



RANGE & PASTURE STEWARD

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Protecting, Conserving, Preserving The Land

Mesquite control

Slay mesquite, spare habitat

Follow five factors to beat mesquite

Technology and tenacity make the difference



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Ruminations

New technologies
in mesquite control
support your goals

There's a theory that human progress isn't the long, continuous upward slope we tend to think it is. It comes suddenly, in fits and starts.

We're starting to see *now* as a period of sudden advancement in mesquite control.

For a generation, there wasn't much new. Reclaim[®] herbicide, introduced in 1987, was a big improvement over earlier herbicides. In the mid-1990s, individual plant treatment proved viable and became popular.

Since 2012, however, the pace is picking up. And you can see it in this issue.

Sendero[®] herbicide, introduced in 2012, is a game-changer. It provides both a higher level of control and more-consistent control than any other herbicide used on mesquite.

So if you want to restore open rangeland, like our featured rancher, you can do that.

As good as it is on mesquite, Sendero is also very selective. It doesn't hurt most of the plants a rancher may want to leave for wildlife habitat. We're just getting a handle on that. Check out our research report on Page 7.

Finally, we're starting to understand how mesquite control in arid country is different, and how to be successful. See our report on Dr. Kirk McDaniel's work on Page 5.

So, watch your local conditions, but know that it's a good *age* for mesquite control.

On the cover: Mesquite foliage should be healthy and dark green when sprayed. Photo by Charles Hart, Ph.D.



Rancher Tom Estes has continually used the latest technology to fight mesquite on Four Way Ranch. But the critical factor is his persistence and follow-up.

Technology, tenacity overcome mesquite

To the untrained eye, it could appear that mesquite just hasn't encroached much on Four Way Ranch, Adrian, Texas. In the mile-plus from ranch gate to the headquarters, open pastures stretch about as far as the eye can see on this western edge of the Texas Panhandle.

But experienced observers know better.

The clear pastures here result from years of work, investment and, most of all, perseverance. They're also a sign of what's possible.

"I've aerially sprayed almost 80 percent of this country," rancher Tom Estes says.

He still has brush to treat, but he's making progress, he says, especially as the technology improves. Prudent grazing and aggressive follow-up help maintain control.

Estes' grandfather bought this ranch in 1952 when it was mostly open plains. As mesquite invaded, his father introduced him to brush control when Tom was a youth. "Back then, the products weren't very good," he says.

Reclaim[®] herbicide was a major improvement when introduced in 1987. Estes used Reclaim in a tank mix with Remedy[®] Ultra herbicide. Seeing progress, he increased his spray frequency, planning to spray somewhere on the ranch every year.

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TECHNOLOGY IMPROVES

Sendero® herbicide, introduced in 2012, was a further improvement, offering both better and more-consistent control than the old tank mix of Reclaim and Remedy Ultra. Estes first used Sendero in 2014 and again last year. Caprock Spraying, Vega, Texas, made both applications, using Sendero at the labeled rate of 28 ounces per acre.

Experts usually judge final rootkill of sprayed mesquite two years after treatment. But a year after his first application, Estes liked what he was seeing. Control looked “better than 80 percent and probably 90 percent,” he says. “It was better than Reclaim and Remedy.”

Estes’ estimate is slightly higher than the average control in research trials across the state.

Applied under the proper conditions in 2009 and 2010, Sendero posted rootkills of 60 percent to 93 percent two years after treatment. It averaged 77 percent rootkill.

Estes helps his average by spraying only when conditions are favorable for control, even if he has to abandon his annual spray plan. His 2014 application was his first after a three-year hiatus due to extreme drought and poor leaf condition. For three years, conditions just didn’t line up.

“I hate to miss a year, because the brush keeps growing,” he says. “The way I look at it is, if you don’t do

something, what’s the country going to look like in 20 years? You might not gain a lot in stocking rate, but if you do nothing, you *will* lose.”

Estes consults with local Dow AgroSciences Range & Pasture Specialist Jodie Stockett to monitor conditions of foliage, soil temperature, soil moisture and timing. Together, they decide whether to put a plane in the air.

GRASS RESPONSE

Less live brush makes cattle easier to find, feed and make gentle, Estes says. Grasses respond, too, especially in a wet year like 2015. But wet or dry, he stocks conservatively and tries to rest a pasture every growing season.

