Managing Smutgrass in Irrigated Pastures

JOSH DAVY, UCCE Livestock and Natural Resources Advisor, Tehama, Glenn, and Colusa Counties; LARRY FORERO, UCCE Livestock Advisor, Shasta County; GLENN NADER, UCCE Livestock and Natural Resources Advisor, Butte, Sutter, and Yuba Counties; JOSEPH DITOMASO, Extension Weed Specialist, University of California, Davis; GUY KYSER, UCCE Specialist, Department of Plant Sciences, University of California, Davis

Small smutgrass (Sporobolus indicus, also called smutgrass) is a tufted perennial grass native to tropical America (fig. 1). Although it occurs as a weed in many different areas, it is most problematic in pastures in the southern and western United States. Because smutgrass is unpalatable to livestock, animals avoid grazing it, and it quickly dominates irrigated pastures, causing significant reductions in livestock grazing capacity. Smutgrass is well adapted to the warm summer temperatures of the Sacramento Valley, particularly in irrigated areas. Its name is derived from a black fungus that often develops in its seed head in humid areas (fig. 2). This fungus has not been found in samples from the Sacramento Valley.

Smutgrass Biology

- Smutgrass is a warm-season perennial: it remains dormant in the winter, begins growing in spring, and produces seed from July to September, depending on elevation.
- Individual plants can produce up to 45,000 seeds per year.
Managing Smutgrass in Irrigated Pastures

ANR Publication 8473

Smutgrass Management

Herbicides

Glyphosate (Roundup)

Rotary wiper application of glyphosate. Rotary weed wipers have been used successfully in the southern United States and many other countries in pasture weed control (fig. 3). This equipment allows the operator to set the height of the rotating wiper above the desirable pasture plants and "wipe" the herbicide on the target weed. The wiper rotates on a drum that is driven by a belt connected to the tires. As the drum rotates it presses a herbicide-saturated carpet material against the leaves it contacts. The wiper can be pulled by a moderate-sized ATV or UTV with a 12-volt auxiliary connection or a direct connection to the battery.

For this technique to work effectively, it is critical that the desirable plants be shorter than the target weeds. Grazing animals can be used to reduce the height of the desirable plants, which will increase the selectivity of the herbicide to smutgrass. Timing of application is critical.

Figure 3. Rotary wiper.
Annual weeds can be controlled with glyphosate throughout most of their life cycle, but control is particularly effective when plants are young. Perennial weeds generally have significant root systems. To kill perennials, glyphosate should be applied after flowering when the plants are translocating sugars back to the roots or belowground reproductive structures (generally late summer and early fall).

Using a rotary wiper is significantly different from traditional broadcast spraying:

- Pesticide drift is reduced because the product is applied directly to the target plant.
- The application solution is much more concentrated than broadcast mixes.
- Desirable plants in the pasture should be grazed as close (short) as practical so that only ungrazed target weeds are exposed to the wiper. Make sure the wiper is set above the height of the desirable plants to avoid herbicide injury.
- The wipers tested for this publication had a push button that activated the pump that sprayed herbicide on the rotating carpet. Depending on the ground speed, the button had to be depressed for 1 to 5 seconds to spray the complete surface of the carpet as it rotated. The amount of time between pushing the button depended on the density of weeds being wiped. While the tendency is to continually press the button, this overfills the carpet, causing the herbicide to drip onto desirable vegetation.

- The greater the density of the weeds, the greater the volume of herbicide mix that must be applied.
- The Roundup WeatherMax label notes that application speed should not exceed 5 mph.

Read and follow all label instructions when applying herbicides. Two sections of the label are absolutely critical to applying glyphosate safely and effectively: the sections on application equipment and techniques (section 8.0 on the Roundup WeatherMax label) and the section on pastures (section 11.4 on the Roundup WeatherMax label). Glyphosate is not a restricted material; however, it does require that a use report be submitted to the local agriculture commissioner. For more information, call your local county agriculture commissioner’s office.

