Managing Yaupon in the Post Oak Savannah

Yaupon can be effectively managed during March or June, with individual plant treatments of triclopyr and diesel, which can be an effective tool for restoring fragmented grassland savannahs.

By James C. Cathey, Rob Mitchell, Brad Dabbert, Dale F. Prochaska, Stephanie DuPree, and Ron Sosebee

Introduction

Yaupon (*Ilex vomitoria*) is a common understory plant in the Texas Post Oak Savannah Ecological Region. This region is a relatively long and narrow ecosystem, stretching from the Red River to San Antonio, Texas. It is bordered by the Pineywoods on the east, the Blackland Prairies on the west, and the Coastal Prairies on the south. Reports indicate that Native Americans used yaupon as a purging agent (hence its scientific name), a response to the high caffeine content and subsequent effects on the digestive system. Negative physical effects on birds and mammals are not known, but many wildlife species use yaupon leaves and berries for food and the entire plant for cover. It is a native, multistemmed, evergreen, thicket-forming shrub that sprouts from the base following top removal.[1] In recent years, yaupon density has increased, and reduced or excluded other vegetation in the understory of the Post Oak Savannah (Fig. 1), reducing useable space for wildlife and livestock.

Figure 1. Dense thickets of yaupon reduce grasses and forbs, Anderson County, Texas.

Yaupon likely gained a competitive advantage when early settlers began to suppress wildfires. Once wildfires became less prevalent, grasses and forbs declined, and woody vegetation, including yaupon, increased. Today, much of the Post Oak Savannah resembles a woodlot rather than a savannah. The strong sprouting ability of the plant has limited the long-term control of mature plants with prescribed burning or cutting (Fig. 2). Consequently, management efforts to reduce yaupon density and restore the flora and fauna of the Post Oak Savannah will require the use of herbicides, likely combined with mechanical treatments or fire.

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Table 1. Cost to treat individual plants using the spray-only treatment with different concentrations of Garlon 4 at Gus Engeling Wildlife Management Area					
Garlon 4 concentration (%)	Cost/gallon of solution	Cost of solution/tree	Cost to treat each tree	Treatment mortality (%)	Cost per dead tree
0 (Diesel only)	2.05	0.04	0.17	96	0.18
5	6.44	0.13	0.26	100	0.26
10	10.84	0.22	0.35	96	0.36
20	19.64	0.40	0.53	96	0.55
25	24.03	0..49	0.62	100	0.62

Cost estimates assume diesel costs of $2.05/gallon, Garlon 4 costs of $90/gallon, and labor costs of $13/hour. Additionally, we treated 100 trees per hour and used an average of 2.6 oz of herbicide solution/tree.

Figure 2. Top removal using the stump-cut method did not kill this yaupon control plant. Vigorous sprouting soon follows top removal.

The suggested method for managing yaupon in Texas is to apply an individual plant treatment (IPT) of 25% Remedy (triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, butoxyethyl ester, 61.6%) in diesel to the lower 12–18 inches of the trunk to wet completely around the trunk at any time during the year.[2] Although this treatment has resulted in very high levels of control, little research has been conducted on other treatment options that may be more cost effective. Our objective was to develop multiple treatment options for managing yaupon to meet different management objectives and to evaluate yaupon response to treatments applied at different times of the year.

This study was conducted in 2002 and 2003 at the Gus Engeling Wildlife Management Area (WMA) in Anderson County, which is located within the Post Oak Savannah Ecological Region of Texas (Fig. 3). This property serves as a research and demonstration area and is operated by Texas Parks and Wildlife Department. Sites at Gus Engeling WMA were selected based on accessibility and the presence of an adequate yaupon density for evaluation.

We evaluated treatment combinations of mechanical removal by cutting, basal applications of herbicides, and mechanical removal plus cut-stump applications of herbicides during March and June at Gus Engeling WMA. Twenty-five replicates (shrubs) of each treatment were applied in March (March 7, 2002) and June (June 11, 2002) in a completely random design. Herbicide treatments were IPT basal applications of 0, 5, 10, 20, and 25% concentrations of Garlon 4 (triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, butoxyethyl ester, 61.6%) delivered in diesel. Mechanical-plus-herbicide treatments were cut only with a chainsaw, or cut and treated with 0, 5, 10, 20, or 25% Garlon 4 in diesel. Plants receiving the 0% herbicide were treated with diesel only. Mortality (no living tissue visible; Fig. 4) was evaluated 15 months after treatment application in June 2003 for March treatments and September 2003 for June treatments.

