Michigan Organic Connections

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In This Issue:

Greetings—

In the midst of a Michigan July—with the boundless beauty of green and blue—the challenges of our time as stewards of the land are always forefront. Be that as it may, is not this the most glorious of all lands; what a true delight and privilege to experience the midsummer season in the water wonderland! Although being seriously vested in the growing and production of food, fauna and fiber, your Michigan Organic Food and Farm Alliance Board members are devoting time and energy to the continual promotion of organic agriculture. Our meetings, both board and committee, continue thru these industrious long days of sunshine. Plans are well underway for many gatherings and learning experiences in 2015/2016, highlighted by our second Organic Intensives event.

We always are seeking input from MOFFA members (and potential members!) who would like to contribute, whether it be an article for the newsletter, volunteer time at an event, serving on a committee, or taking a serious plunge and contributing as a member of the board of directors. We need fresh voices and ideas—your organization can only be as grand as the sustaining members who comprise it. A majority of the work load and communication in this IT world does not involve a physical presence, making contributing less time consuming, with less travel. Please consider!

The quarterly MOFFA newsletter comes to you focused on, but not exclusive to, a highlighted theme. In this issue we feature some absolutely inspirational and enlightening discussions of the first order in regard to carbon sequestration and the amazing role each one of us can have. Often it is with grave concern and doubt that we

question whether any individual can have real impact on the overwhelming ecological problem of a carbon saturated atmosphere. Yet each of us, and collectively, many of us, can be instrumental players. Take a few minutes to read each of these pieces knowing that afterward you will possess new knowledge and renewed optimism.

One priority in the coming months for MOFFA will be our continual effort to partner with organizations whose mission and vision statements closely parallel our own. A unified voice resonates well above the din! Keep up to date by visiting www.moffa.net often.

May these fine summer days be filled with good fortune, gratification and a touch of merriment!

Enjoy,
John

For 40 years John Hooper has been an advocate and practitioner of the organic method of food production. He joined MOFFA's Board of Directors in 2009 and currently serves as Chair.

Hubris or Humus

The General Assembly of the United Nations has declared 2015 the International Year of Soils. This can help to sharpen the focus on a neglected strategy in the mitigation of climate change. This focus on soil includes an emphasis on preventing further soil degradation, such as that caused by plowing. When plowed soil is exposed to air, its organic matter is oxidized and escapes as carbon dioxide. This emphasis on soil also includes the recognition that soil can serve as a sink for the excess carbon dioxide in the atmosphere which causes global warming. This excess carbon can be sequestered in plants and soil by photosynthesis and stored in the soil as humus. The word humus is related to human and humility, and can be used to characterize a non-invasive and human-scale approach to reducing global warming.

Although soil has been largely ignored in the discussion of climate change, the fact is that better farming methods, such as growing crops organically and without tillage, are already being practiced. Ranchers are also adopting methods of rotational grazing to restore organic matter in the turf. These methods emerged as farmers and ranchers tried to restore soil fertility. For many of them the issue of reducing carbon dioxide in the atmosphere was secondary. Such methods should have the support of climate scientists and agricultural bureaucracies, along with a more complete reformation of farming methods that can restore carbon from the atmosphere to the soil. This can be done quite naturally, without the hubris involved in "geo-engineering." Hubris is a Greek word implying arrogance resulting from excessive pride. Unfortunately, the focus on technology among many mainstream "scientific" thinkers seems to have blinded them to the power of biological processes. But, as the conservation policies after the Dust Bowl have illustrated, it is better to work with nature rather than try to control nature.

A second issue, also ignored by general writers on climate change, is that carbon dioxide is not simply a pollutant to get rid of, but a much-needed resource for soil improvement. Organic matter, which is necessary for soil fertility, is 58% carbon. So-called "carbon farmers" (see their website, Carbon Farmers of America) affirm that it is possible to do both: sequester carbon in the soil and thereby also improve the soil. This "both-and" emphasis is articulated in a new article by Adam Sacks and colleagues on reducing atmospheric carbon dioxide to pre-industrial levels. This article, which has just been published in a new book entitled Geotherapy, generally supports my thinking in this paper with more scientific evidence. It is a well-documented book, mostly written by scientists.

Where does the carbon dioxide in the atmosphere come from? The conventional answer is that two thirds comes from burning fossil fuels. This has led many climate change activists, such as Bill McKibbon of 350.org, to urge that emissions should be reduced by reducing the burning of fossil fuels. This strategy has failed for over twenty years, and emissions of carbon dioxide continue to rise. People want to continue an energy-intensive lifestyle and developing countries need fossil fuels to develop. And, of course, the fossil fuel companies are happy to provide the fuel and make record profits. So we do need CCS, (carbon capture and sequestration), but not the kind promoted by technological entrepreneurs, which imagines the development of a machine that could capture carbon in the air and then sequester it into old oil wells, hoping it would stay there. Rather, photosynthesis is a

natural process using the energy of sunlight to “capture” carbon dioxide in the atmosphere and sequester it in soils and plants. And it is free, although the sequestration requires some effort.

More recently an increasing number of analysts have argued that much more than a third of atmospheric carbon dioxide has come from deforestation and plowing the land which oxidizes the organic matter in or on the soil. How much carbon was lost in this way depends partly on how far back in time emissions of carbon dioxide are counted. William Ruddiman, while acknowledging that industrial emissions may have recently been greater, also counts emissions from deforestation and plowing going back to the beginning of agriculture thousands of years ago. While estimates of past emissions are not likely to be accurate, the loss of organic matter from the soil is excessive. According to the Australian soil scientist, Christine Jones, 50 to 80% of the carbon has been lost from the soil. (See her website, www.amazingcarbon.com).

