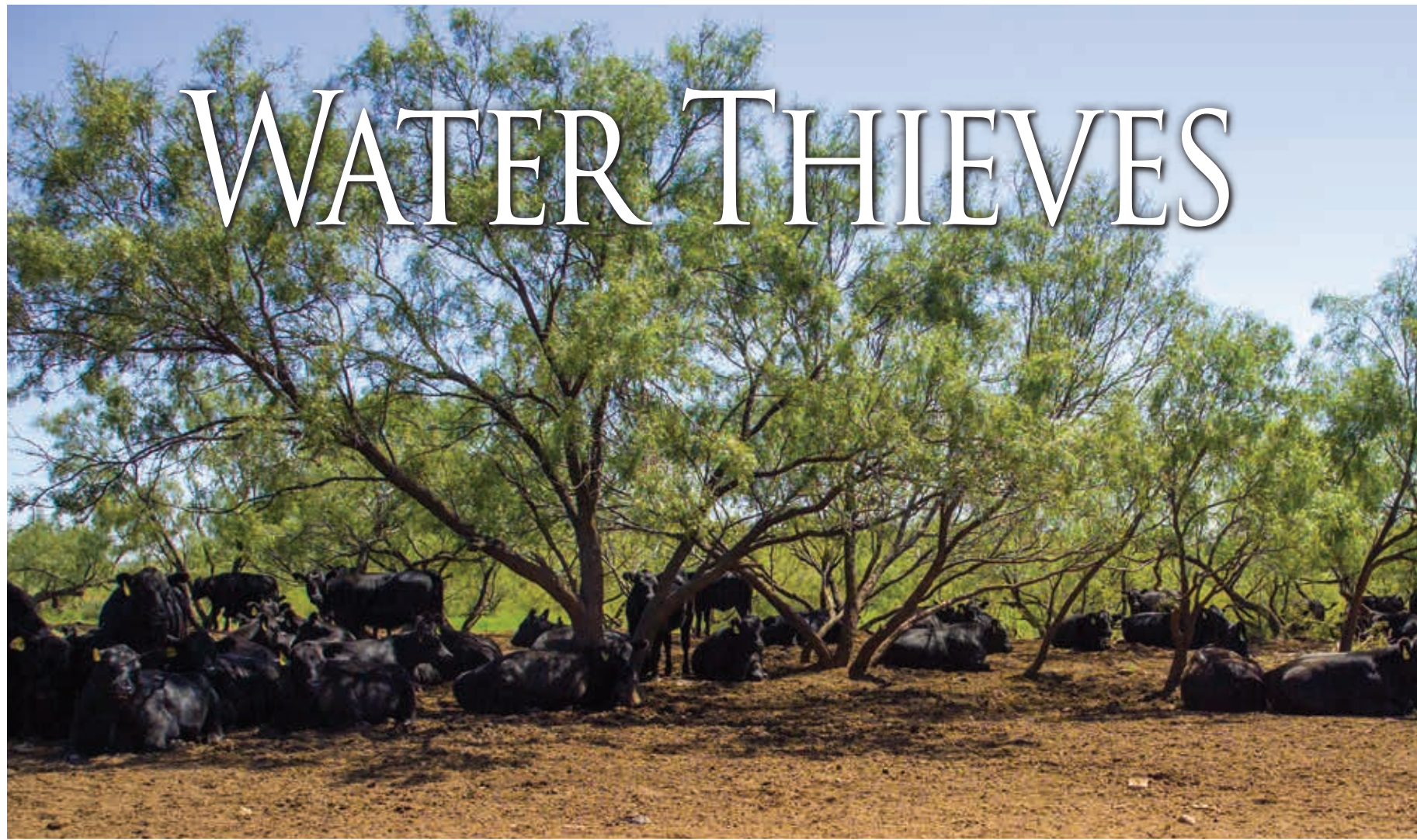


# WATER THIEVES



## With invasive plants, it's all about the competitive advantage.

by Troy Smith, field editor

**E**conomist and Harvard business professor Michael Porter is credited with coining the term *competitive advantage*. It defines a condition or circumstance that puts an individual or company in a favorable or superior position. For example, human beings enjoy a competitive advantage relative to other creatures due to their cognitive abilities to learn, reason and apply logic. Opposable thumbs help, too.

In business, a competitive advantage goes to those able to capitalize on imagination and innovation.

Cattle producers are often advised to seek their own particular competitive advantage, based on available resources and chosen practices that allow for below-average costs of production and above-average returns.

In the natural world, however,

few living things better utilize a competitive advantage than weeds. We're talking about invasive plants, which are said to be the most costly of agricultural pests, causing more yield loss and adding more to production costs than insects, pathogens, parasites or animal predations afflicting crop fields and grasslands.

