PRO-AG CONSULTING, LLC

# Pro-Ag Update

BI-ANNUAL NEWSLETTER

SPRING 2006

## Welcome

The year of 2005 was a year of rapid growth for Pro-Ag Consulting, LLC. We were able to add more new customers than any year in our history. Two of our newest offices were able to show the greatest growth.

Our growth is only possible because we have been able to retain so many of you who have been clients of ours for many years. Our client retention rate still exceeds 90%.

The coming years will be a management challenge for many. The rising prices for fertilizer, fuel, seed, chemicals and other input costs have put many constraints on every farming operation. More efficient use of inputs and marketing will be necessary for one and all.

In this issue of our newsletter, we will discuss the plant food input and how each reacts in the soil. Understanding those principals

## Start with a Balanced Soil

What do we mean when we say you need a balanced soil? Basically, it is having a correct soil pH. For corn, beans and wheat, a pH of 6.5 is ideal. Then have your available Phosphorus and Potash in a ratio of one part Phosphorus and 8 parts Potash.

Look at your soil test: if Phosphorus is in the 30's#/acre range, then Potash should be at least 240#'s/acre. Your best producing fields will have a ratio close to this ratio. The field that does not produce well every year, will have either Phosphates too high or Potash too low. This usually provides a ratio from 1-1 up to 1-5.

We will be discussing these topics at our winter meetings. If you have questions, please call one of us.

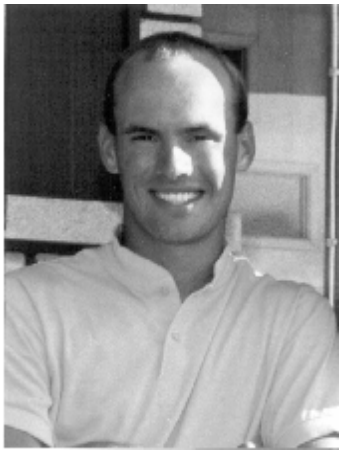
Inside this issue:



## The Jim Koester Memorial Scholarship

To date, Pro-Ag Consulting, LLC has awarded over $20,000 in scholarship money. Applications need to be in our office by May 15, 2006

In 1995, Pro-Ag Consulting, LLC established a scholarship program for family members of its client base. The scholarship program is meant to help an interested student develop his or her learning skills so they too can enjoy the benefits of a career in agriculture.



*Jim Koester*

Requirements and entry forms are available from our Windsor office. Please contact us at 1-800-879-2297

The details of the program are as follows:

Pro-Ag Consulting, LLC will award a $2,000 agricultural scholarship in memory of Jim Koester of Watseka, IL.

This scholarship will be awarded to a college bound high school senior whose parents or immediate family is a client of Pro-Ag. This scholarship will pay $500 each year for 4 years to the college or university the recipient chooses to attend.

# High Priced Fertilizer—What To Do

With the prices of fertilizer continuing to climb, we thought it would be a good time to take a look at each of the major elements and review how they are needed in crop production.

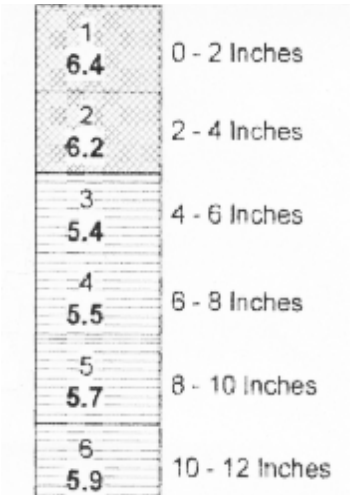
I am sure you have asked yourself, "How much fertilizer do I really need?" "Can I get by with less?" "Is all that nitrogen really needed?"

We'll try to address some of those issues and maybe make your decision making process a little easier.

## Limestone

Limestone is used to increase soil pH or sweeten the soil by replacing Hydrogen & aluminum ions held in the soil by clay colloids. Hydrogen ions are left in the soil during the conversion of ammonia ($NH_4$) to Nitrate ($NO_3$). Lime has $CaCo_3$ which acts as a flushing agent by releasing the hydrogen and replacing it with Calcium. This allows the soil to hold more nutrients. (See Illustration 4 on pg.4)

