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UNIVERSITY OF KENTUCKY WHEAT SCIENCE NEWS

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Inside This Issue:

Announcements:

Illinois Wheat Forum
February 27, 2001
8:30 a.m-3:15 p.m. CST
Holiday Inn
Mt. Vernon, IL
For more information,
Contact Bob Frank
618-687-1867

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IPM Field Crops Scouting School
(Wheat, Corn, Soybean, Alfalfa)
March 21, 2001
8:30 a.m.—3:30 p.m.
Research & Education Center,
Princeton, KY
5.5 hours of CEU for CCA—
3.0 IPM 2.0 CM .5 NM
Contact Ms. Patty Lucas for details 270-365-7541 x 218.

High Prices and Nitrogen on Wheat

Lloyd Murdock - Extension Soils Specialist

The price of nitrogen has escalated rapidly the last few months due to the shortage of natural gas. The price has almost doubled in some cases and we are not sure what the price will be when nitrogen needs to be placed on the wheat crop.

If nitrogen is purchased for 30 cents per pound, then each 10 pounds of nitrogen costs $3 and 30 pounds is $9. This means that it may be more difficult for the last few pounds of nitrogen added to return its costs. This will depend on the costs of the N, the yield level, tillage used, previous crop and application method.

Yield Level: If yields are expected to be below 70 bu/ac the total amount of nitrogen recommended for the February and March application is 60 to 80 lb N/acre.

If yields are expected to be above 70 bu/ac then 90 to 105 lbs of N/acre is recommended. However, the higher rates do not always mean that you will get higher yields. Table 1 shows 8 years of results on a corn-wheat-double cropped soybean rotation. Corn yields averaged about 190 bu/ac with 150 lb of nitrogen applied as a sidedress application.

Yields are high over the eight years and the nitrogen was split (1/3 in February and 2/3 in March). If nitrogen cost 30 cents/lb., the extra 30 lbs/ac of nitrogen (90 vs 120) did not return its cost most years for the wheat planted with tillage. The only years that it paid, was when the wheat was stressed by a later winter or early spring freeze.

The extra 30 lbs/ac of nitrogen did return its costs for the no-tilled wheat. Again most of the large increases came the years of a late winter freeze. The 90 lbs/ac rate is probably not sufficient for several of the 8 years in the experiment for the no-till wheat.

Tillage: Based on research from several trials, the University of Kentucky recommends 30 lbs/ac more nitrogen for no-till wheat compared to tilled wheat. Subsequent research indicates that this may be too high and 15 to 20 lbs/ac is probably sufficient.

Table 1. Effect of Nitrogen Rates on Tilled and No-Tilled Wheat Over 8 Years

N Rate (lb/ac)	Yield (bu/ac)
No-Till (90)	87
No-Till (120)	91
Tilled (90)	92
Tilled (120)	94

Split N Application: In general, the differences between a single application in March and a split February-March application is about 3 bu/acre. If there are no stand or freeze problems, about 10 lbs/ac less nitrogen is required with a single application.

Previous Crop: The above recommendations are for wheat grown after corn. If wheat is grown after soybeans, these rates can be reduced by 20 lbs/ac.

All of the above recommendations are guidelines that will need to be adjusted for more specific conditions. The rates will need to be lowered in fields that have a high amount of nitrogen in them from previous manure applications, low yielding corn crop, etc. They will need to be raised if periods of excess rains occur during the spring.

Wheat Powdery Mildew: Management Options for 2001

Don Hershman, Extension Plant Pathologist

Currently, all of Kentucky's wheat crop is in the dormant state and, hopefully, it will remain that way until mid-March. Nonetheless, now is a good time to consider some of the disease management options available to you for 2001. I specifically would like to focus on powdery mildew management.

The most economical means of limiting the development of powdery mildew is by planting a resistant or moderately resistant variety. Obviously, that option needed to be implemented last fall at planting. The same applies to the use of Baytan seed treatment. Baytan can effectively control powdery mildew as late as the boot stage - early heading (Feeke's stages 10 -10.3). Thus, Baytan often negates the need for additional powdery mildew management tactics, such as foliar fungicides.

If you have planted a variety which is susceptible to powdery mildew and did not apply Baytan, there are still several disease management options available to you this spring.

