Bulletin 6:05

Why A.S.K.™
AGRINTELLIGENCE SOIL KNOWLEDGE

SPECIAL ISSUE:

The WheatTech Watchglass

Wheat Management Tips from Chris Bowley - WheatTech Inc.

FALL 2005

I. SITE SELECTION

When aiming for very high wheat yields it is important to select suitable fields. Avoid low lying ground and areas where water will stand for prolonged periods, as wheat favors well-drained ground and will not tolerate excessive water. Wheat does not compete well with grass weeds such as ryegrass and cheat. Selecting fields that have been in set-a-side or where severe grass problems exist may produce unsatisfactory yields. Try to avoid fields where herbicide carryover potential is high.

II. CROP ROTATION

Wheat works well in conjunction with corn and soybeans providing a rotation that reduces disease, insect, and weed problems. Small grains (cover crop, volunteer, or grain production) grown in successive years reduce yield potential by increasing disease and weed pressure. Do not grow wheat after wheat due to major yield loss potential.

Controlling grass weeds and volunteer cereals in the previous crop and during the winter fallow period will help avoid disease problems such as take-all. Cephalosporium leaf stripe (CLS) can cause severe problems in northern regions of Illinois, Indiana, Ohio, and Michigan especially where wheat is rotated to wheat in a short rotation of 2 years or less. The only control measures for minimizing CLS at present are long rotations, tillage and raising the soil pH above 7.0.

III. FALL FERTILITY

A. Soil pH Levels:

Maintain a soil pH level of 6.3-6.8 for optimum yields on mineral soils. Levels lower than 6.0 will result in key nutrients becoming less available and possibly reduced growth due to aluminum or manganese toxicity; whereas, pH levels higher than 7.0 can result in micronutrient deficiencies.

B. Fall Nitrogen:

Nitrogen (N) applications in the fall can be very important in achieving consistently high wheat yields. Excessive fall N can lead to lush fall growth, poor winter survival, and increased insect, weed, and disease problems. Nitrogen deficiency leads to insufficient fall growth and poor tiller development. Generally, wheat planted 3 weeks after fly date or following corn (especially if no-tilled) requires moderate to high fall N rates. Use the following as a guide for fall N application:

PREVIOUS CROP	YIELD (BU/A)	FALL N RATE (LBS/A)
corn	150	30
corn	100	20
corn	50	15
soybeans	30-50	15-20 higher rates for late planting

C. Phosphorus:

Phosphorus (P) is essential for cell division, the development of new tissue, and influences root development, flowering, and hastens maturity. Maintain phosphorus levels in the high range (30-35 ppm Bray P_1) to complement both the wheat and soybean crops. An 80 bu. wheat crop and a 30 bu. soybean crop will remove approximately 32 lbs P (72 lbs P_2O_5). In areas where double crop soybeans are not grown, crop removal will drop to a total of 21 lbs P (47 lbs P_2O_5). In most cases, an application of 60-70 lbs P_2O_5 (125-150 lbs DAP) will be sufficient to maintain soil levels for good wheat and soybean crops and 40-50 lbs P_2O_5 (90-110 lbs DAP) for a single wheat crop only. Base phosphorous fertilizer amounts on accurate soil tests and apply preplant, either broadcast or banded (recommended if soil test levels are low).

D. Potassium:

Potassium (K) requirements for wheat are very high, but most of this remains in the straw and actual removal is fairly low. Adequate potassium levels improve moisture use efficiency, reduce disease problems, and improve straw strength. Maintain potassium levels in the high range (150-200 ppm). Soil levels can be high, but samples should be taken to see if your soil types are naturally high or low. An 80 bu. wheat crop and a 30 bu. soybean crop will remove 65 lbs K (74 lbs K_2O) in the grain. A wheat crop alone will remove very little potassium: 28 lbs K (34 lbs K_2O). Application rates of 60-90 lbs K_2O (100-150 lbs potash) are typical for wheat and soybeans. For a single wheat crop, maintenance levels of 20-30 lbs K_2O (35-50 lbs potash) should be sufficient. All applied potassium should be preplant incorporated.