If over half of soil carbon has been lost, the soil can easily accommodate at least twice as much as still remains in it. Percentages of organic matter in soils, now down to 1 to 2% in cropland, should be at least twice as much. Undisturbed prairie soils can contain 10 to 20% of organic matter. In fact carbon constantly moves between air and soil and water, and the soil has a vast capacity to sequester carbon. The authors of the Sacks article, mentioned above, claim that replacing just half of the soil carbon that was lost in the past 10,000 years has the realistic potential for reducing atmospheric carbon to a pre-industrial level of 280 parts per million. The oceans are also a carbon sink, but as they become increasingly acidic as a result of absorbing too much carbon, oceanic life is damaged.

The Need for More Organic Farming

Soils that are rich in organic matter and humus provide a habitat for microbial life that can feed the plants growing on it. It is this lack of organic matter that has made chemical fertilizers an easy substitute. But chemical fertilizers, according to soil scientists such as Christine Jones or Elaine Ingham, actually disrupt and destroy organic matter and humus in the soil. They are thus addictive, creating a need for more and more, and this is a problem since they require fossil fuels for their extraction and/or manufacturing. Moreover, chemical fertilizers emit even more carbon dioxide. They also emit nitrous oxide, which is 300 times more potent than carbon dioxide as a greenhouse gas. At best chemical fertilizers are a temporary technological fix.

Now, as we think ahead to a time when fossil fuels, as well as the minerals used to make fertilizers, are likely to be increasingly expensive, it will be necessary to restore organic matter, which is 58% carbon, in the soil. A variety of methods have been proposed to accomplish this and some are suitable for large farms and ranches. These include the Rodale strategy of no-till organic farming with cover crops, grazing ruminants in rotational grazing patterns as specified by Allen Savory in the Holistic Management system, deep sub-soiling using the Yoemans chisel plow, avoiding chemicals for pest control or chemical fertilizers, and pasture cropping, in which annual grains are grown in dormant perennial grasses. Other strategies, such as burning organic materials in the absence of oxygen (pyrolysis) to form biochar and spreading it on soil, returning composted manure to the soil, and gradually substituting perennial for annual food plants, as promoted by permaculture, can be useful in large or small operations. Brian Rumsey reviewed the relevance of perennial food crops, under development at the Land Institute, to climate change in the Summer, 2014, issue of the Land Report, and found that perennial crops best mimic the productivity of the native prairie with deeper roots and less tillage. All these approaches will also require the avoidance of chemical fertilizers, fungicides, and patented GMO pest control practices.

Soil carbon scientists agree with older organic theorists, such as Sir Albert Howard, that plants thrive best in association with mycorrhizal fungi that not only help to deliver nutrients to plants, (grass and trees) but also help to build soil structure and the aggregation of soil particles in the humification process. Once organic matter is humified it tends to remain in the soil for decades or even centuries. And all this is helped by cover crops that grow as much as possible on a year-round basis and provide “fuel” for soil microbes.

Rattan Lal, a soil scientist at Ohio State University, is a long-time advocate for the sequestration of carbon in soils and plants, and he suggests this could be done mainly by avoiding tillage. He does acknowledge that getting the parts per million of carbon dioxide down to pre-industrial levels would happen gradually over a period of 50 years. Other writers and practitioners, such as the Carbon Farmers of America, who are more optimistic about building and storing organic matter in soil, suggest that it could be done more rapidly. Allan Yeomans thinks it could be done in ten years. In any case, carbon sequestration in soil not only restores soil fertility, it buys time to implement the use of more renewable sources of energy and modes of energy conservation which can reduce the burning of fossil fuels.

The Challenges Ahead

If reformed food production techniques make it possible to take carbon dioxide from the air and fix its carbon in the soil, and thereby also make the soil more productive, it may be that the nightmare of global warming will be delayed, thus providing more time to make the changes needed to reduce its most extreme impacts. But the lure of money seems to deter many of us from thinking about a sustainable way of life, so we need a shift in values. One such really fundamental and necessary shift is to convince governmental leaders to move beyond their obsession with economic growth in the money economy as they continue to promote the production and burning of fossil fuels. How can we give up the dream of material progress and, instead, seek contentment in learning how to work with nature rather than to transform nature with technology? And how can we gear into the coming post-petroleum era, which opens opportunities for more people to be involved in food production and participate in the planting and harvesting of perennial plants and trees?

These questions relate to the main concern in this paper: planning for a future in which the use of fossil fuels will be severely constrained. These fuels make climate change worse, they are already expensive, and impending shortages will make them more expensive. A shift to no-till organic agriculture is necessary rather than continued dependence on petrochemicals that add carbon dioxide to the air rather than organic matter to the soil. Although too much carbon dioxide in the atmosphere is a pollutant, carbon is a valuable resource in the soil. So even if carbon dioxide could be buried deep in the earth or under the oceans, as geo-engineers propose, as much as possible should first be incorporated in the soil to build up organic matter. Organic matter provides the nutrients to make plants grow, develops soil structure that can withstand extreme weather by absorbing more water in heavy rain and hold that moisture in dry periods, and because it is 58% carbon, it adds carbon to the soil. The humification process, which converts that carbon into living and productive soil, makes sure it remains there. Above all, we will need more such naturally productive soils to provide enough food with far less dependence on petrochemical inputs. We will need, in short, a transition to a reformed version of organic farming. The United Nations focus on soils in 2015 can support this transition.

If this is all as obvious as it seems, why is it not happening? Of course it has already begun, largely through the independent efforts of farmers and ranchers and a few soil scientists. But it has not yet garnered much support from the Land Grant universities, which have a history of resisting organic methods. They have received financial support from agrochemical industries and look forward to more. As the cost of agrochemical inputs continue to rise, however, and as the possibility of building soil fertility by restoring organic matter is demonstrated on a large scale, it will be imitated widely. Farmers and ranchers are attentive to the success of others, and many read reports of such successes in independent farm publications. And as the movement grows, it may attract more governmental support, especially as it reduces the amount of carbon dioxide in the atmosphere. Eventually the mitigation of global warming will be the major cultural project. This can be done by ordinary humans with humus, in a humble manner, without the hubris of a large-scale technological project that could make things worse.

