Laboratories, Inc.
Duane Schlieman, Agronomy Services
New Ulm, MN Nevada, IA Bismarck, ND

April 2010
Newsletter

MVTL News & Updates

Value of a Fertility Management System

Capability vs. Profitability

Many of you have been soil testing for years, and one way or another, you've tried to decide ...

What are ***optimum*** fertility levels?
How ***low*** is too low when it comes to soil test levels?
Can I forego fertilizer applications to my fields with ***high*** soil test values?
How do we determine the ***best*** nutrient management system?
How do I measure ***profit***?

As much as we hate to hear it ... it all depends. Common denominators such as soil type, temperature, and moisture are large pieces to the puzzle directly impact production. Now add in other key variables such as drainage, manure, compaction, tillage, rotation, disease, and insects. While they aren't always dramatic, they do expose production to *some* risk.

Good management often takes a back seat to the bells and whistles of modern production practices, but in reality, management has often been the key difference for operations that experience long-term success. The details of a comprehensive nutrient management plan can be overwhelming for many, but these managers have a knack for differentiating high yields from optimum yields based on profit and risk analyses … optimum production = highest net return. Agronomic fundamentals drive best management practices (BMP's) and are necessary tools for weaving through analytical data, research information, input selection, environmental risk, and potential returns. Fortunately, the agricultural industry has also had experience and commitment on it's side with qualified crop consultants and agronomists … they've been critical players in sustaining practical solutions in the face of rapid changes in technology.

Develop a ***fertility management system*** … identifying existing soil-types will help you clarify physical components that will improve your handle on significant NPK soil-to-plant nutrient relationships, as well as, the secondary and micronutrients if you have crop sensitive needs. Soil testing methods using grid and zone management schemes have greatly enhanced our ability to acquire soil data, and along with that, we've shifted away from dwelling on specific data values to learning how to properly manage nutrient zones. As a result, we've also been able to better identify southern MN nutrient summaries … recent years have shown increases in low testing soils and decreases in very high testing soils. Why? Volatile fertilizer costs and increased nutrient removal have taken a toll, while Variable Rate Technology (VRT) has helped manage reductions in fertilizer applications on high testing soils.

One constant in all the change has been the effectiveness of starter fertilizers … they are

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MVTL Data Trends

… con't management system, micronutrients

still one of the best risk management tools in the industry. Nutrient relationships between the soil & plant are influenced by the variables discussed earlier, and fertilizer placement is still a very effective practice for supplying critical nutrients with *optimum* response.

Taking our management system another step, we deal with the secondary nutrients. Calcium, magnesium, and sulfur are technically considered secondary nutrients. They are assumed equally important to the plant, but the requirements are not as high and the management is less intensive. Plants primarily utilize calcium to form cell walls and strengthen plant structure, whereas magnesium is the central atom for protein synthesis and critical to photosynthesis. Sulfur is taken in as an anion and is a constituent of protein much like nitrogen, and though it is mobile in the soil, it is not mobile in the plant which relates to most plant deficiencies found in the newer growth. Calcium (Ca++) and Magnesium (Mg++) cations accumulate in exchangeable forms fixed to soil organic matter and clay having a negative charge. Ultimately, their concentrations have a direct impact CEC summations (texture) that can be used to help predict sulfur availability and movement in the soil. As these cations accumulate in soil solution (lnot leached, low rainfall) they become more concentrated in solution and eventually measured (EC) soluble salts.

Micronutrients … rule of thumb suggest they are the oil in the engine. The most sophisticated and finely engineered motors in the world cannot perform with out ***oil,*** therefore, it's assumed our intensive cropping systems have a growing need for additional micronutrients. This leads us back to square one and management must again determine: Do optimum micronutrients levels provide the highest net return?

Organic matter, presence of erodible soils and soil pH are key determinants for micronutrient availability. Below is a chart to clarify some specifics...