**pH Levels**

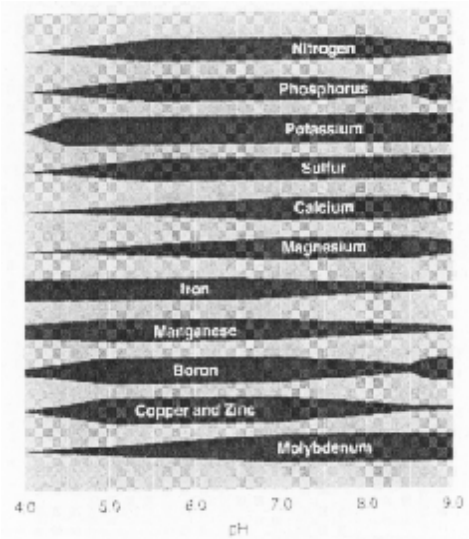



**Lime Applied to No-Till**

Lime moves very little in the soil. The maximum distance is no more than 3 inches. So, if you apply lime to the top of the soil and do not work the lime in, it will go no lower than 3 inches. That is why it is usually best to work lime into the plow layer.

Having a correct pH by applying lime is very important for having the maximum availability of the soil nutrients. Ideal pH for Midwestern soils is 6.5 to 6.8.

The 17 elements needed for corn, soybeans and wheat are most readily available at this range.




**Available nutrients in relation to pH**

Having a low pH causes most of the fertilizer you apply to be lost.

***Example:***

With a soil pH of 4.5-you will lose

- 68% of the Potash Applied
- 70% of the Nitrogen Applied
- 78% of the Phosphate Applied

With fertilizer prices at an all time high you should evaluate your soil pH very carefully. Lime application may save you more money than ever before.

| Effect of pH on Crop Yield | | | | | |
|---|---|---|---|---|---|
| | Relative (%) Yield at Different pH Levels | | | | |
| **Crop** | **pH 4.7** | **pH 5.0** | **pH 5.7** | **pH 6.8** | **pH 7.5** |
| Corn | 34 | 73 | 83 | 100 | 85 |
| Wheat | 68 | 76 | 89 | 100 | 85 |
| Oats | 77 | 93 | 99 | 98 | 100 |
| Alfalfa | 2 | 9 | 42 | 100 | 100 |
| Soybeans | 65 | 79 | 80 | 100 | 93 |

**Crop Response to soil pH**
**This table gives the relative response of various crops at different pH levels. Corn, soybeans and wheat respond best to pH levels of 6.8 and above.**

## Phosphorus

Crops need phosphorus to grow roots and phosphorus is used to transport other nutrients in the growing plant.

Phosphorus is an ion and does not move in the soil. Tests have proven that phosphorus will move less than 3 millimeters from its original placement. If you till no deeper than 8 inches, most all applied phosphorus will be in that top 8 inches. (See Illustration 1)

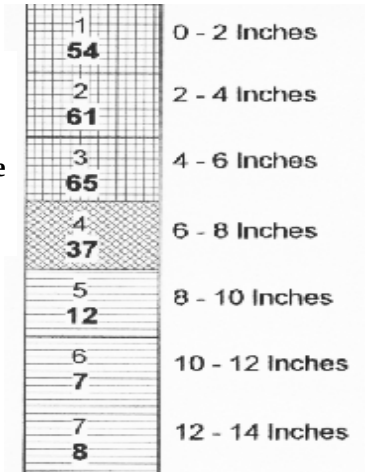


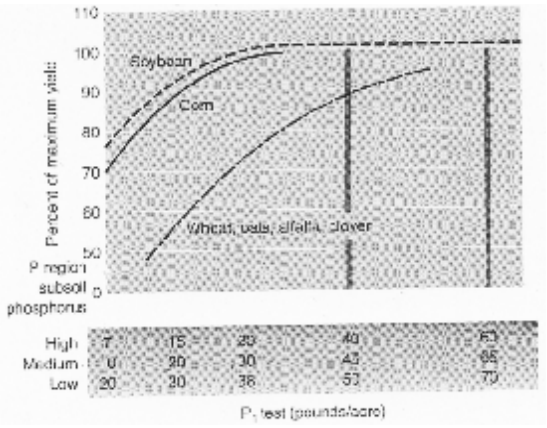

**Illustration 1**

It will not leech out like nitrogen or potash and because phosphorus does not leech out, soil levels do not deplete very quickly.

Soils in Illinois are very rich in total phosphorus. Most soils have 6-8000#'s of total phosphorus per acre. Most phosphorus is not water soluble nor is it available to the plant. But, each year, a quantity is made water soluble and available. When we perform our phosphorus test in the lab, we measure the water soluble phosphorus.

