The Oklahoma Annual Grasslands

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> "There has been much written . . . within the last ten years about the deterioration of the ranges. Cattlemen say that the grasses are not what they used to be; that the valuable perennial species are disappearing, and that their place is being taken by less nutritious annuals. This is true in a very marked degree in many sections of the grazing country."

Sound familiar? Surely this "blinding glimpse of the obvious" must have surfaced as a result of a recent research effort. On the contrary, this quote by Jared G. Smith was published in the 1895 *Yearbook of Agriculture.* These observations are just as applicable today, perhaps even more so today than 90 years ago on many rangelands of the Southern Great Plains.

When range managers think of "annual grasslands," one's thoughts turn immediately to the California annual grasslands. Historically, much of California was dominated by purple needlegrass, but by 1900 most perennial grasses had given way to exotic annuals like wild oats, bromes, fescues, and others.

Rangeland change in the southern Great Plains, specifically Oklahoma, is relatively more recent in the sense that livestock grazing here is only about 100 years old. While some cattle were present as early as the 1880's, yearlong livestock grazing on rangeland was not common until after statehood in 1907. However, over much of Oklahoma's 20 million acres of rangeland, there has been a pronounced trend away from desirable perennial grasses towards the less desirable annual species. An inspection of many sites in early June reveals a beige-colored landscape of sensescing annual bromes instead of vigorous, green mid- and tallgrasses (Fig. 1). Similarly, in October the aspect is not always one of rust-colored little bluestem, but rather the tawny, short-statured annual threeawn.

The Good Guys and the Bad Guys

Historically, Oklahoma was dominated by prairie. As you travelled from the panhandle eastward, you might have passed through shortgrass prairie with its buffalograss and blue grama, made your way into a mixed prairie of little bluestem and sideoats grama, and at last gazed over the southern extension of the tallgrass prairie with its head-high big bluestem, switchgrass, and indiangrass. Today, these "good guys" are battling for water, nutrients, sunlight, space, indeed for survival, against an army of invading annuals.

Most of the annual species, the "bad guys", are of the cool-season persuasion, including the bromes, little barley, and sixweeks fescue (Fig. 2). As far as warm-season annuals, oldfield threeawn, also referred to as ticklegrass or wire-grass, is the primary culprit.

Annual grasses can be a real problem over much of the Southern Great Plains. This Sandy Savannah range site, shown here on June 6, 1985, has a severe infestation of annual bromes. This site is capable of supporting productive stands of perennial tallgrasses.

Each year, the battle for the possession of much of Oklahoma's range is waged between these two adversaries, the desirable perennials versus opportunistic annuals. The native prairie grasses may have the "home field" advantage and years of experience, but the advantageous annuals are rapidly exploiting the system. With allies like livestock overgrazing, drought, and summer wildfires, the annuals gain ground each year. Other allies like annual and perennial broadleaf weeds assisted by increasing brush densities which suppress the vigor of palatable forage plants place a

Cool-season annual grasses like this annual brome compete with desirable perennial grasses for moisture and other nutrients.

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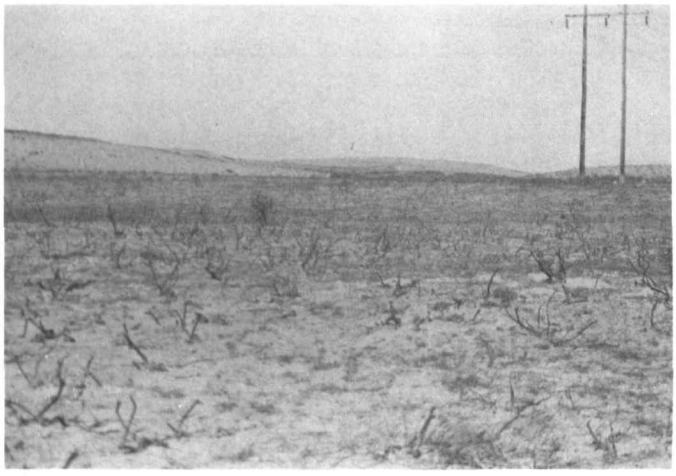

The opportunistic nature of the annuals can be beneficial in some instances as shown in (a) where a summer wildfire in July 1983 left this sandhill range near Woodward, Oklahoma, bare throughout much of the winter months. A dense stand of sixweeks fescue covered the area by May 1984 (b) and helped to curtail wind erosion.

heavier grazing pressure on the desirable plants that remain. Slowly, but surely, desirable perennials become weakened and give way to the annuals.

