

Current Report

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Range Improvement Studies - 1984

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Range Improvement with Atrazine, Fire, and N-Fertilization

About 70% of the state's native rangeland is in either poor or fair condition. A study was begun in April 1984 to evaluate atrazine, prescribed burning, and nitrogen fertilization for improving range condition and forage production on poor to fair condition range.

Study sites were located in Payne (Lake Carl Blackwell area) Osage (Pawhuska Research Station), and Okmulgee (Morris, area) counties. Range condition was poor to fair at the sites (site descriptions and species composition information are presented in Table 1). Atrazine (trade name Aatrex 4L) was applied in late-March to early-April at 1 lb/A. Plots were burned in late-April just prior to green-up. No burn was conducted at Pawhuska as the grasses were too green to burn. Nitrogen fertilizer at the rate of 33 lbs. actual N/acre was applied in mid-May. Grass and forb yields were measured in July (Pawhuska and Morris) or August (Lake Carl Blackwell). Rainfall at all sites was about 50% of normal for May-August.

Results

Lake Carl Blackwell Site

Atrazine provided some control of broadleaf weeds and excellent control of annual grasses (primarily sixweeks fescue) (Fig. 1). Burning reduced broadleaf weeds by about 75% and also controlled annual grasses. Highest herbage production was from N-fertilized plots, however nearly 50% of the yield was undesirable forbs and annual grasses. Atrazine and atrazine + N plots had the highest yields of perennial grasses. There were no differences in grass production between the burn only plots and untreated areas, but burning did suppress grass yields as compared to unburned, atrazine-treated areas. Burned plots had a more desirable species composition as evidenced by increased amounts of big bluestem, indiagrass, and decreaser legumes.

Morris Site

Atrazine, alone and in combination with burning and N-fertilization, provided excellent

Table 1. Descriptions of study sites for atrazine, fire, nitrogen studies.

Site	County	Range Site	Range Condition	Major Species
Lake Carl Blackwell	Payne	Shallow Prairie, Loamy Prairie	Low Fair	Sideoats grama, broomweed, sixweeks fescue, heathaster
Watson Ranch	Okmulgee	Loamy Prairie	High Fair	Little bluestem, lanceleaf ragweed, bitter sneezeweed
Pawhuska	Osage	Loamy Prairie	High Fair	Big and little bluestem, lanceleaf ragweed

Table 2. Descriptions of study sites for atrazine vs. 2,4-D studies.

Site	County	Soil Type	Primary Grasses	Primary Weeds
Lake Carl Blackwell	Payne	Sandy-loam	Big and little bluestem, sideoats grama	Annual broomweed, whiteheath aster
Downy Ranch	Payne	Sandy-loam	Bermudagrass, tall dropseed	Western ragweed
Pawhuska	Osage	Clay-loam	Big and little bluestem, indiagrass	Lanceleaf ragweed, western ragweed, whiteheath aster

control of annual broadleaf weeds (mostly lanceleaf ragweed and bitter sneezeweed) and produced the highest grass yields (2200-2800 lb/A compared to 600 lb/A for untreated areas). Burning, either alone or with N-fertilization, reduced weeds, but increased grass yields only slightly. However, burned plots did contain a higher percentage of big bluestem and indiagrass than did unburned plots. The lowest grass and highest weed yields were from untreated and N-fertilized plots.

Pawhuska Site

Atrazine at 1 lb/A did not control lanceleaf ragweed at this site. However, there

were some increased grass yields with atrazine alone and atrazine + N. Nitrogen alone had little effect on grass or forb yields.

Summary

Range condition was improved by the atrazine and burning treatments, but was not improved by N-fertilization alone. Nitrogen fertilization of poor or fair condition range is usually not recommended because it can increase production of undesirable annual grasses and broadleaf weeds. Generally, atrazine + N yielded the most forage of any treatment, but the additional costs of N fertilizer (\$10/acre for 33 lbs. of N) tend to make fertilization

