1. Fall control of woody plants on rangeland

There may be areas of rangeland with highly concentrated stands of woody plants that have not been controlled by fire or mechanical means. If those areas have good potential for producing desirable forage, producers should consider making spot treatments of the woody vegetation before it becomes unmanageable. Fall is a good time to make those treatments.

Scattered stands of individual trees or shrubs should either be treated individually using the basal bark method (for labeled plants less than 4-6 inches in diameter) or the cut stump treatment method. The basal bark and cut stump treatments will not be effective if the plants cannot be treated down to the soil line. Avoid conditions where water or snow prevents spraying to the ground line.

Producers can treat smaller diameter susceptible woody plants individually this fall by spraying the basal stem parts with triclopyr plus diesel fuel. The lower 12-15 inches of the stems or trunks of susceptible small trees and shrubs should be thoroughly wetted with a triclopyr-diesel mixture. Triclopyr goes by the tradenames Remedy Ultra and Pathfinder II. Remedy Ultra is a new formulation that does not contain the petroleum distillates contained in Remedy. The labeled recommendations for Remedy Ultra are 20-30% solution in diesel. Pathfinder II is a ready-to-use product and does not have to be mixed with diesel. PastureGard is a premix of triclopyr and fluroxypyr, and can be applied as a basal bark or cut-stump treatment as a 50% solution in diesel. Crossbow, a mixture of triclopyr and 2,4-D, can also provide control of certain woody plants as a 4% solution in diesel.
If the woody plant is greater than 6 inches in diameter, the best method is to cut it off at ground level and treat the cut surface and sides of the stump with triclopyr and diesel fuel within 30-60 minutes, before the sap seals over the exposed area. The stump of cottonwood, elm, and oak species can be treated with a 1:1 ratio of dicamba (Banvel, Clarity) in water instead of triclopyr if desired. The stumps of Eastern red cedar do not need to be treated since, unlike many woody brush plants, this species does not root sprout. Simply cutting Eastern red cedar below the lowest green branch will kill it.

Common honeylocust can resprout from a wide diameter area around the main plant because of root suckers, so producers should make a basal bark treatment to kill the entire plant in the fall. Then the main plant can be cut down in subsequent years once the tree is dead.

Tordon RTU and Pathway can be used on cut surfaces in noncropland areas such as fence rows, roadsides, and rights-of-way. However, Tordon RTU and Pathway are not labeled for use on range and pasture.

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2. K-State’s soybean breeding program

The soybean breeding program at K-State focuses on the following objectives:

* Develop high yielding, multiple pest resistant varieties for full-season and double-crop production, including varieties resistant to glyphosate and sulfonylurea herbicides.
* Develop special-purpose varieties for use in food, feed, or industrial products.
* Develop germplasm with specific disease and insect resistance, and improved oil quality.
* Improve selection efficiency in breeding for soybean cyst nematode (SCN) resistance and other traits.
* Improve charcoal rot and SCN management recommendations.

This project concentrates on the development and identification of varieties and germplasm adapted to Kansas growing conditions and production constraints. Each summer, new crosses are made to produce experimental lines with enhanced traits such as higher yield, stress tolerance, oil quality, and SCN and soybean aphid resistance. The highest priority has been to develop high-yielding varieties and germplasm possessing “stacked” traits including SCN resistance, aphid resistance, and resistance to glyphosate and sulfonylurea herbicides.

Over the past two years, the Kansas Agricultural Experiment Station (KAES) has released six new soybean varieties for licensing. The conventional variety KS4607 is a mid-group IV maturity with excellent yield potential and above-average protein content. Special purpose varieties have included KS5505sp and KS5007sp. KS5505sp is an early
group V maturity variety with yellow hila, and above-average seed size and protein content. KS5007sp is an early group V maturity variety with an average linolenic acid concentration of 3%, useful in the production of food products requiring no trans fat. Roundup Ready releases included: KS3406RR, KS5306NRR and KS5507NRR. KS3406RR is a high yielding, mid-group III variety. KS5305NRR and KS5507NRR are mid-group V varieties with resistance to SCN.

