

Plant & Soil Sciences

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Extension Newsletter



In this issue ...

- Hay storage and hay losses
- Changing lime recommendation in winter wheat
- Back to school with Plant and Soil Sciences
- Improving weed control in 2011 wheat crop
- Weather conditions impact in soybean crop
- Conditioning grain sorghum
- Pasture and rangeland pests from east to west
- New OSU crops blog

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Hay storage and hay losses

By Darren Redfearn

Most livestock producers depend on hay to keep their cattle going through the winter. Depending on the method used to store large round bales outside, hay losses could be as high as 20% and result in increased winter feeding costs. Uncovered hay bales stored outside on the ground can result in hay losses that can range from 5% to 20% in only 9 months. Elevating the bales, using either gravel or pallets, may reduce the dry matter losses to 3% to 15%. If the bales are covered, but still stored directly on the ground, the losses may be only 5% to 10%. If they are covered and elevated, the losses decrease to 2% to 4%, which is similar to barn-stored hay. In an enclosed barn, losses are usually less than 2%.

If the purchase price for hay is \$60 per ton, a 20% storage loss results in a loss of \$12 per ton. Large, round bales can weight anywhere from 600 pounds up to 1800 lbs. If an average bale weighs 1000 pounds, this means that bales stored on the ground can lose up to 200 pounds in 9 months. If that same 1000-pound bale was placed on gravel or on pallets and covered the loss could be as low as 24 pounds.

One important key to reducing weathering is the tightness of the outer layer of the bale. Moisture will penetrate a loosely packed bale, causing greater loss of hay. An easy method to check

this on newly formed bales is to press on the outer layer with the palm of the hand. If it goes in more than about ½ inch, then significant storage losses should be expected.

The storage site is another important consideration in reducing losses. Select a site that is not shaded and is open to breezes to enhance drying conditions. The site should be well drained to prevent moisture absorbing into the bottom of the bale. As much as 12 inches of the bottom of a bale can be lost due to moisture “wicking” into the bale. This is the main reason for elevating the bales on pallets, old tires, or 6 inches of crushed rock. If possible, get the bales off the ground without spending much, if any, money.

Weather deterioration is normal for round bales stored outside. If possible, round bales stored outside should be fed within 9 months after they are harvested. In areas with high rainfall potential, storage losses can potentially double due to the high rainfall potential and increased weathering.

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Guidelines for storing round bales outside:

1. Butt the bales end to end in North/South rows and leave at least a foot between rows. This allows for drainage, sunlight penetration, and airflow between the rows to facilitate drying.
2. Site should be well drained, not shaded and open to breezes. A 3-inch gravel base, pallets, or posts under the bales can further reduce storage losses by 10%.
3. Bales should not be stacked on top of each other unless they will be covered.
4. Control vegetation between the rows.

Changing lime recommendation for continuous winter wheat in Oklahoma

By Hailin Zhang

Liming is the most economical measure to increase soil pH, decrease active Al in soils, and improve wheat forage and grain yields. The typical amount of lime recommended is based on soil buffer index when soil pH is below the threshold of a crop. The threshold pH for winter wheat is 5.5. However, when liming continuous wheat, it is only necessary to raise the pH to slightly above 5.5 because higher pH may favor some root rot diseases. Previously, the amount of lime recommended for continuous wheat has been ¼ the amount recommended to raise soil pH to 6.8. In most cases, the amount was below one ton per acre, which may not be economical to apply and is difficult to apply uniformly. A group of research and extension faculty at OSU decided to change the rate to ½ the normal

rate for continuous winter wheat effective Jan. 2011. Both the old and new rates are listed in the table below.

The new rate will not increase soil pH to over 6.0 in most cases, which is considered a critical pH for take all and many other root rot diseases to occur. Field research has shown that both forage and grain yields continue to increase when soil pH is above 5.5. The figure below illustrates how grain yield increased with soil pH to above 5.5. Therefore, the change of lime rate will have minimum risk on pH induced disease, but greater potential for higher yields. Producers are encouraged to make the change for the following cropping season, although the changes on soil test report will not take place until next year.

