k-state extension
Agronomy e-Updates

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1. Management following a wildfire

The abnormally dry conditions throughout much of Kansas, and moderate to severe drought in southeastern Kansas, have led to an increased danger of wildfires. If a wildfire occurs, the ability of rangeland or tamegrass pastures to regenerate forage depends on precipitation amounts, the time of year that the fire occurs, the water infiltration ability of the soil, and management factors following the fire.

Wildfires can damage grasses, reduce stored food reserves, reduce moisture infiltration, increase evaporation and runoff, lead to erosion, create grazing distribution problems, and lead to an infestation of noxious weeds.

The crowns of grass plants often survive a wildfire and will regrow, but some can be damaged if the fire occurs when soil and air conditions are extremely dry. If plant litter remains after the fire, less damage will have occurred to the plant crowns, and soil conditions will be better. Evaporation and runoff may be increased if the fire occurs when the grasses are not actively growing. Bare soil may lose at least one-half inch of moisture per week through evaporation. The higher the clay content of the soil, the greater the potential for puddling and runoff.

A. Native warm-season grass rangeland

When wildfires occur between late June and frost, the major consideration is to protect the plants from overuse. Immediate removal of the grazing animals is usually necessary. This will permit regrowth and allow plants to accumulate food reserves before winter. Wildfires occurring between fall and mid-March leave the soil bare until spring growth. Forage yields will be reduced, and a reduction is stocking rate is advised.

Between mid-March and June, wildfires generally do not reduce forage production. However, if conditions are dry, regrowth will not occur and stocking rate must be reduced. Wildfires at this time may change plant composition of the grazing land.

On sandy soils, blowouts should be controlled as soon as possible. Mulching with manure, straw, or hay free of noxious weeds, along with reseeding can stabilize the blowout area. Fencing of blowouts will restrict livestock traffic and speed recovery.

Several grazing management options exist after a wildfire. If a wildfire occurs where prescribed burning is practiced, burn the areas that were untouched by the wildfire in late spring, when the desirable grass species have 1 to 1.5 inches of new growth. This will encourage grazing of the entire pasture. Observe where the animals are grazing, and use grazing distribution tools such as salt, mineral, and oilers to attract cattle to underutilized areas.

For forage plants to recover, it usually will be necessary to reduce stocking rates on the burned area.

Area	Year after wildfire	Stock at:
Flint Hills and East	1	75-85%
	2	Normal
Central Kansas	1	65-75%
	2	90-100%
	3	Normal
Western Kansas	1	50%
	2	75%
	3	Normal

Note: During lengthy droughts, use lower stocking rates than those listed in the chart. The main concern is the inability of the plants to regrow. The plants must be given the opportunity for regrowth during drought.

If a wildfire occurs where prescribed burning is not practiced, management decisions should be based on when the grassland was burned, how much of it was burned, and where livestock water is located.

Example 1: If there is a livestock-watering source in both the burned and unburned portions of the grassland, divide the burned and unburned areas (using an electric fence, for example) and reduce the stocking rate in the burned area.

Example 2: If there is only one livestock-watering source in the grassland area, the decision is whether to manage the burned or the unburned area. If the unburned area is larger, separate the two areas with an electric fence and stock the unburned area at the normal rate. If the burned area is larger, either manage only the burned part by reducing the stocking rate or establish an alternate water source, fence the area, and reduce the stocking rate on the burned portion. If the sole watering source is in the burned portion, the unburned portion would not be utilized unless the area was fenced and another water source established or a lane is fenced off to allow watering from the unburned area.

Example 3: If only a small portion of the grassland is burned, fence it off and reduce the stocking rate on the unburned portion accordingly.

Mowing unburned areas in the early spring can encourage livestock to move from the burned area. However, don't mow in August or September. Early intensive grazing is another option for burned areas. Removing all livestock from the grassland by mid-July provides late-season rest and time for the desirable grasses to replenish root reserves.

B. Tamegrass hay meadows

Hay meadows burned by wildfires will probably produce less hay. To return hay meadows to their former production, cut the meadow in early to mid-July to allow regrowth and replenishment of root reserves.

-- Walt Fick, Rangeland management specialist
whfick@ksu.edu

2. Atrazine runoff can be minimized this spring

The potential for atrazine runoff peaks during the spring months in Kansas. That's when storm intensity levels are normally highest, and producers should be most careful about their atrazine application methods.

Reducing atrazine runoff is important because surface water in many watersheds throughout eastern and central Kansas has been impaired by atrazine in recent years, and a few areas currently have drinking water concerns.

