

# Directions

A Newsletter of Cornelius Seed® Read it. Profit.

Spring 2016

## Spring Agronomy Days Features Fine-Tuning Crop Management

Cornelius Seed recently hosted two Spring Agronomy meetings for its sales force and its customers. The meetings were held in Maquoketa and Sheffield, IA and both were well attended.

The meeting covered a number of different topics designed to update and inform corn and soybean growers of agronomic issues affecting them.

### “GETTING MORE BANG FOR YOUR BUCK”

Roger Forsberg, owner of Ag Alliance in Illinois, a crop agronomy consulting firm, was the featured speaker. Forsberg spends the vast majority of his time serving as a fine-tuner of on-farm practices used by growers. His goal: getting 9 bushels per acre of corn for every 1,000 population. (33 plants per 1/1000 acre x 9 bu. = 297 Bu/A)

In order to pursue that goal with his customers, who live from Kansas to Indiana, he studies current crop management practices. He then makes suggestions to overcome yield-limiting practices as well as to maximize production output.

Forsberg discussed a number of issues about what he has learned and now teaches to his customers on how to maximize yields. He began his presentations with this comment: “We don’t pay enough attention to the biology of our soil. In a spoonful of soil,



In a single spoonful of soil, there are more living organisms than there are people on Earth.

there are more living organisms than there are people on Earth.”

The point he left with the audience was this: there are fungus, virus, bacteria and other living organisms in there by the millions, and if we learn how to maximize the interaction of what’s there, we can raise yields.

The level of humus on a farm offers three major advantages; 1) it provides the structure for holding the soil particles together and for holding them apart for water and oxygen penetration 2) it adds to the cation exchange capacity (CEC) and 3) it adds nutrients to the soil.

Forsberg said bacteria works in the soil most efficiently at near neutral pH. He pointed out just how critical having an accurate pH is by stating “If you drop from a 6.0 pH to a 5.9 pH, you are reducing the bacteria count by 100-fold.”

He also noted farmers can add to the humus content through simple practices which contribute to organic matter. He advises shallow incorporation of crop residue, minimal tillage and field traffic and finally, more aeration and drainage.

### Understanding & Managing pH

pH stands for “a relative measure (German translation of p) of hydrogen.” It’s a relative measure of alkalinity vs. acidity of soils. What most farmers don’t understand is how sensitive pH is in a scale between 0 and 14. A small difference in pH makes a big difference in crop performance.”

Concentration of H <sup>+</sup> ions compared to distilled water	pH Value	Examples of Solutions
1/10,000,000	pH = 14	Liquid drain cleaner
1/1,000,000	pH = 13	Bleaches
1/100,000	pH = 12	Soapy water
1/10,000	pH = 11	Ammonia solution
1/1,000	pH = 10	Milk of Magnesia
1/100	pH = 9	Baking soda
1/10	pH = 8	Sea water
1	pH = 7	Distilled water
10	pH = 6	Urine
100	pH = 5	Black coffee
1,000	pH = 4	Tomato juice
10,000	pH = 3	Vinegar, Coca-Cola
100,000	pH = 2	Lemon juice
1,000,000	pH = 1	Stomach acid
10,000,000	pH = 0	Battery acid

A pH log scale represents the differences of acidity to alkalinity and the concentration factors of Hydrogen ions compared to distilled water.

Forsberg said soil moves toward acidity levels (pH 1-7) with rainfall, which leaches cations, which in turn, reduces water and oxygen movement within soil particles. He said crop removal also takes a toll on pH levels. Using ammonia can also reduce pH since ammonia is NH<sub>3</sub>, meaning one nitrogen part and three hydrogen parts, and hydrogen is a negative ion. That negativity, if not balanced, will move pH down.

He further pointed out urea is NH<sub>2</sub>,

another high-nitrogen source that lowers pH, and that gypsum has zero neutralization impact on pH. “Gypsum is a great source of sulfur and has an extended release, but it does nothing for pH,” he said.

“Don’t ever put on more than one ton of limestone per year in **reduced tillage**. Most farmers way overdo that. You shock the soil and that’s not good. If your soil requires lime and your Buffer pH is 7, put on 1,000 pounds, if it’s 6.9, put on a ton, but never more than that in one year, even if a soil test says to. Bring that pH up over a period of time and slowly so you don’t shock the environment you’re growing corn in.” If lime is worked in with deep tillage, then up to two ton can be used per year.

On the other hand, if pH soils are consistently above 7, Forsberg noted, you’ll need to work for years to bring it down.

### Magnesium & Potassium

Forsberg discussed the relationship between magnesium and potassium at length. “High magnesium readings deter potassium availability,” he said. “Surface applied potassium travels very little in heavy soils and that affects its availability on different soils. On sand, it travels too far so apply it more often. On clay, it may move less than one inch per year,” so applying it over the surface on various soil types can widely impact the availability to the crop.

### Managing Soil Structure

Sand, silt and clay are organized into an aggregate mix we all know as our soil. If there is a good soil structure, it offers a sponge effect to rain, it drains quicker with less runoff, it withstands traffic better, contains more oxygen available to the plant and offers better root penetration.

Forsberg added, “If we can keep the root looking for more water and oxy-

gen, it will grow more vertical through a healthy soil, giving us an ideal root structure. If not, we will end up with shallow roots.”

So, how do you build a healthy soil structure? Forsberg laid out these points:

- Work from a near neutral pH
- Don’t ever break the soil (via tillage) under compression
- Don’t ever till when it’s wet
- Use shallow incorporation

Forsberg said using cover crops can speed the organic matter building process, but cover crops present an entirely new list of issues to manage. He said the right cover crop can hold residual nitrogen in place, offer weed control, erosion control, build the soil, offer grazing capability as well as a quick cover over harvested crops.



