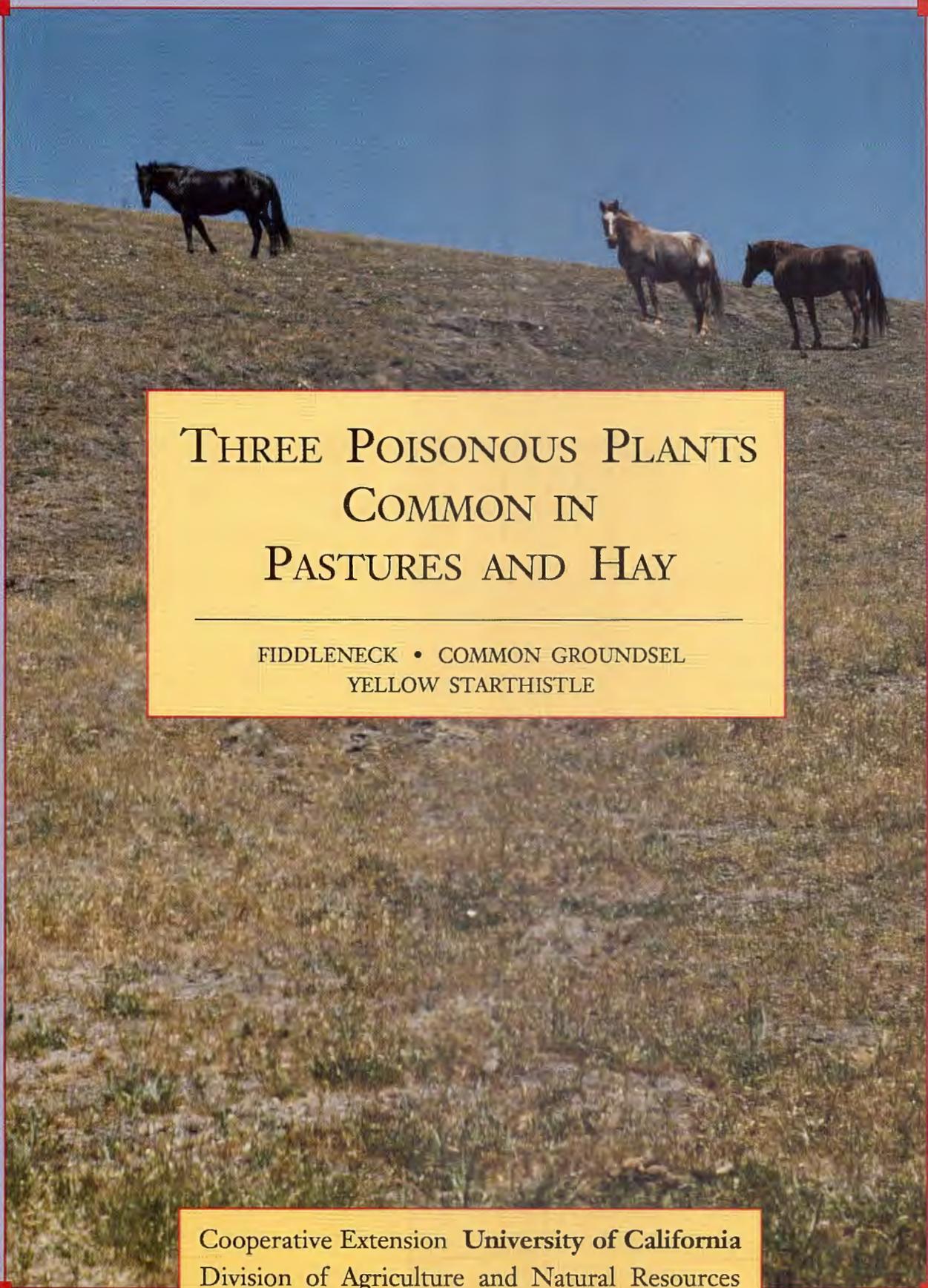


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THREE POISONOUS PLANTS
COMMON IN
PASTURES AND HAY

FIDDLENECK • COMMON GROUNSEL
YELLOW STARHISTLE

Cooperative Extension **University of California**
Division of Agriculture and Natural Resources
Publication 21483

*The authors are W. B. McHenry, Weed Scientist;
R. B. Bushnell, Veterinarian; M. N. Oliver, Staff Research Associate,
and R. F. Norris, Associate Professor of Botany, University of California,
Davis.*

Cover photo: Alfred Smith

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THREE POISONOUS PLANTS COMMON IN PASTURES AND HAY

Fiddleneck

Common Groundsel

Yellow Starthistle

Introduction

Alfalfa, barley, oats, and volunteer “wild” grass grown in California for pasture or hay often contain weeds that compete with desirable forage, reducing yield and quality. Among these common weeds are three that are not only competitive, but poisonous. They are fiddleneck, also called “fireweed” or “tarweed” (*Amsinckia* spp.); common groundsel (*Senecio vulgaris* L.); and yellow starthistle (*Centaurea solstitialis* L.). There are several species of fiddleneck in California.