“Not overstocking helps,” he says. “We stock for drought conditions. You do see a grass response after spraying, but maybe not what some people expect. You’re not going to run 20 percent more cows and still take care of the land.

“If you take care of the land, it will take care of you. If you abuse it, it will really cost you.”

After an aerial application, Estes doesn’t quit on brush control in the treated area. That’s most noticeable in pastures and traps around the headquarters where he has used a grinder attachment on the front of a skid-steer loader. It reduces standing dead mesquite to mulch.

“The mesquite degrades faster, and it makes it easier to see cattle and handle them,” he says. “And it makes it pretty.”

He’s careful not to disturb a treated mesquite for at least two years after spraying. The herbicide may continue to work in the plant for that long. Grind it too soon, and it can resprout. “You can really mess up,” he says.

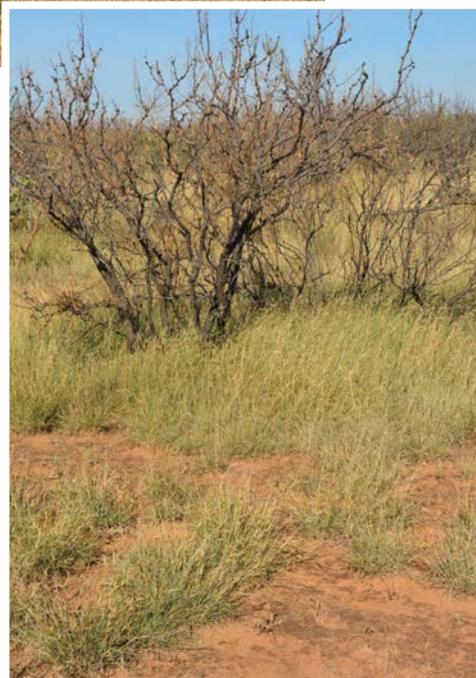
FOLLOW-UP HAND-SPRAYING

Estes follows every aerial application with hand-spraying to kill survivors and new sprouts. It’s a continual task for several years, but the pressure does decline over time. “When you get past a 10-year period, you don’t have to do too much,” he says.

The follow-up has turned into something of a pastime for Estes. On summer evenings, he’ll fill the sprayer on his Polaris Ranger utility vehicle, make himself a cold drink, and roam pastures and traps hand-spraying brush foliage.

“My dad got me started in brush control when I all wanted to do was ride horses and work cattle. I didn’t want to do it then,” he says. “Now it’s my hobby.”

It’s a hobby he happily shares. Friends and family chide him about a Mother’s Day gift he gave his wife: a backpack sprayer. His defense: “It was a *nice* one!” •



Rains and mesquite spraying in 2015 helped grasses recover where Tom Estes worried he’d lost them to drought.



Follow five factors to control mesquite

Mesquite wouldn't be a problem if it was easy to kill. But it is a problem, so spray when you have the advantage.

Mesquite is most susceptible to aerial spraying when the plant is in a growth mode — warm soil, adequate moisture and moving carbohydrates around. Leaves have to be able to absorb foliar herbicides.

Dow AgroSciences Range & Pasture experts outline five critical factors for successful control of mesquite with aerial application. Some of these factors also apply to hand-sprayed leaf treatments. These recommendations are based on the work of researchers with the Texas A&M University System and Texas Tech University, plus more than 25 years of commercial experience.

1 SOIL TEMPERATURE

Soil temperature 12 to 18 inches deep should be at least 75 F or, preferably, more than 80 F. Do not spray when soil temperatures are cooler than 75 F. Soil temperature is critical, because it influences the flow of carbohydrates and absorbed herbicides in the plant.

Make your broadcast applications within 60 days after reaching the minimum soil temperature. Clay soils, wet soils and heavily shaded soils will warm up more slowly than others. Rainfall during the season will cause soil temperatures to drop.

2 CARBOHYDRATE TRANSLOCATION

Herbicides absorbed by the leaves must move down into the roots and the below-ground bud zone in order to root-kill mesquite. Absorbed herbicides flow with the carbohydrates. In mesquite, carbohydrates move downward during two periods.

