k-state extension AGRONOMY e-Updates

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1. Soybean seeding rates

Current soybean seeding rate recommendations are comparatively simple – 3 seeds per square foot, which translates to 130,680 seeds per acre. This assumes 80% emergence for a final stand of about 105,000 plants per acre. This applies regardless of row width, date of planting, and variety growth habit. In high-yield, irrigated environments, the final stand should be closer to 150,000 plants per acre.

These recommendations are about 42,000 seeds per acre (and 35,000 plants per acre) less than the recommendations of the mid 1990s. Research has shown weed suppression by the soybean canopy is not as important to maintain yield now as it had been in the past because of the widespread use of glyphosate-resistant varieties.

A recent series of 21 on-farm strip trials and 6 replicated experiment station studies in Kansas provided an opportunity to revisit the current recommendations. These studies were located in Butler, Harvey, Nemaha, Republic, Riley, Saline, and Shawnee counties, and included full-season, double-crop, dryland, and irrigated environments.

Results can be divided into yield environments:

* Less than 40 bushels per acre. Yields were maximized at populations of less than 100,000 plants per acre.
* Yields of 40-70 bushels per acre. Yields were usually maximized at populations of 105,000 to 120,000 plants per acre.
* Highest yield level (78 bushels per acre). The highest yields, under irrigation, were achieved with 150,000 plants per acre. Increasing the population to 225,000 plants per acre did not increase yields.

So the current recommendations are adequate, with the possible exception of extremely high-yield situations, which may require roughly 150,000 plants per acre to maximize yield. Using seeding rates higher than those recommendations seldom reduced yield, but did increase seeding cost.

The current recommendations assume 80% emergence. Emergence in the studies ranged from less than 50% to 100%, illustrating the importance of knowing just how many dropped seeds will produce plants in each situation. Studies that have compared planters and drills indicate that the 80% estimate is not far off for planters, but emergence for drills is usually closer to 65%. There is tremendous variability around both of these averages, but it illustrates the need to drop more seed per acre if field emergence is less than the 80% assumed for the current recommendations.

Does row spacing make a difference? Several studies have demonstrated that narrow rows (<30" spacing) can produce greater yields in high-yield situations, but there is little evidence that more plants per acre are needed to achieve those yields, provided stands are adequate for a high-yield environment. There have been studies that have shown that seeding rates must be increased when moving to narrow rows, but those studies have used a planter for 30" rows and a drill for narrower rows. The additional seeds likely were needed to overcome reduced field emergence, not to produce additional plants. It should be noted that additional seeds can help the plants set pods higher off the ground in some cases, for harvesting ease.

In low-yield situations (<30 bushels/acre), most studies have shown that row spacing has little effect on yields. A few studies have shown a reduction in yield with narrow rows in low-yield environments.

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2. New herbicides registered for corn in Kansas

Two new herbicides were recently approved for use in Kansas: Balance Flexx and Corvus. Both of these products are from Bayer CropScience.

Balance Flexx essentially consists of Balance Pro plus a crop safener for corn. It can be used as a preplant, preemergence, or early postemergence application. Balance Flexx can be applied up to the V2 (two leaf collar) stage of corn. In K-State tests, it has given excellent control of pigweeds, kochia, Russian thistle, velvetleaf, and some grasses. It will control weeds that are ALS-resistant, triazine-resistant, and glyphosate-resistant. Balance Flexx provides residual control. Duration of this residual will depend on the amount of rainfall received after application. Often nearly three weeks of residual control can be expected. When applied preplant or preemergence, it can be tank mixed with a chloracetamide/atrazine herbicide (such as Bicep II Magnum or Harness Extra) for added grass control. When treating corn postemergence, do not include crop oil concentrate (COC), methylated seed oil (MSO), or any herbicide other than atrazine.

Corvus is essentially Balance Flexx with an added grass herbicide. The grass herbicide in this product is an ALS-inhibitor. Corvus has many of the same characteristics as Balance Flexx, with stronger grass control – including shattercane. Application information is the same as discussed with Balance Flexx.