Invasive plant species can be native to a given ecosystem or

introduced, either intentionally or accidentally. The thing they have in common — the thing that makes them invasive — is their competitive advantage.

### Source of advantage

Typically, the advantage is derived from multiple factors. Many invasive species are tolerant of harsh environmental conditions. They typically steal nutrients away from other plants. Some invaders have allelopathic properties, meaning they produce chemical substances that inhibit the germination and growth of other plants. Most invaders produce copious amounts of seed that may remain viable in the soil for years.

If the weeds in question are not native, there may be few, if any, natural predators present to help regulate the population.

Which invasive plants are the greatest cause for concern can vary by climate,

elevation and personal opinion. In the western half of the country, and particularly the semi-arid region west of the 100th meridian, most conscientious graziers are concerned about the long-term effects of invasive plants having the greatest thirst.

“Most invasive plants could be described as water thieves. They are good competitors for all resources that all plants need to grow, including water. It's one of the characteristics that make weeds weedy,” says Jane Mangold, a Montana State University invasive plant specialist. Hard-pressed to name the worst





Wildfire, drought and invasive plants together make a wicked problem — one that has multiple causes and effects, and no ideal solutions.



PHOTOS BY SHAUNA HERMEL



Mesquite

Spotted knapweed emerges early and eventually produces a taproot that reaches deeper than many other plants. It produces copious amounts of seed, which may remain viable for up to 12 years.

You can't discuss invasive plants of the West without mentioning cheatgrass. According to Mangold, precipitation concentrated in late winter through early spring favors cheatgrass, an invasive winter annual that gets a head start on green-up.

"Cheatgrass makes its living by germinating in the fall, overwintering as a seedling and then flowering and producing seed earlier than perennial grasses — usually by late spring or

offenders, she narrows the field to a couple of exotic bad boys — spotted knapweed and cheatgrass.

### The thieves

Native to southeastern Europe, spotted knapweed is believed to have been introduced to North America in the late 1800s as a contaminant in imported alfalfa seed and probably in soil that had been used as ship's ballast.



Spotted knapweed

GETTY IMAGES



Redberry juniper

PHOTO BY JAMES ST. JOHN



Ashe juniper

PHOTO BY PK BURNS

windows of opportunity. "Using cheatgrass as an example, it is palatable and has relatively good forage value for a short period of time, namely in the fall after it has emerged, and again, briefly, the following spring before it starts to flower and produce

early summer," says Mangold. "By doing this, it doesn't have to live and grow through the hottest and driest part of the summer."

A problem common to many invasive species is that they are not very palatable to livestock or wildlife. Some species actually can be good forage, but offer narrow

seed," Mangold says. A proliferation of cheatgrass and the fine fuel it produces are conducive to frequent, intense fire. Cheatgrass has the ability to thrive under frequent fire and to withstand periods of drought. Wildfire, drought and invasive plants together make a wicked problem — one that has multiple causes and effects, and no ideal solutions.

### Woody challengers

The lack of fire can contribute to problems with invasive plants, too. Historically, periodic fire events help develop grassland ecosystems, keeping woody plant species at bay. Settlement brought a culture of fire suppression that has favored invasive native plants. According to Morgan Treadwell, a Texas A&M University range specialist, mesquite and a pair of junipers have been beneficiaries. They may be the most aggressive invaders encroaching on southwestern rangelands.

"Some people attribute woody



Cheatgrass



encroachment to fire suppression, others blame overgrazing, and some say it's a combination of the two. I think it's the result of both, made worse by drought," offers Treadwell.

"Mesquite and juniper encroachment also show that it's not always exotic species that are the troublemakers," she says. "These are native species. They have been here all along, but were more scarce in the past. But we've lost balance in the ecosystem."

Treadwell admits there are some good things about mesquite. It's a legume capable of fixing nitrogen in the soil. Perhaps most notable are the beans (seed pods), which can be a valuable source of protein and fiber for livestock and wildlife. Although, mesquite is an aggressive competitor for soil moisture. It is capable of exploiting deep water sources by growing a lengthy taproot. It also produces an extensive lateral root system nearer the soil surface.

"Once it finds its niche, mesquite can be nearly impossible to eradicate. That root system includes an extensive bud reserve. Cut a mesquite, and it comes back," explains Treadwell.

Redberry junipers also are capable of resprouting from a bud zone if the top is removed. Unchecked, redberry junipers tend toward a monoculture. They can form dense stands with broad, tight canopies that allow little rainfall or sunlight to penetrate. Litter that accumulates beneath the junipers absorbs most of the moisture that does get through, preventing it from reaching the soil surface.

"Biodiversity decreases rapidly with increased juniper densities, because nothing else grows under redberry junipers," states Treadwell.