The first optimum period is 42 to 63 days after bud break. In many areas, this period will be during the last week of May through the first two weeks of June. Spray during this period only if the mesquite flowers are yellow in color, the leaves are dark green, and soil temperatures are warmer than 75 F. Low soil temperatures usually will limit spraying during this period.

The second optimum timing period is 72 to 84 days after bud break, when mesquite beans are fully elongated

and maturing. In many areas, this second timing will be during the first two weeks of July, but this is year-dependent and may shift due to rainfall patterns.

3 MESQUITE FOLIAGE

Mesquite foliage should be healthy and dark green. Unhealthy or immature foliage won't absorb enough herbicide. Avoid spraying if more than 25 percent of the foliage has been damaged by insects, hail or disease. Avoid spraying if there are new, light green leaves on the twig tips.

4 SOIL MOISTURE

While it may seem like a drought to you, mesquite can be healthy and growing — and ready to spray — even if the soil is dry. Rainfall can actually be bad for mesquite control. Rains after a dry period can cause new leaf growth on twig tips, indicating upward translocation. Don't spray then.

Too much dry weather can also be bad, if it affects mesquite foliage. Don't spray if the foliage is obviously drought-stressed — very sparse foliage on the mesquite, leaves turning yellow, leaf margins and tips necrotic or leaves dropping. Spraying when grasses are dry or "drought-dormant" is OK if the mesquite foliage is healthy.

5 PROPER APPLICATION

Proper herbicide application is the final step. Recommended herbicides and rates will vary by region, associated species and management goals. In aerial trials, Sendero® herbicide at 28 ounces per acre has proven to be the most effective and consistent herbicide treatment on mesquite.

For aerial applications, wind speed should be 2 to 10 mph, or 5 to 10 mph in heavy mesquite cover. Air temperature should be cooler than 95 F. Relative humidity should be more than 20 percent.

In aerial applications, use at least 4 gallons total volume of spray mix per acre. Aircraft should spray swaths perpendicular to the prevailing wind direction. •

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Far enough west, it pays to adapt spray prescription

Is the proverb right — do all signs fail in dry weather? Not necessarily, but the prescription for mesquite control *does* change from the standard as you move west into the arid climates of New Mexico and the Texas Trans-Pecos.

Plant physiology remains the same, but the timing to capitalize on that for control can be different, says Dr. Kirk McDaniel. It has to do with weather patterns.

McDaniel is the long-serving Extension range scientist and researcher now retired from New Mexico State University. In a series of spray trials from 2009 to 2013, he documented that the best time to spray mesquite is a moving target, but a recognizable one.

McDaniel's studies also indicate a slightly different herbicide treatment for arid-country mesquite.

For more than 30 years, range scientists have pointed to the environmental factors that affect mesquite control with herbicide: soil temperature, foliage condition and the timing of carbohydrate translocation after bud break. (See "Follow five factors to control mesquite.")

Developed under more dependable rainfall, the guidelines have worked well in arid country *when there's sufficient moisture*. In southern New Mexico, that's deemed to be at least 2 to 3 inches of precipitation from January through May. With that moisture, the typical spray season is late May through July, if the other factors align.

But that's not the prevailing pattern, McDaniel says. About 6 out of 10 years are dry through winter and spring.

UNIQUE WEATHER PATTERN

In southern New Mexico and the Trans-Pecos, about 65 percent of annual precipitation usually falls from mid-July to early October. May and June are among the hottest, driest months of the year. That weather pattern is different from where the guidelines were developed in Texas under higher rainfall.

So how do you recognize when or when not to spray

mesquite in arid country? Observe precipitation and foliage, McDaniel says. You may be able to spray later.

If mesquite is drought-stressed, it will be obvious in the foliage by the normal spray window — 45 to 90 days after bud break. Droughty mesquite foliage will be sparse, undersized and usually pale or yellow. Don't spray if the foliage is reduced by 25 percent from normal. Wait.

If moisture in July and August is above average, mesquite can produce enough healthy foliage to spray late in the summer, McDaniel says.

After a big rain, mesquite will put on new, light green foliage. When that foliage matures to a uniform dark green — usually one to three weeks after the rain — your spray window is the next two to three weeks. "You can spray into early September if you pick the right year," McDaniel says. "Evaluate foliage conditions — that's the key."

UNIQUE HERBICIDE MIX

McDaniel also compared different herbicide mixes for their rootkill of the mesquite typical of the area.

