Profiting From A High-Tech Approach To No-Tilling Wheat

Handout to Accompany Presentation

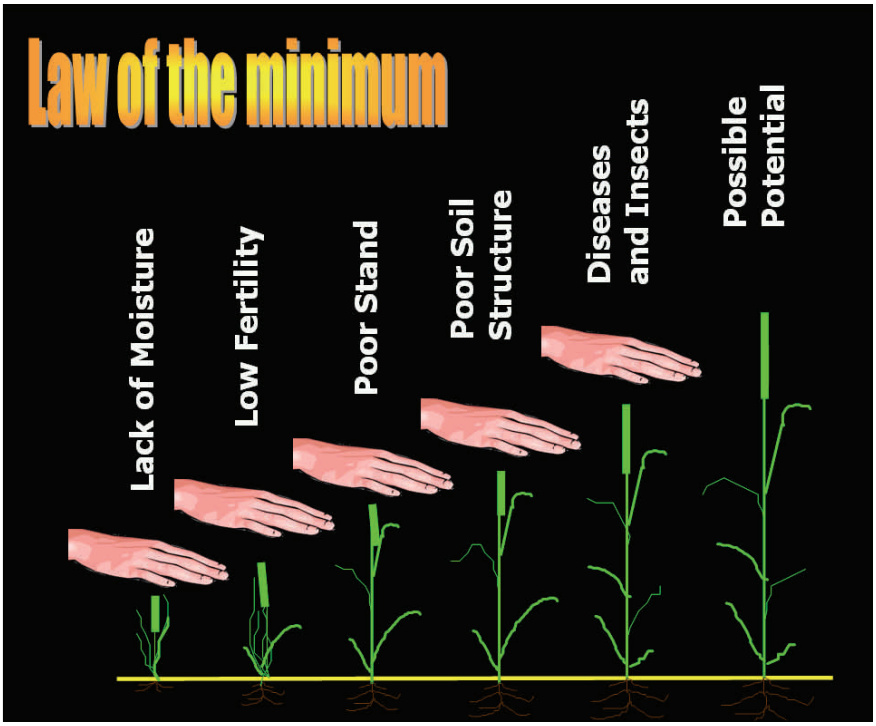
By

Phil Needham
Needham Ag Technologies, LLC

4911 KY 81N
Calhoun
KY 42327
270-785-0999
www.needhamag.com

Is it possible to increase wheat yields and profits within the US, despite its challenging climatic conditions? I think so. Why? - Because most producers have weak links within their production systems which limit yields below the achievable potential for that specific growing season.

Wheat is a common currency around the world. Producers across the US compete directly with farmers in Europe, India, Canada, China, Russia and Australia. These (and other nations) have been utilizing many new technologies to give them a competitive advantage in the world wheat market. To be efficient and profitable there are many agronomic practices that producers within the US will need to focus on. Many states have wheat yields in the 30-60 bu/ac range and such yields are not going to keep producers in business long term, especially with the expected long term declines in government support.



For many producers across the South East and Central Plains, the wheat harvest of 2007 was one that many will wish to forget, the April 8th freeze reduced many field yields, but within such a string of events, there were in fact many lessons learned. These lessons include the fact that many producers planted wheat too early, applied too much N too early in the growing season and many established wheat using conventional tillage practices. All of these factors, together with many others may be weak links within the production system, which if improved can increase wheat yields and profits.

No-Tillage. Many producers across the US have been no-tilling corn and/or soybeans for a number of years, but have still not embraced no-till as a system to establish wheat. Some are concerned about poor yields as a result of no-till and other producers are not ready to make the transition to the system, as a result of the equipment investment required. The fact is, many can NOT afford to make the step towards no-till. With high fuel prices and increasing labor expenses (if you can find good labor), quick calculations will conclude that no-tillage will actually increase bottom line profitability. This statement does assume that yields are similar to a conventional tillage system, but with some improvements in management practices and investments in new technology, no-till yield drag can quickly transition into no-till yield gain. These benefits are significant short term, but the long term benefits of reduced soil erosion and increased organic matter will be the primary factors which keep your family farming for many generations to come.