In the meantime, however, it is possible to understand the governmental neglect of soil, both as a source and sink for atmospheric carbon. In his new book, Geotherapy, Thomas Goreau reported that he was the Senior Scientific Affairs Officer for climate change who was present when the United Nations Framework Convention on Climate Change (UNFCCC) was formulated in 1989. Goreau explained how it was flawed by politicians who put national and corporate interests ahead of the need for a global treaty based on sound science that would recognize all sources and sinks of greenhouse gases. As a result the UNFCCC focused on the strategy of reducing emissions of greenhouse gases, largely through efforts to reduce the burning of fossil fuels. We have seen how this strategy has been resisted for over twenty years as the parts per million of carbon in the atmosphere continued to rise.

Goreau therefore argues vigorously, in his new book, that the strategy of the UNFCCC, and also that of the United Nations Intergovernmental Panel on Climate Change (IPCC), should be reformed, beginning with the formal recognition that soil is the only carbon sink that is adequate to prevent the ravages of climate change. And if soil is also formally recognized as a source of atmospheric carbon dioxide, serious attention must be given to the reform of agricultural practices that destroy organic matter in the soil so that it escapes into the air as carbon dioxide. All this may be implied by the declaration that 2015 is the International Year of Soils.

Bibliography

Bates, Albert, *The Biochar Solution: Carbon farming and Climate Change*. New Society Publishers, 2010.

Broecker, Wallace and Robert Kunzig, *Fixing Climate*. New York: Hill and Wang, 2008.

Fleming, James Roger, *Fixing the Sky: The checkered history of weather and climate control*. New York: Columbia University Press, 2010.

Goreau, Thomas, et. al., editors, *Geotherapy*. Boca Raton: CRC Press, 2015.

Hamilton, Clive, *Earthmasters*. New Haven: Yale University Press, 2013.

Henson, Robert, *The Rough Guide to Climate Change*. www.roughguides.com. 2011.

Hillman, Mayer, et. al., *The Suicidal Planet*. New York: Thomas Dunne Books, 2007.

Lal, R., J. M. Kimble, R. R. Follett, and C. V. Cole, *The Potential of U. S. Cropland to Sequester Carbon and Mitigate the Greenhouse Effect*. Boca Raton: Lewis Publishers, 1999.

Lehmann, Johannes, and Stephen Joseph, (editors) *Biochar for Environmental Management*. Earthscan, 2009.

Ohlson, Kristin, The Soil Will Save Us. Rodale Press, 2014.

Rodale Institute, "Regenerative Organic Agriculture and Climate Change," 2014.

Ruddiman, William F. *Plows, Plagues and Petroleum*. Princeton: Princeton University Press, 1999.

Sacks, Adam, et. al., "Restoring Atmospheric Carbon Dioxide Levels to Pre-Industrial Levels: Re-Establishing the Evolutionary Grassland-Grazer Relationship." In Goreau, *Geotherapy*, 155-193.

Schwartz, Judith D, *Cows Save the Planet*. Chelsea Green Publishing, 2013.

Sheperd, Mark, Restoration Agriculture: *Real world permaculture for farmers*. Austin, TX: Acres, USA, 2013.

Smith, J. Russell, Tree Crops: *A Permanent Agriculture*. New York: Devin Adair, 1950.

White, Courtney, Grass, Soil, Hope: *A Journey Through Carbon Country*. Chelsea Green Publishers, 2014.

Willey, Zack and Bill Chameides, *Harnessing Farms and Forests in the Low Carbon Economy: How to create, measure, and verify greenhouse gas offsets*. Duke University Press, 2007.

Yeomans, Allen, *Priority One: Together we can beat global warming*. Australia: Keyline Publishing Company, 2005.

—Maynard Kaufman

Dr. Maynard Kaufman has been practicing and writing about organic agriculture in Michigan for more than 40 years. He founded the School of Homesteading in southwest Michigan in 1972, and was an original member of Organic Growers of Michigan. In 1992 he was co-founder of MOFFA, and he remains a member today.

Photosynthetic Currency: Making the Green Stuff

I have read that the only method of true money creation is through photosynthesis, harnessing the free sunshine that rains down and growing crops with it. Put that way, agriculture sounds like a crucial force in the economy. Perhaps even more important than its impact on the economy is that on the environment. So much responsibility! So what do we do? Make as much "money" as possible.

The world wants to be a green place, so it should be given every opportunity. Green manure/cover crops should be planted as routinely as harvested crops. Protection for the soil surface, vitality and microscopic communities for the soil subsurface, and nutrients for your next crop are what you will gain. Cover crops also increase the carbon in your soil. Increased carbon causes greater porosity within the soil. Greater porosity means less tillage is required. Decreased tillage saves you money and time. Land newly converted to agriculture from a natural state is well known for both the amount of rocks it contains and the fertility of its soil because natural landscapes are always doing something green. Follow the model. Keep the cover crops coming and keep them and your cash crops diversified. Diversity is key. The greater the number of cover crops involved in your rotations, the more likely you are to develop a diverse, balanced, thriving garden ecosystem. Oats (very carbon rich), buckwheat (very fast growing), clover (nitrogen fixing), lucerne (particularly humus-building), give them each some time for the special benefits they offer. And diversity above the ground means diversity below the ground, both of which lead to long term success and a "new" garden plot every year.

Mulching is also beneficial. Not creating carbon, as such, but putting it into the soil for future use. And protecting the soil and its carbon-creating potential. Mulching decreases the need for tillage, which when done too frequently disrupts the subsurface community to the extent of impairment. Soil acts as a sink for carbon in the form of decomposing plant matter (organic matter) and in the creation of humus, a stable carbon form which is the product of soil microbe activity, and mulching helps with both of these. Also, plants that have a relationship with strong subsurface communities are capable of photosynthesizing at a faster rate, resulting in a more nutritious plant with a higher Brix reading. Add some mushrooms to your mulch, as well, as a boon for yourself and your soil. More life for the soil, more food for you.