### How Much Phosphorus do We Need?

Tests conducted at the University of Illinois, Iowa and Minnesota over the past 50 years, shows that corn and beans reach full yields if phosphorus levels are between 25 & 30 lbs. per acre. Wheat will reach full yields if phosphorus levels are about 50 lbs/acre, as illustrated below.




**Relationship between expected yield and soil-test phosphorus.**

Most soils release large quantities of phosphorus each year. Crop residue returns nutrients back to the soil so net removal of phosphorus is very small compared to nitrogen and potassium. We normally expect soil test levels to decrease 2-4 lbs. per acre per year if additional phosphorus is not applied.

Phosphate is probably the most misapplied fertilizer. Over 75% of the soils we test for the first time are excessively high in phosphorus. When buying fertilizer to get an economic return, applying phosphate when it will not increase yields, is a very poor investment.

We are often asked, "if I apply 200#'s of DAP (18-46-0) why doesn't my soil test go up to 92#'s," even though the chemical analysis is 36-92-0 for 200#'s of DAP? The 92#'s of Phosphorus is not available to the plant or the soil test. Here is an example of how Phosphorus affects soil test.

### Calculating Phosphate Fertilizer to Soil Test Results:

Phosphate Fertilizer is expressed in $P_2O_5$ form analysis. Soil Test Results are expresses in $P_1$ form analysis.

The satisfactory level of Phosphate (as $P_1$) in the soil test is between 30 and 50 lbs. of $P_1$/acre. To convert values of $P_2O_5$ to $P_1$, it generally takes 9 lbs. of $P_2O_5$ to raise the soil test of $P_1$ one pound. Therefore, a 100 lb. application of fertilizer containing 46 units or pounds of $P_2O_5$ (i.e. 0-46-0 or 18-46-0) will usually raise the soil test 5lbs. on the $P_1$ measurement (46 divided by 9 = 5). So, to raise a $P_1$ soil test from 35 lbs. to 50 lbs. would require 300 lbs. of 0-46-0.

"To do a common thing uncommonly well brings Success"

## Potassium

Potassium is often called the health food for corn and beans. Potassium works in the corn plant to keep the stalk clean and strong so nitrogen and other elements can produce the yield. It improves test weight and produces a strong stalk in corn and is very crucial for high soybean yields. Wheat on the other hand produces very well on low levels of potassium.

But, potash moves in the soil. Its movement is an important consideration for your farming operation.

If you have silt loams, sandy silt loams or light colored timber soils, you will get better results from potassium applications in the spring. Why? The above soils have very little clay colloid content. Potash depends on clay colloids or organic matter to "hook up" with and fix in the soil. If the potash cannot find either of the above, potash will continue to move down in soil until it finds clay or organic matter. Most often this is lower than the root zone, resulting in lower yields and lower potash readings on your soil test.

We have completed deep profile stratification studies on these soils and found low levels of potash in the upper 0-10 inches but found high levels 10-20 inches deep.
See illustration 2

Soils with higher clay content, such as, clay loams, sandy clay loams and even the silt clay loam soils have enough clay colloids that allow these soils to retain higher volumes of potash. Soils containing higher amounts of organic matter or crop residue also can hold higher levels of potash even though the clay colloid level may be low.

Illustration 3 shows a clay colloid with a strong negative charge. The cations are positive charged. K+, Mg+, Ca+ and other nutrients bond to the colloid for storage. They will remain until the plant uses these nutrients providing the soil pH is near neutral. Potash applied in the fall will stay in the plow layer and available to the growing crop. Maintaining a correct pH is very important to this example.

pH changes when $NH_3$ ammonia is applied to the soil.

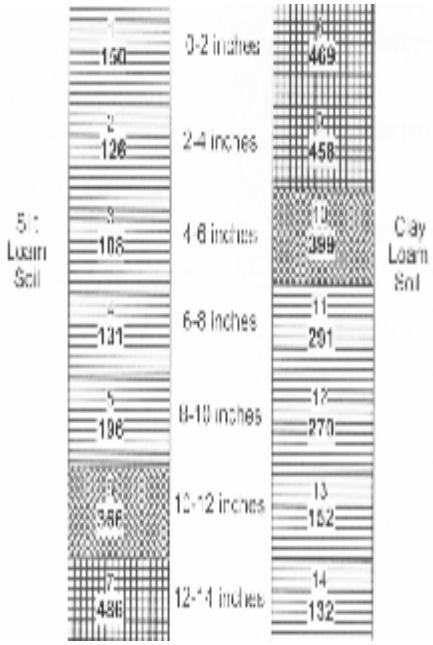



**Illustration 2 (Stratification Study)**

During nitrification NH3 is converted to NO3 leaving 3 H+ ions in the soil. These H+ ions bond to the clay colloids and displace the K+ or potash. The potash then moves deeper in the soil.