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(Grain yield graph on page 3)

Lime Recommendation for continuous winter wheat and other crops in Oklahoma.

Soil Buffer Index	All Crop but Wheat ECCE* Lime (tons/A)	Wheat (Old) ECCE* Lime (tons/A)	Wheat (New) ECCE* Lime (tons/A)
6.2	4.2	1.0	2.1
6.3	3.7	0.9	1.9
6.4	3.1	0.8	1.6
6.5	2.5	0.6	1.6
6.6	1.9	0.5	1.0
6.7	1.4	0.5	0.7
6.8	1.2	0.5	0.5
6.9	1.0	0.5	0.5
7.0	0.7	0.5	0.5
7.1	0.5	0.5	0.5
>7.2	0.0	0.0	0.0

* Effective Calcium Carbonate Equivalent - Pure calcium carbonate ground fine enough to be 100% effective. The rate of ag-lime to apply can be determined from the ECCE requirement using the following formula:

$$\text{Tons of ag-lime / A} = \text{Tons ECCE lime required} \div \% \text{ECCE}$$

Subscription Information

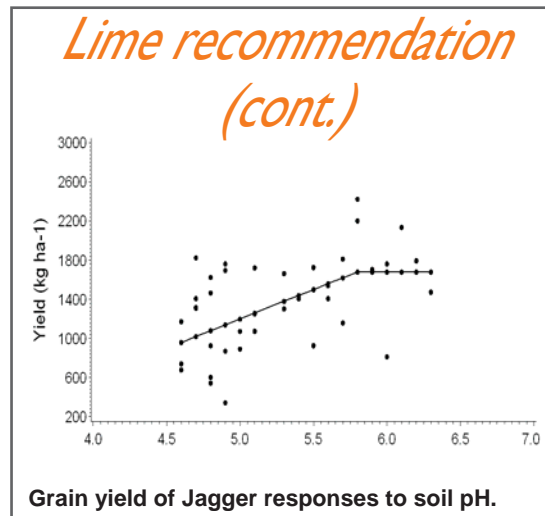
To receive an electronic copy of the OSU PASS Extension Newsletter, contact Janelle Malone at janelle.malone@okstate.edu. Please include "PASS Newsletter Subscription" and your name in the subject line.

Back to school with Plant and Soil Sciences

By Sarah Lancaster

As summer comes to a close, the thoughts of many high school students and their parents turn to planning for college. The plant and soil sciences department at Oklahoma State University has a lot to offer students! We welcome students with or without an agriculture background who want to be involved in crop production, applied plant breeding or genetics, soil conservation, and a variety of other career areas.

A recent survey of graduates shows all plant and soil sciences graduates who desire employment are currently employed and believe that their undergraduate education prepared them well for their careers. Most students surveyed earn between \$45,000 and \$65,000 per year 2 or 6 years after graduation. Recent graduates have found careers in large corporations, such as Dow AgroSciences, Chesapeake Energy Corporation, or John Deere; small business, such as ServiTech or CropQuest; in federal agencies, such as the Natural Resources and Conservation Service; in higher education as students or educators; and on family farms. In the future, jobs in plant and soil science are expected to increase. A recent USDA report predicts a 15.5% increase in demand for plant and soil scientists in the next 5 years. The same report also predicts a shortage of graduates to fill those needed positions, indicating the potential for tremendous opportunities for plant and soil science graduates in the near future.



Plant and soil science students have numerous opportunities to excel in their careers even before they earn their diploma. Most of our students get a head start on their careers by establishing relationships with faculty members in the department through part-time work or undergraduate research. Many students also complete summer internships that help develop job skills and a professional network. Other opportunities include local and national leadership positions in academic clubs and participation in judging contests. Additionally, most of our students earn scholarships from the department. In 2010, all scholarship applicants with a GPA greater than 3.0 received an average of \$2,600 in scholarships from donors to the Plant and Soil Science Department.