E. Sulfur:

A high yielding wheat crop will use large amounts of sulfur (S) equal to 0.25 lbs per bushel produced. In most cases there are sufficient quantities in the soil profile to provide for crop needs. Unfortunately, soil tests are inaccurate in determining sulfur availability due to leaching out of the surface layers. Deficiencies usually occur in course sandy soils with low CEC's. If S is deficient, apply 7-10 lbs sulfur at GS 5-6 in the sulfate form. In very sandy soil types the addition of 10 lbs sulfur in the fall combined with additional spring applications is often necessary.

IV. CULTIVATION

A. No-Till:

Raising no-till wheat can be very effective in certain circumstances. For example, no-tilling on very poorly drained ground can minimize heaving losses and will aid in making timely spray applications. No-till into bean stubble is very effective and should be the preferred method for planting behind soybeans, however, no-tilling into corn stubble often creates problems that are difficult to manage and should be avoided. The biggest problems associated with no-till into corn stalks relate to increased head scab potential, uniformity of depth at planting, and establishing good seed to soil contact.

Above Left: No-till wheat planted into corn stubble. Above Right: No-till wheat planted into soybean stubble.

B. Conventional Tillage:

The main objectives when selecting a tillage method are to reduce compaction, level the ground, and remove sufficient surface residue to permit accurate seed placement. Good soil structure starts with planting and harvest of the previous crop. Primary tillage can range from disc chisel and heavy offset discs to a single light discing. When following corn, tillage should involve a disc chisel or off-set disc followed by one or two discing operations. Deep tillage is not essential to bury residue when following soybeans, but may increase yields in areas where surface compaction exists. Whatever tillage system is chosen, firm the seedbed using a culti-packer prior to drilling to achieve good depth control.

V. VARIETY SELECTION

Select a combination of 3 to 4 high yield potential varieties with moderate to good winter hardiness. It is important to choose high yield potential varieties from different maturity groups that will complement each other.

V. VARIETY SELECTION (cont.)

Sort through test data from several locations and be sure to use 2-3 year data. Make sure the data you select from is conducted using the management practices you intend to use for your fields. i.e. if you intend to use intensive wheat management practices then use Wheat Tech or other high input trials to select your choices. If you will drill it and apply one shot of N, then university tests can be a good source of information. Be very careful to look at seed treatments used on the test plots, many companies will add Cruiser or Gaucho to the seed, this can give 5-10 bushels per acre yield benefits which can move a variety from bottom to the top of the list. Only compare varieties with the same seed treatments. If you cannot find this out, the data is worthless and should be discarded.

Avoid having more than one variety susceptible to a particular problem such as low test weight, poor standability or to a particular disease. Try to select 25% early, 50% medium and 25% late maturing wheat varieties to allow high yields in freeze years and timely planting of the double-crop soybeans. Even on non-double-crop acres, use 3 different maturities to spread the flowering period to aid in head scab control. Head scab is a major problem so try to include at least 50% of your acres in varieties with above average scab tolerance.

The following are some thoughts on good choices for central IL, IN, OH and MI:

Early	Medium Early	Medium	Medium Late	Late
Pioneer 25R54	Roane	Pioneer 25R37	Tribute	Pioneer 25R35
Arise 766	AP Benton	Croplan 8302	Excel 354	Trueman
Diener 490	Excel 400-1	Excel 307		Croplan 8309
Becks 117		AP Cooper		
Arise X21		Diener 510		
		Vigoro 9412		

The important thing to remember when selecting varieties is to pick variety gcombinations that work well together and to pick varieties using test data that mimics your production practices. Examples of good combinations include:

Pioneer 25R54 (25%) + Roane (25%) + Pioneer 25R37 (25%) + Excel 354 (25%)
Diener 490 (25%) + Roane (25%) + Vigoro 9412 (25%) + Pioneer 25R37 (25%)
Arise 766 (25%) + Pioneer 25R37(30%) + AP Cooper (20%) + Croplan 8309 (25%)
Diener 490 (20%) + Pioneer 25R37 (35%) + Diener 510 (25%) + Croplan 8309 (20%)

VI. SEED TREATMENT

Use certified seed that has been cleaned heavily, germ-tested, and treated. Particular care should be taken to use treated seed after years with head scab problems. Seed treatments have shown consistent 2-3 bushel per acre yield increases even in low disease years. There are many good seed treatments. We have tested multiple combinations of seed treatments with no clear favorites. Any of the Raxil or Dividend seed treatment formulations will produce good results.

