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TEAM Spurge mounts a combined assault on this pernicious weed, because there is no silver bullet

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Stemming the advance of leafy spurge across western rangelands has been a little like trying to put out a prairie fire with a garden hose, says Scott Kronberg, range scientist at SDSU.

But, he adds, the "little bit here, little bit there" approach is being supplanted by a four-state collaborative TEAM (The Ecological Areawide Management) Spurge project of the USDA Agricultural Research Service at sites in the Little Missouri River drainage. The federal project leaders called on Kronberg for his expertise in livestock grazing bio-control.

Also tapped for TEAM Spurge membership were Leon Wrage, extension weeds specialist, Darrell Deneke IPM strategies, and Sharon Clay, AES weed scientist.

Wrage is a believer in using just about anything that is safe and that works to keep pressure on what he calls the "The toughest noxious weed in South Dakota."

"The best leafy spurge control program combines mechanical, chemical, and biological measures. A multiple approach prevents the plant from recovering between control efforts. When it's weakened, you have a better chance of finishing it off. We aren't going to stop leafy spurge with one tool," he says.

The TEAM Spurge project is the first large-scale, systematic demonstration of integrated control for leafy spurge. At its research and demonstration sites in range settings, land managers can see different strategies in real-life settings before they select the control methods that fit their own preferences and budgets.

"It's really looking like combining herbicides and sheep is better control than either one alone. A double whammy on the weed," Kronberg says.

Flea beetles also appear to be effective biocontrol agents against leafy spurge at some locations. But again, Kronberg, Wrage, and other TEAM Spurge biologists believe that they are best used in conjunction with other methods.

Kronberg thinks that some landowners were drawn to last year's TEAM Spurge field day near Buffalo mainly for the box of flea beetles they received at the end of the day. These insects are collected in North Dakota. Across the northern U.S. and Canada TEAM Spurge members collected and redistributed more than 20 million flea beetles to 206 ranchers and land managers from 50 counties in 7 states last year.

"Combining alternatives is where the interesting things are going to happen and where the real advances in spurge control will come," Kronberg says.

Kronberg offered flea beetles again this year at the TEAM Spurge field day held in Harding County in late June. This year, the field day was a training session on insect bio-control.

Unfortunately for late-comers, the beetles were "sold out" well before the event. He urged interested parties to sign up now for Year 2001 delivery to ranchers and land managers.

That means checking with Harding County Extension Educator Ken Nelson (375-3412). Nelson is also the contact for the latest information on leafy spurge control in northwestern South Dakota.

Leafy spurge – the "toughest noxious weed in South Dakota," says Leon Wrage, SDSU extension weeds specialist.

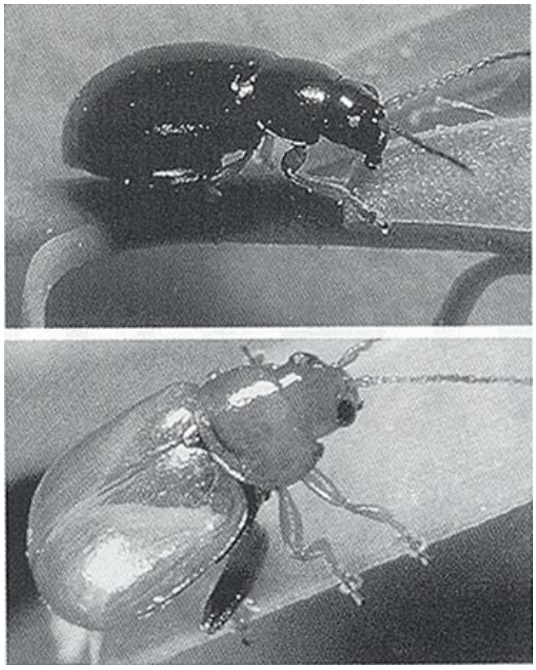
Leafy spurge is one of the most troublesome rangeland weeds that has ever invaded the U.S., Kronberg says. It is officially a noxious weed in South Dakota, and its economic impact in just the four-state area of South and North Dakota, Montana, and Wyoming is a staggering $144 million a year.

Leafy spurge displaces native vegetation, reduces livestock grazing, degrades wildlife habitat, decreases rangeland plant diversity, and lowers land values. TEAM Spurge leaders estimate that more than 5 million acres in the U.S. and Canada are infested and that the number of infested acres has doubled about every 10 years.

In South Dakota, TEAM Spurge scientists are working only in the far northwestern corner. But patches of the weed occur in probably every county of the state, and heavy infestations can turn some pastures and croplands nearly pure yellow. Even homeowners battle the pernicious weed in their lawns.

Wrage's 1999 data show that leafy spurge infested 274,000 acres in South Dakota, 65 percent of that grassland. Total dollar loss when the weed is not controlled is $10.3 million per year.

Once it gets a roothold, leafy spurge is nearly impossible to eradicate by any one method. Roots can grow far down into the soil and extend horizontally 15 feet per year. The aggressive root system defends the plant from drought, grazing, and herbicides, and shoots sprout from root buds, adding to the landowner's misery.



Brown-legged, top, and black dot flea beetles are in the mix of *Aphthona* handed out by TEAM spurge as biocontrol agents. One prefers hot, dry sites; the other like cooler, wetter sites. Adults are 3-3.5 mm long. Their larvae eat spurge roots from the inside out.

Ranchers and land managers have tried herbicides, grazing, and biocontrol. None is a silver bullet.

Herbicide treatments alone can only be economically justified for small infestations. In rangeland, the cost of herbicide spraying can rapidly exceed the worth of the land and its potential production.