Equipment Selection for No-Till Wheat

Successful no-till begins with sound residue distribution during harvesting of the previous crop. Residue distribution needs to include both the straw and chaff (there is more chaff produced out of the back of a rotary combine than a conventional) and the straw should be ideally chopped into 4-6" lengths. Reducing the chop length further does take more power, but it will improve trash flow through seeding equipment, in addition to accelerating the residue breakdown. This principle enables faster re-cycling of nutrients contained within the residue. Image 1 illustrates a rotary combine only spreading soybean residue over about half of the 30' cutting width. Notice the addition of wide front dual tires to help spread the load of heavy equipment and reduce rutting in softer soils. Poor residue distribution frequently leads to poor wheat stands, as illustrated by Image 2.

Regardless of the seeder brand or configuration you purchase, regardless of the quality of the seed or the fertility level of the field, poor residue distribution can frequently limit stands and final yields. Most combines available on the US market do an average to poor job of chopping and spreading the straw and chaff, especially on older conventional models.

It may be as simple as fitting new chopper knives or additional tailboard fins to improve performance, or it may require installing an after market straw chopper such as a Redekop MAV system, to chop and blow residue across the working width of even the widest headers.

1

2

Basic Agronomics For No-Till Wheat. Growers have most of the agronomic tools available to produce high-yielding wheat. They have access to high quality treated seed, the ability to plant in a timely fashion (not too early) and a portfolio of foliar fungicides, but you can't just check off every item on a list and expect them all to make money. The challenge of high management production comes from not just having the tools, but knowing which ones to use and when to use them. Utilizing a trained agronomist, skilled with high-yield wheat production is a sound investment and a long term learning experience.

Soil and Tissue Testing. While many producers have good soil test records for most fields over time, others need to improve their system. There is not a better way of increasing yields economically than determining the nutritional status of each field and deriving accurate application decisions. Soil tests for no-till fields should ideally be pulled to the 4-5" depth, ideally together with deep nitrate tests down to 24 or 36", (image 3) depending on soil type and rooting depth. Tissue tests are also a good tool for determining the plants ability to pull nutrients from the soil and are also commonly a good indicator of potential fertility and soil structure problems. Always check for sulphur and micro-nutrients such as copper and zinc.

3

Fall Fertility. Placement of phosphate in the row is a sound practice for soils with low P levels or within fields which have short-term lease agreements. Nutrient application rates (including micro-nutrients) should be derived from a combination of soil test data and realistic yield goals based on local experience. Site specific applications based on soil types, soil organic matter and expected yield potential can be a sound strategy, especially if such equipment is readily available. High fall N rates (greater than 30lb/ac) should be avoided unless soil N levels are low or fields are planted late into high residue conditions. High fall N rates should be discouraged because of excessive N losses and the excessive fall growth (especially when seeding early). Increases in foliar diseases and insects are also more common in early planted fields or fields with excessive rates of fall N.


4

Drilling. Once the residue is sized and distributed evenly, producers should consider a sound no-till drill such as the ones illustrated in images 4 and 5. New and used ones are both available, but seek expert assistance when considering used models because you may be inheriting someone else's problems. Different brands and styles all work in specific conditions, so be sure that what you are buying will work for you. Be sure to check the condition of disc blades, bearings, seed boots, press wheels, etc. before finalizing the deal on used models. The most frequent weakness on many no-till drills is the amount of down pressure available to each disc opener or pair of disc openers. If residue is heavy and the soil is hard, producers commonly struggle to achieve adequate penetration. In these situations weight brackets and frame weights are frequently required.


5

Attaining consistent depth control has always been a challenge, but no-till helps in this regard because it gives the press wheels or gauge wheels a firm surface to press against to effectively gauge disc depth. Seed to soil contact can be a challenge with many no-till drills, especially within marginal moisture conditions. Many different options may be justified if frequently planting into such conditions. Some of these may include narrower press wheels than manufacturers currently offer (such as the one illustrated in image 6) which fit down into the seed slot of a single disc opener much better than factory versions to imprint seeds into moisture. Such modifications can be the difference between attaining a good stand and a marginal one.


6

Fall Weed and Insect Control. Many producers don't scout their fields for winter annuals or insects. Depending on the region, the previous crop and the tillage system, broadleaved winter annuals such as chickweed, henbit, pennycress and mustards are frequently a problem. If such weeds exist at seeding time, then a burn-down herbicide such as Roundup is a must. However in more northern climates, there may not be weeds present at planting and a post-emergence application will be required. Research has consistently proven that high levels of these weeds (as illustrated in image 7) can reduce wheat yields by as much as 8-10 bu/ac, so if such weed densities exist, post emergence spraying (in the fall) with a product such as Harmony Extra XP is strongly encouraged before the soil and daytime temperatures decline.