There are also two insecticide seed treatments which can control aphids. Aphids vector barley yellow dwarf virus, a disease proven to be responsible for large yield losses (up to 40 bu.) in Kentucky and southern Indiana. Consider using Gaucho or Cruiser in areas where BYDV is a problem, especially on the first 25-50% of acres drilled prior to or near the Hessian fly-free date. Given product cost and high seeding rates, good scouting and necessary foliar insecticide applications are more economical for later drilling dates.

VII. CROP ESTABLISHMENT

A. Seeding Rates:

It is important to drill small grains according to seed size, not by volume, due to the large variance in seeds per pound within different varieties. Generally, seed size will be large with many seed lots ranging from 10,000-11,000 seeds/lb . Normally we would expect seed sizes from 10,000 - 13,000 seeds/lb for most varieties. Seed size will vary greatly across the region due to drought and head scab in certain areas. Many of the seed producers are adding the number of seeds/lb to the seed tag. If this is not the case a good estimate can be attained by counting 500-1,000 seeds and weighing them accurately (use scales that weigh in 0.1g or 0.01oz increments). Calculate the seeds/lb from the following formulas:

$$\frac{\text{number of seeds weighed}}{\text{weight of seed in lbs}} \qquad \frac{500}{0.044} \qquad = 11363 \text{ seeds/lb}$$

seed weight in lbs = weight in grams divided by 453.6 or weight in oz divided by 16

Maximum yields require 200-250 plants per square yard with 2 to 3 well-established tillers present before spring green-up. Our goal is to drill sufficient seed to allow for poor germination, winterkill, and losses due to insects and diseases. Germination losses will vary according to drilling date and seedbed conditions; therefore, adjust seed rates upwards if planting is delayed or if seedbed conditions are poor. Use the chart on the next page as a guide:

Why A.S.K.™
AGRINTELLIGENCE SOIL KNOWLEDGE

Planting Rate Chart - Seeds per Square Yard

	Days before (-) or after (+) Hessian Fly-Free Date			
Seedbed Condition	**-5**	**0**	**+15**	**+30**
Good	275	300	325	375
Average	300	325*	350	400
Poor	350	350	400	450

* For most conditions this fall, a seed rate of 325-350 seeds/yd^2 (1.57-1.69 million seeds/A) will be used.

$\frac{\text{(seeds/sq. yd) x 4840}}{\text{seeds/lb.}}$ = seed rate (lbs/A) e.g. **$\frac{\text{350 x 4840}}{\text{12000}}$ = 141 lbs/acre**

When no-tilling behind corn, add 10% to the seed rate to compensate for reduced emergence. If broadcasting, use 20-25% more seed.

Great Plains - 42 foot no-till drill

Depth-Control Press Wheels

Drill wheat 1 inch deep in most circumstances. If trash is severe or in no-till, you may have to compromise at 0.5 to 1.5 inches. Under no circumstances should you drill wheat deeper than 2 inches. In no-till, make sure the seed is making soil contact below the residue. Good depth control requires a modern drill with good depth control press wheels.

B. Drilling Date:

Drilling dates can significantly affect yields. Sowing too early increases the risk of Hessian fly, barley yellow dwarf virus, and spring freeze problems. Delayed drilling decreases yield potential and risks not getting the crop established in a wet fall. The goal is to have the main shoot and two to three healthy tillers established before going into dormancy. Fall tillers have greater yield potential than spring tillers due to a better root system and a larger head size.

Drilling close to the fly free date or earlier will give maximum yields when barley yellow dwarf virus and spring freeze problems are addressed. We recommend starting drilling a week prior to the Hessian fly free date and trying to be finished no later than two weeks after the fly free date.

It is important to carefully select the planting order of varieties. Generally, late maturing varieties should be drilled first, followed by non-winter-hardy varieties and finish up with early maturity and very winter-hardy varieties. Particular care should be taken to avoid early drilling early jointing varieties.

VIII. HERBICIDE BURNDOWNS

Any no-till fields should be monitored for both grass and broadleaf weeds present at planting time. If mod-high levels of winter annuals are present consider the use of roundup 1-2 pints (depending on formulation) to control these either 24hrs prior to drilling or 3-4 days after drilling. Chickweed and winter annual grasses are particularly damaging if left untreated.