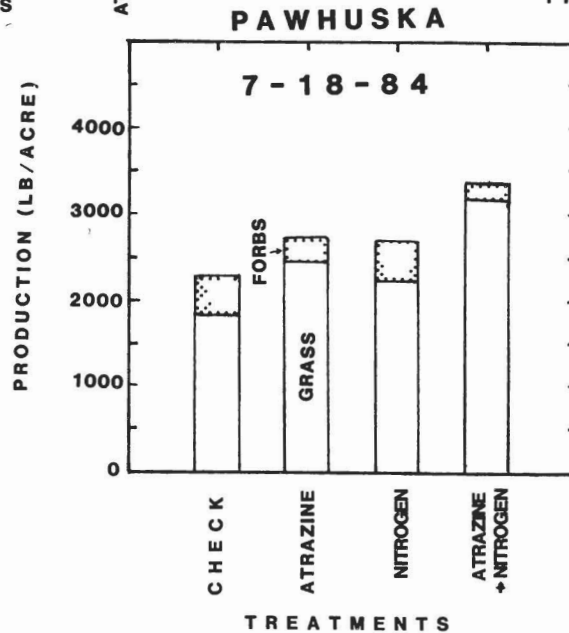
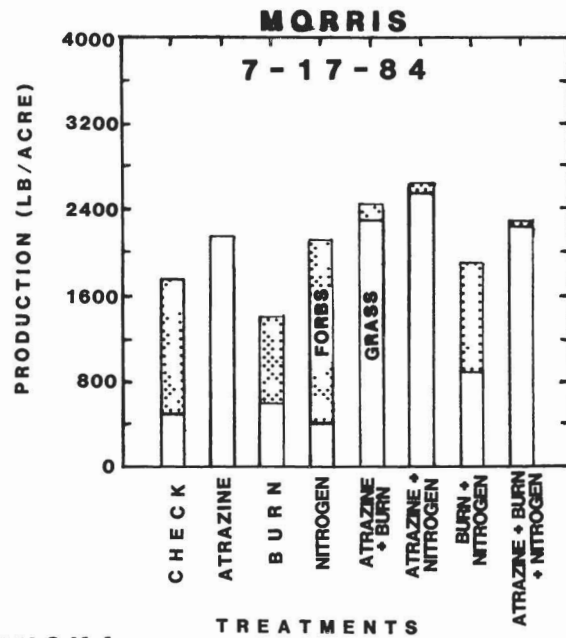
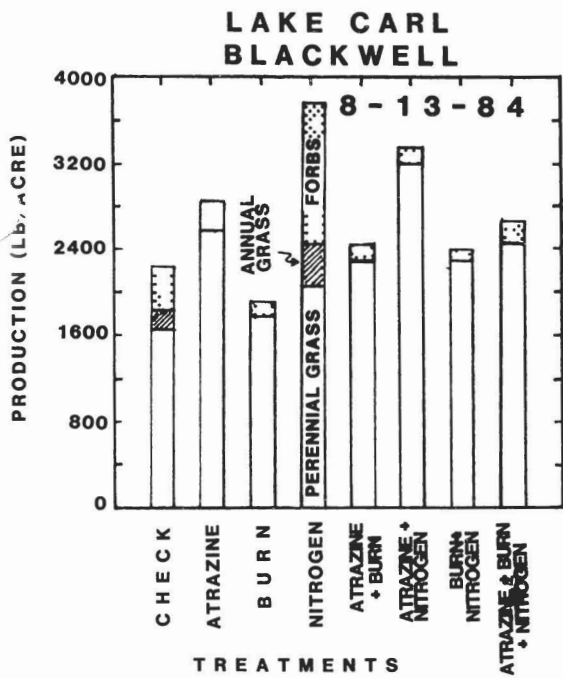


Figure 1. Grass and forb standing crop following atrazine, burning, and N-fertilization.

unprofitable when compared to atrazine alone (\$5.50/acre) (Table 3).

Burning improved species composition by promoting big bluestem, indiagrass, and desirable legumes like catclaw sensitivebriar and leadplant. The combination of burning and atrazine appeared to be a good way of improving species composition and forage production at a reasonable cost (\$7.50/acre).

Once range condition is improved, proper grazing management involving a planned grazing system will help maintain the condition and vigor of the range plants. Continuous grazing tends to promote spot-grazing, and thus even at light stocking rates, some portions of the pasture are overgrazed. Rotational grazing tends to maintain or improve range condition without sacrificing animal performance if

Table 3. Costs for various treatments in 1984.

