October 2010

News from the
High Plains Ag Lab

University of Nebraska Lincoln

From the Advisory Board Chairman:

Our 40th Annivesary Celebration was a great success. We heard a lot of good comments about it. If you were there, thank you for coming. We had over 200 people in attendance. Our thanks to Jerry Radke for an excellent meal as well. In a news article following the event, The Sidney Sun-Telegraph reported that "The High Plains Agricultural Laboratory (HPAL) near Sidney has served for four decades as a beacon of research into dryland crop and livestock production." Certainly the Ag Lab has been a "beacon of research" in the past and we are looking forward to another 40 years and beyond.

The winter meeting of our advisory board will be on Tuesday, February 1, 2011, starting at noon with a luncheon, similar to last year's format. Before the meeting, we need to be thinking about the positives as well as negatives of our Ag Lab activities for 2010. Did you like having a half-day meeting in January as opposed to an all day event? Did you like having one field day in June this year? In evaluating what worked well for you and also other producers, we will be deciding on whether to have one or two field days in either June or August or both. Be thinking about addtional or more specific research you would like to see at the Ag Lab. In addition, at the meeting last January, we decided to implement a quarterly newsletter to be distritubuted by email to all ag lab advisory members. Has this been helpful to you and is this something we should continue?

Watch for a confirmation post card from Tom Nightingale about the winter meeting, mark it on your calendars, and bring your ideas to the meeting.

Respectfully submitted,
Don Cruise, Chairman

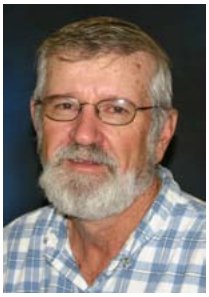
Mark your calendars:

February 1, 2011: HPAL Advisory Board Meeting. For details watch your mail and the High Plains Ag Lab web site: panhandle.unl.edu/hpal

Contact the High Plains Ag Lab:

Phone: 308-254-3918
On the Web: panhandle.unl.edu/hpal

Update from the manager:



Welcome to fall, although with some of the hot, dry weather we have been getting, it sometimes feels more like the middle of summer. We finished wheat harvest in late July, and our average was not too bad. We went from 43 bushels per acre on continuous crop up to 63 bushels per acre on fallow no-till following millet. This year it seems that wheat that followed millet, corn, or sunflowers did somewhat better than wheat following wheat. Except for the continuous rotation, all of these rotations have a fallow period. Next year's wheat crop has been put in the ground, but some of it is struggling to emerge. That planted into no-till situations is having problems. Six weeks without any rain, temperatures in the 90s to 100s, and with all the wind we had, the soil got hard and dried out just past the reach of our drills. Hopefully some rain will come soon to get that wheat up. The only good thing about the whole situation, is that the winter annual grasses are also struggling to get started.

Millet has been harvested, and did fairly well, with yields in the 40-45 bushel per acre range. Corn and sunflowers will be coming out soon. This dry weather is moving the crops along rapidly, so the next two to three weeks are going to be busy.

Be careful during the busy fall season. Take a break occasionally, stay safe, and if any of you have the proper influence, send some rain our way.

Tom Nightingale, Manager
High Plains Ag Lab

Alternative crop research update for 2010

By Dipak K. Santra
Alternative Crops Breeding Specialist

The last newsletter reported research at the High Plains Ag Lab on potential alternative crops, including proso millet, sunflower, camelina, fenugreek, and lentil. Among these five crops, only camelina and lentil trials are completed. The results are summarized below.

Camelina Variety Evaluation

Camelina (*Camelina sativa*) is an industrial crop and non-edible oil-seed crop. It belongs to the mustard family (same as the canola family) and its seed contains about 35 percent oil. Recently, it has been recognized as an excellent biodiesel crop and well-adapted to the semi-arid High Plains. The objective of this research is to test performance of camelina varieties in western Nebraska. The trial was planted under irrigation on April 21, 2010, with a seeding rate of 5 lbs/acre and harvested on August 3, 2010.

Summary:

- Poor plant establishment (av. 45 percent)
- Flowering time ranged from 58 to 59 days after planting (av. 58 days after planting i.e. June 17).
- Plant height ranged from 24 to 29 inches (av. 25.4 inches)
- Seed yield ranged from 555 lbs/acre to 803 lbs/acre (av. 720 lbs/acre)

(See Table 1. Results of Camelina Variety Trial 2010 at High Plains Ag Lab, at end of article)

Lentil variety trials

Lentil (*Lens culinaris*) is cool-season (i.e. spring planted) annual grain legume crop. It grows well in limited rainfall areas of the world. Lentil is a protein/calorie crop and its protein content ranges from 22 to 35 percent. It is an excellent supplement to cereal grain diets because of its good protein/carbohydrate content.

It is used in soups, stews, casseroles and salad dishes. It may have been introduced to the United

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A camelina field.

Alternative crop research update

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States in the early 1900s. In North America much of the acreage is in eastern Washington, northern Idaho, and western Canada, where it has been grown as a rotation crop with wheat.