These three weeds, common in the Central Valley, are rare in southern California’s low desert region and in certain other alfalfa-growing areas. Their presence is critical in the first cutting of hay from new alfalfa fields. However, feed from first cuttings need not be contaminated with these weeds, if they are adequately controlled.

Because these weeds are hazardous only in large amounts over a period of time, a livestock operation that purchases several lots of feed from different sources is not usually at high risk. Livestock owners or boarders who obtain a single lot of hay or cubes to feed a small number of livestock for several months may place animals at risk, if the feed is contaminated with poisonous plants.

Animal Health Considerations

Fiddleneck and groundsel

Consumption of too much fiddleneck or groundsel causes tissue death (necrosis) and scarring of the liver. The liver becomes small, hard, and less functional (cirrhotic).

Both plants contain pyrrolizidine alkaloids. These alkaloids are not themselves toxic, but the liver converts them into toxic pyrroles. Many transformed alkaloids are toxic to horses, cattle, and swine; sheep are less susceptible to groundsel and are resistant to fiddleneck. Younger animals are more readily affected by these plants. A calf may be poisoned if the mother consumes the plants during pregnancy.

Pyrrolizidine poisoning is cumulative. Signs of poisoning may first appear anywhere from a few weeks to 5 months after plant consumption; during this period, animals may appear in excellent condition and even gain weight.

Horses. Signs may appear abruptly and include sluggishness, depression, and lack of appetite. Mucous membranes often appear yellow in color. Weakness, uneasiness, reduced sensibility, and signs of abdominal pain are followed by increased restlessness and aimless wandering—sometimes into hazardous situations—and eventual death.

Cattle. Signs of poisoning are much the same as in horses. The coat hair may appear roughened and the muzzle may be dry and scaly. Abdominal straining with constipation or diarrhea may lead to prolapse (protruding) of the rectum. In the final stages, the animal is either very quiet or becomes easily agitated to the point of being dangerously aggressive. It may act very disturbed and uncoordinated, walking in circles and pushing on fences.

Swine. The first sign of poisoning is failure to gain weight. The animal grows long and thin with an elongated head. Symptoms are similar to acute parasitism; however, there are few or no parasites present. Pigs have died after 2 months on a diet containing about 5 percent fiddleneck seeds.

Sheep. Experimental pyrrolizidine alkaloid poisoning causes the same symptoms seen in cattle; however, sheep must consume twice the relative amount of plant material before poisoning occurs.

It is rare for a single large dose of alkaloid to cause acute poisoning with immediate signs. More common are chronic cases resulting from small daily doses of the toxic plant over a period of weeks or months. Cattle and horses may consume plant material amounting to 10 percent or more of their body weight before poisoning occurs; symptoms appear anytime from a few weeks later until after a few months. These variations depend on the growth stage of the plants being consumed, as well as any stresses acting on the animal at the time.

Although fiddleneck and groundsel are not preferred, livestock may unselectively eat them along with other forage in spring on range or pasture. The seeds of fiddleneck and the young leaves of groundsel are the most toxic. Pyrrolizidine alkaloids are not destroyed during plant drying or fermentation in silage. As a result, hay is a common source of pyrrolizidine poisoning, especially first cuttings.

Unfortunately, no current popular treatment for pyrrolizidine poisoning offers much hope to the affected animal.

Fiddleneck is a known nitrate accumulator, in addition to containing pyrrolizidine alkaloids. High nitrate content in plants can cause livestock poisoning.

Yellow starthistle

Yellow starthistle poisoning in horses is often called “chewing disease.” Consumption of large amounts of starthistle produces a nervous disorder by destroying portions of brain tissue (encephalomalacia). Only horses and ponies are affected by this toxicity; no cases are reported in burros, mules, or other livestock. Though poisoning has been reported in horses aged 4

months to 18 years, young animals are especially affected; 34 percent of reported cases are animals 1 year old or younger. Both sexes are equally affected. Cases have been reported from southern Oregon to southern California.

