News from the
High Plains Ag Lab

April 2011

University of Nebraska Lincoln

Advisory Board Chairman's Comments:

Thanks to all those who attended the Advisory Board meeting in February. Your input is appreciated. It's important to maintain communication with area producers to keep the research relevant to local issues. If you have any suggestions at any time, don't hesitate to relay them to Drew Lyon or myself. We can always use new members and especially would like to encourage participation by more of the young members of our ag community.

The field day this summer will be held on August 4. That should give us a good opportunity to see the summer crops in the field, and review the results from the wheat plots. Hopefully, that date will be after harvest, and before any travel some of us may have planned for the brief let-up in the workload between harvest and seeding.

The fund-raising campaign for the new building is under way. Keith Rexroth has been diligently working on the project. Hopefully, a large donation can be found to jump start the campaign.

Alton Lerwick

High Plains Ag Lab Farm Manager's Comments:

Welcome to the start of a new cropping season. I'm sure that you all have made plans for the work ahead, and may already have started on some of it. Here at HPAL, we have the forage field planted to peas, oats, and brassica. This field will be used by Dr. Jenkins for grazing trials by a graduate student.

All of our seed and pesticides have been ordered, so we should be ready to go when the time comes and the weather cooperates. Our new tractor is to be delivered in mid-May, which will be none too soon for me, as the current one has been a thorn in our sides since we first got it. Drs. Lyon, Santra, Hergert, Bradshaw, and others have their research set up for the year, and are anxious to get started. Looks like a busy time ahead.

If any of you have some extra moisture to pass around, send some our way, as we can use all you can spare. The wheat has perked up, and is starting to look better every day.

Hope you all have a good spring. Stay busy, but stay safe so that occasionally you can take the time to enjoy the season.

Tom Nightingale

Mark your calendars:

August 4, 2011: Summer field day. For details watch panhandle.unl.edu/hpal

Contact the High Plains Ag Lab:

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

Working with Bayer Crop Science

By P. Stephen Baenziger
UNL Wheat Breeding Specialist

In December 2010, NUtech Ventures, the nonprofit corporation responsible for bringing technology to market by building partnerships between University of Nebraska-Lincoln (UNL) researchers and the private sector, and Bayer Crop Science, an innovative crop science company in crop protection, non-agricultural pest control, seeds and traits, signed a licensing agreement to improve wheat breeding and wheat varieties that will be grown by American wheat producers.

The key parts of the agreement were that Bayer Crop Science would have non-exclusive access to UNL's wheat germplasm, the genetic and breeding stocks used to develop new varieties. The agreement is in accordance with principles for collaboration approved by the National Association of Wheat Growers and U.S. Wheat Associates Joint Biotechnology Committee. The University of Nebraska continues to own its germplasm and will release new varieties as it always has. In return for this access to our germpaslm, Bayer Crop Science funded the first Presidential Chair at the University of Nebraska, named in honor of our Nebraska wheat growers; and agreed to support UNL research and education programs.

Furthermore, it will establish its first North American wheat breeding station near Lincoln, NE. The breeding station will be a major benefit in numerous ways—high quality jobs, internships for students, a major breeding effort in Nebraska to increase progress in creating new varieties, and access to technology.

The agreement is the newest part of a strategy that UNL has had to foster economic development, research, education, and outreach that would lead to a more profitable and competitive wheat industry. The University of Nebraska-Lincoln has had a long standing arrangement with BASF, providing access to the Clearfield® technology which has led to the release of two popular cultivars, Infinity CL and Settler CL. In 2009, UNL began a collaboration with ConAgra that allowed us to return to testing wheat cultivars in McCook, NE, and collaborate on improving wheat quality. In the future, we hope to work with other companies and stakeholders (our largest grant to breed wheat is to develop varieties for the organic market) as an integral part of the "People's University".

Why did we develop and support this strategy? Currently, about 65 percent of the wheat grown in Nebraska has been developed by the University of Nebraska in cooperation with the USDA-ARS. Clearly we have been successful in meeting our objectives of providing superior varieties with excellent field performance and end-use quality to help make the wheat industry more competitive. However, looking forward, it is clear that more investment in wheat is needed and the investment will most likely and sustainably come from the private sector.