New genetic sources of SCN resistance are needed. There is considerable concern over the narrow genetic background of current SCN-resistant varieties, and the fact that the nematode has adapted to each source of resistance deployed. Over 90% of the commercially available SCN-resistant soybean varieties derive their resistance from one source, PI88788. Funding from the Kansas Soybean Commission enables us to evaluate thousands of progeny each year in our search for new sources of resistance to SCN. Initial greenhouse evaluations are followed by field trials. Since 1992, the KAES has released six high-yielding varieties that do not use PI88788 as a resistance source, and one variety possessing resistance from PI88788. The two Roundup Ready varieties released since 2006 have resistance to a broad range of nematode populations.

This growing season we began a detailed study of the diversity of SCN populations in Kansas. Soil samples are being collected throughout the state from fields infested with SCN. We plan to characterize 100-150 Kansas SCN populations during the next 2 years. This information will be used to improve variety recommendations to soybean growers and to guide new variety development at K-State. Help is needed from soybean growers to identify fields with known SCN infestations. If you can assist with this project by identifying SCN infested fields to sample, please contact Pam Rzodkiewicz at 785-532-7243 or par@ksu.edu. Pam is a graduate student in the Agronomy Department.

Heat stress represents a powerful deterrent to successful flower fertilization in Kansas. For the past two years, we have characterized the genetic variability in heat tolerance among soybean lines. Elite varieties have been planted in dryland and irrigated environments. Each morning during the flowering period, pollen has been collected from field-grown plants and subjected to various incubation temperatures in the lab. A large difference in pollen viability under heat stress has been measured among the soybean varieties evaluated. We will continue to determine if the differences we are observing in these trials can be exploited to develop more heat-tolerant and higher-yielding soybean varieties for Kansas.

With the soybean aphid becoming an important soybean pest in the Midwest, and a potential threat to Kansas soybean production, we have been working to develop varieties and germplasm with resistance to this pest. Over the past few years, more that 240 soybean genotypes have been screened for resistance to the soybean aphid. Eleven entries have exhibited resistance. Several of the entries with promising resistance were KAES-developed germplasm. Funding from this project has permitted the development of dozens of populations and several thousand progeny to study the genetics of soybean aphid resistance. A KAES germplasm release will be made this fall of an aphid-resistant, SCN-resistant soybean line.
The Southeast Agricultural Research Center in Parsons conducts cooperative North Central soybean research in conjunction with the Department of Plant Pathology. The work evaluates charcoal rot resistance in soybean lines from maturity group IV through V. An SCN-infested site is maintained near Columbus to evaluate commercial varieties in the field. These field evaluations complement our greenhouse evaluations of all entries in the Kansas Soybean Performance Tests for resistance to SCN, and our evaluations comparing SCN-infested and non-infested performance in field evaluations.

Genetic transformation efforts continue, with over 60 independent soybean transformation experiments ongoing. These experiments include the introduction chitinase and glucanase genes for potential fungal disease control, chitinases and novel synthetic genes for nematode resistance, and a phospholipase gene for increased shelf life of oil.

One experiment is focusing on the enzyme phospholipase D (PLD), which hydrolyzes phospholipids (fats) in soybean seed. Increased lipid degradation and oxidation may contribute to undesirable taste, color, odor, and instability of soybean seed, seedlings and products. Because of these adverse effects, and limitations that preclude the use of conventional breeding to eliminate PLD, transgenic soybean plants have been produced that possess a modified PLD gene. Field evaluations of these transgenic events occurred in 2005 and 2006. The phospholipase enzyme activity has impacted the concentration of fatty acids in the mature soybean seed. Evaluation of seed storage and viability, seedling vigor and genetic stability continue.

Figure 1. Closeup of pollinating a soybean flower.
3. Wheat: Diagnosing early-season problems

Over the next month or two, wheat stands will become established over most of the state. Ideally, the wheat will take on a solid green color, form a secondary root system, and develop one or two tillers in addition to the main tiller. But sometimes there are problems. The most common problems are discoloration, stunting, loss of leaves, or dying of emerged seedlings.