A well utilized farming system will produce more than just food for you. Include an animal in your farming practices and you will really start to see just how cyclic farming is. Whether you are talking about cows or chickens or anything in between, they contribute to plant health as pest controllers, producers of organic matter, and cyclers of nutrients. Animals help to keep landscapes working and active. A few animals kept by everyone with a garden, the two giving and taking from one another and improving each other's existence, is a much more connected system than one involving confinement buildings and manure lagoons.

Too often the lessons in nature are ignored, to the detriment of both the ignore-er and the ignore-ee. Nature keeps things in balance with a little of everything. No monocultures. Farm practices of the 50's dictated that fence rows on farms be removed for increased farm production. Unfortunately, it led to decreased farm health in terms of greater wind erosion and decreased biological diversity at work in the fields. A step too far and too much life was removed from the landscape, replaced by an unrealistic picture of monocultured production, which as it turns out is only applied to the natural world with great difficulty, probably because it involves a factory production mentality. Now, I hear young FFA members speaking of the importance of including "biostrips" in the farm landscape. That is, areas with natural vegetation, flowers, and even insects. Apparently, it is better for the environment to keep some of the environment alive and unmolested, even when your goal is farm production. Natural areas are carbon sinks in their own right, as well as providing erosion control, biomass materials, and insect populations that will help your garden to be more vital and thus more photosynthetically effective.

Helping your garden or farm to reach its maximum photosynthetic potential is not as selfish as it sounds, as so many practices that produce a better crop produce a better farm and a better slice of the environment. Of course, maximum production must be assessed in the long term, not in a boom of a few years of high yields followed by a bust, consisting of depleted soils and contaminated water supplies, nor in the production of vast quantities of nutritionally poor crops produced on starving soils. Harvesting healthy, nutritious, tasty crops that have something to pass on is photosynthetic coinage. So are green manure, cover crops, and healthy animals whose value is in maintaining those so important healthy soils. And so are areas of undisturbed nature, especially those with trees, the ultimate in carbon sequestration. Farming creates a more active carbon system than natural systems do, so do your best to stabilize it. How you farm is very important. Remember that unlike many others, you are in the unique position of actually making money out of sunshine, with the help of plants. But the money is nothing without a healthy society and a happy planet as well. Make the most of it!

—Leah Smith

Leah Smith is a Michigan State alumna (B.S., Crop and Soil Sciences). She works at Nodding Thistle, her family's farm, which has a history of organic gardening and farm marketing since 1984.

Composting for Carbon Sequestration

Diverting organic materials from landfills and into compost for amending soils is one way to sequester more carbon to address climate change.

MSU Food Scrap Composting

MSU has been supporting small scale food scrap composting and vermicomposting research at the Student Organic Farm for the past four years. Composting food scraps and closing the food cycle loop is one way that many people can be involved in making a difference personally and locally. A description of the overall project is available here: www.hrt.msu.edu/assets/PagePDFs/john-biernbaum/BaileyWormStory8-Summer2014.pdf. An update of our vermicomposting experiences is available here: www.hrt.msu.edu/assets/PagePDFs/john-biernbaum/Vermicomposting-Systems-19pgs.pdf. I will also be presenting a summary of what we have been learning at the Morgan's Composting Soil Seminar and Field Day on August 13 (www.dairydoo.com).

Valuable Composting Publications

In the summer of 2014 the Institute for Local Self Reliance published two new comprehensive documents about composting available for free download as pdf files.

The first report is titled: *The State of Composting in the US: What, Why, Where and How*. The 131-page report reviews composting basics, provides national and state-by-state statistics and job generation data, summarizes model programs, technologies and systems, and concludes with recommendations on how to grow composting in the U.S. www.ilsr.org/state-of-composting.

The second report is titled: *Growing Local Fertility: A Guide to Community Composting*. This document was also supported by the Highfields Center for Composting in Vermont. Growing Local Fertility profiles 31 model programs in 14 states and the District of Columbia. Programs range from urban to rural and include demonstration/training sites, schools, universities, pedal-powered collection systems, worker-owned cooperatives, community gardens, and farms employing multiple composting techniques. www.ilsr.org/size-matters-report-shows-small-scale-community-based-composting.

Marin Carbon Project: Sequestering Carbon in Range Land

An interesting project worth reading about, the mission of the project is "to enhance carbon sequestration in rangeland, agricultural and forest soils through applied research, demonstration and implementation". The project website (www.marincarbonproject.org) provides information about carbon farming and example projects. Some of the compost from the organic materials collection program in San Francisco is being applied to rangeland used for grazing, resulting in improved grass growth in addition to carbon sequestration.

One of the outputs of the project in cooperation with the American Carbon Registry is a detailed protocol for *Compost Additions to Grazed Grasslands*. The 50 page report provides more detail than most will want to read, but is worth scanning to see the level of science that is being applied to document how composting can make a difference.

Another output of the project is a separate 50 page report that addresses *Greenhouse Gas Mitigation Opportunities in California Agriculture*. There are ideas that support organic farming principles of building soil organic matter for both crop production as well as carbon sequestration.

— John Biernbaum

Dr. John Biernbaum is Professor of Horticulture at MSU, one of the founders of the MSU Student Organic Farm, and Vice-Chair of MOFFA's Board of Directors.

Carbon Sequestration: a Biological Process

Organic and sustainable farmers have long used biological farming concepts. By adding bacteria, fungi, protozoa and nematodes through compost, compost teas, and manures, organic farmers nurse and fuel the soil food web. The benefits include improved soil tilth, increased water holding capacity and higher quality crops. As important—but perhaps less visible to the eye—are the benefits of carbon sequestration by these microbes … specifically mycorrhizal fungi.

