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IMPROVING SOIL QUALITY - Part One
Managing Soil Organic Matter

Pages 4-5

ALSO

A World of Conservation

"Producing in Harmony with Nature"

CTIC

John Hassell, executive director of CTIC.

We frequently hear about environmental damage all over the world: degradation of rain forests, wildfires burning out of control, farmland so degraded it no longer supports crops, severe wind and water erosion and a general lack of conservation effort. What we rarely hear about is the success other countries are achieving in conservation of natural resources.

I had an extraordinary opportunity to learn first-hand about some of these conservation efforts at the 2nd World Congress on Conservation Agriculture, held on Aug. 11-15, in Iguassu Falls, Brazil. The theme of the conference was, "Conservation Agriculture – Producing in Harmony with Nature."

Conservation agriculture — soil management practices that limit the disruption of the soil's structure, composition and natural biodiversity, thereby minimizing erosion, degradation and water contamination – is a fitting theme for an international conference where researchers, practitioners and decision makers in agriculture come together to share success stories about conservation. Not only did we hear from the industrialized countries but also developing countries. Farmers talked about the importance of no-till and the respect they have for soil quality. Government representatives shared ideas for future activities within their countries to further promote conservation agriculture, while researchers discussed the results of studies on controlled traffic, positive impacts of conservation agriculture on carbon sequestration and use of alternative crops and associated benefits.

These presentations were given with a passion and energy rarely seen in our own country. The message of the conference was consistent and clear: conservation agriculture works for the environment and it works for farmers. I was extremely inspired.

Seeking to know more, I found a paper published by the Food and Agriculture Organization of the United Nations that described the difference between conservation agriculture and conventional agriculture in terms of differing mind-sets of farmers: "The conventional farmer believes that tilling the soil will provide benefits to the farm and would increase tillage if economically possible. On the other hand, the conservation farmer questions the necessity of tillage in the first place and feels uncomfortable when tillage occurs."

We – all of us working in the agricultural arena – should feel uncomfortable when we see tillage occur. History has proven the devastating impacts of tillage on our soil resources. In a 1953 publication by W. C. Loudermilk, he states, "In ancient Mesopotamia, at least 11 empires have risen and fallen in this tragic land after 7,000 years. These empires died and were buried by the desert sands, not because of conquering armies, but because silt filled the irrigation canals." And in our own country, who can forget the dark days of the Dust Bowl. Poor farming practices, little regard for conservation and unusual drought conditions were responsible for that terrible catastrophe of the 1930s.

Today, agricultural organizations around the world are trying to make a difference by spreading the message of conservation agriculture. Let's all get on the bandwagon and support this initiative, for our sake, our kid's sake and the future of our world. There truly is a world of conservation taking place.

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CTIC leads the development of public/private partnerships that promote the enhancement of soil, water and air quality and sound habitat management by equipping agriculture with realistic, affordable and integrated solutions.

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On the Cover

Agro-Soyuz chairman of the board, Voldymyr Khorishko, is committed to spreading the word about high-efficiency conservation farming to colleagues in the Ukraine and Russia.

Photo Credit: Agro-Soyuz.

Go Beyond T, Manage for C

Changing the Paradigm in Resource Conservation

A shift in focus for soil conservation is in the making. For decades, conservationists focused on managing soil for tolerable loss, but the next generation will be managing for gains in soil organic matter, also known as soil organic carbon.

Partners spoke with Dr. Bill Puckett, director of the Natural Resources Conservation Services (NRCS) Soil Quality Institute, about the shift in focus and what it means for agriculture. Puckett has been the Director of the NRCS Soil Quality Institute since 2001, providing national leadership for soil quality and ensuring the development and use of sound science in the application of soil quality concepts. He has a B.S. in Agronomy and Soils, an M.S. in Soil Physics and Mineralogy, and a Ph.D. in Soil Genesis and Classification.

What role has managing for tolerable soil loss (T) served in soil conservation?

The NRCS, formerly known as the Soil Conservation Service has been around for more than 60 years, and "T" has served us very well for natural resource conservation. "T" is the maximum level of soil loss that can occur while retaining soil productivity. It is an excellent benchmark, and we will continue to shoot for it. Now, however, we are being asked by many different clients across the country to do more than reduce soil erosion. They are concerned about improving air, water and soil quality and enhancing wildlife habitat.

Now we are hearing "go beyond T, manage for C." What does that mean?

NRCS began searching for additional benchmarks for soil conservation. What else could we shoot for that would give us multiple benefits? We wanted something that was manageable and that, if increased, would have a positive affect on the soil and on the environment.

Carbon seemed to fit the bill. Carbon is something farmers and ranchers can gradually increase by using proper grazing management, growing higher residue crops, not tilling as much and adding different types of crop rotations.

Producers who have been practicing conservation tillage as a way of reducing erosion may not be fully aware of the many other very positive benefits that were taking place to improve their soil quality.

Is it perfect? Probably not. Soil organic matter is only one component of soil quality management and, depending on the location, other factors such as salinity or compaction may be more significant than organic matter. It's not as simple as reducing tillage and raising high residue crops and managing nitrogen accordingly. Producers have to learn to manage everything within the system.

What will this do for the future of agriculture?

Most agricultural soils have lost a lot of organic matter through soil erosion and continuous cultivation. Therefore, we have a long way to go to restore carbon levels in the soil. Over time, by increasing soil organic matter, several soil properties improve, such as soil structure, aggregate stability, water retention, nutrient holding capacity and drought resistance. Instead of managing just to reduce soil erosion, producers are managing to improve their soils, which will lead to improved productivity while protecting the environment.

Agricultural Research Service

Bill Puckett is the director of the Natural Resources Conservation Service (NRCS) Soil Quality Institute and an expert on soil quality.

Managing for carbon and soil quality will give agriculture an edge in meeting air and water quality goals while increasing productivity.

As we move ahead, it is possible for future Farm Bill programs to include managing for C. Also, once producers are managing for C, the carbon trading market offers the ability to sell carbon credits.

The focus has always been to reduce soil erosion. But, as we look toward trying to obtain maximum environmental benefits while increasing production, we will begin focusing on additional factors as well, especially soil carbon.

For more information about the Soil Quality Institute, visit http://soils.usda.gov/sqi/.

To contact Bill Puckett, Tel: (334) 844-4741 ext. 178 or E-mail: bill.puckett@ftw.nrcs.usda.gov.

