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1. Continuous wheat research

Continuous wheat production has been increasing in Kansas in recent years. In some cases, wheat is being “stacked” in a rotation for two consecutive years, then rotated to another crop. In other cases, wheat is being grown for three or more consecutive years. However long the wheat is grown in continuous cropping, there are several issues that need to be considered, including: stubble treatment, fertilizer management, weed control, disease control, and variety selection.

To address some of these issues, we tested no-till continuous wheat at the North Agronomy Farm in Manhattan in 2005 and 2006. In this test, we used three seeding rates (60, 90, and 120 lbs per acre) and three nitrogen (N) rates (60, 90, and 120 lbs per acre). The variety was Overley. The results are in the tables below.

No-till Continuous Wheat: Manhattan 2005-06				
N rate (lbs/acre)	Seeding rate (lbs/acre)	2005 Yield (bu/acre)	2006 Yield (bu/acre)	2-Year Avg. Yield (bu/acre)
60	60	46	52	49
	90	44	53	49
	120	43	53	48
90	60	49	56	53
	90	47	55	51
	120	47	64	51
120	60	51	65	58
	90	53	69	61
	120	53	71	62

Average Effect of Seeding Rate and N Rate on No-till Wheat: Manhattan		
	Yield (bu/acre)	
	2005	2006
Seeding rate		
60	49	58
90	49	59
120	48	63
N rate		
60	44	53
90	48	59
120	52	69

In these tests, increasing N rates had a beneficial effect on yields. Higher seeding rates had little effect on yields in most cases. In 2006, the higher seeding rates did increase yields, but only at the higher N rates. The N in these tests was broadcast in late November or December.

Also in 2005 and 2006, we tested continuous wheat cropping systems in Marshall, Riley, and Saline counties. This work was conducted by graduate student Mauro Carignano. These tests used different N rates (45, 90, 120 lbs/acre), plant populations (900,000; 1,450,000; and 1,800,000 plants per acre), residue management systems (0, 30-40%, and 100% residue at planting), and varieties (2145 and Overlay). The 30-40% residue plots were disked twice in the fall and field cultivated before planting. In a separate set of tests, the effect of a fungicide (Quilt) on tan spot was also measured.

Results varied over the 7 site-years, but in general the optimal seeding rate was 90 lbs/acre and the optimal N rate was 120 lbs/acre. When the wheat residue was eliminated (about two weeks before planting) yields were increased in all tests. The table below shows the results from Marshall County only, averaged over seeding rates and N rates.

Residue Management In Continuous Wheat: Marshall County 2005-06						
	Yield (bu/acre) 2005			Yield (bu/acre) 2006		
Variety	0% residue	30-40% residue	100% residue	0% residue	30-40% residue	100% residue
2145	56.6	54.5	53.3	51.9	44.6	39.1
Overlay	65.0	59.8	54.5	63.4	54.5	54.3

A separate series of plots examined the effect of residue management, variety, and fungicide application on continuous wheat. In these tests, the application of Quilt fungicide in late April and May was effective in controlling tan spot. Also, there was considerably less tan spot on Overlay (moderately resistant to tan spot) than 2145 (susceptible). Without fungicide use, removing or reducing the residue level at the time of planting reduced tan spot in continuous wheat. The effect was greatest with 2145.

Effect of Residue Management, Fungicide, and Variety on Tan Spot Severity in Continuous Wheat: Marshall County 2005						
	Percent Tan Spot Severity					
	2145			Overley		
Treatment	0% residue	30-40% residue	100% residue	0% residue	30-40% residue	100% residue
No Fungicide	32	41	64	16	16	25
Fungicide	0	2	5	0	0	0

Effect of Residue Management, Fungicide, and Variety on Tan Spot Severity in Continuous Wheat: Average of Marshall, Riley, Saline Counties 2006						
	Percent Tan Spot Severity					
	2145			Overley		
Treatment	0% residue	30-40% residue	100% residue	0% residue	30-40% residue	100% residue
No Fungicide	14	22	30	6	9	11
Fungicide	0	1	3	0	0	0

These tests show that variety selection, fungicide use, and residue management systems all play an important role in the success of continuous wheat. In addition, using a herbicide to control cheat and other winter annual grasses is an important factor in continuous no-till wheat.

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2. New herbicide products for 2007

There are several herbicide products that are either new for 2007, released in 2006 but just now becoming available, or will not be released for another year or two. A brief description of these new products follows.