Dr. Baenziger speaks about wheat variety test plots at a High Plains Ag Lab field day.

For example, there are 7-8 times more corn breeders than wheat breeders and the technology and progress in corn is higher than in wheat. In addition, in corn over 90 percent (probably closer to 95 percent plus) of those corn breeders work in private industry. With this in mind, we embrace and support the new commercial interest in wheat genetics and improvement. We embrace healthy competition to make our industry better. Basically, our philosophy is that if you work on wheat, we will work with you. We also believe that as a public university, we create public knowledge, goods, and the human resources to build a more prosperous America and world. Between three-fifths and three-fourths of all the breeders we educate will work in private industry, so providing them access to closer collaborations in the private sector is critical to their education.

A rebirth in private sector wheat breeding is currently underway. Bayer Crop Science, a world leader in cotton, canola, rice, and vegetable seeds, has purchased or formed collaborations with wheat seed and biotechnology companies globally. Monsanto recently purchased Westbred and formed partnerships with Kansas State University and Virginia Tech. Limagrain has developed a North American headquarters in Fort Collins, CO. KWS has entered the U.S. market also. More private seed companies are coming.

Continued on page 6

Downy brome control in winter wheat

By Drew Lyon
Extension Dryland Cropping Systems Specialist

Downy brome (*Bromus tectorum L.*), a.k.a. cheat or cheatgrass, is a common problem in winter wheat fields, especially in winter wheat-fallow rotations. Adding a summer crop to the winter wheat-fallow rotation effectively controls downy brome and other winter annual grass weeds such as jointed goatgrass and feral rye. Plowing is also effective at controlling downy brome, but plowing may result in undesirable outcomes including soil erosion and a decline in soil organic matter and soil quality.

In 1996, I began to evaluate MON 37500 (sulfosulfuron), an experimental herbicide that was later released as Maverick® herbicide. Maverick is a sulfonylurea herbicide that has activity on *Bromus* species, including downy and Japanese brome (*Bromus japonicus* Thunb. Ex Murr.). Since the release of Maverick herbicide, several other sulfonylurea herbicides with activity on Bromus species have been marketed for use in winter wheat. These include Olympus™, Olympus Flex, and PowerFlex®. We compared these products in studies conducted at the High Plains Ag Lab during the 2008-09 and 2009-10 growing seasons.

In 2008-09, we evaluated Maverick, Olympus, Olympus Flex, and PowerFlex herbicides. Fall treatments were applied on September 30, 2008, when downy brome plants had 3 to 4 leaves present and they were 1 to 2 inches in height. Downy brome plant density was heavy. Winter wheat plants had from 1 to 3 leaves, with the first tiller emerging and an extended leaf height of 1 to 3 inches. Spring treatments were applied on March 20, 2009. Downy brome plants were starting to green up along with the winter wheat and both species were starting to show drought symptoms as the result of a very dry winter. Both winter wheat and downy brome were at a similar stage of growth as when the fall treatments were applied.

No crop injury was observed in any treatments in this study. All four herbicide treatments provided similar control of downy brome (Table 1). Fall applications provided very good to excellent control of downy brome, while spring applications provided poor control. This is in agreement with previous field research that has shown that these products generally work best when applied in the fall. The impact of downy brome pressure on wheat yields is clearly evident. Wheat yields were greatest with fall applications, but even the spring applications resulted in grain yields that were significantly greater than the nontreated check.

In 2009-10, we evaluated only Maverick and PowerFlex in a study with a similar design to the previous year. Fall treatments were applied on October 18, 2009, when downy brome plants had 1 to 3 leaves present and were 1 to 3 inches in height. Downy brome plant density was moderate to high, with very high densities in strips running perpendicular to the plot lengths that corresponded to the combine windrows. Winter wheat plants had from 2 to 3 leaves, with the first tiller emerging and an extended leaf height of

Continued on page 6

Table 1. Downy brome control in winter wheat at Sidney in 2008-2009.

