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Technology Development & Agronomy by MONSANTO

Current News and Updates

Although harvest is just gearing up, it's important to plan for additional tasks that need to be completed immediately following crop harvest. Some of the topics we address in this newsletter include fall tillage, soil sampling, and evaluating the current year's weed control and plan for next year.

Implementing fall tillage as soon as possible following crop harvest can have many benefits such as correcting potential compaction issues from previous field operations and getting a jump on residue management. The quicker we can size, evenly spread, and bury residue, the more time is allowed for microbial breakdown prior to cold winter temperatures. This means the decomposition process is faster and there is less potential for negative effects next year. Effective tillage and residue management are also key practices for managing diseases. Pathogens that cause diseases such as northern corn leaf blight and Goss's wilt overwinter in corn residue; therefore, effective residue management can decrease disease inoculum and potential issues next year.

Soil sampling provides critical information regarding nutrient availability and fertility needs. This article will address recommendations for proper soil collection and an in-depth look at some of the key components of a soil sample analysis. Soil sampling is also a key requirement for FieldScripts® in 2014. If you plan to participate in FieldScripts, soil tests will need to be sampled on a 3 acres or less grid and the test must include a number of key soil characteristics, some of which may not be included in basic soil test packages.

Ordering herbicides is also a common fall activity. It is important to evaluate the effectiveness of your previous weed control program and make changes accordingly. The Roundup Ready PLUS® program offers effective weed control recommendations for both corn and soybean. It is also worthwhile to check out some of the incentive programs associated with the use of key postemergence and residual herbicides.

Not only is fall a gorgeous time of year, it is also a time of year to pay close attention to safety. Farming is one of the most dangerous occupations in the United States and harvest is the most likely time for farm related injuries and fatalities to occur. That being said, getting home safely every night is the most important task of the day. I wish each one of you a plentiful, prosperous, and safe harvest!

Fall Tillage as a Management Tool

Tillage programs vary based on soil conditions, available equipment, and residue goals. Tillage can be an important tool to help manage soil compaction, residue, and some diseases.

Alleviate Compaction. Fall can be a good time to correct deep compaction that may have resulted from field operations on moist soils. Greater horsepower is needed for regular tillage operations when soils are compacted. Research has shown that seedbed preparation in compacted soil required a10- to 16-fold increase in energy used at low speeds.[1] The draft of a narrow pointed chisel was shown to increase from 70 pounds in non-compacted soil to 350 pounds in compacted soil. While conservation tillage practices and traffic management should be two of the main strategies for avoiding soil compaction, fall tillage can help lower the soil bulk density and reduce compaction.

Tillage to manage compaction should only be done when conditions are dry enough to shatter soil between the points of a subsoiler or chisel plow. Tillage should go only deep enough to break up the compacted layer. Tillage will have little impact on compaction if the soil at the compacted depth is wet.[2]

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Fall Soil Sampling for Fertility

Soil fertility is one of the foundations for high yield potential and is necessary for maintaining plant health and integrity. Post harvest is a good time for soil testing and fertilizing for the immobile nutrients phosphorus (P) and potassium (K).

Collecting Samples. Soil tests are recommended every 3 to 4 years. If there is concern about fertility, take soil tests to aid with nutrient management decisions. Key items to consider when soil sampling are timing, depth, and tillage systems. To increase consistency, sample fields the same time each year (similar soil environment in terms of moisture content relative to the time of the growing season), ideally after harvest and before the ground freezes. Samples should ideally be collected from the same location each time testing is done; this can be made easier with the use of GPS equipment.

Take soil cores to plow depth or at least the top 6 to 7 inches. To help with year-to-year comparisons, samples from the same field should always be taken at the same depth.[1] In no-till or reduced-tillage systems, nutrients can become stratified. If this is an issue, consider having a separate analysis run on the upper 2 inches of the soil cores. Other soil tests may have different soil sampling requirements; the nitrate test for certain western Minnesota counties requires soil cores to be taken at a depth of 24 inches.[2] Take 8 to 10 soil cores for each composite sample. Check with your soil testing laboratory for specific instructions on collecting soil cores and preparing samples. If dry soil conditions prohibit taking soil cores to the appropriate depth, wait to sample when soil conditions improve. Fertilizer recommendations become more accurate as the number of samples and cores per sample increases.

Test Results. Fertilizer applications should be based on the values received from the soil test and crop removal rates (Table 1). Levels that are adequate for the crop to be grown may only require a maintenance level of fertilizer. Lower levels will require "build up" amounts of fertilizer along with the maintenance amount. Always consider residual fertility from previous crops and manure applications when determining application amounts.