She calls Ashe (blueberry) juniper a "more tame" species. It does not have the same bud reserves, and it will not resprout if the top is cut off. Yet Ashe junipers also form dense thickets that



Eastern red cedar

PHOTO BY DENDROICA CERULEA

crowd out grassland forages.

Treadwell says it's interesting, and a little scary, that woody encroachment has progressed so well for so long — for more than 150 years — and many landowners are seemingly unaware.

"With succession and generational transfer of real estate, a growing amount of land is now owned by folks that think it always looked like it does now," says Treadwell. "They think it always was juniper forest. They don't realize it was prairie."

### Eastern invader

Another juniper, more commonly known as eastern red cedar, is problematic in eastern Texas and northward, gaining ground in much of the Great Plains region. Eastern red cedar heads Kansas State University Range Scientist Keith Harmony's list of most common woody invaders. Others are honey locust, hedge apple (Osage orange) and rough-leaf dogwood.

Most are native to the region or nearby areas, but humans have

contributed to their spread over a wider range and their increased density. The planting of some species for shelterbelts or as ornamentals has created prolific seed sources.

"All are easily spread and are capable of outcompeting native grasses for water and nutrients. All have the potential to turn our grasslands into something else — woodlands," says Harmony. "They can reduce groundwater recharge and the flow of streams, springs and seeps, ultimately changing the water cycle on grasslands. They can suppress the growth and vigor of native grasses, and that changes the energy cycle."

### Bluestem blues

Harmony says the so-called "Old World" bluestems pose another significant threat to grasslands in Kansas and beyond. More specifically, caucasian bluestem and yellow bluestem were originally found in the Mediterranean region of Europe and parts of Asia and Africa.

Like the bluestem grasses native to the prairies of North America (big bluestem, little bluestem and sand bluestem), Old World bluestems are warm-season perennials. They were introduced as a potential forage resource, but Harmony thinks the forage value of Old World bluestems was oversold.

"They're quite productive, but they mature quickly and lose palatability, so cattle often avoid grazing Old World bluestems and concentrate on the surrounding vegetation. The more palatable forage grasses can become overgrazed," says Harmony, explaining that pastures having a mixture of Old World and native bluestems are hard to manage.

Regarding traits affording invasive species a competitive advantage, Old World bluestems check nearly all boxes. They are tolerant of drought. Compared to most native grasses, they grow

PHOTO BY ROB WATTS, THE SAMUEL ROBERTS NOBLE FOUNDATION



Old World bluestem

faster and produce seedheads sooner. They are prolific seed producers that can build up a long-lasting soil seed bank. Old World bluestems also release allelopathic substances into the soil.

“Long term, they can become dominant. Plant communities change, grasslands become less productive for grazing and the loss of biodiversity impacts wildlife, too,” adds Harmony.

Unfortunately, too many land managers fail to get excited about invasive plants until it is too late to effectively manage them ecologically or economically. The longer it takes to acknowledge the problem, the more damage it causes and the more expensive it is to do anything about it.

Harmony and other researchers have been studying chemical control of Old World bluestems, with strategic use of the pesticides glyphosate and imazapyr. Prescribed burning of pastures

during the growing season (August) also shows promise for slowing their advance. Early spring burning has long been used to control woody encroachment in Kansas’ Flint Hills. Use of prescribed fire is increasing elsewhere, too.

“Grasslands evolved with periodic fire, and we need fire on the landscape,” says Harmony. “It’s a good management tool, but its use must be planned and controlled.”

Treadwell agrees, noting that prescribed fire appeals to land managers wanting a more “natural” method of control, and it’s often most economical.

She acknowledges, however, that some people are afraid of fire, or the liability linked to intentional burning. That’s why some people lean toward chemical or mechanical controls, but both can be expensive and each has its

**“Take care of the desirable forage that you have, keeping it healthy and competitive. Invasive species have a more difficult time getting established when the existing plant community is healthy and vigorous.” — Jane Mangold**

drawbacks. It can be hard to selectively control specific plant species with herbicides, and mechanical methods can cause considerable soil disturbance.

“You have to choose the right method or combination of methods for your own situation. There’s no right or wrong, unless you do nothing,” says Treadwell.

The experts emphasize the need for a preventative approach. Mangold urges managers to know thy enemy. Be able to recognize invasive species, and take action to

control them early. Be aware that invasive plants can spread to new areas when seeds hitch a ride in the hair of cattle driven through infestations, or when seeds become lodged in the tires or undercarriage of vehicles. Realize that seeds may be easily spread in hay transported from one area to another. However, most important to preventing the spread of invasive plants is being a wise manager of range and pasture.

“Take care of the desirable forage that you have, keeping it healthy and competitive,” advises Mangold. “Invasive species have a more difficult time getting established when the existing plant community is healthy and vigorous.” ■

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Editor’s note: Troy Smith is a freelance writer and cattleman from Sargent, Neb.