Treatment[a]	Rate	Timing	Downy brome control April 3	Downy brome control May 20	Yield
	oz prod/A		%	%	bu/A
PowerFlex AMS	3.5 24	Fall	94	90	43.0
Olympus	0.9	Fall	94	91	42.7
Olympus Flex AMS	3.0 24	Fall	93	91	42.1
Maverick	0.67	Fall	91	93	43.7
PowerFlex AMS	3.5 24	Spring	0	59	35.6
Olympus	0.9	Spring	0	63	33.1
Olympus Flex AMS	3.0 24	Spring	0	55	33.7
Maverick	0.67	Spring	0	59	35.2
Nontreated check			0	0	28.3
LSD (5%)			3	12	4.6

[a]All treatments included NIS at 0.5% v/v.

Table 2. Downy brome control in winter wheat at Sidney in 2009-2010.

Treatment[a]	Rate	Timing	Downy brome control April 14	Downy brome control May 27	Yield
	oz prod/A		%	%	bu/A
PowerFlex AMS	3.5 24	Fall	80	74	37.6
Maverick	0.67	Fall	75	76	44.3
PowerFlex AMS	3.5 24	Spring	33	33	18.3
Maverick	0.67	Spring	30	25	16.9
Nontreated check			0	0	10.3
LSD (5%)			10	10	5.7

[a]All treatments included NIS at 0.5% v/v.

Left: *Adult wheat stem sawfly females deposit a single egg per stem, and the hatched larva will begin to feed within the stem.* ***Center:*** *Blackened areas can develop on the stem where the heaviest feeding has taken place.* ***Right:*** *The most distinct damage is observed at the end of the growing season, after larvae have cut stems to form pupal chambers, resulting in lodged wheat.(Photos: G. Hein, UNL)*

Wheat survey prompted by potential sawfly increases

By Susan Harvey, Research Technician
And Jeff Bradshaw, Extension Entomology Specialist

Western Nebraska wheat growers are being asked to participate in a survey of wheat stem sawfly to be conducted this year by the entomology lab at the University of Nebraska Panhandle Research and Extension Center.

University researchers fear the sawfly could be more widespread than previously thought, and pose a major risk to the crop. Grower participation will be key to getting an accurate reading of the situation.

The wheat stem sawfly is an important pest in many areas of the northern Great Plains and has been known to infest wheat fields primarily in Scotts Bluff, Banner, and Kimball counties. During the 2010 Wheat Disease Survey conducted by UNL faculty, the presence of wheat stem sawfly adults was easily observed throughout the Panhandle during late May and early June, indicating that this insect may be more prevalent and present a more serious risk than previously thought.

Certain tillage practices may provide a favorable environment for this insect and may be responsible for its expanding range.

The accompanying photos show how wheat stem sawflies develop in wheat plants and how they affect the plants.

The wheat stem sawfly overwinters as a mature larva in wheat stubble. After pupating, the adult emerges in May from the previous year's wheat stubble.

After emergence, adult females deposit a single egg per stem in developing wheat and the hatched larva will begin to feed within the stem. Although blackened areas can develop on the stem (where the heaviest feeding has taken place), the damage is most distinct at the end of the growing season after larvae have cut stems to form pupal chambers, resulting in lodged wheat.

In response to this increasing concern, the Entomology Lab at the Panhandle Research and Extension Center will be leading a survey in 2011 to document the prevalence and abundance of the wheat stem sawfly and its parasitoids.

With the assistance of crop specialists, extension educators, crop consultants, and agribusinesses, growers throughout the western half of the state will be invited to participate in the survey. These wheat fields will be sampled for insect damage and the presence of parasitoids, which can greatly impact sawfly populations.

This survey should prove interesting and beneficial to wheat producers in Western Nebraska.