The oldest, cheapest, and most efficient form of carbon sequestration comes from the exudates from the roots of actively growing plants. This has been happening for thousands of years indicated by the old prairies and forests that boast multiple feet of top soil (carbon). Experts proved this occurred by these green plants "dumping" up to 50% of the carbon produced during photosynthesis below ground through the roots and to the surrounding soil. While this dumping action has multiple purposes, it mainly serves to attract and feed the microbes. Australian soil scientist Christine Jones goes into great detail about this process in many articles she has written (www.amazingcarbon.com). In those articles she talks about the "Liquid Carbon Pathway," and states this form of carbon sequestration is the main mechanism to regenerate soils.

In order for photosynthesis to occur at optimal rates, good mineral nutrition to the plant is necessary through the soil and foliage (foliar feeding works). In addition, microbes in the soil and on the leaf of the plant make those minerals available for the plant to feed on. The photosynthetic process is one that produces sugars; hence our plants are "sugar" factories—the most important process in agriculture! Plants' green leaves draw carbon dioxide from the air, energy from the sun, and water from the soil and create simple sugars. These sugars are translocated throughout the plant but most importantly, to the roots. In biologically rich soils with good mycorrhizal colonization of the roots, this sugar (liquid carbon) is taken up by the mycorrhizal fungi in return for the minerals that the symbiotic fungi and complementing bacteria solubilized. Certain farming practices must be reduced or eliminated in order to facilitate colonization of the mycorrhizal fungi to the roots. Excessive tillage, herbicides and fungicides, as well as superphosphates compromise this colonization. Unlike the decomposer type fungi, which get their energy from decomposing residues, mycorrhizae get their energy directly from actively growing plants. This liquid carbon becomes a food source for these fungi, and much of that carbon is morphed into complex

carbons. These transformed carbons are exuded through the fungal hyphae into the soil and become stable humus, which can remain in soil for hundreds of years (Carbon Sequestration).

Adding compost, vermicompost, teas, extracts, humates and biochar have positive impacts on building soils, increasing biological activity and growing healthy plants. Carbon sequestration is the net outcome of this process.

— Dane Terrill

Dane Terrill is Director of Sales and Marketing at Crop Services International and Flowerfield Enterprises. He has served on the MOFFA Board of Directors since 2012.

2015 Farm Guide Now Available on Paper!

Twenty years after the first edition of MOFFA's Guide to Michigan's Organic and Ecologically Sustainable Growers and Farms, the guide is once again available on paper, as well as online. The paper version represents a snapshot of the guide as of May 17, 2015. Individual copies may be purchased directly from amazon.com (search for 2015 Farm Guide). If you are interested in purchasing multiple copies, please contact us. We are hoping to make a Kindle version of the guide available soon, as well as smaller regional editions that you can download and print for yourself. As always, the most recent farm information will be found in the online version.

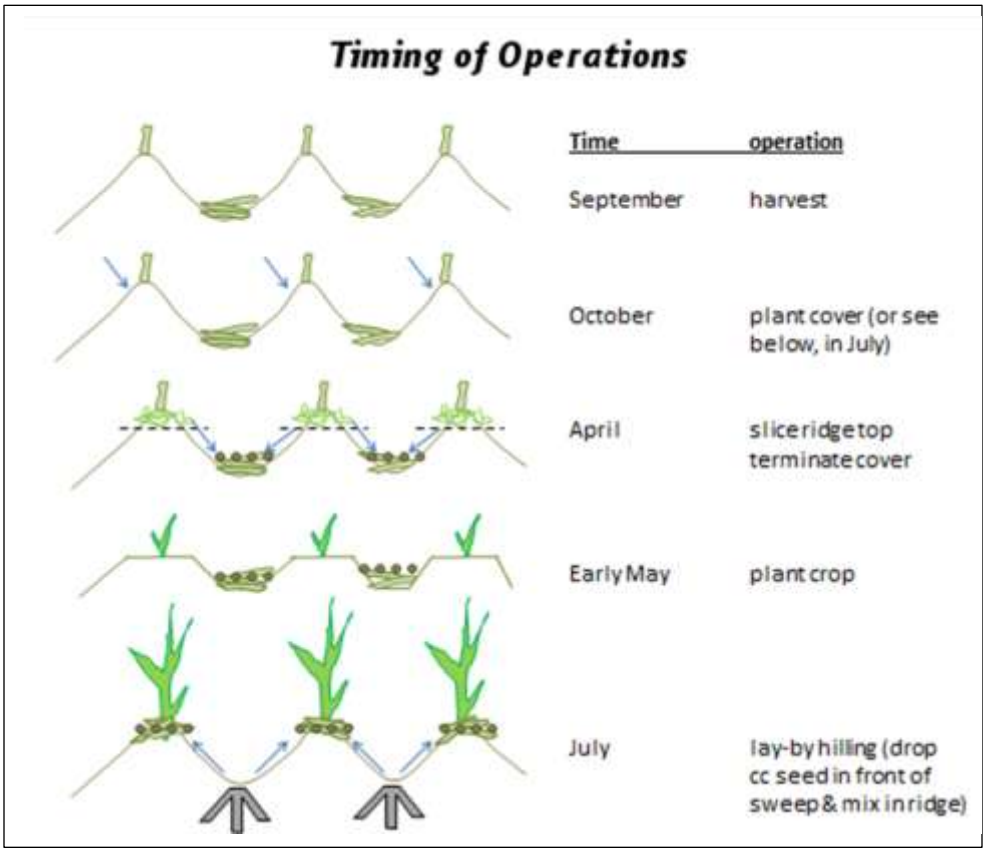
Ever Consider Ridge Tillage?

