

The Gold Rush transformed California in the mid-1800s and brought with it more people, more animals and more feed. With the rush came yellow starthistle, thought to have originated from contaminated alfalfa seed imported from Eurasia.

Yellow starthistle was first recorded in California in 1869 and now covers 25,000 square miles of the state. It is also found in Arizona, Nevada, Oregon and other states throughout the Intermountain West.



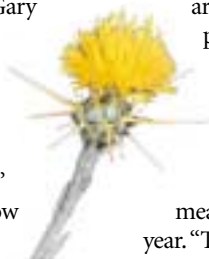
Controlling Yellow Starthistle

STORY & PHOTOS BY ANDRA CAMPBELL

Most horse ranchers are aware of yellow starthistle because it can cause horses to die a slow and painful death — especially if they are less than 2 years old. The disease in horses is called “chewing disease.” Afflicted horses are unable to chew or to drink. Symptoms are irreversible, and if the horse is not destroyed, it will eventually die of dehydration, starvation or aspiration pneumonia.

Recent evidence indicates that a complex compound isolated from yellow starthistle inhibits nerves controlling the muscles for chewing and swallowing. It causes large lesions in the brain, according to Gary Vesperat, Vesperat Consulting in Woodland, Calif. “It is speculated that young animals begin curiously nibbling or picking at anything green, eventually becoming habituated to the plant.”

Luckily for cattle ranchers, yellow starthistle is not fatal to cattle. But it will send ranchers searching for ways to get rid of the noxious and hardy weed, which in 1985 infested close to 8 million acres in the state and is now the most common plant in California, covering an area the size of New York state.



With a deep root system, it bores a tap as deep as 6 feet. The yellow starthistle (*Centaurea solstitialis*) survived California’s hot summers and spread like wildfire to rangelands, hay fields, orchards, vineyards, pastures, roadsides and natural areas. The weed now covers counties all over California and is reaching out to surrounding states in the Intermountain West.

Uncontrolled, yellow starthistle invades and eventually dominates the local plant community, becoming the most abundant plant. Its abundance makes it a fire hazard along irrigation canals, roadsides and forest areas, and it reduces the productivity of pastures. The nationally estimated cost of lost crop productivity caused by noxious weeds is \$7.4 billion — a large proportion of which is attributable to California.

Yellow starthistle is an annual, meaning it completes its life cycle in one year. “The previous summer’s seed germinates with the first fall rains of about ¼ inch,” Vesperat says. The deep taproot robs moisture and nutrients from the surrounding grasses, enabling healthy yellow starthistle to grow in California’s dry summer months.

Vesperat says a stand of yellow starthistle can produce an estimated 50 million to 200 million seeds/acre. A single plant can produce up to 29,000 seeds in a season, and only 2 million seeds/acre are needed to repopulate the next year. “Consequently, only 70 yellow starthistle plants are needed to produce the 2 million seeds required to repopulate,” Vesperat explains.

Ways to control starthistle

Control methods for yellow starthistle vary depending on the degree of infestation and the source of potential seeds. It is also a matter of economics and just how much a rancher can spend for control of a weed that is virtually impossible to eradicate. But yellow starthistle is not something that can be ignored.

The key to prevention begins with hay free of yellow starthistle, Vesperat says. “It is also necessary to prevent invasion of yellow starthistle from roadside ditches and borders.” He says that once the weed is present, there is a spectrum of control methods to consider.

“Repeated tillage and mowing can be used late in the season if it’s done when less than 5% of the plant population is



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flowering,” he says. These methods are labor-intensive, expensive and require cumbersome equipment, he cautions. “The methods will fail if it rains after tilling or mowing, as the moisture causes new plants’ germination from the soil seed bank.”

Insects used for biocontrol have produced mixed results. The insects are released to feed on the flowers or seed head of yellow starthistle to reduce future reproduction. “An astronomical number of biocontrols would be needed to eradicate yellow starthistle,” Veserat says.

Control through competition using grasses and annual clovers can decrease yellow starthistle populations, though it usually requires additional farming practices. “Alternatively,” Veserat says, “grazing by ruminants — cattle, sheep, goats — can be effective.” When yellow starthistle is in the rosette stage, these ruminants will eat the weed and get some nutritional value. “It almost has to be an intensive-grazing situation.”