Atrazine runoff continues to be a potential problem that corn and grain sorghum producers can and should address. There are several best management practices (BMPs) that have been proven to reduce atrazine in Kansas. Some of the BMPs involve application timing and methods, and every producer should be able to use one or more of these BMPs. A few of the possible application-related atrazine BMPs include:

* Early spring (or fall) applications. Atrazine runoff can potentially be reduced by applying atrazine prior to April 15 of the current cropping year, or during the previous fall. Rainfall intensity, duration, and amount are typically lower at these times than in late April, May, and June. This is a good BMP for no-till.

* Split application. Apply one-half to two-thirds of the atrazine prior to April 15, and one-third to one-half of the atrazine just prior to or immediately following planting. This

can potentially reduce atrazine runoff compared to applying all the atrazine at planting time. This is another good BMP for no-till.

* Reduced rates at planting time by a postemergence application. A low rate of atrazine (one pound per acre or less) can be used as a soil-applied treatment at planting time, followed by a postemergence application of a premix product that contains low rates of atrazine. In addition to reducing runoff potential, this two-step approach has consistently resulted in good weed control over a broad spectrum of broadleaf and grassy weeds in corn and sorghum, and is well suited for no-till.

* Reduce rates of soil-applied atrazine. There is a direct relationship between atrazine application rate and runoff amount. Using lower atrazine rates, and/or forumulations with lower atrazine rates (for example, "Lite" formulations of atrazine premixes), can reduce runoff potential while providing excellent control of pigweed and other small-seeded broadleaf weeds.

* Use postemerge atrazine premix products. Postemerge herbicide products that contain low rates of atrazine in mixtures with other herbicides are widely used in Kansas, and help reduce the amount of atrazine runoff. These postemerge products typically contain atrazine rates that are lower than soil-applied atrazine application rates. In addition, the growing crop foliage helps reduce atrazine runoff potential by intercepting some of the atrazine and reducing the impact of storm events at the soil surface.

* Incorporate atrazine in the top two inches of soil. This is an excellent BMP for fields where tillage is used prior to planting corn or grain sorghum.

* Band herbicides at planting. Applying atrazine only in a 10- to 15-inch band over the row instead of broadcast over the entire field is a possible BMP for producers using ridge-till or where cultivation will be used.

* Use alternative herbicides. There are several good herbicide alternatives to atrazine, especially for use with corn. One example is glyphosate on Roundup Ready corn.

-- Dan Devlin, Environmental quality specialist
ddevlin@ksu.edu

3. Soil nitrogen: Understanding an increasingly valuable commodity

Nitrogen (N) is a valuable commodity for producers, this year more so than ever as N fertilizer prices continue to increase. Nitrogen makes up 78 percent of the atmosphere, but unfortunately it is in a gaseous form (N_2) that plants cannot use directly. It is also present in the soil, but much of that N is tied up in organic matter and not readily available for plant use. What producers have to provide to crops is N in the plant available form of nitrate or ammonia within the soil.

Crop producers have to find ways to work with the natural processes that occur in the soil to maximize the amount of N that exists as nitrate or ammonia during the time when crops need it most. To accomplish this, the producer first must understand the basic processes involved in soil nitrogen (the soil nitrogen cycle), and what happens to applied fertilizer N. It is virtually inevitable that part of the N a producers pays for and applies to the soil will be lost, either through volatilization, denitrification, leaching, or surface runoff. Another part may be unavailable for the current crop because of immobilization. A successful N fertilization program, in which the producer gets the most yield response per dollar spent on N fertilizer, depends on the right combination of cropping systems, N sources, application timing, and application methods.

Organic matter is the storehouse of most of the N in soil. This N is not available for plant uptake until mineralization occurs. The most important factors to understand are mineralization, N fixation, immobilization, leaching, denitrification, and volatilization.

* *Mineralization* refers to the microbial breakdown of complex organic N-containing compounds to nitrate-N, which is available to plants. This breakdown occurs in several steps, through the formation of amines and amino acids (aminization) to ammonium (ammonification) to nitrate (nitrification). Because this is a microbial-mediated process, soil temperature, moisture, pH, and aeration all affect the rate of mineralization. At soil temperatures below 50 degrees, the rate of mineralization is quite slow. Mineralization rapidly increases as soil temperatures reach the 65-90 F degree range. A soil with a near neutral pH (6.5 to 7.5), and that is moist and well aerated, would be ideal for rapid mineralization. Ammonification can occur in wet, poorly aerated soils, but not nitrification.