Onset of poisoning is abrupt, following some weeks of thistle consumption without distress; apparently a critical threshold must be exceeded. Typical signs: Aimless walking with the muzzle to the ground, the mouth half open with a partly protruding tongue, and difficulty in eating and drinking. Once symptoms appear, the animal is committed. There is no treatment for starthistle poisoning. Eventually, the animal develops pneumonia from inhaling food particles during uncoordinated swallowing, or it dies of starvation or thirst.

Although the toxic principle of yellow starthistle has not been identified, the circumstances leading to poisoning are becoming clear. Most cases are reported twice each year: 22 percent in June and July and 59 percent in October and November. Because yellow starthistle does not compete well with irrigated crops or estab-

lished pastures, it does not often contaminate hay. Most cases of poisoning occur in weedy paddocks or fallow fields. Horses will consume the thistle in hay while generally avoiding it in pasture, unless there is insufficient feed. Observers report that some horses develop a liking for the plant.

Experimental feeding of yellow starthistle has demonstrated that consumption equivalent to 86 to 200 percent of the horse's body weight in a period of 26 to 81 days (average 54) will cause signs of nervousness. This varies with additional stresses the animal experiences while consuming the toxic plant. Stress-inducing conditions include roundups, jumping, drives, foaling, etc.

Until the toxic principle can be isolated and experimental work completed, animal health specialists cannot say which parts of the plant or which stages of growth are the most toxic. Yellow starthistle is a nitrate accumulator and therefore poses a potential problem to cattle, although no such poisonings have been reported.

Identifying These Toxic Plants

Most people find it easiest to identify fully mature and flowering plants. Weeds of hay crops usually flower at about the same time the crop is ready to harvest. Thus, identification of weeds in the mature hay crop is usually easy. However, the weeds must be correctly identified at a young stage, to control them during early crop growth—months ahead of mowing—and to ensure choosing the correct control, if herbicides are to be used.

Fiddleneck

Fiddleneck, named after the shape of the flowering stalk, curves back on itself like the head of a fiddle. Several species of fiddleneck are similar; they are members of the borage family (Boraginaceae) and are all native annuals. Fiddleneck species, found throughout California,

may also be known as tarweed, fireweed, buckthorn, or yellow burweed. Winter annuals, fiddlenecks germinate in fall to early winter following soil-moistening rains. The first two leaves (cotyledons) are split almost to the stalk. In the juvenile stage the dark green leaves form a compact rosette. In spring, a branching, upright flower stalk develops and reaches a height of 12 to 24 inches, or even taller.

The fresh herbage is dark green. Stems and leaves are densely covered with stiff hairs, which give the foliage a bristly feel. The leaves are elongated and strap-shaped. The small flowers, about 1/4 inch across, are orange to yellow in the more common species. Dried fiddleneck has a characteristic cinnamon brown color, and its flowers are gray and finely bristled.

Fiddleneck grows in many dryland situations, such as rangeland, vacant lots, roadsides, and in cereals that may be used for hay. It is seen in first-year alfalfa (occasionally in heavy infestations) and sometimes in established alfalfa. It is not as well adapted to irrigated conditions as common groundsel, but it is more tolerant of irrigation than is yellow starthistle.

Common groundsel

Common groundsel, a naturalized weed from Europe, is common in California. It is rare east of the Cascade and Sierra mountains and in desert areas. A member of the sunflower family (Asteraceae), it is a winter annual and appears in fields soon after the first soaking rains, or irrigation, in fall. It grows 6 to 18 inches tall by spring. It can also become established in late winter or early spring on moist, newly cultivated soil.

Groundsel begins flowering in late winter; greatest bloom activity is in March and April. Cooler conditions near the coast or at higher elevations slow down the life cycle of groundsel (and other plants); warmer locations and low soil moisture accelerate the growth cycle.

The leaves of common groundsel have deeply lobed or toothlike margins and may be somewhat hairy; they are attached at their base directly to the stem with little or no leaf stalk (petiole). Leaves are arranged along the stem in a spiral pattern. The plants have hollow stems. Common groundsel does not have bristles or spines and is relatively smooth to the touch.

The flowerheads are numerous, yellow, and 1/4 to 1/2 inch long. After flowering, the heads develop a tubular shape with a plume of silky white hairs (pappus). Common groundsel can be confused with annual sowthistle (*Sonchus oleraceus* L.), which has a similar color and pappus; sowthistle can also become poisonous by accumulating nitrates. Sowthistle has hollow stems, milky sap, and leaf bases that seem to clasp the stem; it is much more robust, often over 24 inches tall.

Unlike fiddleneck and yellow starthistle, common groundsel occurs in both newly planted and established alfalfa, and competes effectively. Groundsel is especially widespread in established alfalfa. It is not common, except locally, in cereal grains and wild grass hay.