7

While scouting for weeds, also be on the lookout for insects such as aphids. Aphids are commonly found within early planted fields, but they can also occur within later planted fields, especially if a suitable host species is close-by. Aphids are a problem because they are a vector for the virus Barley Yellow Dwarf. This virus causes stunting and a significant yield reduction. Threshold levels for aphids are 4-5 per square foot, if populations exceed these numbers, then an insecticide application of a product such as Warrior is strongly encouraged.

Spring Plant Health and Nitrogen Applications.

Within Ohio and surrounding states to achieve maximum yields, the number of heads per square yard should be around 550-600. To achieve head populations within this range it is important to learn how to manage tillers. If moisture and total plant nutrition is available, most tillers (with at least 2 unfolded leaves) will each produce grain heads. Image 8 illustrates a healthy wheat plant with 3 tillers, each with at least 2 fully unfolded leaves. Assuming a plant stand of 250 per square yard at the stage (as illustrated within Image 8), that's 750 tillers. If this field is heavily fertilized at this stage with 100lb/ac of actual N for example, more tillers will be created, which will lead to head populations perhaps 2X of what is required, resulting in poor standability and lower yields. What is required at the stage illustrated by Image 8 is a low rate of perhaps 40lb/ac of N, returning with the balance of N applied in a 2nd application at Feekes 6 (jointing). The 2nd application rate is based on a number of factors including plant health, previous crop, residual N levels, yield potential and the varieties standability ratings, but will commonly be in the 50-70lb/ac range. As the plant population or total tiller population is reduced (late planting dates for example), then the potential for lower head populations at harvest (and lower yields) quickly occurs. In these examples, a heavier 1st application (such as 60-70 lb/ac of N) is preferred over a single application to encourage tillering. Single N applications may save a pass across the field, but can result in more than enough losses to pay for the extra pass, especially in higher rainfall areas.

Monitoring plant health is critical for managing tillers and creating high yields. Image 9 illustrates a field of wheat with higher levels of residual N. Plant health was maintained all the way to Feekes 5, so in this example a single application of N at jointing was recommended. Notice the use of stream bars and tramlines to maximize yields. Stream bars (as illustrated in Image 10), deliver liquid N within four concentrated bands which almost eliminate the crop scorch commonly associated when spraying liquid nitrogen with flat fan nozzles. Stream bars also deliver N much more evenly than 3 or 5 hole caps which are sometimes used. The biggest weakness with the 3-5 hole caps is that they are height dependant and can easily streak fields. Stream bars are not height dependant and can be operated from 12" above the crop to 60" above the crop, although lower heights are preferred on the windy days.

If dry urea or ammonium nitrate (if available in your area) is planned to be applied, air-spreaders (Image 11) are the only option to provide the uniformity required to make a high yielding crop. Spinner trucks can be pattern tested to achieve a adequate result, but it always seems the product quality changes or the product does not spread the same on rolling ground, so poor uniformity standards result. Applications of nitrogen with an air-spreader should only be considered for small wheat. This is due to the fact that most air-spreaders are equipped with larger floatation tires and significant plant injury and yield losses can occur if the product is applied close to jointing or after that stage. If the wheat gets to this stage without the N being applied, switch to liquid nitrogen with a row crop sprayer equipped with stream bars.