If wheat is yellow or has whitish streaks this fall, what are the possible causes? Is it something producers can correct? Will it hurt yields? Some of the most common causes of yellowing and/or stunting in the fall are:

* Nitrogen deficiency. Nitrogen deficiency causes an overall yellowing of the plant with the lower leaves yellowing and dying from the leaf tips inward. Nitrogen deficiency also results in reduced tillering, top growth, and root growth in the fall. The primary causes of nitrogen deficiency are insufficient fertilizer rates, leaching from heavy rains, and the presence of heavy amounts of crop residue, which can immobilize nitrogen. Topdressing the field during the winter can solve the problem, provided there is enough moisture to move the fertilizer into the root zone.

* Poor root growth. Nitrogen deficiency and stunting can also be due to poor root development. If the plants have been emerged for several weeks or more, can be pulled up easily, and have only a couple primary roots visible, then the plants are yellow or stunted because the root systems are not extensive enough to provide enough nutrients. This may be due to dry soils, waterlogging, or poor seedbed conditions at planting time. If conditions improve, plants should be developing secondary roots and the color should be nice and green. If not, the plants may not be strong enough next spring to reach their full yield potential.
* Leaf rust. If leaf rust infects young seedlings in the fall, the plants may turn yellowish. Severe fall infections of leaf rust are not common in Kansas, but can occur. Producers will be able to see the small brown pustules on the leaves. Tan spot can also cause wheat to turn yellow in the fall. These seedling infections of tan spot are often associated with wheat sown into heavy wheat residue. Viral diseases, such as soil-borne mosaic, wheat streak mosaic, and barley yellow dwarf, can infect wheat in the fall. Some yellowing can occur in the fall but in most cases the severe yellowing symptoms do not show up until early spring. It rarely, if ever, pays to treat fields in the fall for leaf rust or tan spot, even if those diseases do cause yellowing. Cold temperatures in the winter normally cure this problem.

* Cold temperatures. When temperatures are quite cold at the time wheat emerges, it can result in yellow banding on the leaves. If this is the cause of the yellowing, symptoms should eventually fade away.

* Greenbugs or oat bird-cherry aphids. These insects most commonly infest wheat sometime after the first freeze and before Christmas. They can cause plants to turn yellow and be somewhat stunted. Often, greenbug infestations occur in patches in a field, not uniformly distributed.

* Hessian fly. Seedlings infested by Hessian fly in the fall are typically not yellow, but are often stunted. Affected plants usually have an unusually large, broad greenish leaf for about a month in the fall. Stem elongation is typically much shorter than normal.

* Flea beetles. These tiny insects cause whitish streaks on the upper surfaces of leaves. If streaking is severe, plants may die.

If leaves are being lost, or the plants are sickly or have died, it is important to find out why before replanting. Some of the most common causes of seedling death, sickness, or loss of leaves include:

* Seedling blight. This is one of the most common causes of post-emergence seedling death or sickness. The root system or coleoptile region may be diseased or dead in infected plants. Several fungi cause seedling blight, and these diseases are often worse on early-planted wheat. Seedling blight may not kill the seedlings outright, but can lead to later problems with common root rot, crown rot, sharp eyespot, and dryland root rot.

* Atrazine carryover. Wheat planted into soils with atrazine residue emerges then dies back from the tips of the oldest leaves first. Atrazine carryover is most likely to occur where there were high application rates, high soil pH, coarse-textured soils, and under dry conditions.
* Fall armyworms and army cutworms. Where fall armyworms infest the wheat, leaves start looking ragged from the “windowpaning” effect. As the worms grow, they will chew off entire leaves, tillers, or whole plants. Army cutworms may also damage wheat, much like fall armyworms. Fall armyworms won't overwinter, thus they'll only be a problem until the advent of cold weather. Army cutworms may successfully overwinter and continue feeding during mild spells throughout the winter and spring.

* False wireworms. These insects typically feed on seeds or seedling roots, and can cause death.

* White grubs. If young plants are dying, with no aboveground symptoms evident, white grubs may be the cause. Check to see if roots are pruned.