**Glyphosate concentrations.** The labeled concentration for Roundup WeatherMax (used in the UC wiper applications discussed in this publication) is 4.5 pounds per gallon. Other brands of glyphosate have different concentrations of active ingredient. If a product has 3 pounds per gallon of active ingredient, use 1.5 times as much (4.5 ÷ 3) to match the rates given in this publication. Thus, to reproduce the successful July treatment of 33% WeatherMax (4.5 lb/gal) discussed below, a 50% mixture using a glyphosate product (3.0 lb/gal) would need to be applied. Read the label to make sure you know the active ingredient concentration of the glyphosate product purchased.

The Roundup WeatherMax label notes that “solutions ranging from 33 to 100% of this product in water may be used in panel wiper applicators.” A 33% mixture would equal 42 ounces in 1 gallon of water. Table 1 gives the amount of Roundup WeatherMax to mix for rotary wiper applications.

When using a wiper in a pasture, the Roundup WeatherMax label notes the following

### Table 1. Amount of Roundup WeatherMax (4.5 lb/gal) to mix for rotary wiper application

<table>
<thead>
<tr>
<th>Desired volume</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33%</td>
</tr>
<tr>
<td>1 gal</td>
<td>0.33 gal (42 oz)</td>
</tr>
<tr>
<td>10 gal</td>
<td>3.3 gal</td>
</tr>
<tr>
<td>15 gal</td>
<td>5 gal</td>
</tr>
</tbody>
</table>
grazing restriction: “For spot treatments or wiper application methods using rates of 2 quarts per acre or less, the entire field or any portion of it may be treated. When spot treatments or wiper applications above 2 quarts per acre, no more than 10 percent of the total pasture may be treated at any one time. To achieve maximum performance, remove domestic livestock before application and wait 7 days after application before grazing livestock or harvesting for feed.”

The two areas of consideration for the effectiveness of glyphosate are the concentration of the applied material and the timing of application. Smutgrass is a perennial plant, and perennial plants translocate sugars to the roots after flowering. If applied during flowering, glyphosate is carried with the sugars to the roots, where it kills the plant. An unpublished study in 2010 by Kyser and Nader with wiper-applied Roundup WeatherMax (4.5 lb/gal concentration) at two rates (16% and 33%) with 3 timings (July 12, August 18, and September 15) demonstrated that the July 33% treatment was the most effective. The late-summer applications (August and September) injured the smutgrass but did not provide effective control.

Figure 4 shows smutgrass-treated plants 56 days after the July 12 application of 33% glyphosate. After the crown turned brown and appeared dead, the plant initiated yellowish-green shoots, most of which later died. Reemerging shoots in an adjacent section treated with 10% glyphosate were darker green in color. In an October evaluation, control was estimated at 95% in the 33% glyphosate and 90% in the 10% glyphosate plots. Figure 5 shows the progression of smutgrass death compared with an untreated untreated

Figure 4. Green shoot of smutgrass emerging 56 days after July 12 glyphosate wiper application. Most of these shoots later died.

Figure 5. Control of smutgrass at 10, 30, 64 and 94 days after a 33% glyphosate treatment in July.
green area around an irrigation valve in the front of the field. It is estimated that 2 additional years of control would be required to reduce the seed bank.

In a similar unpublished study by Davy and Betsy Karle, Roundup PowerMax (4.5 lb/gal) applied on September 13, 2010, at 33% percent provided far better control than did 10%, but gave nearly the same control as 68% (fig. 6). Lower-stature smutgrass often survived even high-concentration treatments because the plants were not in contact with the wiper applicator.

**Spot treatment with glyphosate.** Spot-spraying glyphosate onto isolated plants during the start of infestation is an effective practice. Applications of solutions of 1.5 to 2% Roundup in late September effectively controlled smutgrass (fig. 7). The spikelike seed head makes isolated plants easy to recognize in the pasture. Table 2 gives the amount of Roundup WeatherMax to mix for hand-held sprayers (from the Roundup WeatherMax label).

