Plant & Soil Sciences Extension Newsletter

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Plant & Soil Science Extension

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Raised bed crop production for poorly drained soils

Soils that are poorly drained due to clayey sub soils present significant challenges to crop production. This type of soil is commonly found in northeast Oklahoma. Subsurface tile drainage does not provide a solution because the slow water movement makes it impractical. These soils are especially problematic for corn production because of the need for early spring planting to allow pollination prior to the hot and often dry conditions of July and August.

Traditional management of these soils for corn production involves late winter chisel plow operations followed by secondary tillage to dry the surface soils in preparation for planting in early March. These tillage operations dry the soil and allow for early spring soil temperatures to increase sufficient for germination. However, this early planted corn is generally still slow to emerge and slow growing because of generally low soil and air temperatures. Growth is further restricted by the occurrence of excess rainfall in the spring months. This rainfall, of course, causes waterlogged conditions that limit soil and root respiration.

No-till and strip-till management of these soils have been achieved successfully. However, no-till generally requires a later planting date to allow for sufficient soil temperatures. Strip-till allows for more rapid spring soil warm-up in the seed zone, but does little to alleviate the water logging after corn planting. In the past, ridge-tillage has been successfully utilized for crop production in these soils. Ridge tillage provides for more ideal soil environment for early spring corn growth, because it elevates the seed and prevents water logged conditions in the rooting zone. However, this practice requires mid-season tillage to form the ridges. This tillage no longer provides cost effective weed control compared to herbicides, therefore ridge-till was abandoned.

Constructing raised beds prior to planting might be a more viable option. This soil management option provides the same benefits of ridge-till, however the beds are raised prior to planting which illuminates the need for mid-season tillage. Raised beds are extensively utilized in regions such as, the Mississippi Delta and southwest Oklahoma where surface flood irrigation is a common management practice. In these regions, soil moisture and temperature benefits of planting on beds are also realized. In regions of Australia where clayey soils similar to those found in northeast Oklahoma are prevalent, permanent beds are utilized without irrigation simply for the surface drainage benefits.

In fall 2008, experiments were initiated in Nowata, Ottawa and Payne counties. The experiments were on producer-cooperator fields in (continued on page 2) ...

Raised crop beds (con't.)

(continued from page 1)

Nowata and Ottawa counties and at the Lake Carl Blackwell Research Station in Payne County. At each location the raised bed management system was compared to conventional tillage operations. At each location the beds were built on 30 inch centers with a disk bedder. The top of the beds were firmed with a rolling basket and wheat was planted at each location. At the Payne County location canola was also included as a treatment on conventional tillage and raised bed systems. In spring 2009, corn was planted on beds in Ottawa and Payne counties.

The wheat yields from the experiments initiated in the fall are presented in Table 1. No significant differences were found between conventional and bed planted wheat. Wheat yields were suppressed at the Nowata and Payne County locations due to freeze damage and water logging. At these locations the 30 inch beds were not wide enough to protect wheat from water logging (Table 1). Future efforts for wheat will utilize a 60 inch bed to overcome this limitation. The results from the Ottawa location are similar to those from work conducted by Dr. Raun's research team in 2001-2002 that showed no consistent wheat yield responses.

Table 1: Yields for conventional tillage and bed planted wheat.

	Nowata	Payne	Ottawa	Avg.
	----------bu/acre----------			
Conventional	18a	19a	43a	27a
Bed planted	21a	19a	41a	27a

Values with the same letter are not significantly different

There was also no difference in canola yields at the Payne County location with average yields of 1300 pounds per acre. The canola crop also experienced water log damage. Again the beds were simply not wide enough for the narrow row crop.

Corn yields from the experiment in Ottawa County are presented in Table 2. As expected corn grain yields responded positively when planted on beds with a 15 percent increase in yield and no impact on test weight or moisture content. Grain yields in Payne County are not reported due to complete crop failure due to excessive temperatures during pollination in June. The results from Ottawa County are encouraging; therefore this research will be continued. This program will be continued in Ottawa and Nowata Counties next spring. The use of permanent raised beds will also be included as a treatment in a tillage experiment at the Haskell Research Station.

Table 2: 2009 bed planted corn yield experiment.

TRT	Yield	Moisture	Test Weight
	bu/acre	%	lbs/bu
Conventional	90a	17.5a	59a
Bedded	105b	16.8a	58a

Values with the same letter are not significantly different

For more information and photos of dryland crop production on raised beds go to http://www.soilwater.okstate.edu/croplandsoilmanagement/raisedbeds/relatedlinks/index.htm.

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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.

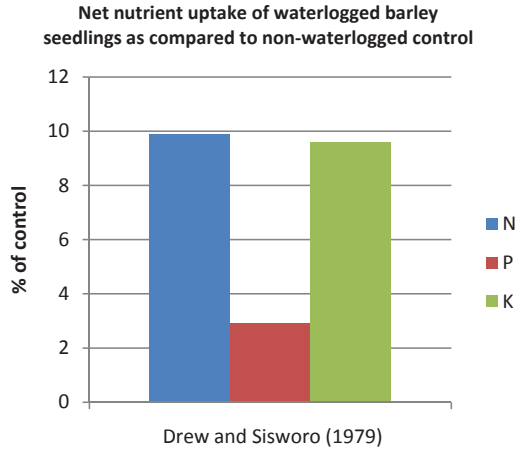
Yellow wheat may not be nitrogen deficient

Many of you may think your crop may be nitrogen deficient when they observe symptoms such as, yellowing in older leaves and healthy, greening in young leaves, and in many cases these assumptions are correct. Much of the yellowing observed in wheat fields this year, however, is being caused by factors other than not having enough nitrogen present.