Cation Exchange Capacity (CEC). Soil CEC (expressed in milligram equivalents per 100 grams of soil (meq/100g)) is the ability of soil particles, which are net negatively-charged (anions), to attract, hold, and release positively-charged nutrient particles (cations). Soil CEC varies according to the percentage of clay and organic matter present. Higher amounts of clay and organic matter produce higher CEC's, which have a greater capacity to hold nutrients.

P and K. Soil fertility levels for P and K are greatly affected by the inherent availability in the soil and by crop removal. Each bushel of corn harvested per acre, removes the approximate equivalent amounts of 0.38 pounds per acre of P_2O_5 and 0.27 pounds per acre of K_2O (Table 1). These amounts are important when calculating the amount of maintenance or build-up fertilizer to apply. Crops cut for silage and stalks that are chopped and baled remove more nutrients because the majority of the above-ground tissue is harvested.

Table 1. Average nutrient removal rates for crops.

Corn	Unit	N	P_2O_5	K_2O
Corn Grain	lb/bu	0.90	0.38	0.27
Corn Silage	lb/ton	9.7	3.1	7.3
Corn Stover	lb/ton	16	5.8	40
Soybean	lb/bu	3.8	0.84	1.3
Wheat	lb/bu	1.5	0.6	0.34
Alfalfa	lb/ton	51	12	49

Source: Average nutrient removal rates for crops in the Northcentral region. 2005. International Plant Nutrition Institute. http://nanc.ipni.net (9/29/13).

As yield potential increases, managing soil fertility is critical. Low P levels can result in stunted, purple corn. Low K levels can result in yellow leaf margins in corn and soybean. Even if soil levels of P and K are adequate, deficiency symptoms may appear due to compaction and restricted root growth, which causes a temporary nutrient deficiency, or due to low soil moisture. Additionally, low K levels can increase stalk lodging potential and affect drought tolerance, as K is critical to plant cell structure and plant water pressure.

Nitrogen. During dry years, the loss of nitrogen (N) from the soil via leaching and denitrification may be negligible. In addition, the removal of N from the soil through grain and/or forage could be less when yields are poor. Nitrogen may remain in a nitrate form in the soil until rainfall occurs in the winter and spring and will then be subject to loss via leaching and denitrification. The remaining N can be assessed next spring by measuring N-Nitrate in soil samples taken a week or two before sidedressing from depths of 0-1 and 1-2 feet.

FieldScripts®. If you plan to participate in FieldScripts next year, certain soil data requirements must be met. Soil fertility test results must be available from 2011, 2012, or 2013. Samples must be from 3 acres or less and referenced to a grid. Sample depth must be from 0 to 6 inches or 0 to 8 inches and results need to include organic matter content, water pH, buffer pH, CEC, phosphorus, potassium, calcium, and magnesium. For fields west of the Mississippi River, EC (soluble salts) should also be included. Sampling depth should be determined by the depth of tillage practices. More information about FieldScripts can be found at: www.monsanto.com/products/Pages/fieldscripts.aspx.

Sources:
[1] Peters, J.B. et al. 2002. Sampling soils for testing. A2100.University of Wisconsin Extension. http://datcp.wi.gov (verified 9/30/13); [2] Soil sample information sheet instructions. University of Minnesota. http://soiltest.cfans.umn.edu (verified 9/30/13); Corn & Soybean Field Guide. 2007 Edition. Purdue Crop Diagnostic Training & Research Center. Purdue Pest Management Program. Purdue University; Hoeft, R. and T. Peck. 2002. Soil testing and fertility. Illinois Agronomy Handbook 2001-2002. P 90. University of Illinois; Soil Fertility Manual. 2003. The Potash & Phosphate Institute.

Harvest Safety—Entanglements, Falls, and Fires

Farming is one of the most dangerous occupations in the United States and harvest is the most likely time for farm-related injuries and fatalities to occur. Below are some reminders regarding several harvest-time hazards.

Entanglements. Machines often work faster than operators can react. A live cornhead has snapping rolls that take in stalks at a rate of about 12 feet per second.[1] Before trying to clear a plugged machine, it should be completely de-energized, which usually consists of disengaging the power and turning off the engine. Good control of late-season weeds can help avoid plugging machines in the future. Be prepared to allot additional time when harvesting during wet conditions as wet crops tend to plug the combine frequently.

Falls. Combines are 12 to 14 feet in height, and operator platforms may be 6 to 8 feet off the ground. Mounting and dismounting of combines may occur dozens of times a day and the most common injury during harvest is falling from a combine.[2] Platforms with painted metal can be slippery under normal conditions and crop residue, mud, or rain can further reduce traction. A platform should be kept clear of tools and debris, and work shoes replaced if non-slip soles are worn smooth. Use railings and grab bars when mounting or dismounting equipment.

