Flanagan State Bank
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Organic AG Newsletter

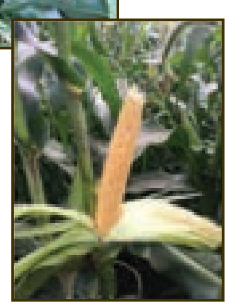
NOV 2022

Got Manure?

That has been a serious question this year for many growers. Between reduced supply due to Avian Bird Flu and increased demand due to higher fertilizer prices, manure has been hard to come by for many growers. This challenge may linger into next year for some growers. The biggest need for manure with most growers is a source of nitrogen for grass crops, primarily small grains, and corn. What are good options to consider in that case?

Part of the answer is a change in mindset from a chemical perspective (I need to apply X pounds of nitrogen) to a more biological perspective (what can nature provide biologically). Certainly, longer rotations that allow a good legume crop to be grown prior to grass crops would provide much of the needed nitrogen. Growing corn after soybeans with no manure is challenging. Trying to seed legume cover crops prior to planting your grass crops could be a partial answer. There are organic nitrogen fertilizer options available, but they are expensive enough that relying on them for your sole nitrogen source is not economically feasible. The two most common products are Chilean Nitrate and feather meal. These products and other starter, side-dress, and foliar applications can be a partial nitrogen bridge, but more is needed for good yields.

Here is a real-life example of how one Illinois grower on light, sandy soils overcame the challenge of growing a popcorn crop without manure. He planted wheat the year before and then double-crop soybeans and a rye cover crop, intending to use manure before planting corn in the spring of 2022. However, no manure was available to him. In early March he terminated the rye while it was still small and planted Forage Peas. He let the Forage Peas grow for 2 months before terminating them, which should have provided 60-90# of nitrogen per acre. He used biological products at planting both on the seed and in-furrow. He came back with a foliar application with 2 biological products, both containing nitrogen-fixing organisms. He put 23 gallons of liquid fertilizer through the pivot along with a biological product. Total N applied was 5.2# per acre. Here is what his corn looked like on August 23. *(cont. pg. 2)*



In This Issue

FSB Locations

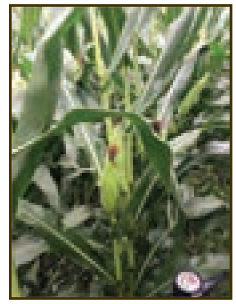
301 W. Falcon, Flanagan
403 State, Benson
2401 E. Washington, Bloomington
111 N. Fayette, El Paso
500 S. Persimmon, Le Roy
208 E. Gridley, Gridley

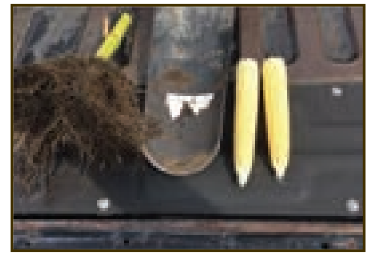
Got Manure? (cont)

We have seen growers with limited amounts of manure available be successful by putting more emphasis on the biology in the soil. Five things are necessary for this approach to be successful.

1) Adequate soluble calcium in the soil-usually provided by an application of lime and/or gypsum. Calcium is needed to flocculate the soil to provide a home for microbes, an aerobic (with oxygen) environment.
2) Abundance of beneficial biology to help cycle nutrients. This is provided with a biological inoculant. We have been using MT-17.
3) Abundance of carbon to feed the microbes. This comes from the manure and/or compost application.
4) Warm soil temperatures and
5) Adequate but not excessive moisture. Needed for optimum biological activity.

When these 5 things come together, we have seen growers raise very nice corn crops with limited inputs, looking at it from a macro nutrient point of view. Case study - Another grower on light sandy soils planted organic popcorn. It was in clover the previous year. He applied 3,000# of chicken litter and 250# each of lime and gypsum. He put a microbial product on the seed and in the liquid 2 x 2 starter, which was a 20-gallon per acre mix with 4# of nitrogen, derived from Chilean Nitrate and fish hydrolysate. He came back over the top with a biological product, MT-17, and rotary hoed for incorporation. Here is the crop on August 11.