This is not a complete list of possible problems on early-season wheat by any means, just some of the most commonly found problems. For a complete discussion, see K-State’s publication S-84, “Diagnosing Wheat Production Problems” at: http://www.oznet.ksu.edu/library/crpsl2/s84.pdf/

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4. Canola: Diagnosing stand establishment and early-season problems

Canola planting is wrapping up in southern Kansas and plants are developing where surface soil moisture is adequate. Canola has reached the 2- to 4-leaf stage in some fields along the I-70 corridor. Unlike wheat, whose growing point is protected beneath the soil during early development, the growing point of canola is above the soil. Thus, canola seedlings are more susceptible than cereals to environmental hazards. As later planted canola becomes established, here are a few points to keep in mind.

A. Stand establishment
Factors such as lack of surface soil moisture, soil compaction, crusting, crop residue, and waterlogging prevent canola establishment. Soil crusting can be especially troublesome. Because of its small seed size and shallow planting depth, rotary hoeing of crusted canola fields is not recommended. Replanting should be considered if adequate time permits and seedlings have turned yellow under crusted soils. Crusting may be a problem where recent rains have fallen on loosely worked fields. Deep furrows created by drills can wash into the seed row, causing plants to emerge from deeper depths. The lack of surface
moisture has reduced emergence in some fields. Subsoil moisture is adequate across most of south-central Kansas, but the top 3 to 6 inches of soil has dried.

B. Fall freeze damage
Canola seedlings in the cotyledon stage are susceptible to fall freeze damage. Canola is very tolerant to freeze damage when 3 to 4 true leaves are growing rapidly. Survival is increased when 6 to 8 leaves are fully formed and the plants are 8 to 10 inches tall.

C. Insect pests
Common insect pests at emergence and early establishment include grasshoppers, wireworms, flea beetles, false chinch bugs, and diamondback moth larvae. Seedling canola is especially vulnerable to chewing insects because plants will die if the aboveground portion is completely eaten. Grasshoppers are the most common pest at establishment and tend to infest field edges more than the centers. If pressure is high, grasshoppers can quickly devour canola plants on field edges. Wireworms can be problematic in sandier soils and are best controlled by an insecticidal seed treatment. Flea beetles may attack the cotyledons at emergence and the first true leaves of seedlings, producing pits or shot holes in leaves. Generally they are not a problem in later plantings. False chinch bugs rarely cause stand reductions in the fall, but could become problematic if populations are high. Diamondback moth larval feeding can be seen as windowpanes in late fall; damage is usually minor with no yield loss if plants are healthy and growing vigorously.

D. Disease problems
If canola was planted into cool and wet soil conditions, the failure to germinate or emerge may be characterized by seedling diseases. The damping-off of young seedlings is caused by fungi including *Pythium*, *Fusarium*, and *Rhizoctonia* spp. Use of a fungicide seed treatment will protect against seedling diseases.

E. Weed pressure
Canola has difficulty competing with established weeds at emergence; however, once established, canola outcompetes most winter annual weed species. Roundup Ready varieties can be sprayed from emergence to the 6-leaf stage for non-selective control of grassy and broadleaf weeds. Grass control products can be sprayed from emergence to before bolting to control volunteer cereals and other grassy weed species.

F. Nutrient deficiency
Nitrogen deficiency likely will appear in the fall if no nitrogen is applied prior to planting. Deficient plants will be stunted with yellowing of the lower, older leaves. Ongoing research shows that canola performs better and has improved winter survival when 40 to 80 lbs of nitrogen per acre is applied prior to planting.

G. Soil pH extremes
Canola grows best in soils with a pH range of 6.0 to 7.0, and yields may be reduced where pH is below 5.5. Low-pH symptoms in canola will be seen in the fall as crinkled, cupped, or strapped leaves. High-pH soils may accelerate micronutrient deficiencies.
H. Herbicide carryover
Canola is very susceptible to carryover from the commonly used sulfonylurea herbicides in wheat. Symptoms include reduced growth and a failure to develop beyond the cotyledon stage. Canola seedlings will eventually become chlorotic and die.

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These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update Editor. 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 Steve Watson, 785-532-7105 swatson@ksu.edu, or Jim Shroyer, Research and Extension Crop Production Specialist and State Extension Agronomy Leader 785-532-0397 jshroyer@ksu.edu