It's never too early to start thinking about college and careers! If you have an interest in plant and soil science, I encourage you to participate in related opportunities through 4-H or FFA. Some of these opportunities include 4-H crops judging, 4-H land judging, the agronomy and soils career development events offered through FFA, and the youth wheat show sponsored by several Oklahoma agricultural organizations. If you have any questions about participating in these events, or about undergraduate programs in plant and soil science, feel free to contact me at 405-744-3525 or sarah.lancaster@okstate.edu.

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Improving weed control for the 2010-2011 wheat crop

By Joe Armstrong

As we move closer to wheat planting, I thought it might be a good time to review some of the basics of weed control in wheat and give a few tips to improve your efforts in keeping your fields clean.

- Properly identify the weeds in your fields. This is especially important for the grass weeds since many of them look very similar to one another as small seedlings. A great resource to help you identify grass weeds is the OSU leaflet, "Identification of Grasses Commonly Found in Oklahoma Wheat Fields, L-316" available online at <http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2850/L-316Keep.pdf>. This publication provides close-up photos of the seeds and identifying characteristics of the most common winter grasses in wheat. Proper identification is crucial because most herbicides are selective and do not effectively control all grass weeds.

- Apply herbicide treatments in the fall. Once you have identified the weeds and chosen the appropriate herbicides, apply the herbicides in fall when the weeds are small and easiest to control. Fall applications will also give the wheat crop the chance to use the moisture and nutrients and out-grow and out-compete any weeds that may germinate in the spring. I recommend scouting fields in the fall, applying herbicides approximately 4 to 8 weeks after planting, and scouting again in the spring to evaluate your weed control and determine if another application is necessary.

- Be aware of the development or spread of herbicide-resistant weeds. ALS-resistant Italian ryegrass, resistant to Finesse, Osprey, PowerFlex, and Beyond, has been confirmed in 17 Oklahoma counties. Additionally, populations of ALS-resistant cheat, resistant to Olympus, Maverick, PowerFlex, and Beyond, have been found in at least two counties. Due to reliance on the same

herbicides in continuous wheat, I expect more and more reports of herbicide resistant weeds in Oklahoma during the next few years. Unfortunately, once resistance is present in these weed populations, we have few, if any, herbicide options left to control them. While products such as Axial XL and Hoelon (both members of the ACCase inhibitor, or Group 1, mode of action) can provide excellent control of ALS-resistant Italian ryegrass, the likelihood of developing resistance to these herbicides in the next few years is very high. The ability of Italian ryegrass to quickly develop resistance to several different herbicides emphasizes the importance of a diverse crop rotation that uses multiple herbicides and modes of action.

- Include a new crop in your rotation. Rotating out of winter wheat will be the most beneficial production practice for future wheat crops. Winter canola has proven to be an effective (and profitable) rotational crop that provides an excellent opportunity to clean up wheat fields that have become overrun with Italian ryegrass, jointed goatgrass, rescuegrass, and feral rye. One of the best comments I've heard about crop rotation came from the 6th Annual OSU-KSU Canola Conference this past July, where a producer said that "my neighbors all want to buy seed wheat from my fields where wheat followed canola—because the fields were so clean!" Other summer crop options, such as grain sorghum, sunflowers, or sesame, can also help break up pest cycles that hinder wheat production.

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The impact of current weather conditions on the 2010 soybean crop

By Chad Godsey

With the recent string of hot and dry days the 2010 Oklahoma soybean crop has started to show signs of drought stress. Some areas have caught timely rains but many need moisture at a critical time of soybean development, blooming and pod fill. Relationships among air temperature, soil water content, and soybean development are complex. The ideal temperature for soybean growth and development is around 86° F. Day temperatures above 95° F, coupled with low humidity, have been shown to reduce seed set and potential seed vigor. Drought symptoms appear early as leaf wilting and reduced growth. In addition, nodule formation, development and nitrogen fixation are reduced when soil temperatures rise above 90° F. In general, soybeans can tolerate short periods of high temperatures if supplied with adequate moisture but the crop cannot tolerate high temperatures indefinitely. With temperatures routinely running near or above 100° combined with the lack of rainfall, yield potential for the soybean crop is most likely being lost.

