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e-Updates

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1. Effects of warm winter temperatures on wheat

This winter, temperatures have been unusually warm throughout all of Kansas. Wheat in many areas greened up in January, and can no longer be considered dormant. Some growth may be taking place, especially where moisture conditions are good and daytime highs have been in the 60s or 70s.

The warm weather may make wheat look good for this time of year, but it would be much better for the wheat if temperatures were colder. Record high temperatures in winter are not good for wheat, for several reasons.

* Plants growing at this time of year will use up valuable soil moisture. Where the topsoil is dry, this will put added stress on the wheat plants. But even where topsoil moisture is adequate, plants will be using up moisture that would be better utilized later in the growing season.

* Plants will have lost some of their winterhardiness. This would not be a problem if the weather never turns extremely cold again this winter, or if temperatures cool down gradually so that the plants can regain some of their winterhardiness. But if the wheat is green and growing, and temperatures go suddenly from unusually warm to extremely cold, either winterkill or spring freeze injury could occur.

* Warm weather in January and February could get certain insect and disease problems started earlier than normal. Army cutworms are sometimes a problem in wheat fields in February and March. Other early spring insects to watch include winter grain mites and greenbugs. Early-season diseases include powdery mildew and tan spot.

One factor that is not a concern is vernalization. The vernalization requirement of winter wheat is more of a "cool" requirement, not a "cold" requirement. Varieties have different vernalization requirements, but as long as there are 3 to 5 weeks in which the air temperature is below 48 degrees, that's enough to vernalize any of the current winter wheat varieties commonly grown in Kansas. We've already had that.

Another question producers often have in warm winters like this is whether the wheat will start jointing in February. That's unlikely, but possible. I don't know of any wheat yet in Kansas that has jointed. But if temperatures remain warm, some of the earliest varieties, such as Jagger, could start jointing early. Wheat that joints early is more vulnerable to spring freeze injury.

What should producers watch for now with their wheat crop? Insects, diseases, and the weather in February and March. The longer temperatures remain above normal, the less winterhardiness the wheat will have and the more susceptible it will be to a sudden drop in temperatures to the single digits or below.

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2. Timing of prescribed burns on grazinglands

The warm weather this winter has some of the cool-season pastures starting to green up earlier than normal, especially where soil moisture levels are good. Producers may have started making plans for prescribed burning of cool-season and warm-season grazinglands this spring.

Cool-season pastures, such as tall fescue and smooth bromegrass, are normally burned in late February or March, if soil moisture is good. This year, if the warm weather continues and the grass is green and starting to grow, producers could start burning cool-season pastures by mid-February. Cool-season grasses should have about 1 to 2 inches of new growth before burning. At this stage, the plants are able to regrow quickly.

There is no agronomic reason to delay the prescribed burn until later in February or March if the grass is already growing. If the weather suddenly turns extremely cold shortly after a cool-season pasture is burned, that does not predispose the plants to more severe winterkill injury. However, cold temperatures may delay growth. Warmer soil temperatures following burning due to removal of protective insulation usually results in more rapid growth and earlier maturity.

Warm-season range grasses will not start growing until later in the spring, regardless of how warm the winter temperatures are. The time to burn native warm-season grasses depends upon your goals. Increased livestock gains and brush control are normally enhanced by burning in the mid- to late-spring when the native grasses have an average of ½ to 2 inches of new growth. This usually occurs by mid- to late-April in the Flint

Hills region, and early-May in northwest Kansas. Ideal dates may be shifted as much as 10 days earlier or later, depending on temperatures. Ideally, the soil profile should have adequate water at the time of burning and the surface should be damp.

Other reasons for burning include improved livestock distribution, wildlife habitat enhancement, maintenance of CRP stands, and conservation of native plant communities. Timing for these purposes is more flexible and can be done earlier.

Timing of the prescribed burn will affect species composition on grazed rangeland. Big bluestem, indiangrass, and switchgrass basal cover increase when the range is burned in late spring compared to unburned sites. The basal cover of little bluestem is normally maintained by late-spring burning. In the tallgrass prairie area, late spring burning will generally maintain sideoats grama and buffalograss, but increase the basal cover of blue grama. Kentucky bluegrass seems to be decreased by burning at any time of the year.

On grazed tallgrass rangeland early burning reduces forage yield. There is no difference in forage yield between a late-spring burn and unburned range. Long-term research at the Konza Prairie Natural Research Area near Manhattan has shown that annual burning on ungrazed prairie in late spring over many years does not reduce overall forage yields. Repeated annual burning does result in a gradual decline in the percentage of broadleaf forbs and cool-season grasses (in a warm-season grassland), and an increase in the percentage cover of warm-season grasses. When annually burned rangelands are grazed, this shift is not as pronounced and a greater mix of various grasses and forbs is maintained.

With no burning over the long term, the cover of woody plants increases by about one percent per year initially, but then accelerates such that prairie grasses and forbs can be completely displaced by 100 percent tree and shrub cover in less than 40 years.