Tests in the Harding County TEAM Spurge project combine grazing and herbicides, using 2,4-D and reduced rates of picloram in the fall on regrowth after sheep have been on the plots.

"After the first year, the herbicides showed about 20% better control on the grazed spurge compared to the herbicide alone. This weakens the weed and also controls first-year seedlings. It's a real improvement over either method by itself," Wrage said.

Grazing alone can be effective, says Kronberg, "but only if cattle ranchers exchange their herds for flocks of sheep or goats."

Goats seem to prefer leafy spurge over grass, according to his earlier research. Sheep eat the weed and grass about equally, and cattle seldom-if ever-come back a second time if they have had a hearty graze the first time.

"After that first sizable meal, they learn to avoid it."

Kronberg has found from 1999 vegetation transects in his TEAM Spurge-sponsored research near Sentinel Butte, N.D., that Ram-bouillet, Suffolk, Columbia, and Polypay sheep grazing together removed about 55% of the leafy spurge and 50% of the grass.

Surprisingly, the degree of leafy spurge grazing depended on the breed of sheep.

"I feel comfortable in saying there are significant differences in breeds. Maybe they differ in the way their rumens degrade the toxic chemicals in leafy spurge.

"If so, perhaps we can eventually increase ruminal degradation of leafy spurge toxins in sheep and cattle and increase their consumption of the weed. And even if we can't do that, we may still be able to help landowners improve their range and weed management simply by choosing the best breed of animal to use."

The work in the field is done the old-fashioned way-with bags and a shovel or whatever it takes to get breed-specific feces.

Leafy spurge turns the hills around Sisseton pure yellow, thrives between the runways at the Sioux Falls airport, chokes out native plants and repels cattle grazing in the west, and flowers in otherwise well-kept lawns. Total dollar loss when it is not controlled is $10.3 million per year in South Dakota alone.

"We collected a lot of fecal samples last year, brought them all back to Brookings, and dried and ground them to be analyzed by near infrared reflectance spectroscopy (NIRS)."

A control group of sheep was fed a diet containing known amounts of leafy spurge. Then Kronberg compared the NIRS spectra from these samples with that from the Sentinel Butte samples. "We could tell how much spurge the range sheep ate each week."

And now, he says, if only he could figure out a way to get cattle to graze leafy spurge. "That's the most intractable of all our challenges."

A third leafy spurge option is biocontrol. From among a number of bioagents, flea beetles appear to hold the most promise. It would seem there's a flea beetle for every location; of those studied, one likes shade, one likes lighter soil, and another prefers heavier ground. Hundreds of releases of the insects have been made across South Dakota.

But the insects are not always dependable.

"We just don't know completely why they take hold in some places and don't in others. Other scientists are beginning to sort this out. When the insects do successfully settle in, they're real achievers," Kronberg says.

Flea beetle adults do little damage to leafy spurge. But when the larvae hatch from eggs laid on the ground surface, they wriggle down into the soil and into the leafy spurge roots. There they eat the roots from inside out before they crawl out and overwinter in the soil.

Even with each female capable of laying 250 eggs in her 3-month adulthood, it can take years for populations to build up to economic levels, according to TEAM Spurge scientists.

“The summer after a release, you might see an area 10 feet in diameter where they’ve killed most of the spurge, the next summer a little bit more, and the next, better yet. At one of my test sites, I even wondered this year if there’d be enough spurge to do grazing trials.”

Kronberg says weed scientists have learned that on really sandy soils, the spurge puts its roots down deep enough that the larvae can’t reach them. He also knows that sometimes beetles relocate a hundred or so yards away from original release sites.

“We just don’t understand everything about the beetle we should.”

Which brings him back to advocating combination efforts to control spurge.

“We know leafy spurge infests the entire state and it acts differently in different habitats,” Kronberg says. “But the TEAM Spurge project is focused on rangeland and wildlands and is limited to the area where the four states come together.

Kronberg’s South Dakota experimental sites are in Harding County on Matt and Jim Johnson’s sheep ranch and the Larry Nelson ranch on the south fork of the Moreau River. Nelson raises both sheep and cattle.

And, like many of his neighbors, leafy spurge. But not a lot of it.

“We think we’ve got a bad infestation, but the people who know say it isn’t bad at all. But it’s starting to spread,” Nelson says. “Primarily, I’ve been trying to keep sheep on it and graze it off before it goes to seed.”

He had been “pestering” county educator Ken Nelson and county weed supervisor Tom Melum for news about bioagents; he’d heard about them through his participation on the Dakotas BLM resource advisory committee.

“It all came together. We got funding from the National Fish and Wildlife Foundation to set up a weed management area on the South Moreau drainage, and Dr. Kronberg and the TEAM Spurge folks came in about the same time.”

Kronberg divided his sites into sheep only, sheep plus herbicides, and sheep plus flea beetles.

“There’s a feeling among the insect people that too much vegetation will keep the soil from warming up enough to keep the flea beetles happy. Mature flea beetles don’t even start emerging from the soil until it’s fairly warm. Grazing where the beetles were originally released ought to get more sunshine down to the soil surface, warm it up earlier, and help the larvae get going earlier.”

The multi-state, multi-disciplinary TEAM Spurge project continues for 2 more years. Even now, practical, comprehensive IPM information regarding leafy spurge is reaching landowners like Nelson through field days, news media, and personal contacts.

“We’re glad to be involved,” Nelson says. “Our neighbors were starting to get nervous about spurge spreading downriver, and we knew we had to do something about it. The message I’d like to get across is that we’ve been really happy to cooperate with SDSU and TEAM Leafy Spurge.

“We’ve got to put the brakes on this weed. The multiple approach is the way to do it.”