Breakfree (DuPont): Breakfree is replacing the Cinch ATZ in DuPont's herbicide lineup. Cinch ATZ was a premix of s-metolachlor (Dual Magnum) and atrazine. Breakfree is a premix of acetochlor (Harness) and atrazine, which will control a spectrum of small-seeded broadleaf weeds and grasses similar to those controlled by Cinch ATZ. Breakfree is labeled for preplant or preemerge use in corn.

Clearmax (BASF): This is a new co-pack of Beyond and MCPA. The addition of MCPA to Beyond provides broader-spectrum weed control and helps control ALS-resistant broadleaf weeds. Clearmax and Beyond are both labeled for use only on Clearfield wheat, and should not be used on non-Clearfield wheat varieties. Clearmax comes packaged as a 192 oz jug, with two separate compartments for Beyond and MCPA, which pour from the same spout. The timing of Clearmax applications is similar to Beyond (tiller initiation to jointing). A nonionic surfactant and nitrogen fertilizer should be used as adjuvants.

Gramoxone Inteon (Syngenta): This new formulation replaces Gramoxone Max. Gramoxone Inteon contains 2 lbs per gallon of paraquat, vs. 3 lbs per gallon of paraquat in Gramoxone Max. The Inteon formulation has additional protection in the event of ingestion. Its alginate base forms a gel upon contact with stomach acids, minimizing movement into intestines. It also contains a purgative to enhance vomiting and excretion. The Inteon formulation also has the odor of decaying grass to alert users not to consume it.

Impact (AMVAC): This herbicide contains a new active ingredient – topramezone. It is a carotenoid biosynthesis inhibitor (HPPD inhibitor), which is the same mode of action used by the active ingredients in Callisto and Balance Pro herbicides. Many tank mixtures are permitted, including 0.25 to 1 lb atrazine, plus crop oil concentrate or methylated seed oil and nitrogen. Impact is for postemerge use on field corn for control of broadleaf weeds and suppression of grasses.

Maximum labeled sizes of broadleaf weeds:

- 3": Venice mallow, prickly sida, Pennsylvania smartweed, morningglory
- 6": Pigweeds, kochia, nightshade
- 8": velvetleaf, sunflower, jimsonweed, cocklebur

Maximum labeled sizes of grasses:

- 3": Crabgrass, woolly cupgrass, fall panicum, green and yellow foxtail
- 4": Barnyardgrass, giant foxtail, seedling Johnsongrass

After applying Impact at the labeled rate of 0.75 fl oz/acre, producers can rotate to a cereal crop after 3 months, soybeans after 9 months, and other crops after 18 months.

Laudis (Bayer CropScience): This is another new experimental product with the HPPD-inhibitor mode of action, which likely will not be on the market until 2009. Laudis is the proposed name for this product. Like Impact, Laudis is for postemerge weed control in corn. As currently formulated, it contains isoxadifen safener (the same safener used in Option herbicide), which will permit higher application rates and allow the use of methylated seed oil adjuvant for better grass control. For best results, 0.25 lbs of atrazine should be mixed with Laudis.

Prefix (Syngenta): This is a co-pack of s-metolachlor (Dual Magnum) and fomesafen (Reflex). It is for use on soybeans, to be applied 14 days preplant through preemergence. Prefix provides residual control of annual grasses and broadleaf weeds, including waterhemp and Palmer amaranth. Prefix is targeted to replace Boundary herbicide.

Prowl H2O (Dow AgroSciences): This herbicide was introduced a couple years ago, but was just recently approved for use as a dormant-season treatment in established alfalfa. It should be applied anytime after the last cutting in the fall and before the initiation of regrowth in the spring. Prowl H2O provides preemergence control of certain annual grass and broadleaf weeds. It is not labeled for use in the establishment of alfalfa.

Radius (Bayer): Radius is a premix of 3.57 lb a.i. Define and 0.43 lb a.i. Balance Pro per gallon. Radius is for use on corn, and is targeted to replace Epic DF, and has the same use restrictions as Epic. Radius is for preplant or premerge applications, and is usually applied in combination with atrazine. Radius-plus-atrazine has the potential to be a one-pass treatment in corn, although it has only fair activity on shattercane.

Resolve DF (DuPont): This is a dry flowable product with 25 percent rimsulfuron (a component of Basis, Basis Gold, and Steadfast). It may be applied with glyphosate over glyphosate-tolerant corn for some residual grass control, if activated by rainfall. It should be applied postemerge to corn up to 12 inches or V6 (six leaf collars). A nonionic surfactant, with either UAN or AMS, can be used as an adjuvant.