Annuals: Friend or Foe

Annual grasses are not always viewed as undesirable. Indeed, they can assume a "Dr. Jeckyl and Mr. Hyde" appearance. Oklahoma rangelands have few cool-season perennial grasses, thus cattlemen are always glad to see a good crop of "wintergrass" to help hungry cows with protein-deficient diets make it through the unpredictable Oklahoma winters. Such favorable views are evident in common names like "rescuegrass" for *Bromus catharticus*. It's true that the cool-season annuals do provide some green grazing during the winter months and into April. However, the bulk of the forage production from these annuals is produced from May 1 to June 1 at a time when the warm-season grasses are actively growing and neither forage quantity nor quality is limiting. Once the annuals produce seedheads, forage quality deteriorates rapidly and cattle refuse to graze them. By that time however, much of the damage to the native grasses has already been done.

One of the basic tenets of ecology is that "nature abhors a vaccuum." As perennial grasses become weakened through continuous overutilization, areas of bare soil are exposed. The influx of annuals into these sites is simply Nature's way of protecting the soil. An example of this was the sequence of events that transpired following a late-summer wildfire in 1983 near Woodward, Oklahoma on a range dominated by sand sagebrush. The fire left this sandy area bare throughout most of the winter, but in April the area was covered with a blanket of sixweeks fescue. In this instance, the annual invasion was beneficial as it minimized wind erosion.

The other "face" of the annual grasses is reflected in the common name "cheatgrass" for various *Bromus* species. Indeed, this name seems appropriate because the annuals, by competing at the right time of year, cheat the perennials out of the soil moisture and nutrients that are needed for summer growth and production. In Oklahoma, most precipitation is received during the spring months. This wet period is frequently followed by 2 to 3 months of very dry weather starting about June 15th. In these years, the annuals have utilized most of the available soil water, thus "cheating" the desirable perennials of the opportunity for maximum growth.

The "cheating" continues in other ways also. Attempts at increasing forage production by nitrogen fertilization usually result in increased production all right, but of annuals, not the desired perennials. In one study, a poor condition range was fertilized and total grass production was increased some 10-fold. However, most of the response was from the unpalatable annual threeawn. Similarly, other attempts at nitrogen fertilization on native range must be approached cautiously to prevent undesirable shifts in species composition towards cool-season annuals.

The current value of annual grasses in Oklahoma is one of a false economy. While some grazing value can be realized from the annuals, the trade-off in subsequent reduced production from warm-season forages is too high a price to pay for a small amount of protein in March and April. Likewise, in the long term, the more predictable forage production from perennial grasses is more valuable in terms of livestock production and erosion control.

Chemical Warfare?

As if the annuals didn't already have the advantage, at least one species resorts to chemical warfare known as allelopathy. Annual threeawn produces a chemical that retards the growth of other more competitive grasses but does not suppress other annual threeawn plants.

Evidence also exists to suggest that annual threeawn can interfere with the nitrogen cycle in these grasslands by inhibiting nitrogen-fixing microbes. In old abandoned fields, this mechanism allows the threeawn to persist for as long as 20 years before it can be displaced by later successional species like little bluestem.

A Plan of Attack

What can be done to stop the assault of these annual bandits? Several strategies, including grazing management, prescribing burning, and herbicides, are available.