Managing Soil Organic Matter

Get More From Your Soil by Increasing Soil Carbon

By Angie Fletcher

Soil erosion became a serious problem in the United States with the devastating wind and water events of the 1920s and '30s. Then, the primary conservation concern was keeping the soil in place so that agricultural production could continue.

Today, however, concerns for air and water quality, along with agricultural productivity and erosion rates, are prominent. "Keeping the soil in place is only part of the job," says Dr. Bill Puckett, director the Natural Resources Conservation Service Soil Quality Institute. "It's a whole package approach. You have to learn to manage everything within the system," say Puckett.

Managing for Tolerable Soil Loss

Out of concern for the erosion events in the era of the Dust Bowl, conservationists created the concept of managing for tolerable soil loss for agricultural production; thus creating the "T" factor, which is the maximum annual soil loss that can occur on a particular soil while sustaining long-term agricultural productivity. Conservationists began focusing on reducing soil loss to "T" by applying conservation practices, such as terraces, contour strips, grassed waterways, wind breaks residue management .

"The goal of managing to 'T' has served soil conservation well and will continue to be an important benchmark," says Puckett, "but in order to achieve broader agricultural and environmental benefits, we must find an additional benchmark."

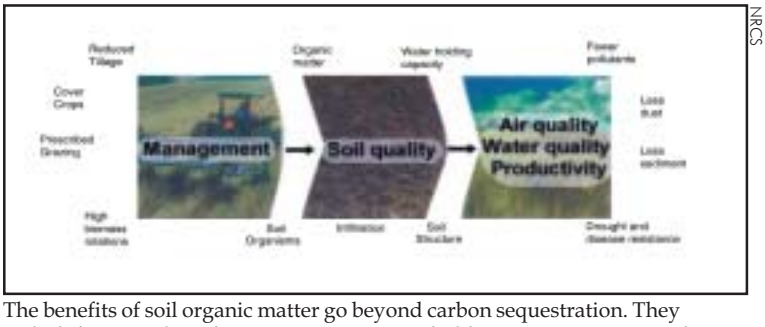
To achieve additional enhancements for soil, air and water quality and wildlife habitat, a shift in philosophy is needed. Puckett says, "We need to manage beyond tolerable soil loss or 'T'."

"We have achieved important soil savings by focusing on erosion control," says Puckett. However, he believes further erosion reductions and gains in other environmental benefits can be made by focusing on managing soil organic matter.

Managing for Carbon

Addressing conservation issues with the goal of building soil organic matter shifts the focus from managing for tolerable soil loss to managing to build carbon levels in the soil.

Managing for carbon, or C, is more than controlling erosion. That is only one aspect of it. In order to function well, soil must hold nitrogen, phosphorus and pesticides in place to keep them out of surface water. It must deliver nutrients and water to plants when they need them, and should minimize the effects of floods and droughts. Soil should sustain plant and animal productivity, maintain or enhance water and air quality and support the health and habitation of all livining forms.



NRCS

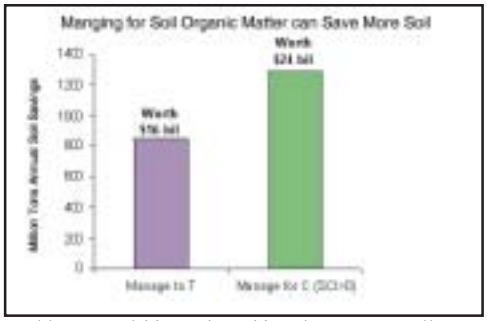
The benefits of soil organic matter go beyond carbon sequestration. They include better soil productivity, greater water holding capacity, improved infiltration and reduced runoff, better air quality, better water quality, more efficient nutrient cycling, more effective pest control and better wildlife habitat.

NRCS

No-till corn in soybean residue gives the soil added protection from wind and water erosion.

By naming the goal as "enhance soil organic matter - manage for C", improvements in soil functions will result, as will additional erosion reduction. Puckett says, "Of all the soil properties, soil organic matter is the most influential in terms of critical soil functions. Because it enhances water and nutrient holding capacity, improves soil structure and provides an energy source for beneficial soil organisms, managing for organic matter enhances productivity and environmental quality, and lessens the negative impacts of drought, flood and disease." In addition, increasing soil organic matter levels reduces atmospheric carbon dioxide levels that are believed to cause climate change.

Dan Towery, CTIC natural resources specialist says, "Initially, managing for greater soil organic matter may require



Soil loss would be reduced by almost 500 million tons annually if all cropland were managed for carbon (no decline in soil organic matter) rather than managed to "T".

slightly higher herbicide or nutrient applications. In time, productivity and environmental quality will be enhanced and application rates will decrease."

Additional benefits of managing for organic matter include an immediate reduction of dust, allergens and pathogens in the air, and, once runoff decreases, reduced levels of sediment and nutrient loads in surface water. According to Towery, ground and surface water quality improve because soil organic matter holds 10 to 1,000 times more water and nutrients than the same amount of soil minerals, making it a more effective filter.

Puckett says there are some people that believe that this increased water infiltration may carry nitrates and highly soluble pesticides into tile drains, ditches and streams through subsurface flow. Towery says this can be managed and, "it certainly beats the alternative of tillage, which reduces soil organic matter and causes soil erosion."

"Another factor to consider is that organic matter may bind pesticides, making them less active," says Towery. However, soils managed for organic matter may suppress disease organisms, reducing pesticide needs.

Increasing Soil Organic Matter

Practices that enhance soil organic matter include high biomass crop rotations, cover crops, reduced or no tillage and rotational or prescribed grazing. Increased surface residue from the high biomass crop rotations and cover crops build a physical barrier that protects the soil from wind and water erosion. These high residue rotations and cover crops contribute more organic matter and nutrients to the soil.

Less soil disturbance means lower organic matter losses. Well-managed, continuous no-till may be the most cost effective practice in many places. But, in some areas, where soils are cold, wet and/or high in clay, strip tillage or other variations may be needed to avoid short-term yield losses.

"Not all land will require the same prescription of conservation practices," says Towery. The best system of practices to achieve sought-after results will vary based on the soil type and climate. And results take time. Improvements to the soil may not be recognizable right away. According to Towery, it is common for some soils to not show visible change for five, sometimes 10, years.

Puckett says, "Measurable increases in soil organic matter may take 5 or 10 years, but improvements in the soil (e.g. better infiltration and soil structure) will likely be apparent within the first few years after management changes."