He achieved the best results with a tank mix of

Sendero® herbicide with Remedy® Ultra herbicide. This mixture root-kills more mesquite than Sendero alone or the old standard of Reclaim® herbicide with Remedy Ultra.

For New Mexico and the Trans-Pecos, that mix is now the Dow AgroSciences recommendation, says Dr. Charlie Hart, a range scientist and market development specialist for the company. The mix is Sendero at 28 ounces per acre with Remedy Ultra at 8 ounces per acre.

In areas with high soil moisture, mesquite may grow into a small tree. But in arid country, mesquite is usually a low-growing shrub with many stems. This disparity in plant height is due in part to different varieties of mesquite, but mostly it's a response to the local soil moisture environment, McDaniel says.

Taller, single-stemmed mesquite is easier to kill than the shrubby, multistemmed mesquite. The lower the plant stature and the more stems it has, the more difficult mesquite is to kill. Use that pattern to prioritize your treatment sites, McDaniel advises. If possible, treat first the more robust upright plants with fewer stems. •



Research by Dr. Kirk McDaniel of New Mexico State University supports new options for timing and herbicide mix in New Mexico and the Trans-Pecos of Texas.

Hand-spray small brush to save bigger costs

The most cost-effective time to control mesquite is probably before you see it as a big problem. Usually you can see that big problem coming.

Left alone over time, mesquite gets bigger and more dense. It robs more moisture from grass and eventually alters the grass community around it.

To prevent that, Dow AgroSciences experts offer two methods of spraying small brush by hand. One method sprays the foliage; the other treats the stem.

LEAF-SPRAY WITH SENDERO® HERBICIDE

For easy application in the summer, the experts suggest leaf-spraying, also known as high-volume foliar application. Leaf-spraying works well on mesquite that's bushy, multistemmed and shorter than 8 feet tall.

The recommended mix for hand-spraying mesquite foliage is 1 percent Sendero® herbicide in water with a surfactant. See the leaf-spray mixing table on this page.

Spot applications of Sendero are limited to 1.75 pints per acre per year, so you'll need an idea of how much total volume you will apply as you hand-spray.

Adding a dye, such as Hi-Light blue dye, to the spray mix will help you see your coverage of the plant and mark the plants you've treated.

Observe the same factors of soil temperature, mesquite foliage and growing conditions as you would for broadcast application. (See "Follow five factors to control mesquite," Page 4.) However, the season for hand-spraying mesquite lasts longer.



Hand-spraying can extend the benefits of broadcast treatments.

You can start leaf-spraying in the spring after soil temperatures at a depth of 12 to 18 inches reach 75 F. Mesquite leaves should have changed from the light pea green to a uniform dark green of mature foliage. The hand-spraying period lasts through July for East and South Texas and through September for West Texas, Oklahoma and New Mexico.

Pump-up sprayers, backpack sprayers, cattle sprayers or sprayers mounted on all-terrain vehicles (ATVs) will all work. Make sure your sprayer has an adjustable cone nozzle capable of delivering coarse spray (large droplets).

STEM-SPRAY WITH REMEDY® ULTRA HERBICIDE

You can control mesquite and many other species, virtually anytime of year, by spraying the stems with a mixture of Remedy® Ultra herbicide and basal oil.

It works best on smooth-barked plants less than 6 inches in diameter. Susceptible species include mesquite, bois d'arc, oak, elm, huisache, locust, Chinese tallow, saltcedar and many others.

See the table here for mixing directions. Spray the mix all around the lower 12 to 15 inches of the trunk or stem. Spray until the bark is wet, but not to the point of runoff.

Use the same mix with Remedy Ultra to treat cut stumps to prevent resprouting. Soon after cutting, spray the entire cut surface until it's wet, especially the outer edges. Spray the sides of the stump and root collar also, almost to the point of runoff. •

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Herbicide mix for spot leaf-spraying mesquite*				
Ingredient	Concentration in spray solution	3 gal.	Tank size 14 gal.	25 gal.
Sendero® herbicide	1%	4 oz.	18 oz.	32 oz.
Surfactant	¼%	1 oz.	5 oz.	8 oz.
Dye	¼% to ½%	1 to 2 oz.	5 to 9 oz.	8 to 16 oz.

*All leaf-spray solutions are mixed in water.