Grazing management can be both a defensive and an offensive weapon. From the defensive standpoint, the best protection against invasion by annual grasses or other

weeds is to maintain a regiment of vigorous, productive perennial species. It's when these vanguards become weakened that the annuals begin to have the competitive advantage. From an offensive standpoint, intensive spring grazing (March 15 to May 15) will reduce cool-season annuals, while at the same time yielding some livestock production from them. For best results, however, it's necessary to put all available animals on about one-third of the range during this period. After May 15, this unit should be rested from further livestock grazing throughout the remainder of the growing season.

Burning is another management tool that can either help or hurt the annuals, depending primarily on the season of the burn. Late-summer wildfires that leave the soil surface barren during winter will usually spawn a good crop of cool-season annuals. Harsh winters following summer wildfires are especially damaging to the perennial bluestems, but are ideal for the opportunistic annuals. By contrast, spring (April) burns can provide almost complete control of cool-season annuals while simultaneously improving the vigor of the desirable perennial bluestems.

Most herbicides used for range weed and brush control are not effective for controlling annual grasses. I have visited with ranchers who have practiced broadleaf weed control with 2,4-D for several years and who proclaim that they "don't have a weed on the place." A casual inspection, however, often reveals that, while the broadleaves are suppressed, the annual grasses may be a real problem. The most effective herbicide for the annual grasses found on Oklahoma rangelands is the triazine herbicide, atrazine. Atrazine is a soil-applied herbicide that has proven to be a cost-effective means of controlling annual grasses in this region. Ongoing research at Oklahoma State University is determining how atrazine can be used in conjunction with prescribed burning to improve poor and fair condition rangelands where remnants of desirable grasses are struggling against annual grasses.

While each of these management tools can provide some control by itself, a coordinated plan of attack involving all three is most cost-effective. Atrazine can be used as the first step to help reclaim poor condition range which, in conjunction with spring burning, helps to shift the species composition of the range toward the desirable tallgrasses. It should be noted that there must be a remnant of desirable grasses present. If not, reseeding may be necessary. Finally, sound grazing management is necessary to ensure that the tallgrasses are able to remain vigorous so that they can act as the first line of defense.

Bringing Up the Scholars

I was young & smart, just out of College,
My head was bursting with technical knowledge,
I was all ready for fortune & fame—
A Range Agrologist, a wonderful name.

I got a job, with the Government of course,
Might as well start right at the source.
I'd work my way to the top, you see;
Before too long I'd be a Deputy.

As a Range Agrologist I couldn't be beat—
All I needed was soil, water & heat.
I'd grow the best darn grass that was known,
My fame would build on what was sown.

As I sat in my office, twiddling my thumbs
A Forester walked in & said, "Well, you bum,
I hear you're going to grow grass on the land
Where I have that great forest Stand."

"I'll have you know we must have trees—
Our forests are the base of our Economy.
The nerve of you, the foolish ass,
The very thought of growing grass!"

My tongue was ready to do debate
When in came a Wildlifer, quite irate.
"What's the idea of your silly plan,
Grass production, you're way out, man."

"Cows out there with my wildlife
Will cause nothing but trouble & strife.
Forbs, not grass I need for my stock.
I'm fed up to the ears with all your talk".

At that moment into the room there oozed
A little old lady in tennis shoes.
She lambasted us all with a mighty swing,
In her hand was a copy of *Silent Spring*.

"You're a bunch of meddlers, fools & bores
Interfering with MY Great Outdoors.
Nature didn't intend all your silly Ideaology;
You've no right to change the Ecology!"

"But, but," all three of us sputtered,
"We're just doing the Things our Professors uttered."
"I'll have your jobs", the lady yelled,
"I'll go to the Capital & have you expelled."

We rushed out of that room, the three of us,
To escape from all the screaming & fuss.
Aghast, we looked at each other & stared—
For a situation like this we weren't prepared.

What could we do to achieve our goals?
Maintain our dignity, our very souls?
We must form an alliance to gain our end,
Some of our education would have to bend.

A much broader outlook we must see
Than what was taught at University.
Decisions can't be made on theory & facts,
We must get some Practical into the act.

Bill Stewart, Rancher
Pres., B.C. Cattlemen's Assoc. 1977