Crops, Dairy, Livestock & Equine Newsletter

Spring 2019

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Editor,

Masoud Hashemi

Upcoming Events:

MA 4-H Blue Ribbon Dairy Calf Sale

March 23rd, 2019

11 AM

Big E Fairgrounds, West Springfield, MA

More information at Blueribboncalfsale.com and on Facebook, Massachusetts Blue Ribbon Calf Sale

Massachusetts Ag Day

March 27th, 2019

9 AM - 12 PM

State House, Boston, MA

MA Poultry Workshop

March 30th, 2019

9 AM

Norfolk Ag School, Walpole, MA

For more information, go to: http://ag.umass.edu/mass4h

Sunday, April 28th, 2019

9AM– 10:30AM

Pasture and Mud Management in Equine Operations as part of "Professional Association of Therapeutic Horsemanship International"

For more information go to: https://www.pathintl.org/path-intl-conferences/regional

Announcements

Now Accepting Nominations for the

2019 Massachusetts Outstanding Dairy Farmer Award

The 2018 winners of the Massachusetts Outstanding Dairy Farmer Award, Rogers Farm, 2301 Southbridge Rd, Brimfield MA.

The selection committee is accepting nominees for 2019. Please nominate a dairy farmer that you think is qualified for such an award by May 1, 2019. Self Nomination is welcome.

Selection will be based on the following criteria:

1) Farm is operated by a full –time farmer with an efficient dairy operation
2) Quality of dairy herd (milk production/cow, breeding program and herd health)
3) Farm Efficiency (milk production/worker, other productivity considerations)
4) The forage program (quality of forage as a well-balanced feeding program)
5) Is the farm operation economically sound?
6) Leadership ability (contributions at the local, regional, state, or national level)
7) Contribution to environmental improvement (management, visibility, appearance, scenic aspects)

For more information, questions,

or comments, please contact:

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A Coordinated New England Grazing Network

A three year 'Cedar Tree' grant to the New England states seeks to maximize grazing potential by strengthening the region-wide communication among grazers and educators, as well as provide technical training events and farmer discussion groups. Local farm tours/ pasture walks will be held throughout the tri state region (Massachusetts/ Connecticut/ Rhode Island) during June through October and need your recommendations for sites to visit, topics, and suggested guest speakers. Please call or email Samantha Glaze-Corcoran, the region's coordinator, at 978-855-3242 or sglazecorcor@umass.edu with suggestions.

First in Spring: Overwintering Rye, Wheat, and Triticale for Forage

Sam Corcoran & Masoud Hashemi

Small winter grains as cover crops are well-loved and for good reason. They tolerate tough New England winters, produce hearty amounts of biomass, smother fall and spring weeds, and just about every grower has already been planting and managing them for years or decades. After the snow comes and goes this year, eventually giving way to all that lush, green growth – why not find one more reason to love these crops and turn them into forage?

Figure One: Rye, wheat, and triticale cover crop residue are studied for decomposition in a corn field throughout the summer months.

If the goal is to build soil organic matter using the cover crops, this will still be achieved even when cover crops are harvested for an additional source of forage. On average, if the crop is harvested to leave 3-4 inches of stubble, that leaves 800-1000 pounds of cover crop dry matter per acre. This dry matter is returned to the soil to build soil carbon and feed microbes, plus copious amounts of roots. That cover crop residue will remain in the field and slowly breakdown throughout the season and into the next year, depending on the tillage strategy. In fact, we have found that as much as 80% of cover crop residue is still decomposing at the end of August, due to the high carbon content of the stubble (**figure one**).

To use small winter grains as dual-purpose cover crops, they should be planted by the 15 h of September to produce an average of 1.5 tons of dry matter the following spring. Planting after the 20th returns significantly smaller yields of closer to half a ton of dry matter, and the plants are more susceptible to winterkill (**figure two**) as they do not have enough time to properly cold acclimate. But don't let this piece of information deter you if you got your cover crops in late last fall. If they look harvest-worthy this spring, then this is a great chance for a practice run.

Figure Two: Rye planted on 9/30 is smaller and shows more winterkill damage compared to rye planted on 9/1.

The overwintering cover crops are ready for harvest in May. Eager rye is the first to boot stage and can typically be harvested in the first week of May. Wheat is more forgiving in wet fields as it matures slower than rye and will wait until late May before it should be harvested to preserve feed value. As a hybrid of the two, triticale falls somewhere in the middle and is ready for harvest at boot stage typically by the second week of May. Of course, crops should be harvested early enough to allow for timely corn planting in fields slated for silage production; rye and triticale harvested before boot stage (con't page 5)

still produce a dependable ton of dry matter. All three crops provide spring feed values near 130 and crude protein ranging from 15-20%, depending on field history and fertility. At the UMass Agronomy Farm, as well as at the UVM Research Farm, we have studied rye, wheat, and triticale in corn silage production systems following fall manure application for the past four years. We have also taken these projects onto three farms throughout Massachusetts.

