

Nutrient Digest

VOLUME 1, ISSUE 1

FALL 2008

MANAGE MANURE APPLICATIONS WISELY THIS FALL

The most common method for dairy manure disposal in Idaho is field application. Applying manures to croplands has been shown to significantly improve yields, as manures are a rich source of nutrients. However, nutrient uptake is highly dependent on how the manure applications are being managed. Here are a few tips to help you get the greatest soil fertility value out of your field applied dairy manure:

1. Spread manure in the fall instead of the spring

Organic nitrogen compounds in the manure will have time to mineralize

into plant available forms (nitrate and ammonium) over the winter months, which will allow for greater nitrogen utilization by spring-planted crops. When manure is applied in the spring, organic nitrogen will likely not be mineralized until late in the season when the plants no longer need it.

Manures can be an effective nutrient source for crops



2. Incorporate manure immediately after application

Leaving manure on the surface for more than even a couple of hours will insure significant losses of nitrogen as ammonia gas. Moving the manure into the soil surface will allow ammonium to attach to soil particles instead of literally evaporating into thin air.

3. Plant residue is a good thing

Incorporating manure into fields that have plant residue on the surface will help to slow the nitrogen mineralization rates over the winter months. Otherwise, nitrates can leach downward into

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AVAILABLE NITROGEN AFTER THE WHEAT HARVEST

Many producers apply and incorporate fertilizer N with wheat residues because they assume low available N after wheat otherwise limits residue decomposition. Previous ARS research in southern Idaho suggested that there is sufficient residual and mineralized N in soil to support irrigated wheat residue decomposition without adding fertilizer N. Nevertheless, the practice has persisted for decades, possibly due to a lack of information on the available N (nitrate and mineralized N) in soils after the harvest.

Post-harvest residual N depends largely on the amounts of N applied to the previous crop and wheat, and the wheat's N utilization. In addition to the post-harvest residual N, there is continued N mineralization and release of N from previous residues until late fall soil temperatures preclude further biological activity.

Since avoided N applications could significantly reduce N fertilizer costs associated with straw management, a survey in 2002 and 2003 was conducted in western



How will residues effect your available N?

Idaho of the post-harvest residual N and late summer-fall N mineralization and N release available for small grain residue decomposition. Post harvest residual N in the first foot averaged 59 lb/A in 2002 and 44 lb/A in 2003 but

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WHY GUESS - SOIL TESTING

A GOOD INVESTMENT IN TODAY'S ECONOMY



Fertilizers and soil amendments are a major investment on the farm. In today's economy the grower is pressed to get the maximum return for every dollar spent on the farm. With many of the farm inputs co-dependent on energy, it is very important that the producer uses the tools that are available to assist in making the best economic and agronomic decision possible. Even at the basic level of fertilizer application, the grower need to make sure that dollars spent in the purchase of fertilizer are being returned in crop production.

How Good Is Your Soil Test

A good soil test measures the nutrients that are available in the soil. The soil sample must be representative of the field and the laboratory that is conducting the analysis should be certified by the North American Proficiency Testing (NAPT) program. A good soil test, when used in combination with the University of Idaho Fertilizer Guides and proper crop rotation, irrigation management, fertilizer timing and method of application, allows the producer to make a sound decision for optimum return for the investment in applied fertilizer. One of the benefits is optimum utilization of nutrients which can have a positive impact on Idaho's most valuable resource, WATER QUALITY. Nutrients that are not removed in crop production can end up in either surface or ground

water. Studies conducted by the State of Idaho's Department of Ag and Department of Environmental Quality (ISDA and IDEQ) clearly show that a majority of Idaho's ground water is impacted by either urban or agricultural activities. Water quality is critical to Idaho's future and it is the responsibility of Idaho's growers or homeowners to take the steps to assure that the nutrients they apply do not end up in their neighbor's drinking water.

"In today's economy it is important that the grower uses all the tools of the trade in an effort to tip the scales in favor of the farming operation."

So what can the producer do to assure good nutrient management?

Good nutrient management starts with a plan (NMP). The process starts by developing the unique characteristics of the farming operation. Soils are different. Clay and sandy soils do not respond the same way to similar fertilizer programs. Eroded soils are less

productive than are non-eroded soils. High organic matter soils release more nitrogen than low organic matter soils. Soils high in phosphorus and low in potassium require entirely different fertility program than soils low in phosphorus and high in potassium. The soil test needs to be used as a monitoring tool, along with experience, past cropping history, past yield data, field tests, history of previous fertilizer, lime and bio-nutrient applications, and last but not least yield follow-up. This combination can be used to determine the effectiveness of applied nutrients.