Soybean response to current conditions will be decided by the following three things:

1. planting date and crop development state
2. maturity group
3. how long hot and dry conditions persist

All of these factors are out of your control at this point but a soybean can be somewhat resilient if it is still in the vegetative growth stages (pre-bloom). Soybeans in the vegetative stage require less water compared to later growth stages. Fields in vegetative growth stages, planted in late June and early July, still have a chance to achieve reasonably acceptable yields. Yields will be greatly influenced by a return to

more favorable weather conditions.

Soybean fields in reproductive stages (bloom, pod set, or pod fill) will have increased flower and pod abortion and in later reproductive stages, pods will be small with fewer and smaller (or shriveled) seeds than normally expected. If the crop has been in the blooming stage for 3 to 4 weeks, has set no or very few pods, and drought conditions persist, it is likely that yields will be very low. The crop will not bloom indefinitely and may be unable to wait for a return to favorable weather conditions. If temperatures remain above 95°F and moisture is unavailable, seed set and development most likely will not occur.

Below is a more complete description of stress periods on soybean reproductive stages:

Stage R2: Full Bloom

Soybeans are better able to escape the effects of hot, dry weather conditions than other crops such as corn. Corn flowers over a short period but soybeans produce more flowers than pods and flower over a long period of time. Even under ideal conditions, soybean plants do not form a pod for each flower set. Up to 75% of the flowers or pods produced by a plant may abort. It is the 25% of the blooms that would ordinarily be expected to set pods and further develop but instead continue to abort that is of great concern.

Stress during flowering reduces the length of the flowering period. We could have expected a blooming period of 3 to 4 weeks or so under excellent conditions but that period will be shortened with these conditions. The exact critical high temperature is not documented but there are many observations that temperatures above 95°F result in very little or no pod set. Flowers and small pods are aborted. If the current weather conditions persist, it is possible that

(Continued on page 6)

Weather impact (cont.)

no pods at all will be set. If the crop has already been blooming for 3 to 4 weeks, it is very near the end of the blooming period and little or no crop will be set.

Stage R3: Rapid Pod Growth to Stage R4: Full Pod Elongation

Stage R3 is the end of the flowering period and the beginning of rapid pod formation. The bean filling period lasts 3 to 5 weeks. Hot, dry conditions at this time cause greater yield reductions than the same stress earlier in the season (vegetative or flowering stages).

Stage R5: Beans Beginning to Develop

Beans are filling rapidly at this stage. The demand for moisture is great. Moisture and heat stress greatly reduces yields. Stress during rapid pod growth reduces the number of beans per pod and reduces bean size. Pod filling is the most susceptible time for drought injury to the soybean crop.

Stage R6: Beans Full Size

Stress at this time will reduce dry matter accumulation and seed size. Dry matter begins to accumulate in the beans at stage R6 and continues at the same rate through

stage R8 (full maturity), about 35 days later. Seed yields are affected by the rate of dry matter accumulation in the seeds and by the length of time that dry matter accumulates. The rate of dry matter accumulation ranges from 60 to 90 pounds per acre per day (1 to 1½ bushels per acre per day). Stress affects both rate and length of time that dry matter is accumulated but the length of time is affected to a greater extent. With drought conditions, a rule of thumb is that soybean yield potential can be decreasing by 1 to 1½ bushels per acre per day.

State R8: Physiological Maturity

Beans are ready to harvest. Most soybeans in Oklahoma have not yet reached this stage.

Hopefully, we catch some rain soon and maintain most of that high yield potential that we had before the current streak of hot and dry weather.

Parts of this article were modified from Sholar and Keim. 1998. Effect of drought on soybeans.

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Conditioning grain sorghum for harvest

*By Roger Don Gribble
and Rick Kochenower*

Grain Sorghum Producers are facing a much different situation than last year at this time. The early planted grain sorghum crop looks very good in most parts of the state and is nearing harvest. One additional option for producers to consider is to condition the crop for harvest. This operation has shown good results with the current temperature we are experiencing and harvest may be just days away if conditioned.