Yellow starthistle

This member of the sunflower family (Asteraceae) is native to the Mediterranean region and is now the most widely distributed starthistle (genus *Centaurea*) in California. It is uncommon in the desert and in the Great Basin. It, too, is a winter annual, germinating in late fall to early winter. It grows 1 to 3 feet high and develops rigid branches spreading from its base. In the low-growing juvenile rosette, the deeply lobed leaves are light green; under dry, moisture-stressed conditions, young rosettes become gray-green.

As the plant matures and flower stems develop, the color changes to gray-green. Loose, fine, cottony hairs often appear on the stems and leaves; this adds to the gray tone of the plant. Long, thickened ribs ("wattles") develop along and parallel to the stem. Yellow starthistle blooms from May to June and continues flowering into late fall. Single, bright yellow flower heads appear at the tips of the upright branches. Surrounding the base of the flowerheads are rigid, sharp, straw-colored spines 1/4 to 1 inch long. Although the spines are harsh to the human touch, they apparently do not discourage stock from feeding on the plants.

Yellow starthistle is well adapted to nonirrigated fields, roadsides, fence rows, and to the foothills, where "wild" plant growth may be harvested for hay. Yellow starthistle does not grow well under irrigation, but it is occasionally a problem where former dry land is brought into production of alfalfa, cereals, or pasture. It can be very competitive in new alfalfa fields following late spring planting. Yellow starthistle is common in dryland pastures, in infrequently used corrals, and on undeveloped urban and suburban land.

Fiddleneck (*Amsinckia intermedia* Fisch. & Mey. and other species)



Three growth stages; note coiled flower heads.
—Photo by Tracy I. Borland



Seedling stage; note divided (bifid) seedling leaves.
—Photo by Jack Kelly Clark



Fiddleneck in hay; note grayish hairs, tan stems and coiled flower heads.
—Photo by Tracy I. Borland



Closeup of fiddleneck from hay. Raspy bumps on stems and leaves and cinnamon-brown coloration characterize several species.
—Photo by Jack Kelly Clark

Common Groundsel (*Senecio vulgaris* L.)



Three growth stages; note small yellow flowers, feathery seedhead, and toothed leaf margins.

—Photo by Jack Kelly Clark



Seedling stage with toothed secondary leaves.

—Photo by Tracy I. Borland



Common groundsel in hay.

—Photo by Tracy I. Borland



Magnified closeup of common groundsel from hay; note black markings at the base of each composite flower.

—Photo by Jack Kelly Clark

Annual Sowthistle (*Sonchus oleraceus* L.)



Flowers of fresh sowthistle have unopened flower buds that end in a point.

— Photo by Jack Kelly Clark



Sowthistle leaves clasp around the stem at the leaf bases.

— Photo by Jack Kelly Clark



Annual sowthistle seedling.

—Photo by Tracy I. Borland



Cut stems of fresh sowthistle are left; common groundsel is right.

—Photo by Jack Kelly Clark

At times annual sowthistle is confused with common groundsel in hay; both plants have feathery seedheads.



Dried seedheads and stems from hay: sowthistle is left; groundsel is right. Note black marks near bases of groundsel composite flowers.

—Photo by Jack Kelly Clark

Yellow Starthistle (*Centaurea solstitialis* L.)



Mature yellow starthistle in flower.

—Photo by Tracy I. Borland



Summer flowering stage is *left*. Note spines at flower base. Spent seed heads, as seen in winter, are *right*.

—Photo by Tracy I. Borland



Seedling stage

—Photo by Tracy I. Borland



Hay heavily contaminated with yellow starthistle.

—Photo by Tracy I. Borland



Closeup of branched stem piece from cured forage. Note typical covering of matted, cottony hairs.

—Photo by Jack Kelly Clark

Identifying Toxic Plants in Cured Hay

Once one becomes familiar with them, these three poisonous plants can be identified readily in cured hay, since the plants retain many of their identifying features when baled. If a suspicious plant in hay does not clearly have the following features, it is likely not one of these three toxic species.

Use a hand lens or other magnifying glass, 4X to 10X, for close examination. Inspect all six surfaces of a bale. Where possible, open bales and inspect at least two “flakes” from opposite quarters of the bales.

Identification of plant parts in cubed or pelleted forage is difficult. Leave this to the experts.

Distinguishing features

Fiddleneck. Surface of leaves and stems have raised (pustulated) hair bases; on leaves raised portion is whitish. Leaves and stems are sandpaperlike to the touch. Dried stems and leaves are typically cinnamon to chocolate brown with dense silvery hair. Flowers are in a coiled arrangement.