If you are an organic farmer dedicated to using cover crops to build soil I think you will agree that it is difficult to predict timing of nutrient release to supply crops. There are so many variables that impact how well and when the plant residue from the cover breaks down and is decomposed by microbes. Choices you commonly make include which cover crop to grow, when to plant the cover crop, and how long to let the cover crop grow. The most critical management decisions are related to when and how to terminate the cover crop, and timing of planting the next crop into that prepared bed. Each decision impacts the amount of organic matter the cover crop eventually contributes, the tilth of the soil, and when nutrients are available to subsequent cash crops. One challenge farmers face each spring is how many weeks to hold off after incorporating a cover crop, as there is always pressure to start planning a cash crop yet at the same time, cover residues need time to decompose.

Is this system any better?

Ridge Tillage is one approach that the Snapp lab at Michigan State University is testing to identify if there is a way to have your cake and eat it too: incorporate cover crops without being forced to wait to plant. The key concept is to set up different zones: one zone is in the furrow between ridges where soil is conserved that serves as a cover crop composting site. The other zone is the planting row on the top of a ridge where soil is disturbed to improve seed-soil contact and create an ideal seedling growth environment. This zone supports rapid nitrogen supply to the young crop plant.

Ridge tillage combined with cover crops was designed by organic farmers in the 1980s and offers several attributes that are integral to organic farming including tillage reduction and continuous use of cover crops. With improved precision farming tools that are now available, MSU teamed up with researchers in Minnesota, Pennsylvania and Illinois to test a modern version of ridge tillage, used with and without cover crops. Farmers today are using various forms of zonal tillage across these four states, but in many cases ridge tillage has fallen out of favor with growers. Researchers were interested in seeing if ridge tillage deserved a second look, as it could help farmers cope with climate change. This summer has proved to be a real testing ground, as flooding problems are occurring throughout the state and data is being collected on crop survival and the impact of ridge tillage on drainage.



In the MSU ridge tillage trial, two sites were chosen in 2012: one near the East Lansing campus and the other at the Kellogg Biological Station in southwestern Michigan. Researchers have been growing corn and soybean as rotational cash crops in this trial, and rye as the cover crop. Rye was selected for the same reason many farmers use it; rye will grow under so many conditions. I call it the forgiving cover since regardless of how deep or which date you sow it, you will usually get good germination. I am sure you notice that wheat is missing from the rotation. This gap is because wheat is grown on 7 inch centers and it is difficult to drill on top of the 30 inch spaced ridges. Farmers could opt to not build the ridges in the year that the wheat is grown, and grow it on 7 inch centers as is done in a conventional tillage system. In these RESEARCH plots, ridge tillage is being compared to conventional tillage so just crops that can be grown in a ridge tillage system are included in this trial, and rye is drilled as a cover crop after corn and soybean harvest each fall.

How does this system work?


Ridge tillage cultivator. A tool commonly used for field crops in areas where flooding is common.

One challenge with this approach is that it does require a special cultivation implement, a ridge tiller. As you can see from the photo, it is a tool bar with soil rollers to crimp crop residue then rippers that go between the rows digging into soil at 6-9 inches deep with discs that push that fresh soil into a ridge forming the center of the rows, shown in the illustration above as the 'lay-by hilling' operation, often done in July. The ridge formed in this midsummer field operation also serves as a weed cultivation step, one that organic farmers have refined to an art - the burying of weeds through building a ridge. The soil from the furrow (including decomposed plant residues) is pushed up around the crop row. In the fall the cover crop is sown after the cash crop harvest, drilling into what remains of the ridges. In early spring the cover is terminated, a knife cuts the top of the ridge, throwing the plant and a bit of soil into the furrow to begin breaking down. This exposes a planting zone at the top of the ridge and allows rapid planting of the cash crop. This is one of the chief advantages of the system, along with the accelerated field composting process in the furrow. When the new ridge is made in early July, the recently composted cover crop is thrown back up next to the young crop plants.

The value of this system

During the growing season: The knife that cuts the cover crop opens the soil in the spring to allow it to dry out for earlier planting of the crop. The ridge raises the crop and supports root growth in well-aerated soil, which is useful in times of heavy rainfall (as we certainly experienced this year). Anaerobic plants often suffer, as can be

seen by the many fields of stunted and yellow corn plants across Michigan this year. Keeping the composting of cover crop residues away from the ridge helps to keep nitrogen available to a crop all season long, compared to a chisel plow. Fields often have an application of compost or manure preplant, but may still run out of nutrients at grain set and filling. Later in the summer is a critical time to feed a plant, which is supplied in a ridge tillage system from the composted materials thrown up next to the crop during ridge making. In some ways this system is a precision approach to feeding microbes in the composting furrow zone, so is a useful way to obtain nutrients from plant matter. There is also minimal disturbance associated with this system as the ridging operation is the only form of tillage and it has been shown to build soil organic matter in long-term trials in Ontario and Pennsylvania.

After harvest: This system has proven popular as a means to conserve soil, particularly for rolling ground and areas with severe winter storms. Ridges built on the contour reduce wind and water erosion, saving precious topsoil. Snowmelt is captured in the furrows reducing run-off and adding to the ground water.

Pluses and minuses. To sum up, there are a number of ways this system contributes to protecting plant growth by providing a good environment for seedling growth in a changing climate where flood and dry spells threaten crop production. As well, ridge tillage done right can build soil organic matter and conserve soil and water. Ridge tillage can provide novel opportunities to grow cover crops, and control weeds as well as conserve soil and water. Of course, the economics of a system is very important to consider. Ridge tillage has unique costs associated with it: this includes purchasing a ridge tiller. Advantages that may translate into better returns on your farm include earlier planting times after a winter cover crop and better supply of nutrients all season long, as availability is improved through in-field composting of cover crops (and their roots), followed by throwing the recently composted materials next to the crop through the ridge making operation. The whole system offers multiple ecological and economic values including water conservation and reduction in soil loss. These values provide short and long term benefits to the farmer!