In summary, try to line up your manure supply as soon as possible, while you still have time to plan for alternatives if there isn't a sufficient supply of manure available. It is extremely important to pay attention to the carbon-to-nitrogen ratios in your soil when growing corn, especially when you know that you are in a nitrogen-challenged situation. Growers find that corn yields take a major hit when planting into high carbon to nitrogen soil environments. That means that it is imperative to start the residue decomposition process early and do all you can to speed that process up. Biological inoculants can be used to speed the decomposition of crop and cover crop residues to create a more favorable growing environment for the next crop.

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Organic Farm Leases

The ten organic farms that I manage range from 200 acres in size to 1,800 acres in size. The leases are either a 50/50 crop share lease or a custom farm lease. All but one of the 50/50 crop share farms were cash rent lease farms before transitioning to organic production. The four custom-operated farms were custom farmed before they were transitioned to organic production.

As a professional farm manager, my preference for an organic farm lease type is a 50/50 crop share lease. There are several reasons I like the 50/50 crop share lease best, the first being the land owner proves to the tenant they are serious about the organic transition by putting "skin" in the game and sharing the risk and rewards equally. The second being the net income for the owner will most likely exceed what the net income would be on the farm if it was conventional cash rent. The organic farms I manage are all high-quality Class A farms in central Illinois. Farms that would typically cash rent in the $350 - $500 per acre range for 2023.

For the 2021 crop year, the 50/50 crop share farms the landowners net income anywhere was from $50.00 - $175.00 per acre more than the 2021 variable cash rent farms. For 2022 I don't expect the spread to be quite as wide due to higher input costs on the organic side and higher conventional commodity prices and yields pushing the variable cash rent numbers quite a bit higher.

The third is what my clients describe as the satisfaction and good feeling they have being part of the organic production. Most of the tenants are younger farmers and the land owners enjoy giving them a way forward into what can be a very profitable enterprise for both parties.

The custom farming arrangement can also be a profitable venture for the land owner who is willing to take on the additional risk. I think it is important for the land owner who hires a custom operator to be willing to pay custom rates at the higher end of the normal custom farming rates and to build in a good bonus system for the custom operator. Timing is so important in organic farming; a good bonus plan gives the custom operator the incentive to be at the farm in a timely manner.

For land owners who own smaller tracts of land, a variable cash rent lease is probably still the best route to go. The biggest challenge I find with a cash rent lease with an organic farm is determining what is a "fair rent" due to the additional risk the organic farmer takes on.

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American Society of Farm Managers & Rural Appraisers

I Would Like to Get into Organic Farming, But How Can I Do That as a Primarily Conventional Farm?

Are you interested in expanding your operations to include organic crops, but aren't sure how that will work while still producing conventional crops? Many people don't realize that you don't have to transition all your acres at once. It is entirely possible to have an operation with a few organic acres, while the rest are conventional, or conversely, a largely organic operation, with just a few conventional acres. In either case, clear and detailed records, along with buffers between crops, will be needed to ensure that the integrity of your organic product is clear to any inspector or auditor who may visit your operation.

Whether running parallel (example: conventional Non-GMO soybeans with organic soybeans) or split operations (example: conventional seed corn with organic soybeans), the prevention of contamination or comingling between products is essential to maintaining the integrity of your organic products and complying with the USDA National Organic Program guidelines. If you are able to keep detailed and clear records, running a dual organic and conventional operation together is entirely achievable.

Records of planting, application of material inputs, seed tags, purchase records and other documentation, harvest records, storage inventory, transport/ trucking records, and equipment cleaning logs should be onsite and maintained throughout the year for both sides of an operation so that an auditor can perform a full audit. Traceability and mass balance of the organic commodity is required. Organic product must be stored separately from conventional product and bins, or areas, should be clearly labeled to prevent contamination or comingling. Equipment that is used for both conventional and organic product must be cleaned between uses following the USDA regulations and the cleaning procedures and dates must be documented to further ensure that there is no risk of contamination to the organic product.

Many organic certifiers will have forms to assist you in keeping clear, organized records such as:

If you would like to learn more about this, or have more questions, feel free to visit our website or give us a call.

ON MARK Certification services
https://www.onmarkcertification.com
574-971-8479.