The obvious option is to use a fungicide, if needed, before a serious powdery mildew problem develops. In the past, Bayleton applied at a rate of 1 oz a.i./A sometime between crop stem elongation and flag leaf emergence (depending on disease pressure), was a highly effective and economical way to control powdery mildew. Unfortunately, this product is no longer labeled for wheat. It is still legal to apply "old" product that has wheat on the label. However, it is very unlikely that many of you would be successful in locating a sufficient quantity of old Bayleton.

The fungicides Tilt, Quadris and a newly labeled product, Stratego, may also be used to effectively manage powdery mildew. In addition, Benlate is labeled for wheat, but only moderate control of powdery mildew is likely with that product. Tilt and Stratego MUST be applied before crop flag leaf emergence due to label restrictions. Quadris may be applied up until crop flowering. In order for any fungicide to be of much value in managing powdery mildew, application will need to be made within the same time frame as indicated above for Bayleton (early stem elongation to flag leaf emergence). Later applications will usually produce a poor result because they allow the powdery mildew epidemic to progress too far. The main problem with applying foliar fungicides early is that the crop will be unprotected against mid- to late-season diseases. And, year in and year out, the late-season diseases like leaf and glume blotch and leaf rust take the greatest toll on crop yield. Thus, in anything except a dry year, a second fungicide application will be required to protect the crop after head emergence.

The only legal choices for post-flag leaf emergence disease control are: 1) Quadris, 2) mancozeb, and 3) Benlate plus mancozeb. However, it is highly unlikely any of these fungicide treatments would be economical if an earlier fungicide application has already been made. This is because of the low profit margin currently associated with wheat production. The upshot of this situation is that growers will have to make a choice when field scouting indicates that powdery mildew is becoming severe. That choice is: spray early to control powdery mildew or wait, allow powdery mildew to develop, and make an application later in the season to address late-season disease pressure. When faced with this choice, most will probably opt to apply a foliar fungicide earlier than is desired and hope that late-season disease pressure is minimal. It would probably NOT be prudent to delay the application of a fungicide and allow powdery mildew to develop unchecked since crop yield potential could be severely compromised.

One factor that can help to deter early and severe powdery mildew is proper nitrogen fertility. The point to remember is that an overly lush crop, which can result from excessive levels of nitrogen, will encourage powdery mildew development. Split spring nitrogen programs can be especially problematic since early crop growth (and powdery mildew) is stimulated by the first nitrogen application in February. If powdery mildew management is a consideration, one option is to apply all the nitrogen needed (usually 90-100 lbs N/acre) as a single application in early to mid-March. This was, in fact, the standard nitrogen management program in Kentucky for many years.

If powdery mildew turns out to be a significant problem this season, make plans to plant a powdery mildew-resistant variety or treat susceptible varieties with Baytan before planting next fall.

Nutrient Management in Different Crop Rotations

Lloyd Murdock - Extension Soils Specialist

When a farmer changes from a corn-soybean or wheat-corn-double crop soybean rotation to one with more corn or soybeans in it, there are usually some questions that the farmer asks about fertilization. Below is some information that might be helpful.

Nitrogen on Corn

The nitrogen recommendations in AGR-1 are made for corn after corn and corn after soybeans. We recognize that soybeans provide a little nitrogen for the succeeding corn crop but also know the corn after soybeans usually means a higher yield. Some recommendations reduce the nitrogen for corn after soybeans about 20 to 25 lbs/ac. Table 1 shows research in Kentucky by J. Herbek and L. Murdock.

Nitrogen on Wheat

Present recommendations for nitrogen rates on wheat are for wheat after corn. Research shows that wheat planted after soybeans should probably receive about 20 lbs/ac less nitrogen for the winter/spring applications.

Lime Changes

The lime needs will change and will be directly dependent on the amount of nitrogen used in the rotation. The commonly used nitrogen sources in Kentucky will generate considerable acidity and lower the pH with time. On the average, it requires about 3 pounds of Ag lime to offset the acidity produced by 1 pound of nitrogen in the ammonium form. Therefore, 1000 pounds of lime would be required for every 330 pound of nitrogen added. This is not to say that lime application rates need to be geared to the amount of nitrogen added. It just means lime will be required more often and soil pH and soil buffer pH from a soil test is still the best way to determine lime needs. Table 2 shows this effect. When 200 lbs/ac of nitrogen was applied each year, the pH dropped to 5.3. When 200 lbs/ac was applied every 2nd year in the corn/soybean rotation, it dropped to 5.9. However, in the other situations when no nitrogen was applied, the pH stayed about 6.5 to 6.6.

