



Yellow Star Thistle

A three-year California study suggests controlling the star thistle with timely grazing.

Story & photos by **Ed Haag**

Ralph Waldo Emerson once quipped, “A weed is just a plant whose virtues have not yet been discovered.” Ranchers who have seen grazing capacity dramatically degraded by the incursion of yellow star thistle are not very likely to agree with the words of America’s illustrious 19th century poet and philosopher, but in the case of the ubiquitous and tenacious broadleaf invasive he might be close to the truth.

“Early in the season, before it produces spines, yellow star thistle is a great candidate for cattle grazing,” says Joseph DiTomaso, weed scientist for the University of California

(UC), Davis. “It is actually fairly high in protein, and cattle will relish it when it is young and tender.”

He notes that the nutritional component of yellow star thistle leaves is highly digestible by ruminants early in the growing season, but its palatability and nutrient value decline as the plant matures. Fellow UC Davis weed specialist Craig Thomsen measured the protein and acid detergent fiber (ADF) content. His data confirmed that yellow star thistle had acceptable nutritional value as a component of a ruminant’s diet. In the rosette stage, protein content ranged between

10% and 13% and ADF between 26% and 28%. In the bolting to early bud stage, protein content was 11% to 13% and ADF was 28% to 32%.

For ranchers who have had to deal with yellow star thistle infestations, the idea that they can be grazed as a control measure is a tantalizing one, DiTomaso says. “They like the fact that they are actually getting some forage benefit out of a plant that they have always thought of as a real problem,” he says.

Well-established invasive

Considering the ubiquitous nature of the plant in the West, it is no surprise that yellow star thistle is ranked by ranchers and county weed boards in Washington, Idaho, Oregon and California as one of their leading noxious weeds infesting rangelands and pastures as well as orchards, vineyards, roadsides, canal banks and parklands.

Reasons for its success as an invasive plant species include seed banks that have an extended germination period; prodigious seed production; a long growing season that includes late spring and summer; a long taproot that outcompetes native grasses for nutrients and moisture; the ability to quickly recover from mowing or grazing; and spines to discourage grazing from the bud to the seed production stages.

Native to southern Europe and western Eurasia, yellow star thistle has been in North America since the early 19th century. Seeds were found in adobe bricks used in the construction of a California structure that predates the mid-1800s.

A highly effective colonizer of new sites, the spiny invasive has succeeded in expanding its territory well beyond where it was first identified. By 1900, patches of yellow star thistle were being reported as far north as Washington state. A survey in the mid-1980s confirmed that it had already infested 280,000 acres in Idaho, 135,000 acres in Oregon and 148,000 acres in Washington and was expanding its range by 7,000-20,000 acres per year in the West; most of that expansion occurring in California, where the number of acres in the state occupied by yellow star thistle rocketed from 8 million to 15 million between 1985 and 2007.

Scourge of the West

A primary reason why most weed scientists view yellow star thistle as a major threat to the rural West is the plant’s well-earned reputation as a ferocious competitor. The aggressive annual is already directly responsible for transforming millions of acres of complex and diverse native ecosystems into marginal plant communities dominated by a single species. In the

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▶ Yellow star thistle produces a spiny flower head that only a bee could love.

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process, the grass-grazing potential in the Coastal and Rocky Mountain West has been markedly diminished by the yellow star thistle's incursion into formerly productive rangeland.

In addition to star thistle's effect on the grasses beef producers rely on to feed cow-calf pairs, mature thistle plants, interspersed in a grass stand, also have the potential of dramatically reducing the quality of any forage fed in or harvested out of that field.

Whether the contaminated forage is grazed or eaten from a bale, mature star thistle — with its long, sharp spines — poses a risk to the eyes of all livestock that come in close contact with it.

As Western ranchers have discovered, the cost associated with the tenacious annual does not end with production losses. Land values are affected and control and containment measures, such as pulling, mowing and spraying, divert finite capital and labor from other tasks affecting the profitability of the operation.

Precious soil moisture resources are also negatively affected by yellow star thistle. Recent studies confirm that the plant is a major contributor to the depletion of soil moisture reserves in annual grasslands in California and in perennial grasslands in

Oregon. One study reports that because of its high water usage, yellow star thistle threatens both human economic interests as well as native plant ecosystems. Based on a conservative estimate of the weed's coverage in the Sacramento River watershed, it is estimated that yellow star thistle may cause an economic loss of \$16 million to \$56 million in water conservation per year.