In today's economy it is important that the grower uses all the tools of the trade in an effort to tip the scales in favor of the farming operation. One of these tools is soil testing and the selection of the lab that is going to give the grower an accurate analysis of the fertility in his fields. This knowledge and using the guidance from proven university research is an investment that a grower can not underestimate. It should be an integral part of every crop production program.

For more information, contact Dick Johnson at 208-685-6992, or dick.johnson@id.usda.gov



DON'T GET BITTEN BY SNAKE OILS!

Each year about 75 new products appear on the market that are supposed to enhance crop production. About one quarter of these new materials are legitimate; however, most materials have marginal or no value. These materials that have minimal value are often referred to as snake oils or wonder products.

These wonder products are seldom worthless – but provide very little value in relation to their cost. There are several categories of these products but the most common ones include: soil amendments, soil additives, supplemental organic materials, microbial inoculants, and growth regulators.

Soil amendments improve physical properties of soils. Soil additives replace or supplement conventional fertilizers. Supplemental organic materials increase levels and activities of soil organic matter. Microbial products increase numbers and activity of beneficial organisms already in the soil. Growth regulators stimulate plant growth processes. There are some legitimate products in the above categories...farmers have been applying nitrogen fixing bacteria to soils for years and successfully enhancing legume growth.

Examples of claims that have been attributed to snake oil products include:

- increased soil water holding capacity
- increased soil aeration
- increased nutrient holding capacity AND nutrient availability

- improved soil structure
- increased microbial populations and activity
- improved organic matter behavior
- increased water penetration
- increased seed germination and root growth
- increased water use efficiency
- decreased need for commercial fertilizers

It is actually very easy to develop and market a snake oil product. I could go out to a local gravel pit and obtain some basalt rock. This basalt contains high levels of iron and magnesium. I can crush the rock into gravel and sell it as a magnesium-iron fertilizer with nutrients in their natural form! Natural does not equate to plant available. I'll call my product FOOLS GOLD. After adding FOOLS GOLD to a soil I would have to wait several thousand years for the iron and magnesium to be transformed into forms that plant roots can take up. What I would sell would be a virtually worthless product...but similar to many other items on the market today. As an added bonus the gravel-sized material would improve aeration and drainage of my soil!

I often get calls about the value of adding humic and fulvic acid products to soils. Humic and fulvic acids do improve soil properties, enhance plant uptake of nutrients and contain some nutrients. Humic and fulvic acids do have some value. However, when you look at the overall picture - the value of an application of a quart or two of humic and/or fulvic acids should be closely scrutinized. Humic and fulvic acids are components of soil organic matter. A typical soil in north-central Idaho already has

about 2% organic matter in the surface foot of an acre of soil. Two percent organic matter works out to about 80,000 pounds of organic material per acre. The one or two quart application of humic acid basically has a miniscule impact on the soil compared to the 80,000 pounds already there!

Snake oils are usually marketed using testimonials by "successful" users instead of by data generated in legitimate scientific trials. I feel that if a product were that good – a small-time business owner would have sold the rights to their magnificent miracle product to a large company and be retired in some tropical paradise. Products with amazing results sold by a small company just don't add up!

If you have the urge to try a product that you might suspect to be a snake oil - practice restraint or do your own experiment. You can try out a product on a small piece of land (3 acres) that you consider to have an average yield on your farm. Buy the product, apply it as directed – but do not tell the sales person where your experiment is on your land. A few days before harvest, have the product seller out to your farm and ask him or her to find where you applied the product. If the product is so good, it should be easy to find the location without help. If it cannot be found, the product simply did not do its job and consequently has very little or no value.

For more information, contact Robert Mahler at 208-885-7025, or bmahler@uidaho.edu

IS RESIDUE REMOVAL = SOIL CARBON REMOVAL?

Irrigated small grain residues are baled more frequently now than ten years ago, for several reasons. Some reasons for this include, (1) Increased demand and price for bedding in confined animal operations, (2) increased need for mulching new seedings and erosion control in burned areas, (3) more limited field burning options, (4) demand for cheaper feed stocks, and (5) the extra costs of tillage, fuel, time, and fertilizer N for residue management and incorporation. In the last two years, even corn residues were baled for some of the same reasons.