Producers in some counties in Kansas cannot use these products because of the risk of an herbicide metabolite which can leach through the soil into shallow groundwater. If the water table (i.e. level of saturation) is less than 25 feet below the soil surface, do not use on sandy loam, loamy sand or sand surface or subsurface soils with organic matters of less than 2.0%. Areas restricted from use of Balance Pro will likely be restricted from use of Balance Flexx or Corvus.

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3. Prescribed burning of CRP this spring

The calendar says it is time to conduct prescribed burning of CRP fields across Kansas. However, weather conditions are such that one shouldn't be in any hurry to do so. Much of western Kansas has been in the Red Flag Warnings area this week (see map below). Warm temperatures, low humidity, and/or high-sustained winds dictate that burning is not safe. Fortunately, the window of opportunity for conducting a prescribed burn is wide enough such that one can wait for environmental conditions to improve. Obviously, do not burn once a county or state-wide burn band has been implemented.

Conservation Reserve Program (CRP) contracts signed since October 1, 2000 may require a maintenance burn during the life of the contract. All CRP participants with contracts effective with signup 26 (October 1, 2003) are required to perform a management practice that can include prescribed burning, interseeding, or light disking. Participants should check with their local Farm Service Agency office for actual requirements.

If CRP ground is burned, it can be burned anytime from February 1 through April 15. The deadline for 2009 has been extended to April 30 for all counties west of a line than runs from Smith to Barber County. Burning CRP early is a good way to spread out the burning season in Kansas and help prevent the concentration of smoke in April, when most pasture burning occurs.

Producers who burn CRP ground should follow the same general safety guidelines and go through the same permit procedures as those who conduct prescribed burns on rangeland. For detailed information on this see:

* Prescribed Burning: Planning and Conducting (L664)
http://www.oznet.ksu.edu/library/crpsl2/L664.pdf

* Prescribed Burning Safety (L565)
http://www.oznet.ksu.edu/library/crpsl2/l565.pdf

When burning CRP ground, building good fireguards is essential. Fireguards can either be mowed to a width of 20-30 feet or disked. If the fireguard is disked, producers may have to go over the area more than once to make sure the residue is all below ground.

Producers must make sure they notify the proper authorities in their county before burning, and obtain any necessary permits. They need to be careful not to allow smoke to drift over highways or airports so as to cause visibility problems. And they must make extra sure the fire is out before leaving.

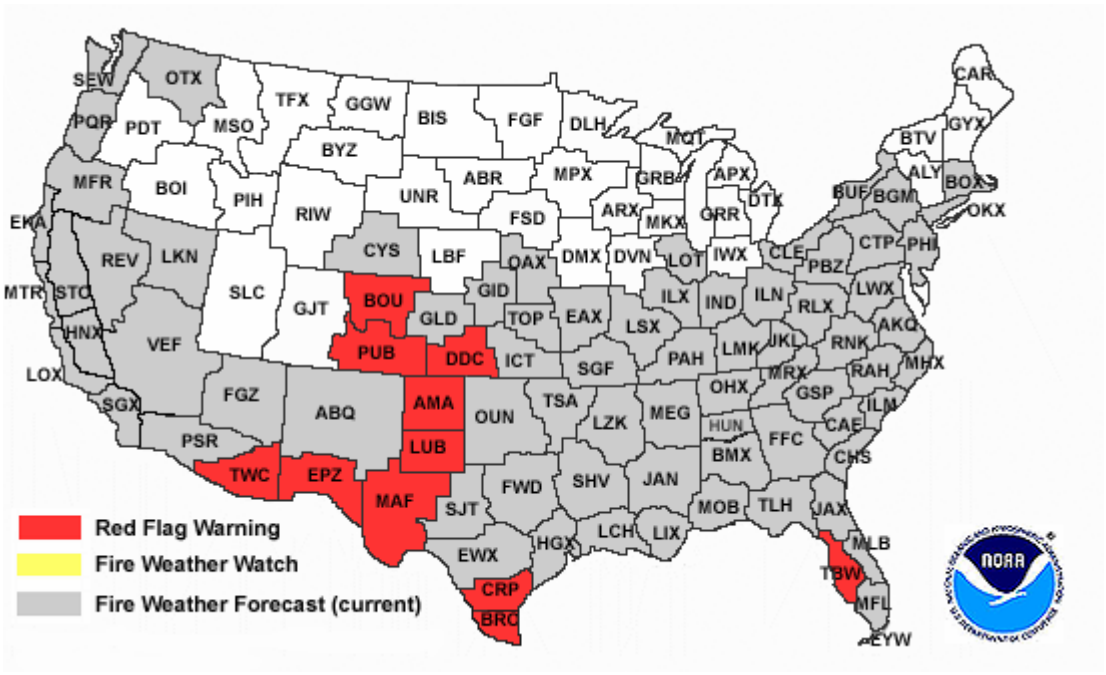
The two most common methods of conducting prescribed burns on CRP ground are a ring fire or a flank fire.