Fires. For your safety and because millions of dollars in machinery, crops, and time are at stake, fire prevention is key at harvest. Coolant and oil levels should be checked daily, and the pressurized oil supply line to the turbocharger should also be examined for areas of wear that could start a leak. Engines and engine compartments should be cleaned to remove caked-on oil and crop residue. Plant material may smolder unnoticed and could ignite in a short amount of time. Be sure to keep a fire extinguisher handy and make sure it is fully charged.

Keep in mind that these are not the only safety concerns at harvest time. Make sure to minimize your potential for dust and mold inhalation by using a properly filtered mask. Be especially mindful of grain handling equipment and storage structures as entrapments can happen very quickly. It takes only one shortcut or misstep to cause irreversible devastation on your farm. *Please be mindful of your safety and that of your family and employees this harvest season.*

Sources:
[1] Hanna, M. 1997. Harvest safety yields big dividends. Iowa State University. Pm-1265h; [2] Pocock, J. 2009. Top-6 Corn Harvest Killers. Corn and Soybean Digest. http://cornandsoybeandigest.com

New Site Launches to Answer Questions about Biotechnology

The subject of biotechnology and genetically modified organisms (GMO) are topics discussed and misunderstood by consumers. The Council for Biotechnology Information (www.whybiotech.com) has created a new website to answer those questions. The site is **GMO Answers** (www.gmoanswers.com).

The site is committed to answering questions about how food is grown and agriculture in general with easy to understand answers. Visiting the site will give answers to questions provided by the public. Experts from academia, government, and industry will provide the answers. Another section features access to scientific data, research and studies around GMOs.

Visit **GMO Answers** (www.gmoanswers.com) today or scan the QR code and learn how to answer the tough questions about biotechnology and GMOs.

QR Code source: http://goqr.me/

Plan Ahead for Weed Management

Fall is a good time to evaluate the effectiveness of your weed management program. As you combine, make detailed notes of weed issues in each field. Record the weed species present in the field, how heavy the infestation was, and where weedy patches are located. Also note the size of the weeds. Weeds that are small grew mostly as the crop was drying down, did not compete with crops, and are unlikely to produce much seed for next year. These are weeds that were likely controlled by your current program. Weeds that are large probably competed with the crop during the growing season and have the potential to increase the weed seed bank. Evaluate the effectiveness of your current weed control program and determine if any changes need to be made for next year. Also, decide whether a fall burn down or fall residual application would be a beneficial addition to your weed management program. Make sure to get your pre-emergence herbicides ordered this fall, so that you are ready for timely herbicide applications in the spring.

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Fall Tillage as a Management Tool (cont from p 1)

Residue Management. Managing corn residue should begin with aggressive stalk processing at the combine header and uniform distribution of residue as it exits the combine. After harvest, tillage can help cut residue into small pieces and bury it to encourage decomposition. Residue that is not incorporated in the fall will largely remain intact until spring because the decomposition process is slowed when residue is not in contact with the soil. Corn residue that does not begin the decomposition process in the fall can result in significant nutrient immobilization during the following growing season. Residue decomposition that begins in the fall means less potential for a negative affect on the following crop. Where crop residue is desirable for erosion and nutrient management, vertical tillage implements can be used to manage residue. Shallow vertical tillage implements with narrowly spaced ripple coulters can be operated at high speeds to help size residue and root balls without sacrificing the conservation benefits of residue cover.

Disease Management. Residue serves as a site for inoculum production and as a source of nutrients for disease growth. Other saprophytic soil microorganisms are able to reduce the amount of potential disease inoculum when residue is buried and mixed into the topsoil. Inoculum survival for diseases, such as northern corn leaf blight, Goss's wilt, eyespot, gray leaf spot, Diplodia ear rot, and anthracnose, decreases when corn residue is buried in soil.

Sources:

[1] Daum D.R. 1996. Soil compaction and conservation tillage. Penn State. 5M96. http://extension.psu.edu (verified 9/29/13); [2] Understanding and managing soil compaction. 2009. Iowa State University Extension. http://www.extension.iastate.edu (verified 9/29/13); Daum Jackson, T. 2007. Goss's bacterial wilt and leaf blight. plant disease central. University of Nebraska. http://pdc.unl.edu, (verified 9/15/10); Robertson, A. et al. 2009. Controlling corn diseases in conservation tillage. Iowa State University. PM 1096; Samples, D. and J. McCutcheon. 2002. Grazing corn residue. The Ohio State University. ANR-10-20; Stalcup, L. 2007. Had it with hardpan. Corn & Soybean Digest. cornandsoybeandigest.com (verified 9/29/2013).