Maintaining soil organic carbon (SOC) is important for maintaining soil fertility, soil structure, nutrient cycling, water infiltration rate, water holding capacity, and microbial activity. With increased straw removed from irrigated fields, some have questioned whether this might lead to changes in soil organic C.

Dr. David Tarkalson, USDA-ARS at Kimberly, Idaho, recently reviewed pertinent literature regarding the effects of residue removal on changes in soil properties and presented the results at the 2008 Idaho Nutrient Management Conference. While there are many studies pertinent to dryland agriculture, few address irrigated systems. In Idaho, most of the straw removed is from irrigated fields, particularly in southern Idaho, since so little residue is generated in dryland acreage.

Dr. Tarkalson found only five studies where SOC was monitored in wheat residue removal treatments; two in Texas and the rest in foreign countries. All studies involved wheat

or both wheat and barley. They differed in their duration and cropping system.

After only three years of continuous irrigated wheat in Iran, SOC was unchanged by annually removing the residue. After 5 years of an irrigated wheat-corn double crop rotation in Mexico, SOC with wheat residue burned or returned to the soil did not differ. No change in SOC was shown in New Zealand after 6 years of removing residues of wheat, barley, or oats. These were relatively short term studies. In longer studies in Texas, the results were

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similar. After 11, or even 14 years of continuous irrigated wheat in Texas, SOC tended to increase even with residue removal. In no case did SOC decline with residue removal.

In most of the studies, SOC was higher with residues returned to the soil than when they were removed. Apparently, returning residues is more important for increasing SOC than maintaining it.

The results of these studies were surprising. Many would assume that with continual surface resi-

due removal that SOC would drop. The only reasonable explanation is that below ground roots are supplying sufficient carbon to maintain, and in some cases increase SOC. Research has shown roots to be significant contributors of carbon to the soil.

Relating these studies to Idaho irrigated systems is difficult. All of the studies cited involved continuous irrigated wheat or other small grains, or wheat grown in systems allowing two crops annually, one of which was wheat. Wheat grown two years in a row may be common in eastern Idaho between potato crops, but continuous irrigated wheat is the exception rather than the rule.

If the underground contribution of irrigated wheat to SOC is as substantial as suggested by these continuous wheat studies, how important to maintaining SOC is wheat occurring only once in three or five years of a row crop rotation? The question is particularly relevant considering the amount of tillage (tillage is generally thought to reduce SOC) associated with the other crops grown in rotation with wheat. We do not know how important wheat is for maintaining SOC in Idaho's irrigated system. If nothing else, these studies underscore the importance of including small grains in the irrigated system.

For more information, contact Brad Brown at 208-722-6701, or bradb@uidaho.edu.

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Wheat residue & nitrogen, continued from pg. 1

ranged widely from 12 to 140 lb/A (Table 1). Average post-harvest residual N was lowest for corn and wheat (20 lb/A), and averaged higher for row crops (43 lb/A), alfalfa seed (60 lb/A), alfalfa hay (48 lb/A), and peas and beans (55 lb/A).

The N mineralized averaged 87 lb/A in 2002 and 63 lb/A in 2003, and ranged from 36 to 128 lb/A. Mineralized N generally exceeded post-harvest residual N and contributed significantly to the total N available for residue decomposition. Surprisingly, mineralized N averaged 26 lb/A higher for alfalfa seed as a previous crop than for alfalfa hay. Alfalfa hay was similar to the beans/peas and wheat/

corn groups. The total post-harvest available N (residual plus mineralized) ranged from 52 to 232 lb/A. Total post-harvest N was higher in 2003 than 2004 (147 vs. 106 lb/A). The most total N available was from previous crops of alfalfa seed and the least from wheat/corn.

When post-harvest residual N is combined with mineralized N, there is ample N to support residue decomposition in practically all fields,

with the possible exception of previous wheat or corn crops.

Slow residue decomposition, if a concern, is more likely due to delayed incorporation (minimal residue contact with soil) and/or inadequate moisture than readily available N. Additional information on straw residue management considerations is available in "Wheat Straw Management and Nitrogen Fertilizer Requirements" Idaho Coop. Ext. Serv.