With a ring fire, the entire perimeter of the field, within the fireguard, is lit. Starting on the downwind side, backfires are started. The burned area is gradually widened. Eventually, the entire perimeter is lit and the fire then burns in toward the center from all sides. This results in a single large plume of smoke in the middle of the field. The advantages of a ring fire are that it requires less manpower than other methods, and it is quicker. The disadvantage is that it can trap wildlife in the field with no means of escape except flight.

If producers want to avoid trapping and possibly killing animals in the fire, the flank fire is a good alternative. In this method, a series of parallel strips of fire are lit into the wind, creating a slow-moving series of backfires. Backfires are hotter than headfires at ground level, and provide a more complete burn of mulch. This method also allows plenty of escape routes for any wildlife living in the field. The disadvantages of the flank fire method are that it takes longer to complete, and requires more people to conduct and control the burn. Backfires are also generally less effective at controlling woody plants.

Whatever method is used, one of the most important considerations when conducting a prescribed burn on either CRP or rangeland is to obtain an accurate weather forecast for the proposed day of the burn. There are several good broadcast stations for weather information, or producers can access any of several weather web sites, such as:
www.weather.com or www.weather.org

The National Fire Weather page http://fire.boi.noaa.gov/ provides a map as follows. Select your area and a Fire Weather Planning Forecast is provided.



For orientation on this map, the “DDC” area in red includes much of western Kansas.

Also, the fire danger index rating can be found at
http://www.crh.noaa.gov/product.php?site=TOP&product=RFD&issuedby=TOP
or http://www.weather.gov/view/validProds.php?prod=RFD

The burn should be conducted when conditions for smoke dispersal are optimum. That means there should be few clouds, with little chance of inversions. Wind conditions should be 5 to 15 mph out of a consistent direction that takes the smoke away from highways, airports, or population centers.

A prescribed burn on CRP ground will help reduce the thatch layer that can build up, promote grass tillering, and reduce the potential for wildfire. Burning can also help control cedars, and woody seedlings such as cottonwood or Russian olive. Once established, older trees will generally resprout after a fire.

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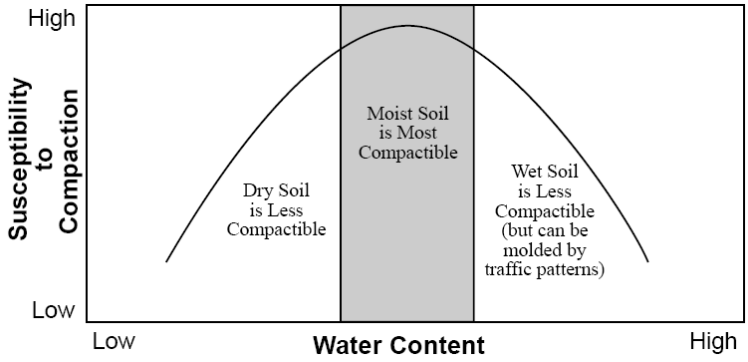
4. Spring is the best time to assess soil compaction

Spring is the perfect time to examine soils for evidence of compaction. It also happens to be a time when soils are often very vulnerable to compaction. Fields should be assessed when the soil is at or near field capacity, the point at which the entire soil profile is moist, but not saturated. These conditions typically occur in the spring, although most topsoils in Kansas are very dry so far this spring.