Burning is another control method, but it brings with it safety concerns.

The final and most effective control, Veserat says, is Transline® from Dow AgroSciences LLC. The active ingredient in Transline is clopyralid, an effective post- and pre-emergent herbicide. It will kill mature yellow starthistle through contact and control seedlings through residual in the soil. Transline is a selective herbicide because it controls primarily broadleaf weeds and is safe for grasses. It does not affect the grasses, but it does control plants like thistles, lupines and groundsel. There are no grazing restrictions, and livestock may graze freely in treated pastures.

In University of California (UC)-Davis

trials, Transline was 100% effective in controlling yellow starthistle for the season when applied at the highest labeled rates. Veserat says that to be the most effective, Transline should be applied during the rainy season (December through May) at a rate of 4 ounces (oz.)/acre.

“Early treatment encourages grass growth by eliminating yellow starthistle competition,” Veserat says. “Transline costs about \$360 a gallon if you buy it through Wilbur-Ellis and could cost as much as \$600 a gallon if you buy it through your local farm store.”

One gallon applied at 4 oz./acre will control about 32 acres of yellow starthistle. “The only criticism I have is that they don’t sell it in pint and quart sizes for the smaller producers,” Veserat says.

To achieve maximum cost effectiveness and results, Veserat suggests adding a surfactant (wetting agent) to the chemical mixture of water and Transline. Surfactants help Transline adhere to yellow starthistle for maximum effectiveness, especially late in the season.

To achieve long-term control, Transline should be applied at the recommended rates for a minimum of three years to reduce the seed bank in the soil. After three seasons the natural seed bank should be depleted, and other methods of control may be used. Veserat suggests follow-up methods should include biocontrol, spot treatment with Transline or other nonselective chemicals, or a combination of biocontrol and chemical.

In California, Transline is a nonrestricted herbicide found in many farm and ranch stores. The herbicide has a “caution” label (the lowest human-hazard-signal

Develop an integrated approach

One way to look at how to control yellow starthistle is to look at the cultural, biological, mechanical and chemical aspects of an integrated vegetation-management program, says Scott Johnson, vegetation management specialist for Wilbur-Ellis in Manteca, Calif.

Cultural controls promote growth of desirable plants. Fertilization, irrigation and planting at optimum densities let crops compete with weeds and not with each other.

Biological controls use an organism to disrupt weed growth. Often the organism is an insect or disease and a natural enemy of the weed (classic biologic control). Livestock can be effective weed-management tools.

Mechanical controls physically disrupt weed growth. This is the oldest control method and is used most often worldwide. Tilling, hoeing, hand-pulling, mowing and burning are examples.

Chemical controls use herbicides to disrupt weed growth. The first rules of pesticide use are to read the label before using the product and to follow all directions and precautions.

“In order to extend the life cycle of the first three components, you need the chemical component,” Johnson says. “If you use the first three steps and extend that with the chemical component, you will have an integrated vegetation-management program.”

“Not many people can afford to spray every acre,” Johnson says, “so you go with the land that has the highest value for your herbicide treatments. Pick places where you can maximize income or contain the spread of yellow starthistle.”

word) and is not a “restricted use” pesticide. Operator identification numbers are required for all herbicide applications to agricultural ground, including rangeland. Noncrop Transline applications may not require an operator identification number. For more information concerning application practices, contact your county Extension office.

Yellow starthistle can be sprayed with Transline in three different stages of its life cycle, says Scott Johnson, vegetation management specialist for Wilbur-Ellis. The best time to spray is in the rosette stage.

During the rosette stage, the flower is lying



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on the ground and can be sprayed with 4 oz. of product per acre. Once the yellow starthistle goes vertical and forms a grayish-green fuzzy stalk, it is in the bolting stage and might require 6-8 oz./acre.

When the thistle blooms, the plant is in the spiny bud stage, which is the last stage in which you can spray effectively. It will take 10 oz./acre or more. After the bright-yellow head forms, it is usually too late to spray

(May-June), and the plant has to be burned. "You are better off to wait until early next year," Johnson says, adding that Transline will be available in half-gallon sizes in 2001.