Managing for carbon affords landowners and managers additional onsite benefits, creating greater motivation for those making the ultimate decisions about managing the nation's natural resources. "Fuel, time and money savings are realized by producers implementing conservation practices, such as no-till," says Puckett.

"Go beyond 'T', manage for 'C', is a philosophy shift," says Puckett. "As we look toward managing and increasing carbon, we will begin to see additional environmental benefits."

No-till farming provides good erosion protection and helps retain moisture for the new crop.

The feature article in the November/December issue of *Partners Magazine* will continue to address the concepts of managing for C. *Partners* will speak with individual producers who have accepted this philosophy and implemented practices to increase soil organic matter. Be sure to read it.

For More Information

Conservation Technology Information Center: www.ctic.purdue.edu.

Soil Quality Institute: http://soils.usda.gov/sqi/.

Natural Resources Conservation Service: www.nrcs.usda.gov/.

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New Strategy for Ukrainian Ag

Conservation Tillage is Critical Element in Playbook

By Steve Werblow

International Conservation Series:

Conservation Here and Abroad

Even under the thumb of dictators and the numbing effects of the collective farm system, Ukraine has been celebrated for centuries as the "Breadbasket of Europe." Good soils, weather calmed by the influence of the Black Sea, and a proud, strong citizenry position the Ukraine for agricultural growth.

However, there's been no shortage of challenges as Ukrainian farmers have cycled through 12 cropping seasons as producers in an emerging free market. After three generations of a command economy, Ukraine has little to no market infrastructure. Hard currency is hard to come by, credit is scarce, prices swing wildly, and inputs such as herbicides and fuel are expensive. Meanwhile, privatization of land and the entry into a free market have created significant growing pains.

Inspired by South Dakota State University researcher Dwayne Beck and no-till farmers across North America, Volodymyr Khorishko believes no-till will provide Ukrainian growers with a vital boost. Chairman of the Board of Agro-Soyuz – a privatized, diversified agricultural operation that farms 17,200 acres on the Ukrainian steppes – Khorishko is passionate about harnessing the economic efficiency of no-till to bring Ukrainian farming into the 21st century.

When Volodymyr Khorishko and his partner, Sergei Prokayev, entered Collective Agricultural Enterprise (CAE) Druzhba in 1996 with an eye towards reorganizing it as a privately owned, profit-making farming venture, much of the enthusiasm that greeted the fall of the Berlin Wall five years earlier had been ground into the waning soil.

Nearly 700 villagers each held land shares for 9.6 hectares (about 24 acres) of land that formerly belonged to the collective farm system – but the papers indicated only the size of the share, not the location (it wasn't until Agro-Soyuz surveyed the land and processed titles that shareholders received title to specific plots). Without a committee to control production, deliveries and prices, growers were lost. They used underpowered tractors to continue tillage-intensive production practices in spite of rising fuel costs. Production went into a tailspin – stuck with crops they didn't know how to market, the shareholders of Druzhba generated little cash, which made it nearly impossible to buy inputs for the next season. Milk output was just 1,300 liters (2,860 pounds) per cow per year; grain production fell from 9,400 metric tons in 1994 to 6,200 metric tons in 1996.

"When the command system unraveled, the economy changed but the actual approach to farming had not had time to change," says Khorishko through the translation of Neonila Martyniuk, Agro-Soyuz's Wisconsin-based representative in North America. "This is like taking an American football team and having them go and play a European soccer match." Even new equipment and inputs contributed by Western interests in the early years of independence didn't help, Khorishko notes, any more than new cleats and uniforms would help U.S. gridiron stars take on European soccer players. What the Ukraine needed was a new playbook and some practice. And Khorishko is devising a strategy based heavily on no-till.

More Horsepower, Fewer Hours

Khorishko and Prokayev surveyed the farm, issued land titles to all CAE Druzhba landholders, and leased land shares from 670 of them to create Agro-Soyuz, a closed joint stock company that in turn employed the shareholders. The partners invested heavily in larger equipment – 410-horsepower tractors to replace the 80- and 150-hp units that survived from the Soviet era, 18-meter (59-foot) planters, a 27-meter (88.5-foot) sprayer and combines with 11.5-meter (38-foot) headers.

But Khorishko was determined to run the new equipment far less. Where traditional farming techniques demanded 8 to 12 passes on grain and oilseed crops, Khorishko cut fieldwork down to 3 passes. Into untouched stubble, workers run Horsch seeding equipment outfitted to apply starter fertilizer, make a second pass to topdress liquid nitrogen and then perform a herbicide/fungicide pass. Manure from Agro-Soyuz's hog and dairy operations is spread as needed.

Of course, massive equipment purchases represent a sobering liability, even to the managing owners/partners of Agro-Soyuz, who are veterans of the equipment industry. In fact, Agro-Soyuz's profits currently come from the venture's network of 96 spare parts distributorships, run by Prokayev – the farming side of the business is still tilted toward capital investment. Ukrainian government subsidies for locally made or co-manufac-

tured equipment, enacted last year, helped keep prices in check, but Khorishko is quick to note that efficient farming must pay the machinery bill or Ukrainian agriculture will not become profitable.

"We are sure that if we continue to use the Soviet designed equipment and our traditional technology, we will not be profitable in agricultural production," Khorishko says. "And if we were to buy new equipment manufactured in Western countries but continued to use our traditional techniques, we would not be able to pay for the equipment. But using equipment that can cover wide swaths of land and using innovative technology, then we can pay for the equipment."

Innovative technology revolves around no-till, good fertilizer management and careful variety selection and seeding. Agro-Soyuz's march toward no-till has reduced operating costs dramatically, Khorishko points out. Traditional tillage, based around moldboard plows, consumed 90 liters of fuel per hectare (9.6 gallons per acre) to produce a crop. Reducing tillage dropped that figure to 60 liters per hectare, then 40. Today, Agro-Soyuz no-tills its crops for an average fuel consumption of 30 liters per hectare, and the farm's agronomy team is looking to reduce it to 15 liters (about 1.5 gallons per acre) in the future. Meanwhile, fewer passes means less wear and tear on equipment, notes Khorishko.