As you know there are bugs everywhere. As a grower, you may want to understand the “good bugs” from the “bad bugs”. Here are some thoughts to separate the good from the bad bugs. They come in sizes from the large dung beetles to microscopic organisms in the soil and in the plants.

Let’s focus on beneficial bugs. The larger beneficials are the dung beetle (ground beetles) plus the thrips, flies, midge, praying mantis, lady beetles, centipedes, and some spiders. These beneficials will generally eat the eggs and carcasses of the bad insects. Some will have pheromones to repel bad bugs.

The other class of beneficials are very small in size or microscopic beneficial bugs. These are organisms that live in the soil and the plant. These beneficials fall into different categories of bacterial, fungal, and nematode strains of organisms.

Beneficial Bacterial strains:

- Some of these strains are older and more common like the bacillus thuringiensis, BT, which infects predatory insects when they eat the plants. There are many strains for potatoes, cole crops, tomatoes, corn, beans, and other crops to protect the plants.

- Bacillus subtillus is a beneficial bacteria that growers apply to the soil for plants to enhance root growth and protect roots and plant surfaces. This organism stimulates the plant to activate natural defense systems, strengthening its ability to resist disease and stressful conditions.

- Other bacillus strains that have been proven to thrive in the root rhizosphere and improve plant health include amyloliquefaciens, lichenformis, and pumilus.

- Pseudomonads are likely the most diverse bacterial group, but all play a large role in plant growth and natural pathogen control. Pseudomonas fluorescens and pseudomonas putida are the most common and thrive in well-aerated, moist soil.

- Rhizobium bacteria are nitrogen-fixing organisms that have a special relationship with legume plants, enabling them to provide their own nitrogen. Each legume species has a specific strain of rhizobium. For example, soybeans need bradyrhizobium japonicum, while alfalfa uses sinorhizobium meliloti. Rhizobium is best added as a seed treatment each time a legume is planted.

Beneficial fungal strains:

In the 80s I wanted to get good performance for the green beans and peas that I grew for the canning company. There was a product on the market called T-22, a beneficial Trichoderma fungus. Many more strains were identified for growers to use on green beans, and I continued to use them. Then about two years later, Iowa State did research on how to protect corn borer. This was another beneficial fungus called beauveria bassiana (Bb). With the amount of sweet corn for processing I had, I did some trials. I continued to use the Bb in the SPE-120 product and now encourage growers to use this on all crops to protect plants and enhance yields.

Mycorrhizal fungi:

Mycorrhizal is perhaps the best-known type of beneficial fungi. These live on or within plant roots and are beneficial to a wide range

of plants. Mycorrhizal products are applied to seed at planting or liquified as a root dip for transplants. The mycorrhizae then colonize the roots as the plant grows and its hyphae extend out into the soil to increase the plant’s ability to draw in more nutrients and water. They are particularly helpful in solubilizing phosphorus, breaking down insoluble rock phosphates into a plant-available form.

Beneficial Nematodes:

Beneficial nematodes work mainly in the soil. These strains attack the larval stages of soil-dwelling pests such as grubs, ants, weevils, and more, leaving the plants alone. Beneficial nematodes parasitize insects by entering their bodies and infecting them with bacteria from their gut. Some strains are commercially available to add to soils but in general, if soil has good structure and an active bacterial & fungal population, beneficial nematodes will also be present.

In summary, beneficial bacteria such as bacillus subtillus and pseudomonas putida live in the soil and the plant to enhance root growth, increase nutrient uptake, reduce stress, and increase yields. Many bacteria activate natural defense systems to maintain plant health.

Rhizobium bacteria fix nitrogen for legume plants, enabling them to fulfill their own nitrogen needs.
Beauveria bassiana fungi grows in the plant (it’s called an endophilic response) to protect the plant.

Mycorrhizal fungi protect the new root from pathogens and increases the uptake of water and nutrients including soluble phosphorus.

Beneficial nematodes attack insects in the soil and require good soil structure and microbial populations to thrive.

In closing, I and other growers have used a number of these inputs in combination: trichoderma, beauveria bassiana, mycorrhizal fungi, and bacillus, just to name a few. In recent years many microbial products have been developed to help farmers build beneficial biology in their soils with the goal of increasing quality, performance, and yield of their crops plus improving soil health for many years to come. A key to success is not to focus on one specific species, but to propagate and maintain a diverse, balanced microbial population of good bugs.