Common groundsel. Black-tipped flower bracts (involucre) are near the base of the flower head. Stems are hollow.

Yellow starthistle. Flowerheads have conspicuous rigid yellow spines. Surface of leaves and stems are covered with matted, cobweblike hair. Flattened extensions of leaf ribs continue down stems.

Weed Control

To avoid contaminating forage with poisonous plants, prevent or limit the presence of the weeds in the field where forage is produced. Attention to certain cultural practices can significantly reduce the incidence of weeds.

Preventing weed seed contamination

Wind is an important distributor for plants which have seed attached to feathery or plume-like structures (pappus), such as dandelion (a nontoxic species) or common groundsel. Seed from plants along ditches, fence rows, roadsides, and adjoining land can infest a forage crop; control these contamination sources.

Weed seed is also carried into fields in irrigation water and with contaminated crop seed. The feeding of livestock with hay containing

weed seeds is another source of infestation; seed can fall to the ground during feeding, or livestock may deposit seed in the field with their feces. People may carry weed seed from one property to another on clothing or on vehicles or equipment. Manure brought to fields for fertilizer can also be a source.

Cultural controls

Once weeds become established in a field, their growth can be reduced by observing crop production practices that result in dense and vigorous growth of the hay crop. Well-managed crop plants usually compete strongly with weeds, so that fewer weeds become established beyond the seedling stage.

The following cultural practices aid in successfully establishing a crop and keeping it vigorous:

1. Select forage species and varieties that are adapted to the local climate, soil type, and terrain; use certified seed to reduce the possibility of sowing weed seeds.

2. Prepare an optimum seedbed; seed to the correct depth, at the best planting date; and include fertilizers, soil additives, and inoculum when recommended. Consult your county University of California farm advisor for requirements specific to your hay crop and location.

3. Control diseases, insects, and other pests which restrict crop establishment and development. Recommended crop varieties may be resistant to specific pests in your area.

4. Meet soil moisture needs (for irrigated forage) through optimum irrigation frequency, quantity, and distribution. Plant nonirrigated forage, such as oats, after the first soaking fall rain or, in areas with freezing winters, early in spring after the likely end of severe frosts.

5. Preirrigate and cultivate before seeding. Preplant irrigation germinates weeds which can be controlled by cultivation before planting. Allow time for weeds to emerge before cultivating seedbeds. This can reduce the number of weed seedlings that emerge and become established with the crop.

Failure to accomplish necessary cultural practices often results in poor crop establishment and thin, spotty crop plant populations. These conditions tip the balance in favor of the weeds. A larger number of weeds survive the critical seedling stage, become vigorous, and seed heavily.

Cultural methods in alfalfa

Unlike cereal and volunteer hay crops, alfalfa is harvested several times each year for 3 to 5 or more years. Alfalfa is particularly susceptible to invasion by weeds during seedling establishment and, in areas of mild winters, when it is dormant or growing slowly. Although alfalfa is a competitive plant, frequent cuttings reduce its

competitive advantage and enhance conditions for weed establishment and growth. Cutting at longer intervals (30 days or more) and avoiding late fall cuttings, particularly in the Central Valley and desert regions, helps keep alfalfa at a competitive advantage.

Fiddleneck usually infests seedling alfalfa most seriously, although it occurs in established alfalfa stands as well. Common groundsel occurs in both seedling and established alfalfa fields. Yellow starthistle often appears in alfalfa grown as the first crop on new land. Because these weeds are winter annuals, they usually create greater problems in fall-seeded fields rather than in spring-seeded fields. Winter annual weeds that germinate following spring seeding do not compete as well because they do not thrive in hot weather. If a heavy weed population is expected, pre-irrigate and cultivate before seeding. This procedure is required, if a fiddleneck infestation is expected, because this species is difficult to control in alfalfa.

Weed control with herbicides

Some of the herbicides registered and sold in California for use in forage crops do not control common groundsel, fiddleneck, and/or yellow starthistle. They are effective for other weeds, however. Other products are very effective for one, two, or all three of these poisonous species, and for other weeds as well. If you are a grower, consult University of California weed control publications about your forage crop. Note herbicide use recommendations for soil type, stage of growth, regional location of your farm, etc. Your county farm advisor will be able to assist you. Also look for target weed species in the weed listings on herbicide labels.

Forage treated with most herbicides, when used in compliance with labels, does not injure livestock or other animals. Use of some herbicides requires that stock not be exposed to treated forage for a specified period of time following application. This is to avoid excessive herbicide residue levels in animal products. Observe label instructions.

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