This system is being tested at Michigan State University and in three other land grant universities to compare with conventional tillage. Reduced tillage for organic and non-organic field crop farms provide a way to reduce tillage while supplying nutrients directly to the crop via a cover, being grown to supplement other nutrient sources and improve the soil health. Whether you want to call it climate change or a weather anomaly or whatever, we are experiencing more intense and more frequent rainfall. We need to review old methods, and develop new ones to find alternative approaches to build soil, and grow food in a challenging environment.

This approach is not a No-Till system but rather a way to reduce the amount of field tillage while directly incorporating a cover crop that functions as a weed management and soil building system—all good for organic production and the environment.

— Vicki Morrone

Vicki Morrone is an organic field crop and vegetable outreach specialist with the Center for Regional Food Systems at MSU, and is a MOFFA board member.

Look to the Land

One of the often mentioned classics of organic farming history and related literature is Lord Northbourne's book "Look to the Land". I was under the impression that it was out of print, but when I finally went looking for a used copy, I discovered that a revised special edition was made available in 2003. Looks like mine was printed the day it was ordered. Originally published about 1940, it is impressive to me to read the warnings and recommendations that are still at the foundation of organic farming. The message aligns well with the writings of Rudolf Steiner and Sir Albert Howard. If you are looking for some motivational reading, or a gift for your favorite organic farmer, think about getting a copy. The final lines of the book, and the subtitle on the cover of the new edition, are: "We have tried to conquer nature by force and by intellect. It now remains for us to try the way of love."

— John Biernbaum

Is Extracting Useable Heat from Compost Practical?

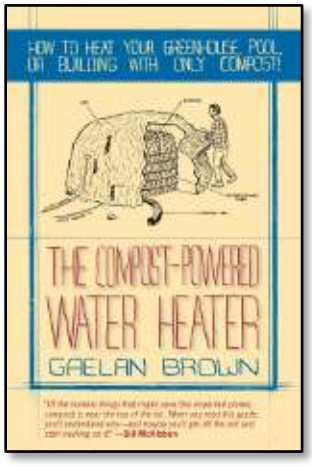
Like many farmers and composters who have experienced the heat of a compost pile, the idea of using that heat to warm a greenhouse or seedling production area is intriguing to me. I am pretty convinced of how horse manure or compost can work in cold frames based on all the published examples and personal experience. However, when it comes to piles of wood chips, the practical observer in my head tends to go to the concern that there is only so much energy in wood chips and that one would have to think about how many you would have to burn for example to heat a greenhouse.

Last year I looked at the online videos about the Frenchman Jean Pain, who worked on perfecting compost heat extraction from wood chips for his home and methane production for his farm equipment during the 1970's and early 80's. He showed how composting small brush and branches from wooded areas could prevent the risk of fire while making compost for farming and energy for the farm.

Part 1 https://www.youtube.com/watch?v=JHRvwNJRNag,
Part 2 https://www.youtube.com/watch?v=zGCj7NA0OIs

His work has not been well known due in part to his death at an early age.

Apparently for the last decade or more, individuals in Vermont and the Northeast US have been working on applying and expanding his work. Recently I read the book "The Compost-powered Water Heater" by Gaelan Brown which was published last year. Brown does a great job of telling some of the history of the story and then giving details of the work that has been done by a growing team working as the "Compost Power Network". You can learn more about the network and projects at the web site www.compostpower.org. The book has many pictures and detailed directions and is well worth the $17 cost.



Compost energy recovery ideas are evolving to integrate both aspects of making valuable compost for improving soil as well as capturing energy. When the two processes are put together, the economic return has a better chance of being positive. In our composting work at MSU we are also considering how wood chips can be used for "ramial chipped wood" (RCW) as mulch for building soil humus or to make biochar for longer term carbon or a transplant media amendment. Each of these options have potential benefits related to carbon sequestration.

Gaelan Brown and others at the Compost Power Network are able and willing to do educational workshops for those interested in testing these concepts on farm. So, are there enough farmers and composters in Michigan interested in compost powered heat that we could host a for fee workshop? The worm composting hoophouse at the MSU Student Organic Farm is a candidate for a source of external compost heat. There may not be time to plan for this fall, but if not, we can plan ahead for next fall. Are you or someone you know interested in participating in a workshop to build a medium to large scale

heating compost pile to heat a greenhouse? If so, please email me at biernbau@msu.edu so we can get a sense of interest in this topic. If you think you could possibly host an event on your farm and cover the cost of necessary materials (details available) let me know that also.

— John Biernbaum

Michigan Grown: Voices from the Field

Michigan has many powerful stories to offer when it comes to how communities all around the state are strengthening their local economies through food and farming. Organic and sustainable agriculture are an important part of our state's economy and the viability of local communities. As part of our ongoing farm bill advocacy work, the National Sustainable Agriculture Coalition (NSAC) is developing a collection of stories from farmers and other food system allies who are most affected by these federal policies.

NSAC is a nonpartisan alliance of advocates for federal policy reform for the sustainability of food systems, natural resources, and rural communities. Our work on organic agriculture includes **conservation** - sustaining and enhancing natural resources through organic farming systems, **insurance** - working to level the playing field for organic producers through appropriate and accessible risk management tools, **marketing** - helping defray organic certification expenses for organic farm businesses through cost share, and **research**: supporting strong investments in organic research, education, and extension to help organic producers meet production and marketing challenges.

WHY SHARE MY STORY?
Our goal is to collect stories about the impact and importance of these programs on the ground. When policymakers are deciding what should go in the bill, they rely on their constituents to help them understand how these policies and programs really impact their businesses and communities. These stories will help reporters, editors, and others better cover these issues as the implementation of the laws begins and as we prepare for the next reauthorization of big policies like the farm bill and the child nutrition reauthorization act. We want to make sure farmers' voices are featured more prominently in the media, and in the decision-making process.

HOW DOES IT WORK?
If you are interested in sharing your stories, we would like to set up a brief interview with you to gather some basic info about your farm or organization, and learn about your experience with the federal program(s) you have put to use. Then, we have that 'on file' for potential future media efforts. If and when we are able to highlight your story in the media, we will contact you first so that you know where we are "pitching" it and offer to help coach you for talking with reporters if you like. We may work with you about gathering related pictures or other media to be used with the stories as well.