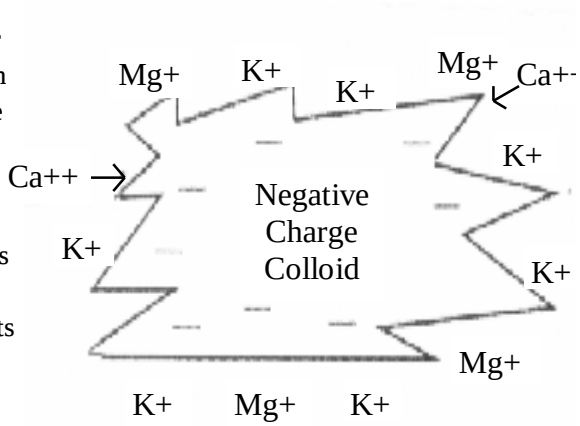



**Illustration 3**

With a high concentration of H+ ions, (or low pH) there is no place to hold additional potash (K) when it is applied to the soil.

By not correcting the soil pH and allowing the pH to drop to 4.5, up to 68% of applied potash could be lost.

Applying lime corrects the soil pH by having the calcium in calcium carbonate ($CaC0_3$) replace the H+ ions thus increasing the pH level. See illustration 4.

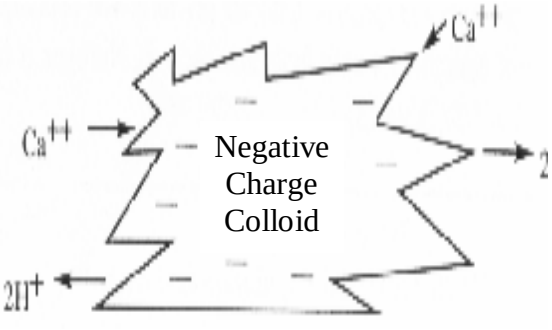



**Illustration 4**
**Ca++ replaces H+ on soil surfaces because of simple attraction. Each calcium ion replaces 2 Hydrogen ions.**

**Calculating Potash Fertilizer to Soil Test Results:**

Potash Fertilizer is expressed in $K_2O$ form analysis.

Soil Test Results are expressed in K form analysis.

The satisfactory levels of Potash are between 260 and 300 lbs./Acre. To convert values of $K_2O$ to K, it generally takes 4 lbs. of $K_2O$ to raise the soil test one pound. Therefore, a 100 lb. application of potash (0-0-60) will raise the soil test 15 lbs. (60 divided by 4 = 15). To raise the K test from 255# to 300# requires 45#'s of K. 15#'s per 100# of 0-0-60 requires 300#'s of 0-0-60.

# Nitrogen Prices! How High is it Going?

If you believe the forecasters, we will see Anhydrous Ammonia at $600+ per ton come spring. With the price of Natural Gas in the control of about four companies, American plants are closing. Last year 50% of our $NH_3$ consumption was imported. Next years predictions are in excess of 60% and climbing. Another form of Nitrogen, Urea, will not be produced in the U.S. The lead-time to secure nitrogen will be 18-20 months instead of 30-60 days.

Decisions on the type of Nitrogen to be used will have to be made well in advance of application time. Switching forms of Nitrogen may not be a choice we have had for many years.

## *Can we Reduce the Amount of Nitrogen we apply?*

Generally speaking, Yes! We are still applying some Nitrogen that does not give us an economic return. Several factors must be considered when calculating Nitrogen application.

**First**- Have the correct soil Ph – a low Ph (4.5) can cause a loss up to 70% of the Nitrogen being applied.

**Second**- Know the organic matter content of each of your fields. Tests have shown each 1% of organic matter produces the equivalent of 20# of Nitrogen for the growing crop.

**Third**- The previous crop effects the Nitrogen carryover. Soybeans before corn have a value of .5 to 1.0 #'s per Bu of yield up to a maximum of 40 #'s.

**Fourth**- Split applications of Nitrogen have always generated the best return. We lose about 25% of all Nitrogen applied. The less time Nitrogen is in the ground before the plant needs it, the more of the Nitrogen gets used.

**Fifth**- Sources of Nitrogen makes a difference. Liquid Nitrogen knifed or worked deep in the soil will increase corn yields 10-15% Applying a Nitrogen stabilizer like Guardian® further enhances it's use.