He adds that efficiency has also improved due to better placement of fertilizer with the seed, the result of intensive research efforts on Agro-Soyuz's Concept Farm, a 640-acre research farm where staff agronomists conduct variety trials, experiments with fertilizers and growth stimulants, herbicide studies and comparisons of various tillage techniques. The Concept Farm and its Practical Learning Center also serve as a vital source of production information in a country that lacks a state extension service. Since 1999, more than 17,000 people representing 1,165 agriculture ventures in the Ukraine and Russia attended programs at the center aimed at increasing production efficiency. Seven universities have sent students to complete practical course requirements there.

Agro-Soyuz

Agro-Soyuz's integrated crop and livestock operation in the steppes of the Ukraine includes a Concept Farm and Practical Learning Center, which serve the region as testing grounds and classrooms for conservation farming technology.

Challenges Remain

Of course, Agro-Soyuz still faces many challenges. Not the least is a market that swung from $65 to $200 per metric ton of wheat – and back – in 2003. Some revolve around developing rotations that are practical for the agronomic and economic climate of the Ukraine. Some will require Agro-Soyuz leaders to strike a balance between the bedding needs of the operation's booming hog and dairy operations with the benefits of leaving more residue on the fields after harvest. And perhaps the biggest is gathering experience to succeed over the long term.

"Anytime you're going to bring in new crops and new cropping systems, it takes 10 years to grow local systems and local know-how," says Dwayne Beck, who has met with Khorishko in South Dakota. "And until you have the rule of law – an economic/government/judicial system designed to allow the free market to work properly – you can't function. We have enough problems in the U.S. and our system has been in place for 200 years. Can they do it? Yeah. Will it be easy and without mistakes? No."

Volodymyr Khorishko and Sergei Prokayev recognize the challenges – and they're committed to facing them with no-till as a guiding force and a survival strategy.

Steve Werblow is a free-lance writer based in Ashland, Ore.

Building Bridges

After a tumultuous period of adjustment in the mid-1990s as Ukrainian farmers sought to rebuild a free-market agricultural system after more than 70 years of Soviet rule, farmers in the Breadbasket of Europe are hitting their stride, says Agro-Soyuz Chairman Volodymyr Khorishko in Majskoye, Ukraine. Now is the time for increased dialogue between Ukrainian and North American farmers, he says, as well as greater opportunity to move much-needed Western equipment into the region along with training in new farming systems – especially conservation tillage.

"A lot of American companies think, 'oh, if we have sales, we can provide the training,'" says Khorishko. "With the Ukraine, if they provide the training, it will help expose farmers to this technology and they will have the sales."

Khorishko will present a two-hour session titled "The Potential for Adoption of Conservation Agriculture in Ukraine" after the CTIC board meeting on Oct. 29 in Washington, D.C.

Efficiency Leads to Improved Soil

Continuous No-till in Indiana Improves Soil Quality

By Angie Fletcher

Lately it seems the big push in agriculture is: go big or get out. "But that's not the way I see it," says Kevin Bowman, of DeKalb County, Indiana. "What you have to do is be more efficient with what you have."

Bowman's father, Bob, has been farming since the 1950s. Today, the Bowman family farms roughly 4,200 acres of corn and soybeans in northeast Ind.

"If getting bigger were the key to successful farming, it would have happened a long time ago," says Kevin Bowman.

According to Bob Lambert, Natural Resources Conservation Services soil conservationist, who has been working with the Bowmans for more than two years, the Bowmans are always looking for ways to improve the land they farm. "As farmers who are making a living at grain farming, they are very conscientious individuals," says Lambert. "Especially when it comes to no-till, these guys are it," he says.

NRCS

A continuous no-till system, like the one used by the Bowmans, leads to dark-colored, highly productive soil.

Creating Success

The land farmed by the Bowmans has been under a continuous no-till system for more than 12 years. It wasn't always that way though. They no-tilled beans several years before switching the corn over to no-till. "With beans, the soil didn't seem to get as hard," says Bowman. "It was easier with the lighter soils," he adds.

The Bowmans would field cultivate the bean stubble and then plant corn. "A lot of producers in this area still do that," says Bowman.

However, as the Bowmans watched the soil on a nearby farm improve with no-till soybeans and no-till corn, they were convinced of the benefits of completely removing the field cultivator from their process. "They have the same type of soil we do - fairly heavy clay," says Bowman, "and they started no-tilling their corn along with the soybeans. We witnessed the tilth on their land getting better, quicker."

After a couple of years with less than perfect stands, the Bowmans were convinced that they needed to make some adjustments. "We went to a heavier frame and added zone-till units (three coulters), added the spiked closing wheel and slowed our planting speed down. The coulters opened up the soil enough to let it warm without that extra tillage pass and the other changes improved our stands," explains Bowman. "Once we got our equipment right and eliminated that one pass, things got a whole lot easier," he admits.

It takes several years for the soil to show visible signs of improvement, but Bowman notes, "the soil we've been no-tilling longer definitely has better tilth."

Supporting Research

Not only were the Bowmans impressed with the improvements in the soil, but they recognize the entire environmental benefits. Bowman says, "We are involved in a U.S. Department of Agriculture research project to see just how much sediment, nutrients and pesticides are getting into the creeks." He is adamant that he doesn't think farmers are "polluting near as much as what gets portrayed."

Lambert praises the Bowmans for participating in this USDA Agriultural Research Services project designed to evaluate the effects best management practices have on surface water quality in DeKalb County. "You couldn't ask for two guys that could do more for this project than they are, and they aren't getting reimbursed for what they do," says Lambert.

"We thought our no-till system would help our land, but we also saw it as a way of saving us time, fuel and money," says Bowman.

It's a Whole System

Lambert says, "The Bowmans are also keyed into nutrient management and pest management in their no-till operation."

Currently the Bowmans apply sludge from the local waste water treatment plant mixed with gypsum as a fertilizer. "This reduces the amount of soil crusting and increases water

infiltration," Lambert explains.

"The sludge and gypsum helps the microorganisms," says Bowman, "to help build the soil tilth." This helps improve soil tilth until the roots decay and the worm population increases.

"I've noticed that the ground tends to be softer where manure is used," says Bowman. "We are looking into manure (chicken litter)," he says, "but there are some additional expenses to trucking it."

"Once the soil tilth builds and more air gets into the soil, the more the soil acts like a sponge," says Bowman. "It's apparent when you dig a trench and see the macropores in the ground." He says it's no substitute for tile, but it's better to have the natural percolation of the ground. "It's less runoff and better water quality," he says.