**HEXAZINONE (VELPAR)**
Hexazinone is a soil-based herbicide that is taken up by plant roots and foliage. Velpar L contains the "Danger" signal word and is a restricted-use pesticide; it is potentially damaging to oaks and other tree and shrub species. As such, applicators must leave a buffer zone between treated areas and trees. It should not be applied in areas where it could leach into groundwater or in situations where treated soil could wash away. Based on research conducted in Florida (fig. 8), some

![Figure 6. Roundup concentration and effectiveness on smutgrass, September 13, 2010.](image)

![Figure 7. Late-September glyphosate spot treatment of new smutgrass infestation.](image)

**Table 2. Mixing WeatherMax (4.5 lb/gal) for hand-held sprayers**

<table>
<thead>
<tr>
<th>Desired volume</th>
<th>0.5%</th>
<th>0.75%</th>
<th>1%</th>
<th>1.5%</th>
<th>2%</th>
<th>4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 gal</td>
<td>0.6 oz</td>
<td>1 oz</td>
<td>1.3 oz</td>
<td>2 oz</td>
<td>25 oz</td>
<td>5 oz</td>
</tr>
<tr>
<td>25 gal</td>
<td>1 pt</td>
<td>1.5 qt</td>
<td>1 qt</td>
<td>1.5 qt</td>
<td>2 qt</td>
<td>4 qt</td>
</tr>
<tr>
<td>100 gal</td>
<td>2 qt</td>
<td>3 gal</td>
<td>1 gal</td>
<td>1.5 gal</td>
<td>2 gal</td>
<td>4 gal</td>
</tr>
</tbody>
</table>
agencies are recommending Velpar L at 4.5 pints per acre for control of smutgrass.

In a trial conducted in 2010 on an irrigated pasture in Marysville, California, Velpar L was applied at 4.5 pints per acre at three timings, February, March, and April (fig. 9). Smutgrass control was only 30 to 50%, with little difference among timings. The difference in results between Florida and Marysville may be due to soil texture. In fine-textured or high-organic-matter soils, hexazinone binds tightly to soil particles and is not as available for root uptake as in coarse soils. The Florida experiments were conducted on sandy soils with low organic matter; the Marysville study was on a silty clay loam with 1.5% organic matter.

Grazing
It is not understood why livestock avoid grazing smutgrass. Grazing may be limited by the plant’s low nutritional content, the very coarse leaves, or perhaps a secondary compound such as alkaloids.

The protein concentration of smutgrass in June starts out at acceptable levels, but in the absence of grazing it declines to levels near the value of rice straw (fig. 10), which would not support even dry (nonlactating) cows. Clipping smutgrass every 30 days can increase protein levels, but the levels ultimately drop back down in October, likely due to the onset of dormancy.

Acid detergent fiber (ADF) is a chemical test that can be used to estimate the energy levels of feeds. The higher the level of ADF, the lower the energy available to the animal. Ungrazed smutgrass has much less ADF than rice straw and is about the same as fescue hay (fig. 11). Clipping it every 30 days further reduced fiber content and increased its available energy content.

Neutral detergent fiber (NDF), which includes the entire fiber fraction captured in ADF and also hemicellulose, is used to estimate intake
by animals. In September, ungrazed smutgrass has a higher NDF than rice straw and fescue hay, whereas clipped smutgrass has a much lower fiber fraction and a marked reduction (fig. 12). The lower in NDF value, the higher the available energy and estimated intake of forage by grazing animals.

Some producers have used intensive grazing to reduce the animals’ grazing selectivity. One producer uses a stocking rate of 42 cows per acre on 2.5-acre pastures with an average 21-day rotation. The results can be seen in figures 13 and 14. If the infested field is hayed in the spring and kept grazed down and more vegetative, the nutritional value of smutgrass increases. This method does not eliminate or reduce the weed, but it does diminish its negative effects on pasture intake.

**Irrigation**

Research conducted by Davy and Karle in Glenn County, California, studied the impact of optimizing irrigation intervals on a smutgrass population in a very well-drained soil. They found
that treatments normally irrigated on a 14-day schedule had higher smutgrass composition than pasture treatments more optimally irrigated on a 7-day schedule (fig. 15). Desirable forage grasses showed a corresponding increase in cover. The production response was also very favorable.