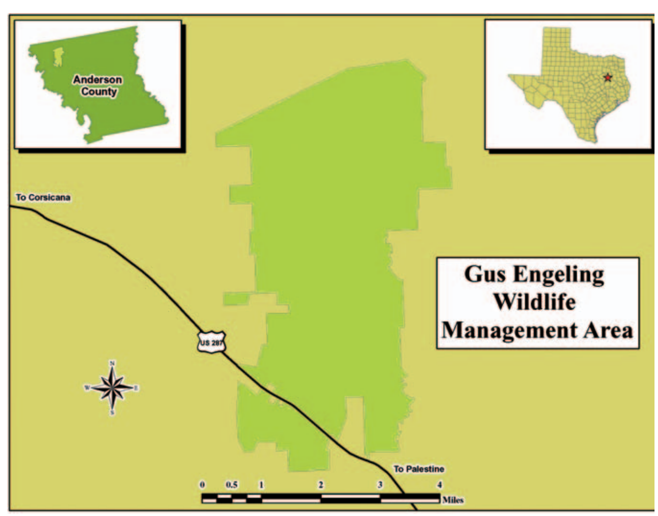

Figure 3. This study was conducted at Gus Engeling Wildlife Management Area in Anderson County, Texas.

Figure 4. Stump-cut treatment combined with Garlon 4 resulted in the death of this yaupon plant.

Results

Height of the 600 treated trees averaged 10.6 feet and ranged from 2 to 24.3 feet tall. Treated trees had an average of 3.5 stems per plant and ranged from 1 to 27 stems per plant. Stem diameter of treated trees ranged from 0.1 to 3.2 inches with an average stem diameter of 1.1 inches. There was no difference ($P = 0.5402$) in yaupon mortality for treatments applied in March or June. Yaupon mortality averaged 79% for March-applied treatments and 80% for June-applied treatments.

Treatments were different ($P < 0.0001$), and all treatments killed yaupon (Fig. 5). Mortality due to cutting (6%) was similar to the natural mortality of nontreated trees (2%). However, cutting followed by spraying with diesel or 5% Garlon 4 resulted in a 10% unit increase in mortality over spraying alone. Cutting and spraying with diesel or 5% Garlon 4 resulted in 96–100% mortality. None of the spraying-only treatments achieved 100% mortality.

There was a significant treatment by season interaction ($P = 0.0642$). The numerically largest difference in mortality across seasons occurred in the trees treated with a basal application of diesel (Fig. 6). Trees treated with diesel in March had a 12% unit greater mortality than those treated in June. Conversely, trees treated with 5, 10, and 25% concentrations of Garlon 4 in June had significantly greater mortalities when compared with trees treated during March. In general, as Garlon 4 concentration increased, yaupon mortality increased.

All cut-and-spray treatment combinations resulted in at least 92% yaupon mortality, regardless of time of application (Fig. 7). The only difference in mortality across seasons was for trees that were cut and treated with diesel. Yaupon mortality was 100% for 6 of the 10 cut-and-spray treatments, with 4 treatments applied during March and 2 applied during June. The 92% mortality for trees that were cut and treated with 25% Garlon 4 likely resulted from stems being missed during spraying.

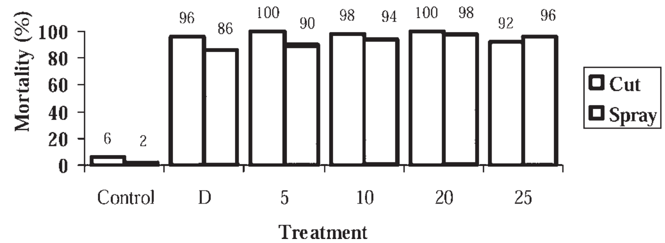

Figure 5. Treatment effects on yaupon mortality, averaged across season of application. Cut treatments represent treatments in which herbicides were applied following top removal by chainsaw. The spray treatments were applied to intact shrubs by basal applications of diesel or as 5, 10, 20, or 25% concentrations of Garlon 4. LSD(0.05) = 8.