Bowman believes that because there is continuously new research and technology available, you have to keep an open mind. "It keeps changing," says Bowman, "there are better ideas all the time."

No matter what, Bowman's experience has taught him that you cannot "do a little no-till." He says, "It's a hard choice, but you've got to either do it – or don't do it." There is no in between. "It takes a long-term commitment," says Bowman.

NRCS

No-till farming provides good soil protection from erosion and helps retain moisture for the new soybean crop.

But, according to Bowman, once you make the commitment, you have to be prepared to make adjustments. It's not a one-time event.

"In the early years there may be a time when your ground goes through a hard phase," he says. His suggestions to alleviate some of these struggles include starting with no-till soybeans, taking care of compaction, monitoring the calcium levels in the soil and adjusting your fertilizer program.

Lambert notes the Bowmans have a lot of experience with no-till. "They are becoming very successful at it."

For information, contact Bob Lambert, NRCS soil conservation, at the Auburn Service Center. Tel: (260) 925-3710; Fax: (260) 925-1471.

Nonpoint Source Pollution Information and Education Programs

October 20-23
Congress Plaza Hotel, Chicago, Illinois

As part of this national conference, Conservation Technology Information Center will host a workshop on Oct. 20 entitled *Draw Them a Picture: Translating Data into Information.*

The workshop will help you present pertinent information to the appropriate audience in the most useful format.

For more information, visit www.chicagobotanic.org/research/conference/nonpoint or contact Karen Scanlon, CTIC communications director, Tel: (765) 494-2238 or E-mail: scanlon@ctic.purdue.edu.

CTIC Board Meeting

The CTIC Board of Directors fall 2003 meeting will be held Oct. 29 at the Monsanto, Washington, D.C., office (600 13th Street, NW, Suite 660, Washington, D.C., 20005) from 8 a.m. to 4 p.m. The Business Alliance Council and CTIC Members Meeting will start at 8 a.m. on Oct. 30 at the Washington Court Hotel, in Washington, D.C.

Following the board meeting will be an opportunity to discuss agricultural conservation in the Ukraine with representatives from that country's agricultural community.

For more information, contact CTIC, Tel: (765) 494-9555.

With support of partners like you, CTIC will continue to increase conservation in agriculture while increasing profits for farmers. Your donation helps.

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Testing Soil Organic Matter

Active Organic Matter is True Indicator of Improved Soil

By Angie Fletcher

Experts agree that soil organic matter is a prime indicator of soil quality because of the effects organic matter has on other indicators, such as bulk density, aggregate stability and water infiltration. Because of this, and the fact that carbon sequestration may help decrease carbon dioxide levels in the atmosphere, the importance of soil carbon is gaining attention, bringing with it questions about soil sampling procedures and their interpretation for those interested in monitoring management changes.

"A field test to estimate active organic matter would be very useful and help producers make management decisions that will improve soil quality," says Dan Towery, Conservation Technology Information Center's natural resources specialist.

Dr. Raymond Weil, professor of soil science at University of Maryland, and his collegues have developed a method that may meet that need.

Just What We Need

Weil, et al, published "Estimating active carbon for soil quality assessment: a simplified method for laboratory and field use" in the first quarter of the American Journal of Alternative Agriculture.

This method is the first to measure active organic carbon and the first to be usable in the lab or field. All other tests for organic matter have to be done in the lab and measure only total organic matter.

The test involves shaking air-dried soil in a reactive solution of potassium permanganate (.02 M KMnO4) for two minutes and then comparing the color of the sample to known standards or to a hand-held colorimeter.

Know Your Matter

Organic matter can be separated into two main components. The active fraction, occupying 7 to 21 percent of the organic matter, is used and transformed by living plants, animals and microbes for 10 to 25 years. The stable (passive) fraction makes up 70 to 90 percent of the organic matter and lasts hundreds to thousands of years. Living organisms and fresh organic matter can make up the remainder.

Some scientists believe the active carbon, which is found in active organic matter, serves as an earlier indicator of soil quality changes compared to total organic matter.

Towery says, "The active organic matter, and the microbes that feed on it, are vital to aggregating soil particles and nutrient cycles." Soils with better aggregation have bio-pores that improve root penetration and water infiltration and are less erosive.

Many nutrients used by plants are held in organic matter until soil organisms decompose the material, releasing ammonium and other nutrients for plant use. Organic matter provides nitrogen, phosphorus, sulfur and iron to plants.

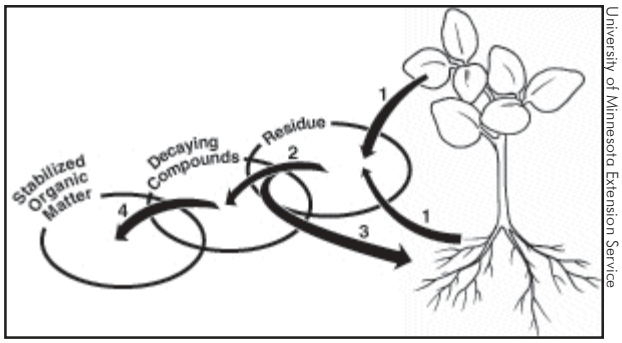
"A soil with 3 percent organic matter contains roughly 3,000 pounds of total nitrogen per acre," says Towery. However, he notes that, depending on decomposition rates, only 25 to 100 pounds of nitrogen from organic matter may be available to plants in a year.

Towery says testing for active organic matter will be more meaningful and helpful when monitoring a farm for improved soil quality. Through his research, Weil expects to prove that a test for active carbon, which is more sensitive to management practices than total organic carbon, will help farmers to identify what practices to apply to not only improve organic matter but also to increase yields and productivity.

Standardized Testing

Researchers agree it is imperative that soil sampling be as standardized as possible. No matter what testing procedure is used, comparisons should be made using results from the same testing procedure, same soil depth and location in the field. Samples taken using varying procedures, depths or locations will skew results.

Visit www.nrsl.umd.edu/research/NRSLResearchAreaInfo.cfm?ID=14 for more information about Dr. Raymond Weil's soil research.



University of Minnesota Extension Service

When roots and leaves die, they become part of the soil organic matter. Soil organisms continually change organic compounds from one form to another, consuming plant residue and other organic matter, and then creating by-products, wastes and cell tissue. Some wastes released by soil organisms are nutrients that can be used by plants. Eventually, soil organic compounds become stabilized and resistant to further changes.