## *Review Nitrogen Calculation:*

Make sure your Ph is in the 6.5-7.0 range. Determine your yield goal: lets use 165 Bu for this example. Generally accepted Nitrogen factor is 1.1# of Nitrogen per Bu. A 165 Bu goal x 1.1 = 182 #s of Total Nitrogen. If your organic matter content is 2.5%, you will receive (2.5% x 20# = 50#s of nitrogen) from the organic matter. In this case you will need to add 132# of Nitrogen. If soybeans were the previous crop and you raised 40 Bu beans, using the lower factor of .5#'s per Bu, you can expect an additional credit of 20#'s or a net application of 112#'s Nitrogen.

The University of Illinois and Iowa State University have changed their methods of calculation. Iowa State has a corn Nitrogen Rate Calculator on a Web site: http://extension.agron.iastate.edu/soilfertility/nrate.aspx it is easy to use. Just enter your yield goal and the price of your Nitrogen and it will give three different application rates based on Rate of Return for the Nitrogen dollars. We entered a corn price of $2.20/Bu and a price per unit of Nitrogen @ 35¢. The results we got were 114#'s of Nitrogen gave a yield of 168Bu maximum percent of yield @ 94% and a return of 80.78 for nitrogen. 133# of Nitrogen produced the best yield of 172 and a 96% of maximum yield (net return of 81.78.) *See sample on page 6*

If you need help with Organic Matter determination or Nitrogen Calculation, give us a call and we will be glad to help.

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Bloomington, IL 888-776-2440


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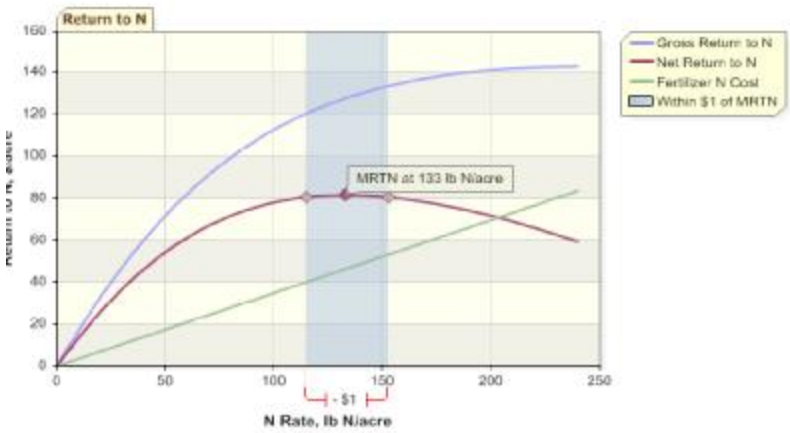
## Corn Nitrogen Rate Calculator

Finding the Maximum Return to N

| | | | |
|---|---|---|---|
| State: Illinois | | Nitrogen Price ($/lb): | 0.35 |
| # of Sites: 185 | | Corn Price ($/bu): | 2.20 |
| Rotation: Corn following Soybeans | | Price Ratio: | 0.16 |
| Non-Responsive Sites Included | | | |

| | Profitable N Rate Range | | |
|---|---|---|---|
| | LOW | MRTN | HIGH |
| **Return to N (lb N/acre):** | 114 | 133 | 152 |
| **Yield (bu/acre):** | 168 | 172 | 174 |
| **Net Return to N ($/acre):** | $80.78 | $81.78 | $80.78 |
| **Percent of Maximum Yield:** | 94% | 96% | 98% |




## An Employee Owned Company

**With over 155 years of Experience**

| | | |
|---|---|---|
| Don Hackerson | Owner | 21 Years |
| Gary Frye | Regional Manager | 24 Years |
| Chris Behl | Co-Owner | 18 Years |
| Jim Molock | Shop Manager | 18 Years |
| Gail Molock | Lab Manager | 17 Years |
| Ted Huber | Co-Owner | 10 Years |
| Jason Boerngen | Co-Owner | 9 Years |
| Matt Schilling | Co-Owner | 8 Years |
| Marilyn Nelson | Lab Assistant | 7 Years |
| Charlotte Newman | Lab Assistant | 6 Years |
| Kurt Storm | Soil Technician | 4 Years |
| Neil Eimer | Regional Manager | 4 Years |
| Charles Campbell | Controller | 3 Years |
| Tish Behl | Mapping Manager | 2 Years |
| Pam White | Mapping Assistant | 2 Years |
| John Radloff | Soil Technician | 2 Years |