*“Cover crops need to be selected carefully depending on your specific goal.”*  
- Roger Forsberg, Ag Alliance

Forsberg also pointed out there are 2 million pounds of soil in an acre slice six inches deep so moving the OM 1% is a huge move. “That can take 10-20 years to move it 1%, but once successful, a 1% increase in OM adds water-holding capacity by 1” in the top 1’ of soil. Imagine how many times we would have liked to have had one more inch of water in our top foot of soil,” he projected.

He said farmers can also boost soil biology and health by limiting chemical disruptions, not over-liming or over-fertilizing, not shocking the soil with

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over-applications of herbicides, using wheat or cereal rye as cover crops, reducing traffic and tillage and pointed out the more days we have a growing crop in the field, the more days it is boosting soil biology.

### Leaf & Stalk Disease Control

There has been a significant presence of leaf diseases in the past few years and they are fairly unpredictable in occurrence. Forsberg said there is significant evidence that if fungicides are used in an appropriate and timely fashion, there is a big benefit.

“Fungicides, once applied to the plant surface, don’t really move,” he said. “That means initial coverage is crucial.” He strongly urges growers to investigate Y-drop applicators that put fungicide under the canopy as well as on top. Forsberg showed the coverage difference of an under-and-over application vs. an airplane spray on test strips and the difference could easily be seen.

“The performance in health retention was remarkable, and it showed up in yield and standability at the end of the year,” Forsberg said.

### Wheel Track Study

Forsberg is adamant about keeping wheel tracks in a field over the same tracks and equally enthusiastic about moving tires on vehicles onto tracks. “The first thing I’d get off of wheels and onto tracks is the grain cart,” he noted. “That thing weighs a ton when it’s full and the compaction it creates wherever you take it is often overlooked.”

He has participated in two different wheel track studies and here is what he found. In one study, corn yields from corn rows where there was no wheel track was compared to rows only over wheel tracks. The rows with no wheel tracks out-yielded the rows with wheel tracks 161 bu/a to 147 bu/a. Averaged



Because fungicides don’t really “move” on a corn plant once applied, the initial coverage of the leaf canopy, both below and above, are crucial. Forsberg urges growers to investigate Y-Drop applicators that put fungicide above and below the canopy. Photo credit: <http://www.agri-labsinc.com/solutions/360-yield-center/360-undercover>

over a 16-row planter and tractor, that’s an average of 4.7 bu/a across the field.

The other study compared rows with no tracks to rows with dual tractor tires compared again to tracks instead of tires. Here are the results from that study:

No tracks	250.4 Bu/A
Tracks vs. Tires	234.7 Bu/A
Dual tires	229.9 Bu/A

“Draw your own conclusion, on how to best manage this but I’m a big fan of staying in the same tracks through the field and then moving over 8” the next year and reverting to the original track pattern the following year.”

Forsberg said he even encourages anyone with an 8-row head to put an auger extension on the combine so the dump trailer and tractor can stay in the next set of tracks while unloading through the field.

### What’s it Take to Produce a Bushel?

Forsberg concluded his presentations with a contemporary update of his research and experience on what kind of nutrient level is removed for every bushel of corn and soybeans harvested. Chart 1 (corn) and Chart 2 (soybeans) show the nutrition pounds removed for various nutrients for every bushel produced.

As you can see, the stover, if left on the field, may offer some level of cred-

its back to the crop the following year. Perhaps the most surprising figure in the charts below is this: It requires 4.2 pounds of N to produce a bushel of soybeans, so essentially, at approximately 40 bushels per acre, (if your soybean plants are well nodulated) your soybean crop becomes a net nitrogen user, not a nitrogen replenisher. That fact surprised a lot of growers.

Forsberg works in the sciences of finely tuned management and detailed soil profiles and how to manage them. The crowd was certainly attuned to the topics Forsberg laid out so they can calculate how they, too, can help maximize yields on their own farms.

Chart 1. Corn nutrients removed from crop per bushel harvested.						
	N	P	K	Mg	Ca	S
<b>Grain</b>	0.8	0.35	0.25	0.06	0.02	0.08
<b>Stover</b>	0.5	0.25	1.05	0.14	0.19	0.09
<b>Total</b>	1.3	0.6	1.3	0.2	0.21	0.17

Chart 2. Soybean nutrients removed from crop per bushel harvested.						
	N	P	K	Mg	Ca	S
<b>Grain</b>	4.2	0.9	1.5	0.23	0.2	0.2
<b>Stover</b>	1.3	0.3	0.9	0.22	1.5	0.25
<b>Total</b>	5.5	1.2	2.4	0.45	1.7	0.45



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to start receiving timely agronomic  
updates throughout the year.

## Xtend™ Soybeans Available From Cornelius Seed

Will Cornelius, Cornelius Seed Soybean Lead, kicked off the 2016 Agronomy meeting with a detailed explanation of the status of Xtend soybeans, the new dicamba-resistant traited beans. “We have received approval for planting in 2016,” Cornelius told the crowd, “but we do not have approval

to use dicamba-based herbicides.” This means this year’s Xtend soybeans will be featured primarily in Cornelius Profit Plots, but are also available for field testing. Many growers are taking



the opportunity to get a first look at the new technology that will be taking the industry by storm over the next few years.

For the 2017 season, Cornelius is

planning on introducing a full maturity range of Xtend soybeans to parallel its current lineup of Roundup Ready 2 Yield soybeans.