Micronutrient	Crop	Plant Roles	Adverse Soil Conditions
Boron (B)	Alf, S.Beet	Cell Wall	ST<1.0ppm, low CEC, high pH
Copper (Cu)	Peanuts	Chlorophyll	ST<0.3ppm, high %OM, high pH
Iron (Fe)	SB, Millet	Chlorophyll	ST<4.0ppm, high carb., high pH
Manganese (Mn)	SB,NavyB	Catalyst/Enzymes	ST<2.0ppm, high %OM, high pH
Molybdenum (Mo)	SB, Alf	Symbiotic N-fix	ST<0.1ppm, low %OM, low pH
Zinc (Zn)	Corn	Metabolism	ST<1.0ppm, low %OM, high P&pH

Interestingly, much of the interest in micronutrients has come from our own desires to acquire and manage new information. Evaluating the impact higher production levels can

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Miscellaneous Soil Facts

… con't micronutrients, Nitrogen losses

have has led may to believe current nutrient plans must do a better job accounting for crop sensitive needs, fertilizer technology, equipment, and site-specific applications via precision ag. Efficiency in predicting and targeting nutrient needs to specific soils and crops will directly increase our ability to manage micronutrients with optimum levels for the highest net return.

Listed are the average nutrient values for MVTL, 2009.

pH	BpH	%OM	Bray-P	Bray-O	K	Zn	S	CEC	CaSat%	MgSat%	KSat%
6.7	6.4	5.2	30	18	176	2.0	9	25	70	16	2

Suggested "optimum" nutrient ranges:

pH = 5.8-7.2 inits
% Organic Matter = 4-7%
Phosphorus-Bray = 20-30 ppm
Phosphorus-Olsen = 15-25 ppm
Potassium = 160-200 ppm
Zinc = 1.0-2.0 ppm
Cation Exchange Capacity (CEC) = 20-35
Calcium Saturation Percent = 65-75%
Magnesium Saturation Percent = 15-20%
Potassium Saturation Percent = 2-5%

Potential Nitrogen Losses and know (Conducive conditions)

Depending on soil condition, temperature and moisture, nitrogen follows different paths

Nitrification = Conversion of Ammonium (NH_4) to nitrite (NO_2-) to nitrate (NO_3-)
(Moist soils & warmer temperatures over 50 degrees)

Volatilization = Conversion of ammonium (NH_4) to ammonia gas (NH_3)
(Warmer temperature, high pH, low CEC, moist soils, **surface applied urea**)

Denitrification = When soils become depleted with oxygen, they utilize nitrates to metabolize
(Available nitrates, no available oxygen … neutral soil pH, warm soil temperatures)

Immobilization = Nitrogen poor materials use up most inorganic-N … reduces N availability.
(Organic materials (ex: straw low in N) requiring available N during decomposition)

Leaching = Nitrates lost by moving deeper in through the soil
(High nitrates, high water movement, soil texture)

Symbiotic Fixation = Legumes source energy to microorganisms, and the same microorganism uses the energy to convert N_2 to ammonium form on the legume nodule ... providing most of the legumes needs
(Soils low in nitrate and ammonium, high legume growth, fallow soils, acidic soils)

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Other notes and reminders

Soil Probes … We currently carry a few different styles of probes, but keep only 1 or 2 of each on hand. Closed tube, open slotted tube, alligator jaw, etc. We do carry replaceable tips for those probes that use them. Try to allow 1 week for shipping and/or delivery.

SCN … you can use your regular soil bags for the SCN, just keep them separate from soil samples you want analyzed for nutrients.

Plant Analysis … it's always best to keep them dry (open air) to keep samples in proper condition. If you ship them, just use a large envelope with perforated/punched holes. We will completely dry them once we receive them. Depending on workload, expect a 3-7 day turn-around time.

Manures … on request, we will send kits pre-addressed for MVTL Nevada, IA.

Contact Information

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Thanks and have a great spring/summer!!