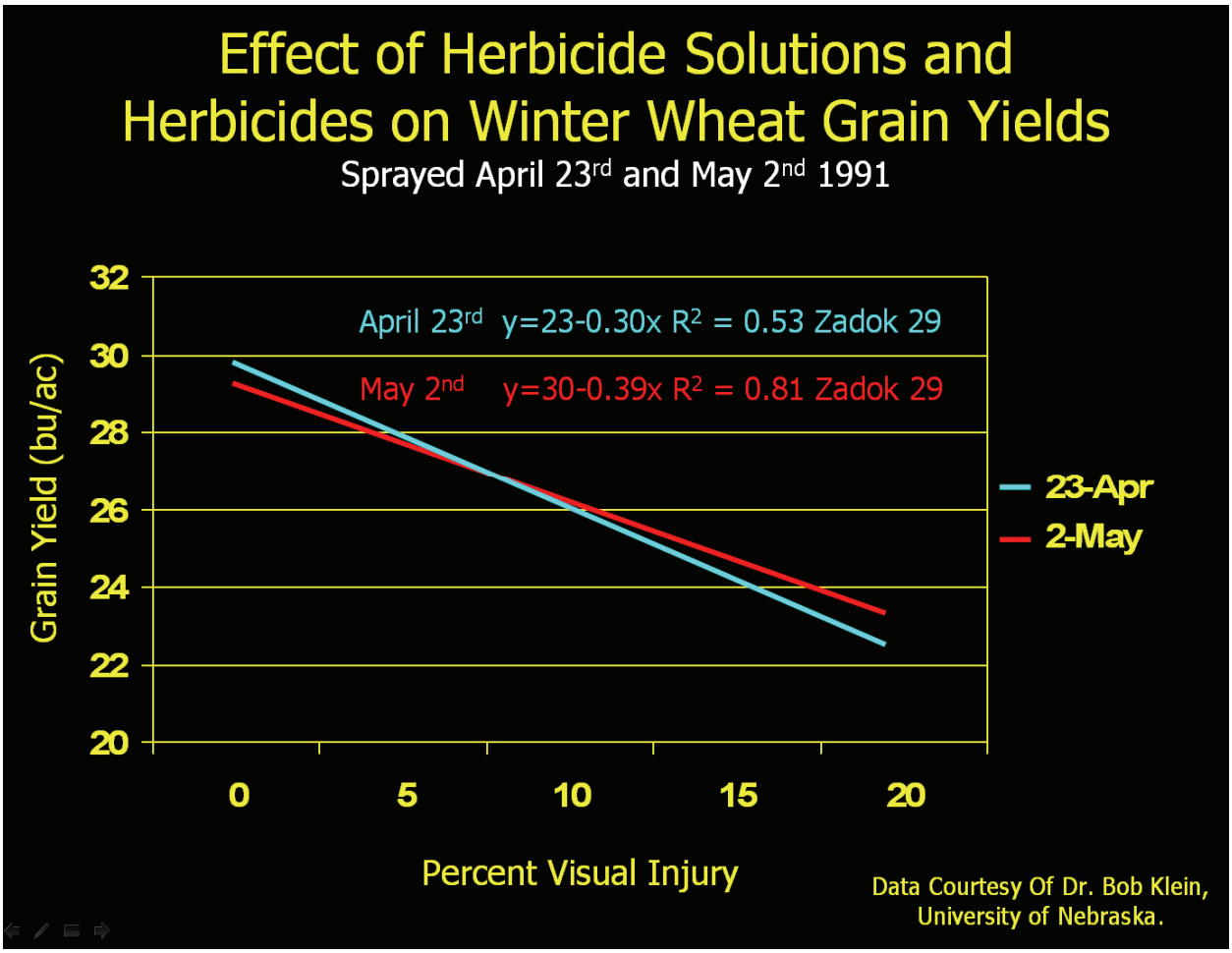
8

9

10

11

When using liquid nitrogen, never apply the nutrient with flat-fan nozzles as significant plant injury and yield losses can result. To make this scenario worse, NEVER add a herbicide and apply them together in the spring with spray nozzles. Yield reductions in the order of at least 5-10% frequently occur because of the increased leaf scorch and the accumulated plant stresses during critical grain initiation stages. Most weeds can be controlled in the fall, which enable straight liquid N applications with stream bars in the spring. The data below comes from the University of Nebraska and illustrates yield losses to leaf injury relationships associated with liquid nitrogen plus herbicide tank mixes.



Disease Management. Once the crop canopy has been managed to achieve high yield potential, it is then important to protect the leaves and developing heads from foliar diseases. Depending on the variety, area and disease pressures present within that specific growing season, two of the most common foliar diseases will usually include septoria and leaf rust (Image 12). A sound understanding of the varieties specific disease susceptibility package is suggested and this data should be available from local seed suppliers or University Extension for your area. If your varieties illustrate an average or lower resistance to diseases such as septoria or leaf rust, then a foliar fungicide should be strongly considered. Fungicides with multiple modes of action are preferred over single modes of action, from both a disease control standpoint and to also avoid fungicide resistance occurring within that specific mode of action. Fungicides such as Quilt, offer a triazole mode of action in addition to a strobilurin mode of action. At recommended rates, such products will provide both curative and a preventative activity over a period of around 20-25 days, depending on variety, disease pressure, rainfall etc. The optimal timing for such a product is around the early head emergence to full head emergence stages unless significant foliar disease pressure is present prior to this stage. Avoid the use of AI nozzles when applying foliar fungicides. Such nozzles don't provide the coverage required within the crop canopy to achieve disease control. Any nozzle configuration that angles forwards or backwards, preferably forwards AND backwards will also help achieve higher levels of coverage on both the heads and the leaves.