* *N fixation* is the biological process in which microorganisms in the soil convert elemental N in the soil air into organic N compounds, which in turn are converted through further microbial activity into plant available nitrate or ammonium. Symbiotic N fixation by legumes is the principal means of biological fixation, but some fixation does occur by free-living organisms. N fixation by legumes in crop rotations can be substantial and fertilizer application rates should be adjusted for legume credits.

* *Immobilization* can occur as organic matter is decomposed. The nitrogen content of the organic matter or crop residue is an important factor in determining the rate of mineralization. Soil organic matter typically has a carbon-to-nitrogen (C:N) ratio of roughly 10:1. Organic residue such as wheat straw with a much wider C:N ratio of 80:1, for example, will be mineralized at a much slower rate than residue from soybean or alfalfa, which has a much narrower C:N ratio. In fact, an immobilization or tie-up of available nitrate-N in the soil may occur during the decomposition process of wheat straw, and other residue with a high C:N ratio, such as corn and grain sorghum. This is generally short-term immobilization, with release of the “tied-up” N as the decomposition process progresses. However, a crop planted during this period of tie-up may show N deficiency if no supplemental N is supplied.

* *Nitrogen leaching* occurs with nitrate-N on sandy soils where excess rainfall and/or irrigation water causes rapid movement of water below the root zone. Nitrogen in the form of the ammonium ion will not leach because it has a positive charge and is held by negatively charged clay particles and organic matter.

* *Denitrification* is the breakdown of nitrate or nitrite ions by anaerobic organisms under waterlogged soil conditions to gaseous forms (N_2, N_2O, or NO), with loss to the atmosphere. Ideal soil temperature and pH conditions for denitrification are similar to conditions that favor mineralization. The soil generally has to be waterlogged for several days for substantial losses to occur. Ammonium-N is not subject to denitrification.

* *Volatilization* is the loss of N from the soil as ammonia (NH_3) to the atmosphere. This may occur from improper application of anhydrous ammonia (not sealing the ammonia in the soil), or from manure or urea-containing fertilizers left on the soil surface. Urease enzymes in the soil-residue complex convert urea to ammonia, which is volatile. Conditions that favor volatilization losses include surface application of manure or urea on moist to wet soils covered with high amounts of residue under rapid drying conditions. Incorporation of manure or urea eliminates volatilization losses. Also, rainfall shortly after application of a half-inch or more will move the urea into the soil, minimizing volatilization.

With higher fertilizer prices, N management becomes even more important. Producers should utilize agronomic practices that maximize mineralization and N fixation, and minimize volatilization, denitrification, and leaching.

-- David Whitney, Soil fertility specialist
785-532-5776

4. Topdressed nitrogen and dry wheat ground

Time is running out for topdressing the 2006 winter wheat crop. The nitrogen (N) in topdress applications must be moved into the root zone with precipitation in order to be efficiently utilized by wheat.

If sufficient precipitation is not received to move the applied N into the root zone, wheat plants may be unable to utilize it when they need it most. Since about one-third of total N utilized by wheat is in the plant by jointing, it is best to apply topdressed N early – preferably December through February – in order to maximize the probability of receiving enough moisture to move the N into the root zone.

In some areas, there has been no significant moisture since early last fall. Where N was topdressed on wheat this winter in those areas, there has not been enough moisture to move the N into the root zone. While some may worry about N volatilization loss or immobilization, the bigger concerns are the effect of dry soils on wheat growth and the fact that the applied N has not yet reached the root zone.

Typically, the biggest wheat yield response to N is where the N is in the root zone before jointing. In the dry areas of the state this year, wheat may begin jointing before a rain occurs to move the topdressed N into the soil.

If rains do not come until after the wheat has jointed, will the topdressed N still have any impact on yields? In most cases, yes. Even though we would prefer to have the N in the root zone before jointing, N can still increase yields on N-deficient wheat if it is taken up as late as the boot stage.

About one-half of the total N utilized by wheat is already in the plant by early boot stage. Nitrogen taken up at or after boot stage will not increase tiller numbers or maximum potential head size, but it can increase kernel weight and help maintain potential kernel numbers per spikelet. In this way, N taken up at a later growth stage by N-deficient wheat can help protect yields.

-- Dale Leikam, Nutrient management specialist
dleikam@ksu.edu

These e-Updates are a regular weekly item from K-State Extension Agronomy. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Jim Shroyer, Research and Extension Crop Production Specialist and State Extension Agronomy Leader
785-532-0397 jshroyer@ksu.edu