Mechanical attempts to remove the plant, such as plowing, can lead to soil disturbance, which can increase the infestation. Some managers have plowed pastures and reseeded them. However, the smutgrass seedbank in the soil leads to rapid reinestation. Given that seed survive for 2 years or more, pastures must be left fallow for an extended period or rotated to another crop to eliminate smutgrass.

Drying

In California, it is possible to stop irrigation for the summer and allow the pasture to dry. In some locations, this has killed smutgrass. This practice can be followed by seeding a new pasture in the fall with a no-till drill. However, smutgrass seeds in the soil may reinfect the site.

Biological Control

There have been no biological control efforts for this weed in the United States.

References


Measurement Conversion Table

<table>
<thead>
<tr>
<th>U.S. Customary</th>
<th>Conversion factor for U.S. Customary to Metric</th>
<th>Conversion factor for Metric to U.S. Customary</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>acre (ac)</td>
<td>0.4047</td>
<td>2.47</td>
<td>hectare (ha)</td>
</tr>
<tr>
<td>miles per hour (mph)</td>
<td>1.61</td>
<td>0.62</td>
<td>kilometers per hour (k/h)</td>
</tr>
<tr>
<td>ounce, fluid (oz)</td>
<td>29.57</td>
<td>0.034</td>
<td>milliliter (ml)</td>
</tr>
<tr>
<td>quart, liquid (qt)</td>
<td>0.946</td>
<td>1.056</td>
<td>liter (l)</td>
</tr>
<tr>
<td>pint, liquid (pt)</td>
<td>0.473</td>
<td>2.11</td>
<td>liter (l)</td>
</tr>
<tr>
<td>gallon (gal)</td>
<td>3.785</td>
<td>0.26</td>
<td>liter (l)</td>
</tr>
<tr>
<td>gallon per acre</td>
<td>9.36</td>
<td>0.106</td>
<td>liter per hectare (l/ha)</td>
</tr>
<tr>
<td>°F</td>
<td>°C = (°F – 32) ÷ 1.8</td>
<td>°F = (°C ´ 1.8) + 32</td>
<td>Celsius (°C)</td>
</tr>
</tbody>
</table>

For Further Information

To order or obtain ANR publications and other products, visit the ANR Communication Services online catalog at http://anrcatalog.ucanr.edu or phone 1-800-994-8849. You can also place orders by mail or FAX, or request a printed catalog of our products from

University of California
Agriculture and Natural Resources
Communication Services
1301 S. 46th Street
Building 478 - MC 3580
Richmond, CA 94804-4600
Telephone 1-800-994-8849
510-665-2195
FAX 510-665-3427
E-mail: anrcatalog@ucanr.edu

©2012 The Regents of the University of California
Agriculture and Natural Resources
All rights reserved.

Publication 8456

The University of California prohibits discrimination or harassment of any person on the basis of race, color, national origin, religion, sex, gender identity, pregnancy (including childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services (as defined by the Uniformed Services Employment and Reemployment Rights Act of 1994: service in the uniformed services includes membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services) in any of its programs or activities.

University policy also prohibits reprisal or retaliation against any person in any of its programs or activities for making a complaint of discrimination or sexual harassment or for using or participating in the investigation or resolution process of any such complaint.

University policy is intended to be consistent with the provisions of applicable State and Federal laws.

Inquiries regarding the University’s nondiscrimination policies may be directed to the Affirmative Action/Equal Opportunity Director, University of California, Agriculture and Natural Resources, 111 Franklin Street, 6th Floor, Oakland, CA 94607, (510) 987-0096. For information about ordering this publication, telephone 1-800-994-8849. For assistance in downloading this publication, telephone 530-754-3927.

To simplify information, trade names of products have been used. No endorsement of named or illustrated products is intended, nor is criticism implied of similar products that are not mentioned or illustrated.

An electronic copy of this publication can be found at the ANR Communication Services catalog website, http://anrcatalog.ucanr.edu.

This publication was anonymously peer reviewed for technical accuracy by University of California scientists and other qualified professionals. This review process was managed by ANR Associate Editor Chair Mary Louise Flint.

web-7/12-SB/WFS