

RESEARCH ROUNDUP

Scientists warm up to fall burn

by Mary Lou Peter, Kansas State University

For years, ranchers on the High Plains have used controlled burning, traditionally during the spring, to impede the growth of invasive plants on rangelands. In many ways, it's been effective. The practice helps control weedy plants that rob moisture and nutrients from more desirable nutritious grasses for cattle to graze.

However, not every spring day lends itself to burning large swaths of the prairie, especially during high winds or spring rains. Sometimes those burns happen in a small window of time when conditions are favorable. That leads to hundreds of acres being burned in a short space of time, resulting in smoke wafting over communities and reducing air quality.

That smoke problem, plus evidence that one of the more invasive of weed species in Kansas, sericea lespedeza, was not being controlled effectively by spring burns led Kansas State University (K-State) Range Cattle Scientist KC Olson and a team of researchers to study whether it would be possible to better control sericea by conducting burns in late summer or early fall and still have the desired nutritious grasses come back for cattle to graze the acreage.

"We had 60 years of history of spring burnings [indicating that we were] not controlling sericea lespedeza," says Olson, who in addition to his research responsibilities, teaches students in animal science. "I thought, 'what if we applied fire at a time when the plant at least has the appearance of vulnerability — at the point of



By burning in late summer and early fall, Range Cattle Scientist KC Olson says research shows there is less basal cover and seed production of sericea lespedeza.

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flowering or the beginning of seed set.”

That window of time is typically around late August or early September.

“We wanted to touch it, so to speak, before it had the chance to make viable, mature seed.”

▶▶▶ Early findings

Olson and a team of K-State scientists and students initially conducted limited studies of nine 14-acre plots between 2014 and 2017 in Geary County. The average dates the plots were burned were April 1, Aug. 1 and Sept. 1. By 2016, Olson says, they could tell visually

they were having a strong effect.

“Before we were done, we knew we had a pretty exciting solution — a pretty exciting talking point for the people of the Flint Hills,” Olson says. Those first results ended with less than 2% sericea lespedeza basal cover on the two alternative fire treatments (Aug. 1 and Sept. 1), and more than 11% basal cover of sericea lespedeza on the spring [burning] treatment.

“Not only did we have less basal cover, we almost totally suppressed seed production in each of the four years that we burned in the off-season,” he says.

Studies since then have borne that out. The sericea plants that did come back were smaller, lighter and less robust than those that survived traditional spring burning.

“Today if you go to that site — and we haven’t burned since the fall

of 2017 — it’s still very clean-looking,” Olson says.

▶▶▶ Eye-popping results

The team is also looking into how later-season burning will affect other weeds, including Old World bluestems, which are technically not bluestems at all and have invasive characteristics, Olson says. Two that have become problematic on the High Plains are yellow bluestem and Caucasian bluestem.

“They’re another thing we did to ourselves. They were either seed or hay that was brought into the state, was cultivated and in many cases have supplanted the native vegetation,” he says.

K-State studies, as well as data out of Texas, indicate that later-season burning thwarted growth of yellow bluestem.

At the same time, Olson says, he

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was not aware of any studies looking at fire suppression of Caucasian bluestem, so in August 2018, the team burned 18 one-acre patches to compare to control plots that were not burned. The plan was for another burn a year later, but the climate was drier and did not have enough litter accumulation to burn.

“But a year post-treatment, when we again measured plant community characteristics, we saw some things that were just eye-popping,” he says.

With one-year treatment there was a 38% reduction in Caucasian bluestem basal cover and a 20%-40% increase in native species.

▶▶▶ Performance data

Since the early studies, the research has expanded to larger regions and includes how cattle that graze the land perform in terms of weight gain and breakeven costs.

“The performance data is pretty exciting,” Olson says, after three treatments and two summers of

conventional stocker grazing.

In typical spring grazing, an animal will graze a certain amount of acreage, which researchers call its average “footprint.” Using that, they then looked at the economics of using fire alone to combat invasive weeds (at an average cost of about \$2.25 per footprint) vs. the cost to apply a well-known herbicide (\$54 per footprint).

The team determined that, given real-world values of gain, animals grazing in a nontraditional fire regime could gain up to 70 pounds (lb.) less per head and still break even with conventional burning and subsequent herbicide application to the “footprint.”

“You can give up 70 pounds of total weight gain and use fire instead of herbicide control and still break even,” Olson says.

In Year 1 of the current study, the team looked at six pastures per burning treatment with conventional cattle stocking rates (with heifers) and saw small differences in cattle performance.

Year 2 included the same stocking

density, but with steers rather than heifers.

“We had strong differences in growth performance in cattle that grazed the summer-burned pastures compared with those grazing spring-burned and fall-burned pastures,” Olson reports.

“Basically, over two years, considering the performance of cattle grazing spring-burned pastures versus summer-burned, the pastures were equivalent,” Olson says. “The cattle that grazed the fall-burned pastures were just a few pounds behind — about 20 pounds, far below the 70-pound breakeven level.”

Though the team is planning four more years of this research, the results so far are encouraging enough Olson says he wants people to know about them now.

“I don’t want to wait four more years to help these hills be healthier,” he says, recommending producers interested in trying summer or early-fall burning visit with their neighbors who have already been trying it.

“They’re reporting fantastic results, some of which I’ve seen with my own eyes,” he adds.

Olson says the team is considering expanding the research beyond the Flint Hills, adding that studies by the University of Nebraska indicate the Great Plains would benefit from more controlled fires, not less.

“Every year we’re giving up more land to woody encroachment and catastrophic wildfires. We have only begun to tap the potential for prescribed fire for ecosystem management and improvement. It’s my hope we can take an open mind moving into the future,” he explains.

“Using fire is low-cost and low-risk during most of August and early September and helps us be a better neighbor with respect to smoke management,” he continues. “It’s an excellent way to take back those invaded acres and build carrying capacity of your rangeland.” ■

Editor’s note: Mary Lou Peter is a communications specialist in the Department of Communications and Agricultural Education at K-State. An *Agriculture Today* radio interview with KC Olson on the topic is available at <https://bit.ly/ksu-olson-burn>.