25% herbicide mix for stem- and cut-stump sprays		
Total volume (tank size)	Remedy® Ultra herbicide	Basal oil or diesel fuel carrier
1 gallon	1 quart	3 quarts
3 gallon	3 quarts	9 quarts
4 gallon	1 gallon	3 gallons
5 gallon	1.25 gallons	3.75 gallons

Slay the mesquite, spare the habitat and do it all by air

If you ever thought you couldn't aerially spray mesquite because you wanted to save surrounding woody plants for wildlife, think again. You can now sculpt brush by air.

Recent research documents the unusual selectivity of Sendero® herbicide in aerial applications. Sendero offers a consistent, high level of control on mesquite. But it's gentle on oaks, willows, wild plum, bumelia (coma), lotebush and many other woody plants of value to wildlife.

"It's win-win," says Dr. Charlie Hart, a range scientist and market development specialist for Dow AgroSciences. "Ranchers want more grass for cattle, and hunters want cover — brush that makes wildlife feel comfortable. They don't want open pasture.

"At the same time, with a closed canopy of brush, you can't shoot an animal you can't see."

Historically, wildlife biologists have encouraged either selective mechanical clearing or individual plant treatment with herbicides to kill target brush and keep desirable brush. Sendero offers that opportunity by air, Hart says.

LESS MESQUITE, MORE DIVERSITY

In research trials before introduction, Sendero applied at 28 ounces per acre posted mesquite rootkills of 60 percent to 93 percent two years after treatment. It averaged 77 percent. But researchers noticed most other woody plants in the plots showed little or no damage. So they investigated further.

In 2013, 2014 and 2015, Hart and his cooperators sprayed new plots in Central and South Texas. In, with and under the mesquite was a wide variety of woody plants valued by wildlife. Early results are summarized in the nearby tables.

"By being selective, taking out the dominant, noxious brush species, Sendero allows the other plants to flourish and increase overall diversity over time," Hart says. "We still leave adequate cover and browse, and we produce more grass. That's good for wildlife habitat and for cattle."

Managing for multiple uses of rangelands can be a real benefit for ranchers, Hart says. Income from leased hunting can help stabilize returns compared with the boom-and-bust cycles of cattle-only enterprises.

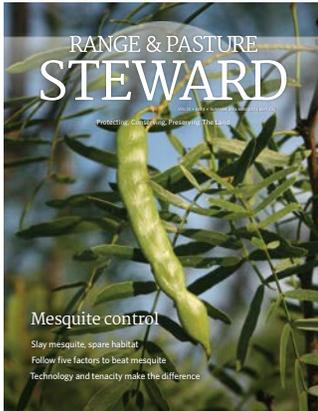
"Diversity in habitat promotes diversified revenue streams," he says. •

Central Texas		
Sendero® herbicide applied at 28 ounces per acre Results one year after treatment*		
Category	Species	Injury level
Tolerant	Algerita, buttonbush, bois d'arc, bumelia, ephedra, hawthorne, juniper, littleleaf sumac, liveoak, lotebush, wild plum, pricklyash, pricklypear, seep willow, soapberry, skunkbush sumac, tasajillo, whitebrush, wolfberry	Less than 25% canopy reduction; 0% mortality
Moderately susceptible	Hackberry	Less than 50% canopy reduction; less 50% mortality
Susceptible	Mesquite, honeylocust	More than 50% canopy reduction; More than 50% mortality

*Plant response may vary based on condition of the plant at time of herbicide application.

South Texas		
Sendero® herbicide applied at 28 ounces per acre Results one year after treatment*		
Category	Species	Injury level
Tolerant	Algerita, brasil, coma, colima, condalia, coyotillo, desert yaupon, elbowbush, guayacan, leatherstem, liveoak, lotebush, Mexican olive, pricklypear, retama, shrubby bluesage, Spanish dagger, wild olive, Texas persimmon, whitebrush	Less than 25% canopy reduction; 0% mortality
Moderately susceptible	Blackbrush, granjeno, huisache, kidneywood, lime pricklyash, tasajillo	Less than 50% canopy reduction; less 50% mortality
Susceptible	Catclaw, guajillo, huisachillo, mesquite	More than 50% canopy reduction; More than 50% mortality

*Plant response may vary based on condition of the plant at time of herbicide application.



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