The effect of burning on undesirable woody plants and forbs will vary, depending on the growth habit. In general, plants are more easily killed by burning when their growing points are aboveground, are unable to resprout from belowground, and their food reserves are at the lowest point.

Burning readily kills eastern red cedar, especially when it is less than 5 feet in height. It does not have buds that can resprout, so when this plant is defoliated, it dies. Larger cedar trees will not be killed by fire and must be cut at ground level to be controlled. Buckbrush (coral berry) or sand plum must be burned in late spring for 2 to 3 consecutive years for effective control. During late spring, these plants are actively growing and fire destroys the topgrowth. Regrowth is slow since its food reserves are low. Successive burns prevent buildup of food reserves and eventually kill the plant. Western ragweed and western ironweed are perennial forbs, which can also be reduced with 2 or 3 consecutive late-spring burns.

Smooth sumac has a life cycle similar to warm-season grasses in that it doesn't reach the lowest point in its food reserves until late May or June. Burning in late spring will kill the topgrowth, but results in an increase in the number of stems that resprout from belowground buds. The net result is that smooth sumac will actually spread more rapidly as a result of late-spring burning.

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3. Managing high-pH, calcareous and sodic soils

High-pH soils can be even more of a problem than acid soils because high pH levels are more difficult to correct. Soils with a pH of 7.5 or higher may result in reduced plant growth, depending on the crop species and the cause of the high pH level. However, there are a lot of high pH soils that produce excellent crops so high pH alone is no reason to undertake corrective practices.

There are two major categories of high-pH soil conditions: calcareous and sodic soils.

* Calcareous soils. In many cases, the high soil pH is the result of calcareous conditions, or excessive amounts of lime (calcium carbonate) in the soil. Calcareous soils occur most often in western Kansas, where soils are geologically quite young.

Soil pH levels increase with depth in most soils of Kansas, except for southeast Kansas. Subsoils typically have higher pH levels than topsoils. On eroded hillsides and side-slopes, the more calcareous layers are closer to the surface and may be quite calcareous.

Iron chlorosis can be a problem with some crops on high-pH, calcareous soils. Sorghum and soybeans are more affected by iron chlorosis than corn, wheat, or alfalfa. Marked differences in tolerance of calcareous soils also exist among horticultural crops.

To lower the pH of a calcareous soil, an amendment needs to be added to neutralize the excess lime. Natural processes can slowly lower the pH of a calcareous soil – including organic matter mineralization, crop removal of calcium and magnesium, and natural weathering. But these processes can take hundreds or thousands of years to have any effect on the soil pH of a very calcareous soil. Applications of nitrogen fertilizer also results in soil acidification, but again would be slow to lower the pH of a calcareous soil.

Elemental sulfur is one amendment that can be used to lower the pH of a calcareous soil. Even sulfur will take some time to be effective and relatively high rates are needed. Elemental sulfur is microbially converted in the soil to sulfate, and soil acidification is a by-product of this process. Acidity produced reacts with the excess lime to neutralize it. Unfortunately, it takes quite a bit of elemental sulfur to neutralize the excess lime in a calcareous soil. It takes a third of a pound of elemental sulfur to neutralize a pound of excess lime. A soil with one percent excess lime would have 20,000 pounds of excess lime per acre in the soil 6-7 inches of soil. This would mean 6,600 pounds of elemental sulfur per acre would be needed. Many of the calcareous soils causing severe chlorosis on grain sorghum and soybeans have excess lime contents far greater than one percent. This is not economical in most agronomic situations.

In K-State research, banding sulfur to neutralize a small zone of soil near the seed has not been effective in solving an iron chlorosis problem on calcareous soils. Neither has the application of inorganic iron fertilizer. Chelated iron products have been effective, but are expensive and repeat applications are needed each year.

To manage for iron chlorosis problems on calcareous soils, producers can utilize crop selection, or varieties/hybrids within a crop, to achieve some degree of crop tolerance. Manure application is quite effective and is the most consistent treatment in correcting the problem. And foliar applications of iron have also been effective in minimizing yield losses.

For horticulturists wanting to lower the pH of a relatively small volume of soil, aluminum sulfate can be used effectively.

* Sodic soils. A second reason for high-pH soils is the presence of high exchangeable sodium in the soil. High exchangeable sodium results from soils that formed from parent material with excessive sodium, use of poor quality irrigation water, application of manure or sewage sludge high in sodium, or spillage of brine water association with oil production.

Reclamation of sodic soils requires the addition of a soluble calcium source, such as gypsum (calcium sulfate). Gypsum will displace the exchangeable sodium from soil clay particles. Gypsum improves soil structure, allowing better water penetration and movement of the excess sodium into the subsoil. A salt-alkali soil test is needed to confirm the exchangeable sodium level is high, and to calculate the rate of gypsum required. Gypsum rates needed will vary from less than one ton per acre to more than 10 tons per acre.

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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
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