Completed stories may be used for state or national blog posts, online profiles, social media, op-eds, and more! For a great example of a home-grown story, see this post by MOFFA member, Chris Bardenhagen: sustainableagriculture.net/blog/growing-organic-in-michigan.

If you or someone you know can speak to the importance of farm bill programs, please contact us by email: lscalera@sustainableagriculture.net, by phone: 734-926-5534, or fill out our contact form here: bit.ly/mi-voices.

WHERE CAN I LEARN MORE?
To learn more about our work, visit sustainableagriculture.net/our-work and to learn more about what federal programs might be available for your farm business, see our Grassroots Guide here: sustainableagriculture.net/publications/grassrootsguide!

— Lindsey Scalera

Lindsey Scalera is Grassroots Organizer with Michigan Voices for Good Food Policy.

Organic Farmers of Michigan Field Day

Who: Organic Farmers of Michigan (OFM)

What: Organic Field Crop and Educational Day

When: August 21, 2015 @ 10:00 a.m.

Where: Tom Stings Farm, 10256 Huron Line Rd., Sebewaing, MI 48767

Why: To promote organic field crop agriculture in Michigan

Speakers:

- Gary McDonald: Organic Resources, an Illinois organic farmer and consultant presenting on weed management.
- Dan Bewersdorff: Organic Grain Program Director @ Herbruck's Poultry talking about Avian Influenza (AI).
- Dean Baas: MSU Agriculture and Natural Resources, reporting on MSU soybean research.
- Steve Steely: OFM marketing representative, giving an organic field crop overview.
- Tentative presentation of weed flaming.

The Organic Farmers of Michigan will be hosting its annual organic educational meeting August 21, 2015 at Tom Stings Farm in Sebewaing, MI. The day will consist of a morning of educational and informational speakers, with lunch at noon. In the afternoon the group will view the MSU soybean research plot, located nearby. The next stop will be Bayshore Farms, located in Unionville, to view Bayshore's organic yellow corn test plot and take a look at their "state of the art" cultivation and weeding equipment. The final destination will be Dean Berden's future solar powered grain cleaning facility. RSVP to Stacy Steely 810.404.9347 or ofmllc@yahoo.com by August 14 as there is limited space.

A passenger bus from mid-Michigan will be provided for those wishing to travel with a like-minded group, sponsored by MOFFA. Contact Dan Rossman @ 989.763.7255 or rossman@msu.edu to RSVP. Leave your name and a contact information with Dan so he can schedule pickup locations.

Event sponsor: Organic Farmers of Michigan

Co-Sponsors: Michigan Organic Food and Farming Alliance (MOFFA)
Herbruck's Poultry Ranch
Bayshore Farms

Persistent Herbicide Contamination in Compost

We have been hearing about persistent herbicide contamination of compost impacting community gardens, gardeners and farmers for many years, but I have yet to see or hear about contamination here in Michigan. I visited a small start-up farm in Virginia in early July and saw firsthand what was likely herbicide contamination from horse manure impacting tomatoes and peppers. It was definitely frustrating for these beginning farmers trying to do things right and using horse manure to build soil organic matter.

Based on published information from when this first became a problem, I thought the issue was more with dairy manure, but a quick internet search demonstrates the problem is also evident with horse manure. The horse

manure in question came from the farm where my son teaches and trains horses and riders. They know the source of the majority of hay and had no reason to think it was the problem. My son speculated that the contamination may have come from a horse visiting for only a short time for a clinic where owners bring their own hay and feed. Apparently it has been shown that the herbicide can come through not just in hay but in horse feed, potentially in the oats. Still need to check on the evidence for this but it adds another dimension to the problem.

About the same time I was visiting at the Virginia farm, the Cornucopia Institute ran a news story about "The Canary in the Organic Coal Mine" regarding how organic crops and gardens are being increasingly contaminated by persistent herbicides. I won't repeat the details that were provided along with links to other references. This story related what I found at some other websites: rather than restricting the use of these persistent herbicides, the EPA is reportedly giving a higher rating to persistent herbicides and those effective at low application rates.

As we work to "close the loop" to keep nutrients on the farm and sequester more carbon from manure, food scraps and other sources as long term soil organic matter, the use of persistent herbicides is counterproductive and needs to be addressed quickly. Do organic farmers and gardeners have a right to herbicide free organic matter? In the meantime, be aware of the risk for your own garden or farm. Consider a seedling bioassay before applying any compost of questionable source.

If you have seen or know of vegetable crop damage in Michigan due to persistent herbicides from hay, feed or manure, let us know so we can keep track of the evidence. Email a note to moffaorganic@gmail.com, or write to us at P.O. Box 26102, Lansing, MI 48909.

— John Biernbaum

MOFFA News

Membership – Earlier this week we sent letters to people who were MOFFA members in the past few years but have not renewed their membership for 2015. If you're among that group, we hope that you will take a minute now to renew your membership (or consider joining, if you have not been a member before). MOFFA relies on dues from its members to pursue goals such as the Organic Intensives event, ongoing public education, the Farm Guide, and keeping our members up to date on state and national policy issues. You can join online at www.moffa.net/membership.html, or send a check to us at P.O. Box 26102, Lansing, MI 48909. The cost of membership hasn't risen in this century—still just $30 for individual/family membership, $50 for businesses bringing in less than $50,000 per year, and $100 for larger businesses.

Newsletter – The next issue of this newsletter will focus on seed saving. If you'd like to contribute an article on seed saving, or on another topic, please let us know.

Keep up with MOFFA on our website: www.moffa.net, or email us at moffaorganic@gmail.com.

Contact us at:

Michigan Organic Food & Farm Alliance
PO Box 26102
Lansing, MI 48909
248-262-6826