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Organic No-till with Mowing Weed Control

An increase in consumer demand and availability of organic products in conventional big retailers are driving organic market growth. Market demand was responsible for a 586% increase of organic food sales from 1997 to 2008, reaching the $40 billion mark in 2015 . As demand for organic products has increased, supply in the United States has not kept up and imports are used to support demand.

Figure 1. Photo of between row mower designed and built at the University of Missouri.

Concerns about weed control without the use of herbicides has limited the adoption of organic agriculture in the United States and farmers who have adopted organic practices list weed control as one of their greatest problems . The reliance of non-organic farmers on a limited number of herbicides has contributed to the weed problem by selecting for exploding populations of glyphosate-, imazethapyr-, and thifensulfuron-resistant weeds . Resistant Palmer amaranth was found to have an economic impact of $17.5 million in just one county in Georgia and over $100 million was spent on its control by cotton farmers in Georgia in 2010 and 2011 . Because water hemp and Palmer amaranth control is often poor in non-organic fields, their prevalence has contributed to widespread dispersal of seeds and contamination of neighboring organic fields. Both weeds have aggressive growth habit and prolific seed production. Under Missouri growing conditions, water hemp and Palmer amaranth plants produce an average of 289,000 and 251,000 seeds per plant per year .

Organic farmers require multiple management tools to combat weeds in their fields. Because of the competitive advantage over the crop exerted by weed species, tillage by itself is unlikely to be successful in achieving adequate control in many conditions. It is also well established that tillage is detrimental to soil physical, chemical, and biological properties , thus posing a threat to soil productivity and producers' economic performances. When soil structure is damaged by tillage, water infiltration and plant available water can be greatly reduced. Tillage can negatively affect weed seed dynamics and impairs carbon sequestration in soil through oxidation or mineralization, leaching and translocation, and accelerated erosion. The relationship between tillage and soil erosion is a factor in organic sustainability and some organic growers have been removed from NRCS programs due to a determination that tillage practices were leading to increased erosion. This highlights the need to find alternatives to tillage for weed control.

An established standard of the USDA National Organic Program is the maintenance or enhancement of soil quality on organic certified cropland and soil quality is often considered at the heart of organic practice. Although organic production has been found to result in improved levels of soil quality compared to conventional production, including conventional no-till, those comparisons often show reduced yields in organic production relative to conventional production practices . Reduced organic yields are often attributed to increased weed interference and decreased soil fertility .

Developing a weed control system that reduces tillage and integrates cover crops has been a major goal of the MU Sustainable Agriculture program and of many growers throughout the Midwest. Recently, studies have examined organic no-tillage with cover crop residues for weed control and reduction of carbon loss and soil erosion. If enough biomass is produced by the cover crop (>8,000 pounds/acre), the unincorporated residue in a no-till cover crop system reduces early germinating weeds while minimizing the need for cultivation . Under adequate growing conditions, no-till organic crop yield can equal that of conventional crop production using synthetic weed control and fertilizers . Utilization of no-till with cover crops for weed control may help organic producers qualify for the NRCS EQIP cost-share incentive programs for improving soil quality and organic matter. However, it has been found by the MU Organic Program as well as other research projects, that the crimped cover crop residue usually does not adequately suppress weeds throughout the entire growing season. Our research found that when the cover crop biomass is at least 8000 pounds/acre, weeds are inhibited for approximately 33 days.

A system of organic no-till can only become successful if needed tools are available for producers. Some farmers have found that high residue cultivation can be used in a no-till system where weeds have emerged, but few implement or tool options exist for controlling weeds with minimal soil disturbance. There are existing mechanical control methods such as torsion finger weeders, compressed air, advanced sensing, and robotics, but most of these require clean-tilled ground for removal of small weeds only and tend to be significantly more expensive than traditional cultivators. In organic weed control research at MU, we have identified between-row mowing as a potentially low-cost method of controlling weeds between crop rows while causing little soil disturbance.