Nutrient Removal

The other thing that needs to be considered is the nutrient removal rates with the changing rotations and its effect on soil test and the need for replacement nutrients. Table 3 gives the expected nutrients (P_20_5 and K_20) removed from row crops on a bushel basis. There are significant differences in nutrients removed by the crops on a bushel basis but the long term effects will depend on the yields from crops in different rotations. Table 4 shows total nutrients removed by the grain in 4 different rotations with assumed yields of 140, 70, 35 and 50 bu/ac for corn, wheat, double cropped (d.c.) Soybeans and full season soybeans, respectively. There are almost no differences in the expected removal over a 4 year period. The only exception is a little lower P_20_5 removal in the soybean/wheat-d.c. soybean/corn/soybean rotation .

Conclusions

The changes in the nutrient management with changes in crop rotations are small.
The main differences are:

1. Increase the nitrogen rate 20-25 lb/ac if a credit for soybeans has been taken in the past. (No change in recommendations from the University of Kentucky).
2. Reduce the nitrogen rate for wheat grown after soybeans by about 20 lbs/acre.
3. The soil pH will drop more rapidly as more corn is added to the rotation due to more nitrogen use. This will result in liming more often.

Table 1. Effect of Different N Rates on Corn Yields after a Corn or Soybean Crop (3-Year Average)*

Previous Crop	N Rate (lb N/Acre) 0	50	100	200
	Bu/Acre			
Corn	34	104	133	138
Soybeans	78	123	145	142
Rotation Advantage	+44	+19	+12	+4

*1981, 1985, and 1987 data. Data not reported for 1983 due to a drought which severely limited yields.

Table 2. Effect of 7 Years of N and Different Crops on Soil Tests

Rotation	N/Yr Of Corn	Soil Test Results P	K	pH
	Lb/Acre			
Corn	0	76	307	6.6
Corn	200	41	211	5.3
Soybeans	0	63	211	6.6
Corn/ Soybeans	0	72	240	6.5
Corn/ Soybeans	200	40	201	5.9

Table 3. Nutrient Removal by Grain Crops

Crop	Bushel Weight	Nutrients Removed P_2O_5	K_2O
	Lbs/Bushel		
Corn	56	0.40	0.35
Soybeans	60	0.70	1.10
Wheat	60	0.50	0.30

Table 4. Total Nutrients Removed by Grain in 4-Years with Different Crop Rotations

- Corn (140 bu/A)/Wheat (70 bu/A)-D.C. Soybeans (35 bu/A) x 2 yrs.

P_2O_5 = 232 lb/A

K_2O = 215 lb/A

- Corn/Corn/Corn/Wheat-D.C. Soybeans

P_2O_5 = 228 lb/A

K_2O = 206 lb/A

- Soybeans (50 bu/A)/Wheat-D.C. Soybeans/Corn/Soybeans

P_2O5 = 186 lb/A

K_2O = 218 lb/A

- Wheat-D.C. Soybeans x 4 Yrs.

P_2O_5 = 240 lb/A

K_2O = 236 lb/A

The Affect of Temperature on the Relative Risk of Aphid Borne Disease in Wheat

Doug Johnson, Extension Entomologist

This time of year always bring questions about how much Barley Yellow Dwarf (BYD) to expect in this years wheat crop. Additionally, our curiosity can only be increased by the warm weather spell we are entering. However, this year, unlike the past four, we at least have had a "normal" winter.

A comparison of the 1999-2000 vs. 2000-2001 seasons might show us how a "normal" winter (this year) compares to the very warm winters (e.g. last year) we have been having. What I would like to show you is the relative change in risk associated with fall and winter temperatures and the interaction between temperature and planting date.

Remember that aphids cannot regulate their own body temperature. The temperature of their surroundings dictates what their body temperature will be. They will not die until the temperature becomes very cold. However, they do not move, feed or reproduce, to any great extent when the temperature is below 48-50^{o}F. We are going to look at our situation now compared to last season based on temperatures above 50^{o}F. In my research plots at Princeton, KY during the 1999-2000 season, BYD ran between 12 and 50% infected plants.