Grower participation will be the key to an accurate and informative survey. Any grower who is interested in this project is asked to contact:

Susan Harvey, Research Technician
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Phone: 308-632-1250
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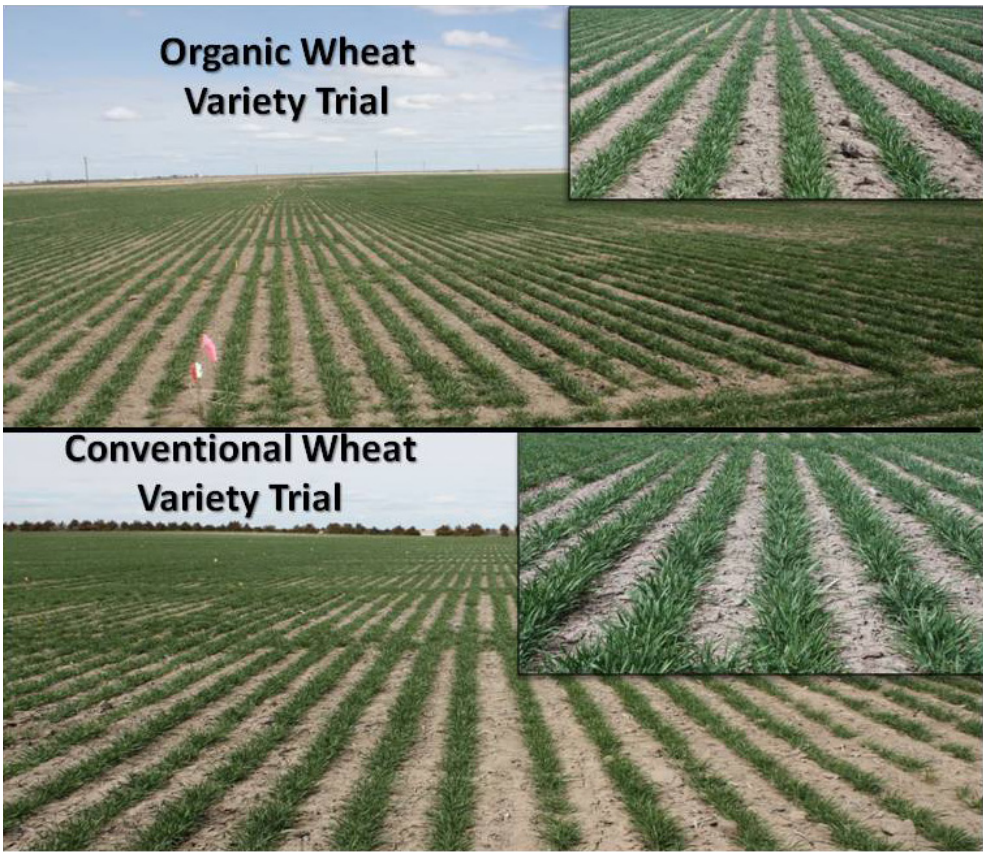
Alternative Crops Research at HPAL: Spring 2011 Update

Dipak K. Santra
and Vernon Florke
Alternative Crops
Breeding Program

Winter crops (planted in fall '10)

Winter wheat: Two variety trials planted in fall 2010 at High Plains Ag Lab are conventional dryland (51 entries), conventional and organic dryland (34 entries). Entries include varieties and experimental lines from Nebraska (the majority), Kansas, Colorado, South Dakota, and also from private seed companies (Agripro-Syngenta, and Westbred). Three organic wheat breeding nurseries planted at HPAL include 300 lines. Wheat stand is good and there has not been any significant winter kill observed (See photo).

Winter triticale: The variety/breeding trial has 12 entries. Similar to wheat, the stand is good and no visible winter kill has been observed.



Winter wheat variety trials at High Plains Ag. Lab research farm.

Spring and summer crops

Camelina: A variety trial (14 varieties) and a germplasm evaluation trail (45 lines) will be planted in spring 2011 to test their potential for commercial production in western Nebraska.

Fenugreek: Twelve fenugreek varieties with 4 replications will be planted under irrigated conditions to test their production potential in the region. A total of 172 breeding lines will be evaluated as an unreplicated single plot.

Safflower planting date study: Three commercial safflower varieties will be planted at three different planting dates starting the first week of April and then at 7- to 10-day intervals. The purpose is to capture early spring moisture with earlier planting.

Pea: Ten grain pea varieties will be tested for their yield potential under dryland conditions in western Nebraska.

Proso millet and sunflower trials have been conducted at this research farm for many years. It is the second year for camelina and fenugreek. However, pea (grain type) and safflower variety trials are new at this location.