The objective of this research is to test performance of lentil varieties in western Nebraska. The trial was planted under irrigation on April 21, 2010, with a seeding rate of 35 lbs/acre and 75 lbs/acre for small- and large-seeded varieties, respectively. The trial was harvested on August 3, 2010.

Summary:

- Excellent plant establishment (av. ~90 percent)
- Flowering time ranged from 41 to 51 days after planting (av. 48 days after planting i.e. June 7)
- Plant height ranged from 11 to 18 inches (av. 14.2 inches)
- Seed yield ranged from 470 lbs/acre to 1581 lbs/acre (av. 1194 lbs/acre)

(See Table 2. Results of Lentil Variety Trial 2010 at High Plains Ag Lab, at end of article)

Table 1. Results of Camelina Variety Trial 2010 at High Plains Ag Lab

Variety	Plant Stand (%)	Flowering (days after planting)	Plant height (inches)	Yield (lbs/acre)
SSD186	47	58	26	803
Galena	52	58	25	802
Licalla	45	59	24	789
Calena	47	58	26	781
Ligena	47	58	26	772
SSD138	52	57	25	748
Celine	50	59	29	737
Blaine Creek	40	58	25	696
Lindo	42	58	25	693
Cheyenne	45	58	25	638
SSD87	50	59	26	625
Suneson	27	58	24	555
Average	**45.33**	**58.17**	**25.39**	**719.92**
LSD (0.05)	**21.35**	**1.35**	**2**	**196.58**

Table 2. Results of Lentil Variety Trial 2010 at High Plains Ag Lab

Varieties	Type (seed size)	Flowering (days after planting)	Plant height (inches)	Yield (lbs/acre)
Crimson	Small	47	11	1581
Eston	Small	48	13	1495
Brewer	Large	48	15	1323
Robin	Large	47	15	1303
Merrit	Large	48	14	1224
Pardina	Small	48	12	1136
Riveland	Large	47	18	1023
Shasta	Small	51	16	470
Mean		**48**	**14.25**	**1194**
LSD (0.05)		**2.05**	**1.95**	**268.2**

History of Sidney long-term tillage plots

By Drew Lyon
Extension Dryland Cropping Systems Specialist

The start of the High Plains Ag Lab (HPAL) occurred on 7 April 1967, when the U.S. Government made 2,410 acres of land available to the University of Nebraska for agricultural research and educational purposes. This was a portion of the Sioux Army Ordnance Depot, a World War II installation.

That same year, Charlie Fenster started tillage research at the HPAL. The original experiments, known as Tillage A & B, were established on an Alliance silt loam soil. The land had been farmed from 1920 until 1957 and then seeded to crested wheatgrass for 10 years prior to being broken out of sod with a moldboard plow in 1967.

The site was divided into two major sections (A & B), with one section seeded to winter wheat and the other left fallow each year. The sections were cropped alternately to complete the winter wheat–fallow rotation. Fallow management treatments were: plow, stubble-mulch, and no-till. Each fallow management treatment area was divided into two equal subplots, one receiving no N fertilizer and the other receiving 40 lb N/acre. The N fertilizer was surface broadcast as ammonium nitrate to growing wheat in April each year. Phosphate fertilizer was applied at seeding according to UNL soil test recommendations. These plots were terminated after wheat harvest in 1997, 30 years after they were established.

In 1969, Dr. Gary Peterson, a soil scientist at UNL in Lincoln, was looking for a native grass site that could be converted to cultivated land in a wheat-fallow system with conventional tillage. He was interested in following changes in soil total N content from the introduction of tillage. Charlie Fenster took an interest in the idea, and he asked Ray Cruise to identify native range sites on the HPAL. Mr. Cruise identified the pasture in Section 24 as having never been cultivated.

Tillage C & D were established in 1970 on a Duroc loam soil. Unfortunately, the site was located in a natural flood plain and experienced two flooding events prior to a berm being built around the plots in 1982. The site had remained in native mixed grass sod (predominately buffalograss, blue grama, sideoats grama, western wheatgrass, and needle and thread) until 1970, when it was broken out of sod with a moldboard plow. This site was also divided into two major sections (C & D), with one seeded to winter wheat and the other left fallow each year. Sections were cropped alternately to complete the winter wheat–fallow rotation. Fallow management treatments in each major section were the same as in Tillage A & B. Additionally, a sod treatment was maintained in each of three replicates to serve as a control. The sod treatment was not hayed or grazed, but grass was burned occasionally to reduce residue accumulation and promote growth of warm-season species. No fertilizer has been applied to these plots.

The Long Term Tillage Plots (C & D), were established at the High Plains Ag Lab in 1970 in native sod to follow nitrogen changes in soil. Forty years later, these plots are a valuable resource for soil quality research.

Native fertility is still sufficient to support winter wheat yields 40 years after the plots were initiated. These plots are currently in a state of transition to an intermittent tillage study, which will look at the effect of tillage every six years on soil quality changes. All treatments will be managed as no-till in the years between plowing. In the year of plowing, half of each previous tillage treatment plot will be plowed and the other half of each plot will remain no-till. Soil scien-

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Crop residue cover differences just prior to winter wheat seeding between June 1 and July 2 annual forage (cover crop) kill dates.