Sequence (Syngenta): This is a prepack of 2.25 lb s-metolachlor (Dual Magnum) and 3 lb glyphosate acid per gallon. No safener is included. Sequence is labeled for burndown plus residual control and broadleaf and grassy weeds ahead of corn, grain sorghum, soybeans, and cotton. It is also labeled for postemerge and lay-by use in glyphosate-tolerant corn, soybeans, and cotton.

Sonic (Dow AgroSciences) and **Authority First** (FMC): These are identical premixes containing 62.1 percent sulfentrazone (Spartan) and 7.9 percent cloransulam (FirstRate). Sonic and Authority First are for preplant or premerge weed control in soybeans. They are similar to Gauntlet herbicide co-pack. These herbicides control pigweeds, morningglory, velvetleaf, cocklebur, copperleaf, black nightshade, and others. A low rate of these products can be used as a foundation treatment in glyphosate-tolerant soybeans.

Status (BASF): A new herbicide for corn, which contains dicamba and diflufenzopyr (Distinct), plus isoxadifen (the safener used in Option). Five ounces of Status is equivalent to 4 oz Distinct plus 1 oz of isoxadifen. Status can be applied postemerge to corn 4 to 36 inches tall. No drop nozzles are needed. It can be applied with methylated seed oil or crop oil concentrate plus UAN as an adjuvant to improve weed control without increasing crop injury potential.

Velpar AlfaMax Gold (DuPont): This is a premix containing 23.1 percent hexazinone (Velpar) and 55.4 percent diuron (Karmex) for use as a dormant season treatment in established alfalfa. It controls winter annual grasses and broadleaf weeds, and early-

season summer annual weeds. Corn can be replanted 12 months after application. No other crop can be replanted for two years after treatment.

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3. Comparison of four HDDP-inhibitor herbicides: Callisto, Impact, Laudis, Lumax

Impact (a new herbicide from AVVS) and Laudis (a proposed new herbicide from Bayer CropScience) have active ingredients with a mode of action similar to the active ingredients in Callisto and Balance Pro. As such, these new herbicides will compete with mixtures such as postemerge Callisto-plus-atrazine and preemerge Lumax. At K-State, we conducted a trial in 2006 comparing these four products on corn.

Weed Control in Corn: Manhattan, 2006					
			% Control 6-20-06		
Product	Rate per acre	Timing	Large crabgrass	Barnyardgrass	Palmer amaranth
Callisto + atrazine	3 oz + 1 pt	Early post	43	57	82
Impact + atrazine	0.75 oz + 1 pt	Early post	32	55	83
Laudis + atrazine	3 oz + 1 pt	Early post	45	74	90
Lumax	3 qt	Pre	79	91	96
LSD			15	18	12

Weed Control in Corn: Manhattan, 2006 (continued)						
			% Control 6-20-06			
Product	Rate per acre	Timing	Ivyleaf morningglory	Velvetleaf	Shattercane	Domestic sunflower
Callisto + atrazine	3 oz + 1 pt	Early post	93	97	30	93
Impact + atrazine	0.75 oz + 1 pt	Early post	87	93	50	99

Laudis + atrazine	3 oz + 1 pt	Early post	90	96	93	99
Lumax	3 qt	Pre	83	95	2	94
LSD			10	5	14	9

In this test, large crabgrass and barnyardgrass pressure was heavy, and cool, dry weather was not conducive to good grass control. Concep-treated grain sorghum was planted across plots to simulate shattercane. Other weed pressure was light to moderate. Some observations based on these results:

* It appears that postemerge Callisto plus atrazine or Impact plus atrazine will give little control of annual grasses. Producers will need a preemerge herbicide ahead of these post treatments. Laudis has the edge for barnyardgrass control, and is much better than the other products on shattercane. It remains to be seen if Laudis plus atrazine will have enough grass activity as a “stand-alone.”

* Pigweed control was very good with all four products, although there were several escapes in most plots. After showing foliar spotting early, the escapes recovered completely.

* At reduced rates, Callisto provided better morningglory control than the other products.

* All four products were effective on velvetleaf and sunflower.

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These e-Updates are a regular weekly item from K-State Extension Agronomy. 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 Jim Shroyer, Research and Extension Crop Production Specialist and State Extension Agronomy Leader
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