Soil compaction occurs when soil particles are pressed together, limiting the space for air and water. The amount of soil water present is a critical factor in soil compaction potential.

Assessing soil compaction

If compaction is suspected, it can be confirmed by using a shovel or soil probe. With a shovel, look for either a surface crust, or for platy soil structure (soil structure that resembles a stack of dinner plates). With a soil probe, push the probe into the soil slowly, and feel for a layer of increased resistance. Quite often, if a compacted subsurface layer is present, you can "punch through" the tillage pan, and the soil beneath it will have less resistance.

Cone penetrometers may also be used to locate compaction. Penetrometers need to be used in combination with some device to assess soil moisture and texture, like a soil probe. That's because penetration resistance is a function of soil density, texture, and moisture content, as well as compaction. Readings should be taken when the whole profile is at or near field capacity (approximately 24 hours after a soaking rain). If the soil is too wet (muddy), compaction could be underestimated because the soil water acts as a lubricant. If the soil is too dry, compaction could be overestimated because roots will be able to penetrate the soil when it re-wets. The idea behind using the penetrometer at field capacity is that this is the best-case scenario to mimic the penetration power of roots.

If using a penetrometer, push or drive it into the soil at a rate of 1 inch per second. Record the penetration resistance at each depth increment. Note depths at which the penetration resistance exceeds 250-300 pounds per square inch (psi), a range that is root-limiting when the soil is moist.

Controlling different types of compaction

* Shallow, **surface compaction** is related to the pressure applied to the surface of the soil, and can be controlled by distributing a load, either by using a larger tire or more tires. GPS-based auto-steering systems are a tremendous aid for establishing and maintaining a controlled traffic system. Shallow compaction is normally removed with subsequent tillage operations and to some extent by freeze-thaw and wet-dry cycles. Surface compaction should be avoided at planting time in conventional or reduced tillage, and at all times in no-till.

*** Sub-surface compaction** is related to the maximum axle load, and is not reduced by distributing the weight across more tires or larger tires. The only way to avoid sub-surface compaction is to limit the amount of traffic with heavy axle loads. Keep in mind that a 1,000-bushel grain cart weighs upwards of 36 tons!

* Another-type of compaction is **sidewall compaction** that occurs if the crop is planted when the soil is too wet and the planter openers push on the side of the soil furrow, creating a compacted zone. Sidewall compaction is preventable by delaying planting until soils are sufficiently dry. Use of spoke wheel seed slot closers can also be helpful. If you can mold the soil into a ball in your hand and the soil ball will not easily crumble apart, it is too wet to plant.

Preventing soil compaction

The best cure for compaction is by not working or driving on soils that are too wet. Crop fields also can be at risk of compaction from grazing animals or manure spreaders just as much as when using any other farm equipment, especially in conditions near field capacity. Fall-planted cover crops could provide physical support for livestock and/or manure spreaders, while spring-planted cover crops might be a good option for soils with excess moisture at planting time.

Can you manage soil compaction once you have it?

If you determine you have compacted soils, fall is usually the most appropriate time to address the issue (when soil is dry). Sub-soiling may be a temporary fix, but it takes a lot of power and fuel. Make sure there is need for sub-soiling before you perform such an operation. Deep tillage is very costly as it is time, fuel, and power-intensive, so you need to make certain it is absolutely necessary and economically feasible. The best remedy for eliminating compaction is prevention.

Effect of Subsoil and Chisel Tillage on Corn and Soybean Yields: East Central Experiment Field

Tillage system and frequency	Corn yield (bu/acre) 6-year average	Soybean yield (bu/acre) 6-year average
No-till	98	35.4
Chisel ever year	100	36.6
Subsoil every year	103	37.0
Subsoil every other year	99	37.3
Subsoil every third year	105	37.9
Note: None of these yields is statistically different.		

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