Construction or Destruction?

Researching Best Management Practices for Urbanization

By Angie Fletcher

What happens when farmland is urbanized? What changes take place to lakes and streams as buildings are erected on once vegetative soils?

In an attempt to discover systems that will reduce runoff and increase water infiltration on urbanized farmland, the U.S. Environmental Protection Agency (EPA), U.S. Department of Agriculture-Agricultural Research Service (ARS) and the North Appalachian Experimental Watershed (NAEW) in Coshocton, Ohio, seek answers to these questions.

"The EPA plans to use the results of this first, fully controlled study of water runoff to create a national program to trade runoff credits, similar to the way carbon, water quality and stack emission credits are now traded," says Dr. James V. Bonta, ARS research hydraulic engineer.

NRCS

In the U.S. in the year 2000, cropland was being lost to urban development at a rate of 6 acres every minute. Just what affect this has on lakes and streams is the basis for the mock housing development.

Researching Urban Design

Four experimental watersheds, measuring 1.5 to 7 acres, will house 3-foot structures, simulating residential housing developments. Each year, Bonta and colleagues at the agency's North Appalachian Experimental Watershed in Coshocton will increase development until it covers 40 percent of each of the mock watersheds.

Around each structure, the scientists will plant and maintain a lawn with fertilizers and pesticides similar to what a homeowner would do. Then, they will monitor downstream watershed outlets for nutrients, pesticides and increases in the amount of water and peak flows — all under natural rainfall.

"Because annual runoff from these watersheds has been monitored for many years, as has land use, this will provide long-term background data for comparison as urbanization proceeds," says Bonta.

As development replaces soil and vegetation that once soaked up rainwater, the scientists believe impervious (solid) surfaces such as roofs and roads may increase the volume and speed of water runoff, increasing the risk of flooding, soil erosion and the transport of chemicals into waterways.

Engineering Best Management Practices

"We will evaluate the impact of placing the structures in different spatial arrangements — close to and away from the stream channel," says Bonta. One theory is that if the structures are placed away from the stream channel, rainfall has more opportunity to infiltrate. In contrast, placing them close to the stream channels increases peak flows and causes additional runoff, and possibly more chemicals being released into streams.

This research has both long-term and short-term goals. "We expect to uncover practical techniques and good screening tools for best management practices for use in urbanizing long-term agricultural land," says Bonta. "We hope to discover practical information regarding best management practices for use in engineering designs," he adds.

"We are not looking to build a pond or retention basin," says Bonta. "We are looking to increase infiltration to get rid of the massive volume of runoff water that comes from urbanized areas," says Bonta.

For information about the mock housing development, visit www.ars-grin.gov/coshocton/ or contact Dr. James V. Bonta, E-mail: bonta@coshocton.ars.usda.gov or Tel: (740) 545-6349.

NRCS

The U.S. Environmental Protection Agency plans to use the results from this study to develop best management practices to be used during urbanization.

Partners Survey

Partners Magazine just got better. Now, we are making it available in two forms: printed , which is the form you have received for years; or electronic, attached to an email message.

Which do you prefer? Printed ____ Electronic (print current email address) _____

In order to continue to provide useful information **to** you, we request information **about** you.

1. What is the name of your organization? _____
2. What is your primary job function? _____
3. Have you visited the CTIC website (www.ctic.purdue.edu)? _____
4. Which topics covered in *Partners* interest you most? _____
5. What topics would you like to see addressed in the future? _____
6. Is the information you read useful? _____
7. Do you share *Partners* with other people? If so, how many? who? _____
8. Do you know someone who should be a member of CTIC? Please tell us how to contact them. _____

Submit the completed questionnaire to Karen Scanlon, communications director, Fax: (765) 494-5969; or E-mail: scanlon@ctic.purdue.edu or visit www.ctic.purdue.edu/survey to complete the survey.

With support of partners like you, CTIC will continue to increase conservation in agriculture while increasing profits for farmers. Your donation helps. Please give $25_____ $50_____ $100_____, or any amount of your choosing. Send payments to CTIC, 1220 Potter Dr, #170, West Lafayette, Ind. 47906.

Aggregate Stability Demonstration

In healthy soil, particles bind together to form stable aggregates that resist breakage when subjected to tillage, intense rain, or other disturbances. The aggregates can range in size from clumps to gritty sand to microscopic clay particles.

Soil aggregates are important because they protect the organic matter within their structure from decaying due to attack from soil micro-organisms. Organic matter, in turn, is important because it helps soil hold water, and therefore, decreases the amount of run-off from fields. Organic matter also improves aeration (the amount of air in the soil), especially on finer textured soils such as clay.

Materials Required

Clod of soil from a field that has been no-tilled for several years
Clod of soil from a conventionally tilled field.
Clod of degraded soil from a severely eroded field
3 wide-mouthed jars filled with clean water

Performing the Test

1. Air dry the soil clods.
2. Gently drop clods in containers of clean water.
3. Swirl the water in each container.
4. Repeat the procedure with the clod of degraded soil.

Results

Note that the clod from the no-tilled field stays together and the water remains fairly clear. The clod from the conventionally tilled field, however, starts to dissipate and the water becomes somewhat cloudy. The jar containing the degraded soil demonstrates the effect that an intense rainstorm has on an agricultural field.

Clearly, the continuous no-till soil particles hold soil together much better, making the soil more resistant to the erosion process.

The jar on the left is from a field where most of the topsoil has eroded. The middle jar is from a field that has been in continuous no-till for 11 years. The jar on the right contains the same soil type as the no-till jar, but the soil came from a conventionally tilled field.

Taylor Celebrates 10 Consecutive Years of Dedicated Service to CTIC


CTIC

After 10 years of service, Tammy Taylor deserves a door to her CTIC office.

Tammy Taylor began working at CTIC in October 1987. In August 1989, she left CTIC, only to return again in July 1993. During her 12 years of dedicated service to CTIC, Tammy has held the positions of administrative secretary, administrative assistant, systems manager and, most recently, office manager.

Her responsibilities include human resource management, accounting, conference and workshop development, including creating brochures, developing websites, soliciting call for papers and registering attendees. Tammy works with others in developing publications and has helped to redesign CTIC's master database.

Tammy has traveled extensively in the U.S. representing CTIC and helping with workshops, conferences, board meetings and tours. Most recently she traveled to the Baltics to evaluate a joint EPA/CTIC project.