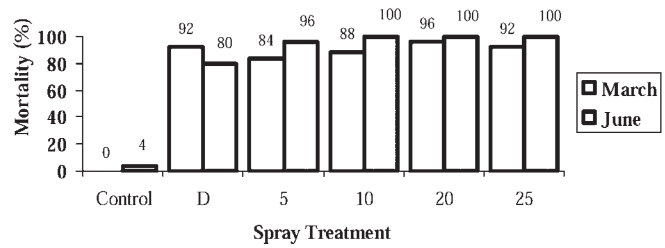

Figure 6. Treatment-by-season interaction effects on yaupon mortality. The spray treatments were applied in March and June 2002 as basal applications of diesel or as 5, 10, 20, or 25% concentrations of Garlon 4.

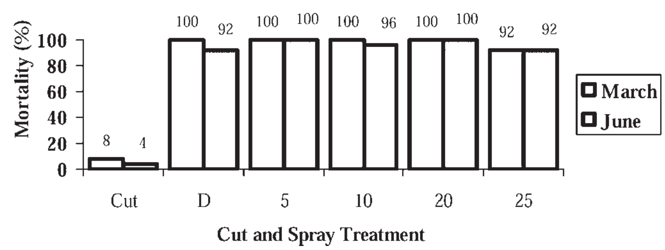

Figure 7. Treatment-by-season interaction effects on yaupon mortality. The cut-and-spray treatments were applied in March and June 2002 by removing the tree and immediately spraying the stump with diesel or with 5, 10, 20, or 25% concentrations of Garlon 4.

Suggested Treatments

We suggest selecting the treatment based on your management objective. For example, if you are clearing a fence line, your goal is to kill and remove all of the yaupon. In that situation, cutting and spraying the stumps with diesel or 5% Garlon 4 usually resulted in 96–100% mortality and would be an excellent choice. The 5% Garlon 4 treatment may add some insurance over the diesel treatment. However, if leaving standing dead trees and 80–90% mortality is an acceptable outcome, a basal application of diesel or 5% Garlon 4 would require less labor input than cutting and spraying and is much less expensive than higher herbicide concentrations (Table 1). Based on our data from treatments applied during March and June, IPT applications of 25% concentrations of Garlon 4 were no more effective than 10% concentrations of Garlon 4 and, in some cases, no more effective than diesel alone. Consequently, it is not necessary to apply 25% concentrations of Garlon 4 to achieve very high yaupon control. Although we did not use Remedy as suggested by others,[2] Garlon 4 has the same concentration (61.6%) and acid equivalent (44.3%; 4 pounds/gallon) of triclopyr.

Yaupon is a plant that can be readily controlled in most situations. We have provided several alternatives for managing yaupon, each of which could be tailored to a specific management situation and budget. However, early response to the problem is the key. Monitoring habitat and responding to yaupon invasions early will reduce the negative impacts of yaupon and make more treatment options available (ie, prescribed burning). If yaupon becomes too dense before treatment, grass production will be limited, which reduces the grazing value of the site, and wildlife habitat heterogeneity will be reduced. Additionally, increased yaupon density will restrict the ability to use prescribed burning as a management tool because of the reduced grass production on the site. When using prescribed burning as a follow-up method to IPT, grazing pressure must be monitored to ensure adequate fuel loads for burning. Early treatment will lower treatment costs because IPT costs increase as stem density increases. Additionally, early treatment will reduce the time required to return the Post Oak Savannah to productive wildlife habitat and grazing lands.

Authors are Assistant Professor and Extension Wildlife Specialist at Texas A&M University, Department of Wildlife and Fisheries Sciences, Rm. 210 Nagle Hall, College Station, TX 77843, jccathey@tamu.edu (Cathey); Rangeland Scientist with US Department of Agriculture–Agricultural Research Service (USDA-ARS), University of Nebraska, 344a Keim Hall, East Campus, Lincoln NE 68583 (Mitchell); Associate Professor (Dabbert), former graduate assistant (DuPree), and Professor (Sosebee), Texas Tech University, Department of Range, Wildlife, and Fisheries Management, Box 42125, Lubbock, TX 79409; and Wildlife Biologist, Texas Parks and Wildlife Department, Kerr Wildlife Management Area, 2625 FM 1340, Hunt, TX 78024 (Prochaska). *This paper is a joint contribution of the USDA-ARS, Texas A&M University, and Texas Tech University and is published as Texas Tech University Journal Series T-9-1069.* *Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the USDA, Texas A&M University, or Texas Tech University. Always read and follow label directions.*

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