoke and particulates. These particulates can build up in the respiratory system, causing a number of health problems including burning eyes, runny noses, and illnesses such as bronchitis. Smoke can also aggravate heart and lung diseases such as congestive heart failure, chronic obstructive pulmonary disease, emphysema, and asthma. Livestock that are burned by wildfires may experience shock, pain, and systemic complications. Because little information is available to

livestock producers or even veterinarians on the effects of fire and smoke on livestock, the following suggestions are offered to serve as a general guide.

What's In Smoke? Smoke is made up of carbon dioxide, carbon monoxide, particulate matter, soot, hydrocarbons and other organic substances including nitrogen oxides and trace minerals. The composition of smoke depends on what was burned; different types of wood, vegetation, plastics, house materials, and other combustibles all produce different compounds when burned. Carbon monoxide, a colorless, odorless gas that is produced in the greatest quantity during the smoldering stages of the fire, can be fatal in high doses. In general, particulate matter is the major pollutant of concern in the smoke of wildfires. Particulate is a general term used for a mixture of solid particles and liquid droplets found in the air. Particulates from smoke tend to be very small (less than one micron in diameter), which allows these to reach the deepest airways within the lung. Consequently, particulates in smoke are more of a health concern than coarser particles that typically make up road dust.

How Does Smoke Affect Livestock? The effects of smoke are similar for humans and livestock: irritation of the eyes and respiratory tract, aggravation of chronic lung diseases, and reduced lung function. High concentrations of particulates can cause persistent cough, increased nasal discharge, wheezing and increased physical effort in breathing. Particulates can also alter the immune system and reduce the ability of the lungs to remove foreign materials, such as pollen and bacteria, to which livestock are normally exposed.



Figure 2. Initial burns cause swelling of the face and eyes.

Protecting and Treatment of Livestock from Smoke Particulates:



Figure 3. Water supplied to livestock by local fire crews.

Limit exercise when smoke is visible. Don't force livestock to perform activities or increase exercise that increase the airflow in and out of the lungs. This can trigger bronchoconstriction (narrowing of the small airways in the lungs).

Provide plenty of fresh water located near feeding areas. The consumption of easily accessible water keeps the airways moist and facilitates clearance of inhaled particulate matter. This allows the windpipe (trachea), large airways (bronchi), and small airways

(Continued on page 6)

(bronchioles) to remove inhaled particulate material in smoke. Dry airways make particulate matter remain in the lung and air passages.

Limit dust exposure by feeding low or dust-free feeds and sprinkling or misting the livestock holding area. This reduces the particles in dust such as mold, fungi, pollens, and bacteria that may have difficulty being cleared from the lungs.

If livestock is coughing or having difficulty breathing, contact a livestock veterinarian. A veterinarian can help determine the difference between a reactive airway from smoke and dust versus a bacterial infection and bronchitis or pneumonia. If livestock has experienced coughing over a long period of time, there is a greater risk of secondary problems such as bacterial pneumonia.

Give livestock ample time to recover from smoke-induced airway insult. Airway damage resulting from wildfire smoke takes 4 to 6 weeks to heal.



Figure 4. Sheep with varying degrees of burns and smoke inhalation from wildfire.

Therefore, plan on giving livestock 4 to 6 weeks to recuperate after the air quality returns to normal. Attempting to handle, move, or transport livestock may aggravate the condition, delay the healing process, and compromise the performance of livestock for many weeks or months.

If your livestock continues to experience primary or secondary problems with smoke-induced respiratory injury, you should contact a livestock veterinarian. Veterinarians can prescribe specific treatments such as intravenous fluids, bronchodilator drugs, systemic antibiotics, or other measures to facilitate hydration and health of the airway passages. Blood tests or other tests may be recommended to determine whether a secondary bacterial infection has arisen and is contributing to the current respiratory problem.

How to Evaluate and Treat Livestock Burned by Wildfire?

Initial assessment of a burned animal is challenging because the depth/severity of the burn may be

difficult to ascertain and the animal may not appear distressed or painful. The burned area may have destroyed the nerve endings and no pain



Figure 5. Burned legs of sheep with compromised hoof walls.

behavior is observed despite severe tissue damage. Vital signs such as heart rate also may be deceptively low. For example, burned sheep from a fire in Zamora, CA in 2006 were walking normally, but their burned legs were without hoof walls which exposed the bone. The animals with burns that are more painful to touch may not be as severely compromised in the long-term. Daily reassessment of all burned animals is necessary.

Triage for Livestock with Burns from Wildfires:

Severely burned animals that are in shock and have a great percentage of the body skin damaged are obvious candidates for euthanasia to prevent suffering. Emergency euthanasia for livestock (depending on species) include captive bolt gun, gunshot by firearm (regulations and laws may apply), barbiturate overdose (licensed veterinarian), and in some extreme cases, exsanguination and electrocution. (Euthanasia guidelines see:

<http://www.vetmed.ucdavis.edu/vetext/animalwelfare/>).

Burn shock is treated by a veterinarian with intravenous fluids, balanced electrolytes, or possibly plasma for valuable animals.

(Continued on page 7)

If there is history of smoke inhalation plus/minus cough and labored breathing, there is a tendency for pulmonary edema (fluid in the lungs).

Livestock that have inhaled hot gases may have a cough with a frothy material discharging from the nose.



Figure 6. Exudate in nostrils should be removed to assist with breathing.

Topical treatment of silver

sulfadiazine (1 lb. jar) is appropriate for burned areas of the eyes and skin. If none is available, Desitin® ointment provides some protection.

Approved medications for pain relief in livestock species may be obtained through a licensed veterinarian.



Figure 7. Sheep with burns on their back; also check the condition of their feet.

For deep burns with or without contamination, antibiotic treatment may be beneficial. Consult a livestock veterinarian for appropriate medications.

No initial debridement or trimming damaged skin of burn wounds is possible with large numbers of animals and lack of a sterile hospital setting. Keep the wounds as clean as possible with as minimal contact as possible.

Initial burn injuries will continue to progress and may worsen for 6 weeks following the initial injury. Debride (cut back) dead tissue, treat, and protect exposed areas during healing. Protect the wounds from fly strike with appropriate repellants.

Lack of appetite and inability to chew along with impaction or other disorders of the gastrointestinal tract can be seen when the head and face are burned. Soaking feed with water allows for easier eating.

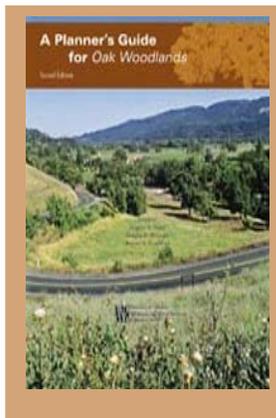


Figure 8. Fly strike in a wound of a sheep at 11-days post burn.

Reassess, reassess, reassess on a daily basis. The severity of the burn and the compromise in the health of the animals will become apparent. It is difficult to judge burned animals initially, but the burned areas of skin become leather-like and slough in 5-14 days, while systemic signs may worsen. Animals which go “off” feed require careful examination for complications. Ability and desire to eat and drink are good indicators but can change up to 6 weeks following injuries caused by the burns and smoke inhalation of wildfires.



Figure 9. Leather-like skin 10-days post burn.



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