Many fields, such as the one in the picture above, are truly nitrogen deficient. This picture was sent in from a producer near Frederick, OK. Note the majority of the field is yellow in color with a few green areas interspersed, similar to "cow pox" observed after grazing.

Many fields have areas with plants that are showing symptoms of nitrogen deficiency, but these symptoms aren't alwyas to blame on nitrogen deficiency. Rather, there is enough nitrogen present but it is below the rooting zone or the plant is not able to take up the nitrogen due to anoxic, also known as without oxygen, soil conditions. Just as your body requires oxygen to perform various metabolic activities, wheat roots require oxygen to grow and metabolize nutrients.

As shown in the graph, waterlogged small grains seedlings will take up as much as 90 percent fewer nutrients than non-waterlogged plants. To compound this problem, waterlogged conditions will reduce wheat root growth by about 50 percent (Yu et al. 1969). So not only are the roots less able to take up intercepted nutrients, they are less able to grow downward in the soil to find nutrients that have moved deeper in the soil profile. For more information on how heavy rainfall can move nitrogen through the soil profile take a look at Dr. Arnall's article in Volume 2 Issue 21 of the Plant and Soil Sciences Extension Newsletter.



Finally, there is a lot of yellowing in crops caused by leaf rust. Jagger and many of the Jagger offspring (Jagalene, OK Bullet, Overley, etc.) are very susceptible to juvenile leaf rust. Leaf rust can be identified by the rust pustules on leaves. When moderate temperatures and moisture are present leaf rust can cause significant yellowing in young wheat plants.

Regardless of the cause of yellowing, the remedy is the same. Continue to scout for insects, weeds and disease, but forget about the yellow wheat. The most frequently asked question about yellow fields is "should I go ahead with a light topdress now?" In my opinion, the answer is no. I would put these fields first on the topdress list early next year and make sure to provide adequate nitrogen fertility at topdress time. However, in most cases there is enough nitrogen there to carry the wheat until topdress time. As the soil conditions improve, the yellowing should subside.

Jeff Edwards, small grains extension specialist, can be reached at jeff.edwards@okstate.edu.

N Rich Strips will save money

It is the N Rich Strip time of year, and it's necessary to apply N Rich strips within the month of this time period. In general the rates for the N Rich Strip range from 120 to 150 pounds of nitrogen per acre. The issue is to apply enough nitrogen so that you are guaranteed it will not run out. Either way, if you missed getting these out at planting, they can be applied as late as the end of November and can still be useful for determining your mid-season topdress nitrogen rate in late February.

Knowing how much nitrogen you are going to apply in February is very important, and the only way to get a clear idea of how much to apply is having an N Rich Strip in each field. Weather determines what nitrogen demand you are going to have. Therefore, we rely on the N Rich Strip to tell us exactly what the weather within the first months of the growing season did. If it was warm and wet from planting to late February, you will likely have mineralized nitrogen from soil organic matter, and the demands for more nitrogen late in the season may be smaller. Alternatively, if you have cool, dry winters, the demand for topdress nitrogen can increase. Both of the above scenarios are bound by what kind of yield you will have. The sensor based nitrogen rate calculator, using inputs from the GreenSeeker sensor can reliably predict what your yield potential will be in late February. For more information about the sensor based nitrogen rate calculator visit, http://www.soiltesting.okstate.edu/SBNRC/SBNRC.php.

Combined with the N Rich Strip, this allows us to get at the right nitrogen rate you should apply in late February that will maximize yields and profit. However, none of this is possible unless you get your N Rich Strip applied in your fields.

If you have any questions, many counties in Oklahoma are equipped with a GreenSeeker sensor and they can assist with taking readings and making the mid-season nitrogen recommendations. If you have further questions, feel free to contact us.

Happy N Rich Strip season!

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Extension specialist question and answer

Q I have a field that I fertilized with the intentions of sowing it to wheat but wasn't able to due to waterlogged soil conditions. The field has a thick stand of rescuegrass. Can rescuegrass be grazed like wheat?

A Rescuegrass can be grazed. While it is still in the vegetative stages, rescuegrass would be about the same nutritional value as wheat. Once it has headed, however, forage quality would not be as good as wheat and would be comparable to cheat. The rescuegrass will not be as persistent as wheat and this first flush of growth is about all I would expect out of it. Given the limited re-growth potential, you could make plans to sow a spring oat crop in February to provide some additional forage and hay or plant sorghum, soybeans or sunflowers next summer.

Q Why is wheat always taller where it is double planted or where the drill stops and drops a clump of seed?

A The wheat is taller in thicker-sown areas due to plant competition for light. The thicker plants are more shaded from light than thinner stands. Shaded plants produce hormones that encourage them to grow rapidly. This process aids in getting seedlings through the soil surface at germination. This concept is used in the production of pine trees. Trees are sown thick at first to encourage rapid vertical growth rather than horizontal growth in the form of branching. The result is taller trees that can later be thinned and allowed to expand horizontally.

Upcoming Events

Canadian County Wheat Production Meeting

Dec. 7, 2009 *Canadian County Extension Office - 9 a.m.*
El Reno, Okla.
(Contact Canadian County Extension Office for more information.)

Oklahoma Wheat Grower Association State Convention

Dec. 12, 2009 *Express Events Center - 9 a.m.*
Oklahoma City, Okla.

2009 OSU Winter Crop School

Dec. 15-16, 2009 *Wes Watkins Center-Oklahoma State University*
Stillwater, Okla.
(Visit www.wheat.okstate.edu for registration materials.)

2010 Oklahoma Soybean Expo

Jan. 27, 2010 *Oklahoma State University*
Stillwater, Okla.
(More details to follow.)

2010 No-till Oklahoma Meeting

Feb. 8-9, 2010 *National Center for Employee Development*
Norman, Okla.
(More details to follow.)