John Hassell, executive director of CTIC, says, "There is not enough room to list the contributions Tammy has made to CTIC. She is a tireless employee who gives her all to ensure that the work is completed in a timely and thorough manner. She is the definition of a true team player. Plus, her warm and caring nature and her infectious laughter make her a valued friend as well as a co-worker. CTIC is very fortunate to have an employee of the caliber of Tammy Taylor."

Online EQIP Summary Available

In response to industry requests for more specific information on the Environmental Quality Incentives Program (EQIP), CTIC has compiled a comprehensive database summarizing 43 practices and associated payments.

Access to the database is structured similarly to CTIC's biennial Crop Residue Management (CRM) Survey. Current members having paid $6,500 will have access to all states and all practices. Members at the $2,000 level will access regional data, and $500 members will have access to one state's data. Members can access the database at the CTIC homepage, www.ctic.purdue.edu. Click on "Environmental Quality Incentives Program (EQIP)" under NEW.

Non-members can join CTIC today by calling 765-494-9555 and get access to this valuable information. See a sample of the database by following the above directions.

For more information, contact Cathy Myers, Tel: (765) 494-9555 or E-mail: myers@ctic.purdue.edu.

Feature Member

Ray L. Brownfield, AFM, ARA, and former president of Capital Agricultural Property Services, Inc., (CAPS) established Land Pro, LLC., a farm management and agricultural consulting firm, in July 2003.

Land Pro, LLC. focuses on consulting, agricultural property management, sales and acquisitions, referrals and presentations in the upper Midwest.

Partners spoke with Brownfield, who has 38 years of agricultural property experience and has worked in farm management and real estate brokerage.

How long have you been a member?

I have been a member for 14 years.

What benefits have you received by being a member?

My ties to CTIC have given me tremendous networking opportunities with industry leaders and early information regarding conservation policy, rules, technology - all benefiting me, my clients and farm operators.

What has your membership provided CTIC?

I offer CTIC insight into the private sector. In addition, I give of myself and my time providing leadership and guidance where needed.

In what ways could CTIC provide greater benefits to your organization?

I just want the continued networking opportunities.

What would you like to see more or less of in *Partners* Magazine?

Partners continues to offer timely information. It's just right.

No-till on the Plains

The Whirlwind No-Till Expo drew over 250 attendees July 28-30 at Glen Elder and Hutchinson, Kans. and Blackwell and Red Rock, Okla. Experts Dr. Ray Ward, Wards Labs; Dr. Paul Jasa, University of Nebraska/Lincoln; Dr. Bob Wolf, Kansas State; Bud Davis, Kansas NRCS state agronomist; Matt Hagny, agronomist and No-Till on the Plains board member; Bill Wehmueller, NRCS soil scientist; Greg Scott, Oklahoma NRCS soil scientist; as well as Feature Farmers Doug Palen, Ron Jacques, David Young, Tom Cannon and Tony Kodesh presented vital information to the crowd and performed in-the-field demonstrations. Attendees viewed the rainfall simulator in action and witnessed the impact that no-till practices have on soil. In addition, equipment and sprayer demonstrations, as well as soil pit observations allowed the participants to hear vital no-till information firsthand as well as see it in action. Attendees were provided no-till notebooks and lunch.

NTOP

Dr. Paul Jasa comments to the crowd following Kansas NRCS State Agronomist Bud Davis's rainfall simulator demonstration.

The eighth annual South Dakota No-till Bus Tour took place Aug. 4-6. This was a chance to candidly discuss production practices and management challenges with people committed to long-term success with no-till (and achieving it), and to meet fellow Kansans, Oklahomans and Nebraskans in various stages of no-till adoption. This intense three-day tour departed from Salina and featured the Dakota Lakes Research Farm with Dwayne Beck and three no-till farming operations.

The eighth annual No-Till on the Plains Winter Conference will be held Jan. 26-27, 2004, in the Bicentennial Center, Salina, Kans. Designed "by farmers, for farmers", this yearly premiere no-till conference of North America will attract over 1,400 people. Speakers from several states and countries will enlighten and motivate producers about the benefits of using no-till, with over 60 transition sessions available to choose from. In addition, more than 60 exhibitors participate in the very popular tradeshow portion of the two-day event.

NTOP

Nearly 100 attendees withstood the intense Oklahoma heat to hear Dr. Ray Ward and Oklahoma NRCS Soil Scientist Greg Scott discuss the soil profile in this pit at Blackwell, Okla., during the Whirlwind Expo.

For more information on the Whirlwind No-Till Expo, the South Dakota No-Till Tour, Alliance meetings and Field Days, or the upcoming Winter Conference, contact No-Till on the Plains, Inc., at Tel: (888) 330-5142 or visit the website at www.notill.org.

Tri-State Strip-till Alliance

More than 400 people, from seven states, visited the Irrigation Research Foundation's August Farm Show to view results from the side-by-side strip-till vs. mulch-till vs. conventional (disk-chisel-plant) tillage research fields.