Grain Sorghum Producers have several reasons for conditioning the crop for harvest. 1) Poor initial emergence, 2) uneven heading dates, 3) Delays in maturity of their crop, 4) Soil textural changes in field causing differing moisture levels in the soil, 5) Development of late tillers (sucker heads), 6) weed that were not controlled during the growing season and may interfere with harvest. Also for producers intending to seed wheat follow grain sorghum, killing the plant will keep it from utilizing moisture required for wheat seeding emergence.

While the previously mentioned positive steps for conditioning the grain sor-

ghum crop exist, please be reminded that this production practice could cost producers both grain yield and test weight if not properly utilized. The grain you intend to harvest must have reached physiological maturity in order to maintain proper weight. At physiological maturity, the grain has reached maximum weight and additional moisture, nutrients and carbohydrates can no longer move into the grain. At this time, a black layer forms at the point of attachment and seals the seed from the plant. It is recommended that no harvest aids be applied to grain you intend to harvest above a 30% moisture level.

Each harvest aid has its own parameters to work with. A producer should study the labels closely to determine if the product will satisfy the needs of the crop termination. Look at products such as Aim, Touch-down, glyphosate or Sodium Chlorate as good options for this operation. Be sure and follow all preharvest interval on the labeled instructions of the product of choice.

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Pasture and rangeland pests from east to west

By Tom Royer

It seems that rangeland and pasture grasses are very popular with some old nemesis insect pests. Robert Bourne, Extension Educator Agriculture, reported fall armyworm infestations in some grass pastures south eastern Oklahoma. On the other side of the state, I have received several reports of noticeable grasshopper infestations in western Oklahoma. These pests are addressed individually, so look at the Bold Header to select the pest that you are dealing with.

Fall Armyworm: One female fall armyworm moth can lay up to 1000 eggs over several nights on grasses or other plants. These eggs hatch a few days after being laid. Caterpillars grow through six molts before becoming mature, increasing in size after each molt. Mature caterpillars measure 1½ inches long with a body color that ranges from green, to brown to black and have a prominent inverted white “y” on their head. Small larvae do not eat through the leaf tissue, but instead, scrape off all of the green tissue and leave a clear membrane that gives the leaf a “window pane” appearance. Larger larvae feed voraciously and can completely consume leaf tissue. It is not uncommon to hear anecdotes by producers that said they saw a fescue pasture “disappear” in less than 4 days after they noticed armyworms feeding.

An Auburn University entomologist developed an easy-to-use scouting aid for pasture that consists of bending a wire coat hanger into a hoop, placing it on the ground and counting fall armyworms in the hoop. Examine plants at several locations along the field margin as well as in the interior. Look for “window paned” leaves and count all sizes of larvae. The hoop covers about 2/3 of a square foot, so a threshold in pasture would be an average of two or three ½ inch-long larvae per hoop sample (i.e. 4-5 per square foot).

Target control efforts on smaller cater-

pillars (1/2 inches or less) for two reasons. First, the caterpillars don't cause really severe damage until they reach an inch long, and secondly, smaller caterpillars are much more susceptible to insecticide control than larger caterpillars.

One spot of good news is that several very effective active ingredients, cyfluthrin, lambda cyhalothrin and zeta cypermethrin have recently been registered for rangeland and pastures and they are effective and have a very short waiting period for grazing (0 days) and hay harvest (7 days). Cyfluthrin is marketed as Baythroid XL, zeta cypermethrin is marketed as Mustang Max, and lambda cyhalothrin is marketed under various names including Grizzly Z, Karate with Zeon, Lambda-Cy Lambdastar and others. Of course other products are registered for fall armyworm control in pastures as well. For control options, consult OSU Fact Sheet CR-7193; Management of Insect Pests in Rangeland and Pasture. In any case, we will not be out of the woods for a fall armyworm outbreak until we get a good killing frost.

Grasshoppers: Over 130 species of grasshoppers reside in Oklahoma. Most never become a pest because they are either too small or don't become numerous enough. In rangeland and pastures, grasshopper problems develop from “complexes” of grasshoppers, called guilds, which tend to occur together and build in numbers large enough to cause damage. The most economically important species in rangeland and pastures appear to be the two-striped slant-face, migratory, two-striped, redlegged, differential and Packard grasshopper.