Other chemicals are available, including 2,4-D®; Roundup®; Curtail®, which is a combination of clopyralid and 2,4-D; and Tordon®, which includes the herbicide picloram. Disadvantages to these chemicals are that 2,4-D is restricted and has to be

sprayed numerous times. Roundup might kill more than you want it to. There are also chemicals like Escort® and Telar®, but Transline is the most specific of any of these chemicals to treat yellow starthistle. Be sure to check the regulations regarding what is available in your state.

Ranchers' experience

Yolo Land and Cattle Co. near Winters, Calif., has been fighting yellow starthistle for 20 years. "We have done trial applications with helicopters, ground applications, burned, chopped and hand-sprayed," Casey

Stone says. Stone, his father, Hank, and brother, Scott, own and operate this commercial ranch with primarily Angus-influenced cows on 7,500 acres. Three years ago they decided to try harder to reclaim land lost to yellow starthistle.

In spring 1997, Yolo Land and Cattle Co. used Transline in conjunction with Dow AgroSciences. "We used the herbicide at both low and high rates and found that 2 to 3 ounces per acre were enough to destroy the yellow starthistle in our area," Stone says. In one of their trials, they used a fertilizer tank, outfitted with 30-foot (ft.) booms and

pulled by a four-wheeler, filled with Transline. "We saw a response to this type of spraying and feel that you get better control if you spray from the ground."

"You must have a comprehensive management plan if you're going to gain control of the yellow starthistle," Stone says. Spraying, followed by ground work and planting a grass mix, combined with chopping and burning are control strategies Stone suggests. "You have to be careful with the chemicals you use because the yellow starthistle can develop a tolerance."

Stone serves on the Citizens Advisory

Committee that was formed after Assembly Bill (AB) 1168 passed in 1999, allocating \$200,000/year to the Yellow Starthistle and Other Noxious Weeds Statewide Control Program through 2002. "The committee was formed under the jurisdiction of the California Department of Food and Agriculture (CDFA) to act as an oversight committee for project analysis. In order for a county to qualify for funding, that county must have an active weed-management advisory group," Stone says.

Range and Pasture Specialist Tim

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Baldwin, Dow AgroSciences, says a lot of the work they have been able to do has been based on funding from the CDFA. AB 1168 and Senate Bill (SB) 1740 will help control yellow starthistle and other noxious weeds. SB 1740 proposes to appropriate \$10 million from the General Fund to the department.

“We have already done some cost-share trials in El Dorado, Plumas and Sierra counties,” Baldwin says. “Weed mapping,

roadside spraying with Transline and Roundup all help with preventing the spread of yellow starthistle.” With the additional funding from SB 1740, which was amended in the assembly in June, a lot more will be accomplished.

“This is very beneficial to the seedstock producers who need to manage more intensively,” Baldwin says. “The cost of treatment is significant, but if you use an

integrated approach (farming, reseeding), you can see eradication in three years with a continued management program.” Baldwin says the best scenario is to find a place where there is not a big problem and to start there.

Give-and-take

“Another problem,” Baldwin says, “is if you do effectively manage yellow starthistle and now have a worse weed — like medusahead.” Ranchers who spend a lot of money to control yellow starthistle, which has some nutritional value, and end up with medusahead have to think of the yellow

starthistle as the lesser of two evils, Baldwin says.

It takes a lot of give-and-take, good decisions and timing to make a successful weed-control program. "Timing is everything," Baldwin says. "You have to take a comprehensive or holistic view of your program and go from there. You have to look at the economics and decide if you are going to try and eradicate yellow starthistle or try for range improvement."

Joseph DiTomaso, UC-Davis noncrop weed ecologist and Extension specialist, says the university has been doing studies on

yellow starthistle since he first came on board in 1995. "Basic biology and ecology studies; integrated approaches, including Transline and reseeding; and prescribed burning with Transline have all been done to try and determine which combination works best. We are going to try late irrigation this year, starting in August, and irrigating every two weeks." Their hope is to get rid of 90% of the seed bank by using this method.

"Six years ago few people were working on the control of yellow starthistle," DiTomaso says. "Now we have some funding, Transline, and people are mowing,

burning, irrigating and using other chemicals, such as 2,4-D and Roundup." The most important aspect is to remember you are not just killing yellow starthistle, DiTomaso says, "but you are developing a management strategy."

The experts agree that the best advice is to contact your local Extension office or chemical company to seek help with yellow starthistle or other noxious weeds. There are a number of strategies that can be used to improve your land.