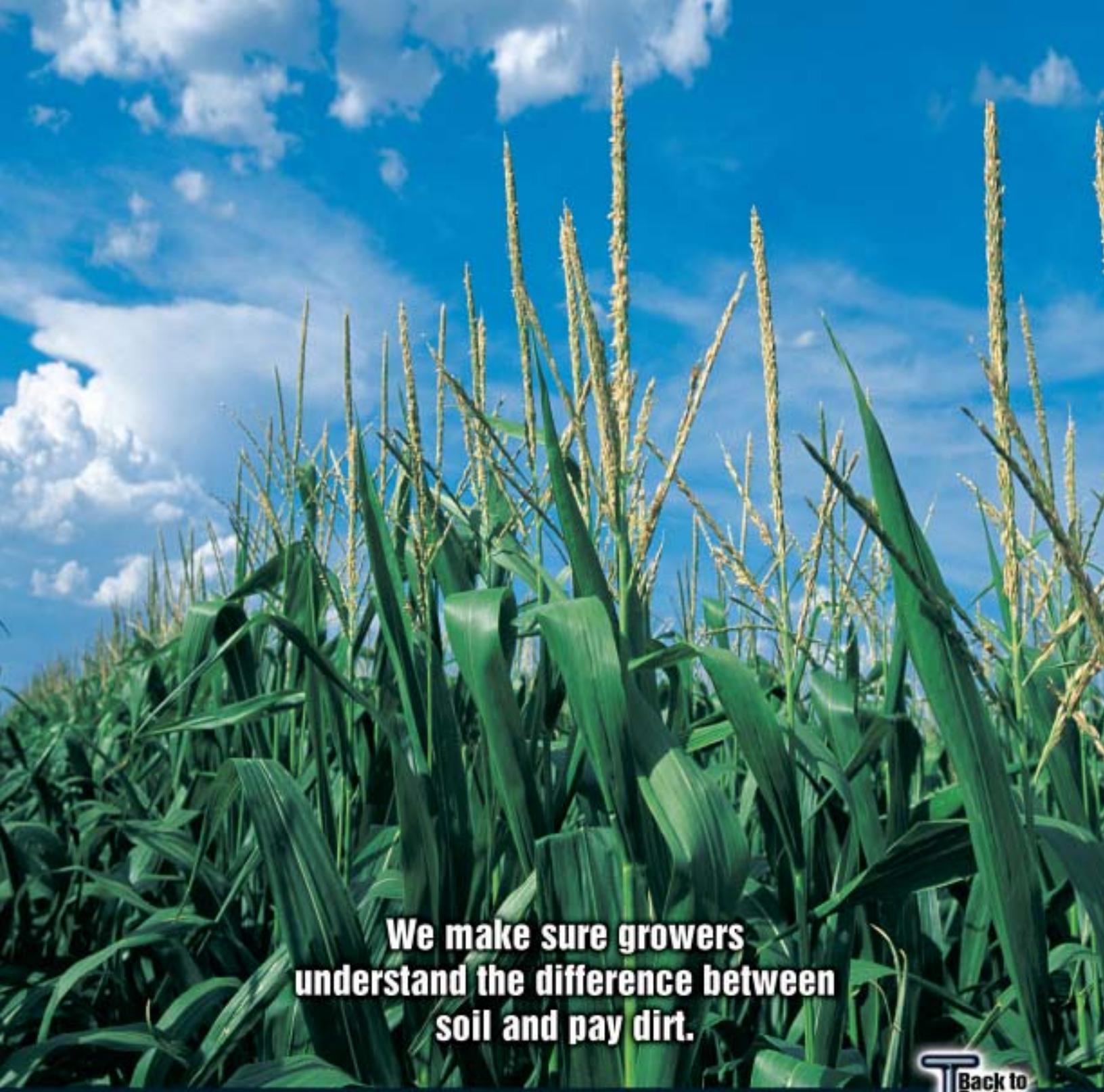
During the two days, informative presentations were given by John Bradley, who traveled from Tennessee and is one of Monsanto's leaders in conservation tillage; Mike Petersen, agronomist-irrigation specialist with USDA-NRCS for northeast Colorado; Jeff Tichota, technical development manager (TDM) for Monsanto; and Corby Jensen another TDM for Monsanto. This team of men, along with Jim Hudson, Monsanto, presented facts that are being repeated worldwide, "strip-till and no-till offer sustainable improvements so growers see a better profit. That is Core 4 Conservation principles at work," says Petersen.

Growers observed strip-till tools in action and heard about the advances strip-till has made for soil quality, soil fertility, irrigation water management, weed control and $60+/acre profit economics. Seven strip-till units were sold over the two-day event.

At the end of August, a smaller field day was held that drew 45 growers to the Front Range to hear from a grower with a 600-acre furrow irrigated farm. "He is making strip-till work like gangbusters!" says Petersen. While it is a constant struggle to tell, cajole and plead the story of using better tillage management early in the crop growing scheme, Petersen says "we must keep it up with consistency and fervor."

For more information regarding the Tri-State Strip-till Alliance, contact Mike Petersen, Tel: (970) 330-0380, or E-mail: michael.petersen@co.usda.gov.

Send your Alliance news and updates to Karen Scanlon, E-mail: scanlon@ctic.purdue.edu.



Educating growers about the importance of proper soil fertility requires good information. That's why our *Back-to-Basics* program offers dealers the marketing and educational materials they need to explain the benefits of a balanced fertility program. Of course, you can always rely on our experience, technical support and quality potash and phosphate products – as well as K-Mag® – to help keep your business successful. Visit our Web site at www.back-to-basics.net. Together, we'll make sure growers understand the difference between soil and pay dirt.

IMC www.back-to-basics.net www.imcglobal.com www.kmag.com

CTIC Board of Directors

Calendar

September

Sept. 29-Oct. 10 *Watershed Partnerships: Collaboration for Environmental Decision Making,* Shepherdstown, W.Va. Contact: Theresa Trainor, EPA. Tel: (202) 566-1250; E-Mail: trainor.theresa@epa.gov; or Web: www.leadership.opm.gov.

October

Oct. 1-3 *48th Annual Midwest Ground Water Conference,* Western Michigan University. Contact: Alan Kehew, Western Michigan University. Tel: (269) 387-5486; E-Mail: alan.kehew@wmich.edu; or Web: www.geology.wmich.edu/mwgwc.pdf.

Oct. 7-9 *2003 Conference - Management of the Illinois River System*, Peoria, Ill. Heartland Water Resources Council, 416 Main Street, Suite 828, Peoria, Ill. 61602; Tel: (309) 637-5254; E-Mail: hwrc@mtco.com; or Web: www.heartlandwaterresources.org.

Oct. 19-22 *Achieving Sustainable Water Resources in Areas Experiencing Rapid Population Growth*, Atlanta, Ga. American Institute of Hydrology. Web: http://dnrnet.dnr.state.ga.us/aih/.

Oct. 20-24 *Natural Rivers: Mechanisms, Morphology, and Management.* Asheville, N.C. Contact: Tammy Winfrey. Tel: (336) 750-0522; Fax: (336) 750-0177; E-Mail: pvitw@triad.rr.com.

Oct. 20-23 *Nonpoint Source Pollution Information and Education Programs*, Chicago, Ill. Contact: Bob Kirschner, Chicago Botanic Garden, 1000 Lake Cook Road, Glencoe, Ill. 60022; E-Mail: bkirschn@chicagobotanic.org.

Oct. 29-30 *CTIC Board of Directors, Business Alliance Council and Members Meeting*, Washington, D.C. Contact: CTIC, Tel: (765) 494-9555.

For more upcoming events and to add your alliance events to the calendar, go to www.ctic.purdue.edu and click on Ag Calendar or Watershed Calendar.

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