HPAL building fund project needs help identifying potential donors

The High Plains Ag Lab laboratory building fund project has started, with initial contacts to area potential donors. According to a high UNL official, it is not a question of whether the project will proceed, but when it can be completed. Help is requested in either names or donation offers at this time. Anybody who is interested in making a donation, or suggesting a contact, is asked to contact Alton Lerwick, Drew Lyon or myself.

The HPAL is a dominating feature in dryland research over the last 40 years. This UNL research center will continue the unique setting and significant research results into the future as a site of food and fiber research. Your help is greatly appreciated.

Keith Rexroth, Chairman
High Plains Ag Lab Building Project

Downy brome control in winter wheat

Continued from page 3

2 to 3 inches. Spring treatments were applied on March 30, 2010. Downy brome plants were starting to green up along with the winter wheat. Both winter wheat and downy brome were at a similar stage of growth as when the fall treatments were applied.

No crop injury was observed in this study. Maverick and PowerFlex provided similar downy brome control (Table 2). As in the previous year's study, downy brome control was best with fall applications. Spring applications resulted in commercially unacceptable control of downy brome. Winter wheat grain yields were increased approximately four-fold with fall herbicide applications compared to the nontreated check. Grain yield was slightly greater for the fall-applied Maverick treatment than the fall-applied PowerFlex treatment. Grain yields with Spring treatments were less than two-fold greater compared to the nontreated check.

These results largely agree with the previous year's study. Although in the previous study, no winter wheat yield differences were observed between herbicides treatments applied at the same time. All four herbicide products appear to provide similar control of downy brome in winter wheat. Growers should base their product selection on price, and if applicable, crop rotation restrictions. PowerFlex has the shortest recrop intervals for most crops grown in the region. The one notable exception is that Maverick and Olympus have a 3- and 4-month rotation restriction to proso millet, respectively, and PowerFlex has a 9-month rotation restriction.

Working with Bayer Crop Science

Continued from page 2

These companies are in addition to the long standing wheat breeding programs of Pioneer, Syngenta/AgriPro, and numerous smaller companies.

What are our expectations from these collaborations? Simply, we expect better varieties and technology, and more choices. All business, public and private, is based upon value returned for the cost of their goods. It would be foolish to say that growers may not pay more for seed from some suppliers, but as long as they have choice, they can determine if they get more value from the added cost. The popularity of our Clearfield® wheat varieties with a higher cost, but greater value is an example of paying for technology that many growers think is well worth the additional cost.

The University of Nebraska remains committed to providing new varieties (in fact the Presidential Chair assures that as long as there are amber waves of grain, wheat breeding and genetics will continue at the University of Nebraska), especially for those markets where industry may not see sufficient economic returns for their considerable investment.

A few words about the process. Clearly negotiations of this nature require a high level of confidentiality. The University of Nebraska's strategy of fostering economic development, research, education, and outreach is well known. When companies began approaching UNL, we had previously developed a set of core principles and discussed them publically and openly to ensure our stakeholders understood and had an opportunity to provide excellent input, which they did.

Once the negotiations began, we signed confidentiality agreements and negotiated using our public principles. Frankly, this was one of the hardest parts for those of us who believe in the "People's University" and the land grant mission. However, it was completely necessary. Once the negotiations were completed and the results made public, the outcome was reviewed by our stakeholders and compared to our public principles. We stayed true to our principles.

Finally, a note of thanks to all involved. I breed wheat and that is what I love. The strategy and collaborations could not have been possible without the support of NUtech Ventures (specifically David Conrad and Emily Hatas), who are superb at building public-private partnerships, the support of the University of Nebraska from the President's and Chancellor's offices to the Vice Chancellor and Deans within the Institute of Agriculture and Natural Resources and their staff (specifically Dr. Susan Fritz, Dan Duncan, and Jeff Noel).

Similarly, we greatly appreciate working with the excellent team from Bayer Crop Science who helped explain their aspirations and what was needed for the private sector to prosper, and persevered as this agreement was put together. The Nebraska Wheat Board, Wheat Growers Association, and Crop Improvement Association provided excellent input as we developed our principles for collaboration and trusted us during these negotiations.

Now, it is back to work, breeding new varieties worthy of Nebraska.