Let me just remind you how a Degree Day (DD) is calculated. In this example, we are assuming that nothing happens when the temperature is below 50^{o}F, so this is called a "Base 50" DD. So we take the daily Maximum and Minimum temperatures, average them, then subtract 50. The remainder is the number of DD's for that day (the number can not be less than 0). With each passing day, we add the DD together to get a total (sum) over time. The higher the temperature and the longer the time with temperatures above 50^{o}F the more time that aphids can reproduce, move around, feed and spread Barley Yellow Dwarf Virus (BYDV).

Figure 1 illustrates the accumulation of DDs from Oct. 15th through Jan. 28 of the current and the previous season. This would simulate exposure of wheat that emerged on about Oct. 15th in Princeton, so it would have been planted about a week or ten days earlier, say Oct. 5 – 8th. For comparison, Princeton is at Lat/Lon- N: 37° 06' 01" / W: 087° 51' 13" and an altitude of 550 ft. The Hessian Fly free date is Oct. 15th.

You will notice that in both seasons the first few days were about the same. However, after about Oct. 20th the 2000 fall was warmer than that of 1999. You can see by the steepness of the line that the DD accumulation occurred at a much greater rate between Oct. 20 and Nov. 7 in 2000 than in 1999. However, from about Nov. 7th 2000 through our current date, DD accumulation just about ceased. In the 1999-2000 season, however, the DD accumulation after Nov 7th 1999 just kept right on increasing through the winter. So in the current season on Jan 28, 2001 we have accumulated 379 DD. Also, the accumulation has only increased by 12 DDs (from 367 DD) since Nov. 7, 2000. In contrast, on Jan. 28, 2000 we had a DD accumulation of 462 and that total had increased by 243 DD from the Nov. 7, 1999 total of 219 DD. This certainly implies that during the fall and winter of the 1999-2000 season aphids had more opportunity to remain active.

So it should be easy to see that we are at less risk for BYDV problems in 2001 than we were at this time in 2000. Fewer DD's have accumulated, and almost none over the previous two and ½ months.

There is still risk of BYD in the system. This is largely due to the fact that the latter portion of Oct. and early Nov. were quite warm.

Depending upon when your crop emerged it was at greater or lesser risk.

Figure 2. illustrates the accumulation of DD's in the 2000-2001 seasons depending upon when the wheat emerged. The upper line represents DD accumulation for a crop that emerged on Oct. 15th while the lower line is for a crop that emerged on Oct. 25. Certainly it is easy to see that the crop emerging on Oct. 25 was at less risk. The earlier crop accumulated a DD total of 379 while the later crop only reached 234 DDs.

Neither of these examples are absolute. There are many other factors that affect BYDV movement, reproduction and expression as BYD. This is especially true if your crop emerged earlier than the dates illustrated. We may, however, have been aided by last summer's drought in the southeast. The drought should have reduced the number of aphids that survived the summer and stressed the plants that serve as alternate hosts for BYDV. Though I cannot say for certain what will happen this year, it certainly looks as if we should have less BYDV than we did last year. Certainly we know that when we have more "normal" cold winter temperatures --

Aphids:

- Fewer aphids will survive
- Aphids don't reproduce as much
- Aphids will not spread as much
- Aphids will not feed as much

BYDV:

- Will not replicate in the plant as rapidly

Wheat:

- Will be less susceptible to late cold injury.

Figure 1. Difference in Base 50 Degree Day Sum at Princeton, KY for two wheat seasons beginning with Oct. 15. each year.

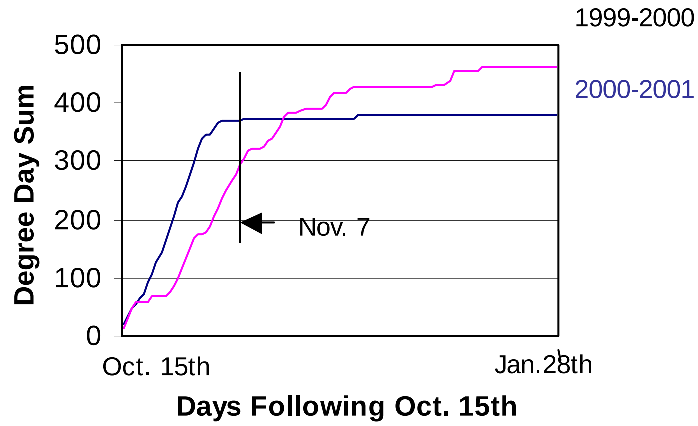

Figure 2. Difference in Base 50 Degree Day Sum at Princeton, KY for wheat emerging on Oct. 15th or Oct. 25th, 2000