Nearly all grasshoppers produce one generation each year. All have three stages, the egg, nymph and adult. Most grasshoppers overwinter as eggs, but a few overwinter as 4th or 5th instar nymphs. In late summer and fall, eggs are deposited in the soil in “pods” that contain from 8-30 eggs.

(Continued on page 9)

Pasture and rangeland pests (cont.)

Eggs hatch in the spring. Hatching time is affected by weather, especially soil temperature. Cold winters have little effect on the eggs because the pod and soil provide insulation from extreme cold.

Nymphs begin feeding within a day of hatching, usually on the same plants that they will feed on as adults. These small nymphs remain congregated and are most vulnerable to weather effects, disease, predators and parasites. They grow through 5 nymphal instars, shedding their exoskeleton each time, and become adults in 40-55 days after hatching. Each species hatches and develops at its own rate, so we tend to see a continuous flush of hatching grasshoppers over several months.

Grasshoppers compete for forage with cattle. Heavy infestations can reduce the quality and quantity of forage that is produced, which can affect the rancher's ability to manage the grazing pressure effectively. Research suggests that pound for pound, a grasshopper will eat 12-20 times as much plant material as a steer. One way to look at it is that 30 pounds of grasshoppers will eat as much as a 600-pound steer.

The fact is that it is probably too late to do anything about grasshopper control right now. The best time to control grasshoppers is from mid-May through about July 1, while they are immature. Now they have all sprouted wings and can fly miles to locate a good food source. However, you can assess grasshopper density to see if you need to consider treating next year's grasshopper

crop when the "egg bank" begins to hatch.

There are two reliable methods for counting grasshoppers. The square yard method requires the surveyor to walk in a straight line across an area, visually delineate a square yard area about 9-12 feet in front of the surveyor, and simply count the number of grasshoppers that can be seen jumping out of the space. About 30 samples should be taken each spaced about 75 feet apart. Take an average of the counts to determine grasshopper density.

With the square foot method, the surveyor counts grasshoppers from 18 different "square foot" areas in much the same manner as is done with the square yard method. After 18 samples have been taken, divide the total grasshoppers counted by 2 to come up with an average number of grasshoppers per square yard.

If the grasshoppers that are causing damage need to be identified, collect some 'hoppers from several different 1 square-yard areas (sweep nets are useful), put them in a container, and send them to someone who can identify, or ship them to the Plant Disease and Insect Diagnostic Lab for identification. For more information on control of grasshoppers in rangeland and other crops, consult OSU Fact Sheet CR-7193; Management of Insect Pests in Rangeland and Pasture and OSU Publication EPP-7196 Grasshopper Management in Rangeland, Pastures and Crops.

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OSU crops blog started

Chad Godsey, Cropping Systems Specialist, has started a blog that will provide an avenue for timely summer crop updates and discussion of Oklahoma Cropping Systems. The blog will provide commentary or news on a particular subject of interest. This blog is intended

to encourage positive discussion on what crops and what systems work best for certain regions in Oklahoma. Questions or comments can also be asked in response to blog posts. To view the blog, simply click on the following address <http://osu-crops.blogspot.com> and sign up to follow.

Upcoming Events

Expanding the Rotation: Sesame, Sunflower, Soybean and Sorghum

Aug. 18, 2010 North Central Research Station
Lahoma, Okla.
Registration starts at 8 a.m. / Tour begins at 8:30 a.m.
(Lunch will be provided.)

Kay County Grain Sorghum Tour

Aug. 23, 2010 Cori Woelk, OCES Ag Educator
580-362-3194
Tour begins at 9 a.m.

Major County Grain Sorghum Tour

Aug. 24, 2010 Jim Rhodes, OCES Ag Educator
580-227-3786
Tour begins at 7 a.m.

Alfalfa County Grain Sorghum and Soybean Tour

Aug. 26, 2010 Tommy Puffinbarger, OCES Ag Educator
580-596-3131
Tour begins at 7 a.m.

Kay County Soybean Tour

Sept. 3, 2010 Cori Woelk, OCES Ag Educator
580-362-3194
Tour begins at 9 a.m.