Forage for thought

But there is another side to yellow star thistle, a side that some longtime ranchers say is often overlooked.

Craig Thomsen, UC Davis rangeland ecologist, asked a fifth-generation cow-calf operator why he wasn't out trying to kill the plants that infested parts of his ranch.

The rancher tersely replied,

"Why would I want to get rid of yellow star thistle? It is providing me with a living."

After thoroughly studying the maligned invasive, Thomsen says he understands the rancher's answer. Like DiTomaso, he sees an economic opportunity at a time when feed and forage production costs are on the increase and regional droughts are growing in frequency.

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► The only time to graze yellow star thistle is when it bolts: between rosette and bud stage.

pointed out, it can provide some pretty decent forage," Thomsen says, adding that ranchers using the weed to their advantage have recognized that it is available to cattle at a time when most grasses and forbs are past their prime and have little nutritional value.

"Yellow star thistle can help fill a significant gap in the California forage cycle," he adds. "Although poisonous to horses, there is that point in time when it can be grazed by ruminant animals and utilized as feed," Thomsen says, adding that the control benefits of grazing the annual, before it sets seed, should not be discounted.

Thomsen notes that to better understand how and when star thistle can help contribute to a rancher's bottom line, an acquaintance with the plant's growth cycle is necessary.

As an annual, yellow star thistle has a very long life cycle, germinating in the fall, wintering as a small rosette and then maturing long after most other annuals are done for the season. While most seeds sprout after fall rains, additional germination can extend for many months, something that can favor yellow star thistle, especially in wet years.

In May and June the plant "bolts" and sends up stalks, which give rise to the flower heads. The mature plant reaches a height of 1 to 3 feet (ft.). The gray-green to bluish-green stems of the mature plant are widely branched, and rigid spines project from the bracts that surround the bright yellow flowers.

"It is during that time, before the plant becomes spiny, between the rosette and bud stage when it bolts, that there is a great deal of biomass produced that animals will readily consume," Thomsen says, adding that it is in that May through June period when ranchers in California traditionally have difficulties locating grazing sites with the quality of forage their herds require.

In contrast, yellow star thistle protein can run 12%-14% at that stage of its growth, Thomsen says.

Study confirms grazing value

To confirm his observations, Thomsen initiated, with the cooperation of the California ranchowners, a three-year, replicated study to determine whether grazing yellow star thistle suppressed its growth and reproduction. He was also interested in determining, under scientific conditions, the production value of the plant in terms of tonnage consumed.

For one of his study sites, Thomsen

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selected a 4.5-acre experimental site within a 120-acre pasture in the Inner Coastal range that represented the annual type grassland common in California. While yellow star thistle was dominant on the site — with densities that exceeded 800 plants per square yard — more than 70 other annuals were found growing within the experimental unit.

The site was divided into half-acre paddocks, which were defined by movable hotwire. Stock densities were 18 cow-calf pairs per acre, and the duration of the initial grazing period ranged from 12 to 24 hours per paddock depending on the biomass present and when the plants had been defoliated to the point that the animals no longer showed an interest in the stand.

Animals were reintroduced into the paddocks for additional grazing after regrowth occurred.

For Thomsen the results were clear. “Grazing in all three years significantly reduced star thistle flowerhead densities, and there were decreases in canopy densities of more than 90% in two of the three years,” he reports in the written results of his study.

When the grazed paddocks were compared with the ungrazed control paddocks, the ungrazed thistle formed dense

spiny thickets 2 ft. to 3 ft. tall with flower head densities four to 11 times greater than the grazed thistle.

For Thomsen, controlling yellow star thistle with grazing was just one part of a larger equation. His study also revealed that the amount of edible forage available in an average stand of star thistle was significant.

He notes that on one measured test site, in a pregrazed state the star thistle biomass exceeded 2 tons of dry matter per acre. Thomsen adds that average yields for the study were more like 3,000 pounds (lb.) per acre but, with certain conditions, yields can double. For example, at one ranch that received more than 1 inch (in.) of rain in late May, Thomsen measured up to 6,000 lb. of dry matter per acre.

“That is an extraordinary amount of biomass available to grazing, even when compared to highly managed, heavily fertilized production ground,” he adds.

Considering the escalating costs associated with intensive forage production and the fact that there are more than 15 million acres of yellow star thistle in California alone waiting to be grazed or harvested every May, Thomsen’s work provides a lot of forage for thought.

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