Treatment	Cost (\$/A) ^a
Atrazine (1 lb/A)	5.50
Atrazine (2 lb/A)	8.00
2,4-D (0.5 lb/A)	4.25
2,4-D (1.0 lb/A)	5.50
Burn	2.00
Nitrogen (33 lbs. N/A)	10.00
Atrazine + Burn	7.50
Atrazine + N	15.50
Burn + N	12.00
Atrazine + Burn + N	17.50

^aIncludes \$3.00/A for aerial spraying.

properly implemented. Grazing systems promote range improvement by providing alternating graze-rest periods that restore the vigor to desirable grasses.

Comparison of 2,4-D and Atrazine for Broadleaf Weed Control

Weeds compete with desirable forages for light, water, and nutrients, resulting in decreased forage production. For years, 2,4-D has been the most common means of controlling broadleaf weeds in grasslands because of its effectiveness and relatively low cost (\$3-6/acre). However, 2,4-D does not control weedy annual grasses such as Japanese brome and little barley which are often encountered on grazing lands. There has been considerable interest and use of atrazine for these weedy grasses since Aatrex received label clearance in 1983. This label plus competitive pricing with

2,4-D, has prompted many producers to inquire about the relative performance of atrazine versus 2,4-D for broadleaf weed control.

Studies were initiated in April 1984 to compare the relative effectiveness of these two herbicides for weed control on grazing lands. Experiments were established at three sites: two in Payne County west of Stillwater, and the third in Osage County at the Pawhuska Research Station (see Table 2 for details on sites). Treatments included atrazine at 1 and 2 lb/A and 2,4-D low volatile ester at 1/2 and 1 lb/A. Atrazine was applied in mid-April when cool-season annual grasses were 2-4 inches in height and summer annual broadleaf weeds were germinating to 2 inches in height. Applications of 2,4-D were made in May when plants were from 6-8 inches in height. Plots were evaluated in mid-July for weed control and grass production.

Results

Lake Carl Blackwell Area

All herbicide treatments provided some weed control and increased grass production compared to the untreated area (Fig 2). Excellent control of annual broomweed was achieved with all herbicide treatments. Aster control was good with all treatments except the 1 lb/acre rate of atrazine.

Downy Range Area

This site was a mixture of native grasses and bermudagrass with western ragweed being the major weed (Table 2). Control of western