Current Information Series No. 825 from UI Ag Publications or your local County Extension Office.

For more information, contact Brad Brown at 208-722-6701, or bradb@uidaho.edu

Table 1. Residual N after harvested wheat, fall mineralized N, and total post-harvest available N as affected by previous crop.

| Previous crop category | Residual NO ₃ -N | Mineralized N | Total N |
|------------------------|---------------------------------------|---------------|--------------|
| | Range (mean) -----lb per acre----- | | |
| Row crops (13) | 15-136 (43) | 47-104 (75) | 80-196 (118) |
| Wheat/Corn (4) | 15-27 (20) | 37-80 (61) | 52-104 (81) |
| Beans/Peas (9) | 21-108 (55) | 36-100 (65) | 80-196 (120) |
| Alfalfa Hay (13) | 16-76 (48) | 40-96 (58) | 56-172 (106) |
| Alfalfa Seed (21) | 12-140 (60) | 28-128 (86) | 84-232 (146) |

Dairy manure application, continued from pg. 1

the soil profile, away from roots and toward sensitive groundwater resources. Growing winter cover crops, such as wheat or rye, is also an effective means for utilizing excess nitrates in the profile, as opposed to leaving the field fallow.

4. Have your manure tested –
You would never waste money on a fertilizer with an unknown N-P-K, so don't do it for field-applied manure either. Send a composite sample to be tested for dry matter

Leaving manure on the surface for more than even a couple of hours will insure significant losses of nitrogen as ammonia gas.

content, total nitrogen, ammonium nitrogen, total phosphorus, total potassium, electrical conductivity, and if possible, total carbon to labs approved for manure analysis. Updated lists of certified manure testing labs are available at <http://www.mda.state.mn.us/licensing/pestfert/manurelabs.htm>. Guides for effective manure sampling can be accessed at <http://info.ag.uidaho.edu/pdf/CIS/CIS1139.pdf>.

For more information, contact Amber Moore at 208-736-3629, or ambergm@uidaho.edu



Questions from the field



Which one is better for my crops, manure or compost? In a nutshell, it depends on what you're looking for. Both manure and compost will improve water holding capacity, infiltration rates, organic matter content, phosphorus and potassium concentrations, and cation exchange capacity. Compost tends to be more expensive and lower in nitrogen content than manure. Manure, on the other hand, is difficult to apply uniformly, is costly to transport, smells bad, and may potentially cause issues with E. coli, nematodes, fungal diseases, and weed seed germination in the first growing season after application.



If I apply compost or manure at a rate of 10 ton/acre, how much phosphorus am I applying? Phosphorus concentrations in composts and manures can vary by 100-fold, depending on factors such as animal feed composition, moisture added, maturity, and amount of carbon added. Submit your manure to a certified lab for analysis of phosphorus concentration and dry matter content, and perform the following simple calculation to determine amount of P_2O_5 that you can anticipate will be applied to your field.

$$\frac{\text{Desired rate of application (ton/acre)} \times \text{Dry matter \%} \times P_2O_5 \%}{5} = \text{lb } P_2O_5 / \text{acre}$$

If you have a nutrient management question from the field, please email your question to amberm@uidaho.edu. Names will not be used.

Upcoming Events and Contact Information

University of Idaho

Nutrient Digest Newsletter Contact Information:

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UPCOMING EVENTS

August-December 2008

- **Aug. 26:** Composting school—Session 1 (Basics)—Gooding
- **Sept. 17:** Soil Sampling Certification through ISDA—Twin Falls
- **Sept. 18:** Organic potato field day, hosted by NCAP—Idaho Falls
- **Sept. 24:** Composting school—Session 2 (Advanced)—Gooding
- **Dec. 10-12:** Idaho Grain Producers Annual Conference—Coeur D'Alene

January-February 2009

- **Jan. 5-7:** FarWest Fertilizer & Chemical Conference—Jackpot, Nevada
- **Jan. 8-9:** Idaho Sugar beet Conference—Twin Falls
- **Jan. 21-22:** Idaho Potato Conference—Pocatello
- **Feb. 3-4:** Idaho Alfalfa Conference—Burley
- Idaho Bean Conference—Time/Location TBA

NRCS CMNP Training and Update Sessions TBA for January, February, and March. Call 208 685-6992 for more info.