(cont. pg. 6)

Between-row mowing in no-till fields is a weed control method that was pioneered at the University of Missouri in the mid-1990s. USDA-ARS researchers utilized banded herbicide application over crop rows and mowing with a hand-pushed string trimmer between rows to reduce herbicide use in a non-organic system. Although it was never successfully adopted by growers, we have found it to be a useful weed control practice in an organic system. Lack of available equipment was a likely reason for non-adoption. In a two-year study, total grass and broadleaf cover was the same for mowed treatments as the weed-free check, and corn and soybean yields were not adversely affected by mowing . In a second study, between-row mowing controlled and reduced annual weed cover as well as did applications of atrazine and s-metolachlor . Mowing can control broadleaves better than grass weeds because the growing point of a broadleaf is above-ground while a grass weed growing point is below-ground at early stages. It is possible to control emerged broadleaf weeds such as water-hemp, common cocklebur and common ragweed with one-time mowing only, while multiple mowing performed at 2.5 cm above the soil surface is necessary to control giant foxtail. Soybean and corn yields showed no significant differences between treatments performed with repeated use of mowing, hoeing, and rototiller.

Our own research has shown similar results, with complete broadleaf control from one mowing, including in areas with no cover crop residue. After seeing promising results from mowing in our field studies, we developed a prototype mower that could be tractor mounted with a three-point hitch (Figure 1). We then went on to work with organic growers to convert old cultivators into mowing machines (Figures 2-3).

A few years ago, Dawn Equipment (Sycamore, IL) announced their new product called the Row Mow. There are also local and regional equipment designers who have developed their own between row mowing equipment.

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Figures 2-3. Mowers in production at the University of Missouri that were converted from old cultivators through collaboration with a stakeholder who received a SARE farmer-rancher grant.

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Organic grain farmers are always making complex management decisions. They are an innovative group of people who must be willing to take calculated risks in often intimidatingly complex systems. In many cases, there's not much more than a year or two of data and a big dose of intuition that might support a farmer's choice. Variables in organic farming systems are always changing! What can researchers do to help farmers calculate their risks and understand the short- and long-term effects of their crop management choices?

Some best practices might be uncovered by new research that will begin in the Midwest in 2023. Purdue University was recently awarded an Organic Education and Research Initiative (OREI) grant to compare two kinds of organic crop rotation strategies in the upper Midwest. Working alongside researchers at Western Illinois University and University of Wisconsin-Madison, the team will set up a "standard" rotation and an "eco-intensified" rotation on research farms at each university. The project is large in scope and will measure a number of variables, including yield, insect populations, disease and weed pressure, and more.

The standard organic rotation looks like what many growers might do during the transition period or early in their certified organic careers. The rotation includes corn, soybeans, and a small grain, and management practices like planting cover crops and utilizing multiple tillage techniques to manage weeds and residue. The eco-intensified rotation will feature the same cash crops, but incorporate strategies such as intercropping cash crops and cover crops, reducing tillage, and planting green.

In 2024, farmers across Indiana, Illinois, and Wisconsin will implement the two rotation plans at field scale on their organic farms. Involving farmer collaborators helps ensure that the project's extension and outreach activities reflect growers' real-world needs. They'll help advise the research team on what's practical, what's not, and whether the experimental crop rotations make economic sense on their farms. Ultimately, the project will inform stakeholders in organic ag about which crop management strategies will help farmers meet their environmental and economic goals.

The research gets underway with the upcoming 2023 growing season. If you have any questions about this research, please contact Christian Krupke, Professor of Entomology and Principal Investigator, at ckrupke@purdue.edu or 765-494-4912. If you have other questions or questions about Purdue's Organic Agriculture Extension program, please contact Ashley Adair at holmes9@purdue.edu or 765-496-6362.

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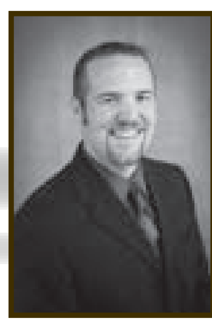

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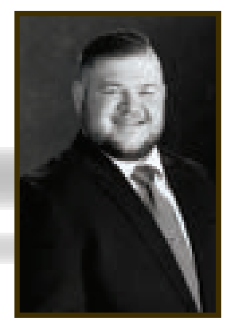

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