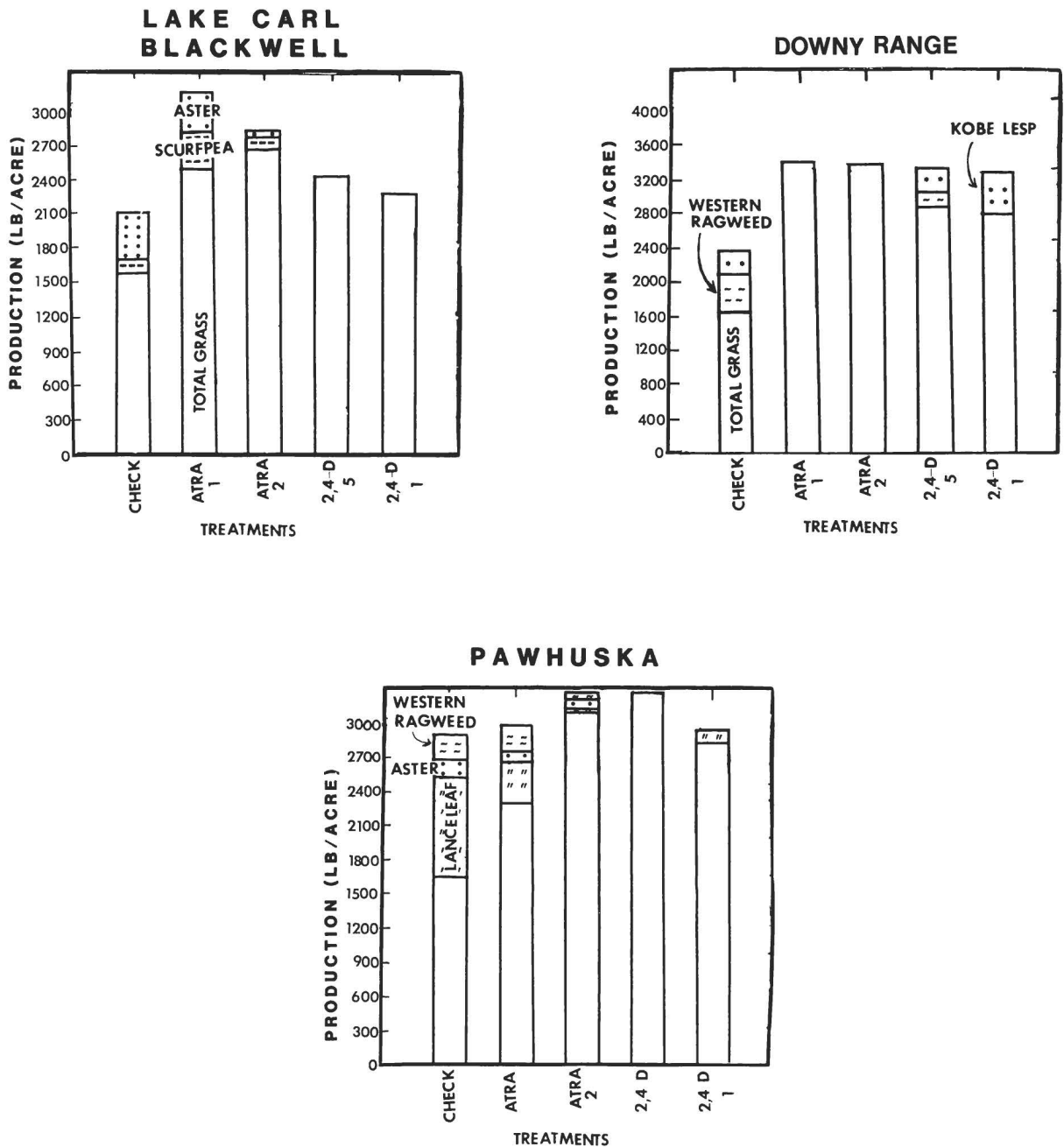


Figure 2. Grass and forb standing crop following herbicide treatments.

ragweed was good (better than 90% stem reduction and yield reduction) with all treatments except the 1/2 lb/A rate of 2,4-D. Grass production was doubled with the two atrazine treatments (1600 lb/A for untreated area as compared to 3200 lb/A for atrazine) and increased about 75% with the 2,4-D treatments (about 2800 lb/A). Kobe lespedeza, an annual legume, was not affected by

2,4-D, but was eliminated by both rates of atrazine.

Pawhuska Research Station

This site was native prairie in fair condition dominated by lanceleaf ragweed with some western ragweed and white heathaster. Control of western and lanceleaf ragweeds and

asters was good with both rates of 2,4-D. The 1 lb/A rate of atrazine controlled no western ragweeds and gave only fair control of lanceleaf ragweed and asters. The 2 lb/A rate of atrazine resulted in good control of lanceleaf ragweed, but only partial control of western ragweed and asters. Excellent grass release (over 70% increase) resulted from all treatments except the 1 lb/A rate of atrazine (only 37% increase).

Summary

Both 2,4-D and atrazine should be considered for weed control programs on grazing lands. Cost estimates for the various treatments in 1984 are listed in Table 3. If weedy grasses such as bromes or annual threeawn are a problem, then atrazine should be used. If annual legumes (such as lespedeza) are present, then 2,4-D should be used since atrazine will eliminate most annual legumes, whereas some selective control is possible with 2,4-D. Also, if the site has predominantly broadleaf weeds and brush problems (such as sumac or buckbrush),

then 2,4-D should be used. Atrazine is a good choice on overgrazed areas where a serious annual broadleaf weed problem exists. Atrazine applied in early spring (March-April) will give good control of annual warm-season weeds like common broomweed, lanceleaf ragweed, and bitter sneezeweed. However, the 1 lb/A rate of atrazine is probably marginal for control of some of the perennial broadleaf weeds found on grasslands, and for control of some annual weeds on soils with higher clay and organic matter content.

Currently, atrazine (sold as Aatrex) is labeled cleared for only 1 lb/A rate on native range and Old World bluestems. Rates of up to 2 lb/A are allowed on bermudagrass. Atrazine does have a 60 day grazing restriction, so applications should be conducted by March 15 to allow grazing by May 15. Also, areas treated with atrazine cannot be cut for hay during the year of application. Always read and follow label directions when using any herbicide.



Comparison of grass with and without Atrazine treatment. Left is mixture of Lanceleaf ragweed and grasses. Right is native grass release with one pound of Atrazine Treatment.

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