A group of no-till enthusiasts tour the annual forage (cover crop) study on June 23. Note the strips of living plants and residue from the June 1 kill date.

Annual Forage/cover crop study update

By Drew Lyon
Extension Dryland Cropping Systems Specialist
And Karla Jenkins
Cow/Calf and Range Management Specialist

There has been a lot of attention and interest in the use of cover crops in no-till production systems. Technically, the USDA Natural Resources Conservation Service does not allow cover crops to be grazed or harvested. They are to be used for the protection of the soil resource, not as forage.

However, what many people mean these days when they speak about cover crops is really what we would refer to as annual forage crops. We initiated a preliminary study at the High Plains Ag Lab this past spring to take a look at several annual forages and annual forage mixtures (cocktails) for their potential for grazing or haying. We also wanted to see what their impact would be on the following winter wheat crop.

Eight different annual forage treatments were no-till drilled into standing proso millet stubble in our no-till continuous crop winter wheat-sunflower-proso millet-annual forage rotation. These eight treatments were forage pea, oat/pea, four different forage cocktail mixes, fenugreek, and triticale. The seed, with the exception of fenugreek, was provided to us by the Berns Brothers in Bladen, Neb. Unfortunately, the triticale seed was winter triticale, not spring triticale as we had assumed. The winter triticale did not get vernalized and remained vegetative throughout the study. We also failed to get an acceptable stand of fenugreek.

Karla and her crew collected biomass and quality samples from each treatment four times during the year. We are presenting only the biomass data from two of the four sampling dates here. The quality analysis has not been completed. We are also not showing any data from the forage treatments containing winter triticale or fenugreek.

Half the plot area was sprayed with glyphosate on June 1 following biomass sample collection. The other half was sprayed on July 2 following the last biomass collection. Just prior to winter wheat seeding, Drew and his crew collected soil samples to determine gravimetric water content. Soil samples were collected from portions of the plots that had been killed June 1 and from portions killed July 2. Soil samples were not collected from treatments containing winter triticale or fenugreek. Soil samples were taken to a depth of four feet.

Peas produced the least amount of forage of any of the forage treatments at both harvest dates (Ta-

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Forage/cover crop study

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ble 1). Oat/pea produced the most forage of any treatment at the July 2 harvest. The two cocktail treatments had similar forage yields at both harvest dates. Unfortunately, our cocktail mixes were not as diverse as we had hoped (Table 2). Perhaps we planted too deep for some of the plant species. April and May were also very cool and this may have prevented germination of some of the warm season species such as sunflower.

There were no significant differences in soil water content between forage treatments. There was a slight difference in soil water content between the two harvest dates. There was about one-half inch more water in the soil profile following the June 1 harvest date than following the July 2 harvest date. This is not much difference considering the large difference in biomass produced at these two harvest times.

We will take what we learned this year and adjust the experiment for next year. We plan to continue our work in this area until we can answer the questions we get from growers about the use of annual forages or cover crops in dryland cropping systems for the Nebraska Panhandle.

Table 2. Plant species as a percentage of total biomass on June 1 and July 2, 2010.

Annual forage	Oat	Pea	Brassica	vetch/clover
		June 1		
Pea	--	99	--	--
Oat/pea	62	38	--	--
Cocktail* 1	79	14	5	2
Cocktail 2	79	18	1	1
		July 2		
Pea	--	100	--	--
Oat/pea	73	27	--	--
Cocktail 1	86	11	1	2
Cocktail 2	88	9	2	1

**Species planted in cocktail mixes were: 1) pea, oat, turnip, yellow sweet clover, sunflower, medium red clover, vetch and oilseed radish; 2) pea, oat, grazing Brassica hybrid mix, yellow sweet clover, sunflower, medium red clover and vetch.*

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Long-term tillage plots

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tists with the USDA-ARS at Akron are sampling the soil prior to initiating these changes. This will allow a summary of the effects of the last 40 years on soil quality and serve to establish initial soil conditions at the start of the new study. The new study will likely need to run for 12 to 18 years before significant soil quality changes become evident.

Long-term field studies, such as these, have provided valuable information on the long-term effects of agricultural practices on soil condition and function as influenced by the ever-changing conditions of climate, weather, biological adaptation, and environmental, social, cultural, and technological considerations with time. This information cannot be obtained from 2- or 3-year experiments, yet the majority of research reported today consists of these short-term experiments. More than 45 scientific journal articles, nine book chapters, a research bulletin, and numerous scientific abstracts have been published from work conducted at these two sites over the past 40 years. Scientists with the USDA-ARS in Lincoln, Fort Collins, Akron, and Ames, Iowa, have worked on these plots, as have university scientists and graduate students from UNL, Colorado State University, Kansas State University and Michigan State University.

Funding long-term experiments has grown more difficult in recent years, resulting in the termination of many existing long-term field experiments and preventing the establishment new long-term experiments in the United States. The Long-Term Tillage plots at the HPAL are a valuable resource that are growing increasingly unique. The vision and dedication of people like Charlie Fenster and Gary Peterson have paid rich research dividends for many researchers and farmers in the High Plains.