Figure Three: Harvesting a field of triticale in May.

At the UMass Agronomy Farm, as well as at the UVM Research Farm, we have studied rye, wheat, and triticale in corn silage production systems following fall manure application for the past four years. We have also taken these projects onto three farms throughout Massachusetts.

Triticale provided yields of 1.8 tons of dry matter A^{-1} on a local dairy farm in a field in rotation with sweet corn. The triticale was planted in mid-September, received 30 lbs. of nitrogen in the spring, and was chopped in early May. Following a period of dry down in the field, the forage was collected (**figure three**) and then stored in a silage bunker; the forage was integrated into the animals' feed ration throughout the spring.

On an organic beef farm, triticale was seeded with a Brillion seeder at a rate of 110 lbs. A^{-1} in a pasture waiting to be reseeded with perennial forage species. The triticale provided a ton of dry matter A^{-1} the following spring and was readily mowed down by cattle (and made a great play area for the new calves as the triticale was nearly as tall as them).

Due to increasing interest in triticale, we also conducted an on-farm trail with a local dairy producer on a four acre field annually planted to silage corn. In the trial, we compared three triticale cultivars to one each of rye and wheat. All grains were seeded on September 28th at a rate of 110 lbs. A^{-1} and were planted by simply using a fertilizer spreader to spin on the seed after corn harvest. The field had a long history of manure application and no additional fertility was added to the cover crops.

Despite the risks of late planting, all crops performed well under the mild fall and winter conditions and were ready for harvest on May 6th, offering impressive yields and feed quality (**table one**).

If you would like help determining yield of your over-wintering cover crops to decide if it is worth the time to harvest, or if you would like an assessment of the feed value and nutrient composition, please contact Sam Corcoran via email at sglazecorcor@umass.edu. The only thing it will cost you is a request for your feedback and opinions!

Crop	Yield Per Acre (Tons of Dry Matter)	Relative Feed Value	Milk Value (lbs/A)	Milk Value (lbs/ton of dry matter)
Rye (Wheeler)	1.5	100	4100	1300
Wheat (Emerson)	1.4	116	3900	1370
Triticale (Organic, VNS)	1.2	111	3700	1500
Triticale (Trical 815)	1.75	104	4800	1400
Triticale (NE426GT)	1.5	106	3900	1400

Table One: Crop quality and yield results from an on-farm trial.

Long Term Effect of Sugar Maple Hardwood Biochar on Soil Acidity

Omid R Zandvakili, Allen V Barker, Masoud Hashemi, Baoshan Xing, Fatemeh Etemadi, Emily Cole

Biochar has great potential for carbon sequestration and improving soil health. Both benefits can have a high impact on the northeastern USA in mitigation of climate change and enhancing crop productivity. Biochar can also reduce the acidity of the soil which in turn may decrease the need for liming. However, most studies on biochar have been conducted in controlled (greenhouse) condition and field studies have been focused on relatively short-term impact of biochar. A six- year field study was conducted in the Research Farm of University of Massachusetts in 2012-2018 to investigate the effect of different rates of biochar application on soil properties. Treatments included five rates of biochar; 0%, 2%, 4%, 6%, and 8% by weight of soil (equivalent to 0, 40.5, 81.1, 121.5, and 162.0 ton/ha, respectively) which applied to the research site in 2012.

Application of hardwood biochar resulted in increase in soil pH relative to the biochar application rate. Higher application rates of biochar resulted in higher soil acidity (Fig 1a). Soil pH remained higher than the control treatment (unamended soil) for six years. However, the pH peaked after 4 years of biochar application and then started to decrease with time. The initial influence of biochar on soil pH can be attributed to both the alkaline pH of the original biochar itself but also to the release of a significant amount of the base cations Ca^{2+}, Mg^{2+} and K^{+} from the biochar. These cations will replace acid cations, including Al^{+3} (Fig 1b) allowing the acid cations to be neutralized, leached away or precipitate out in unavailable forms such as aluminum hydroxide. However, the decrease in soil pH with time could be due to the lower biochar alkalinity (Fig 2a) resulted from decrease in the ash content (Fig 2b) and base cation uptake by plant roots during growing seasons and to some degree because of leaching-downward due to precipitation.

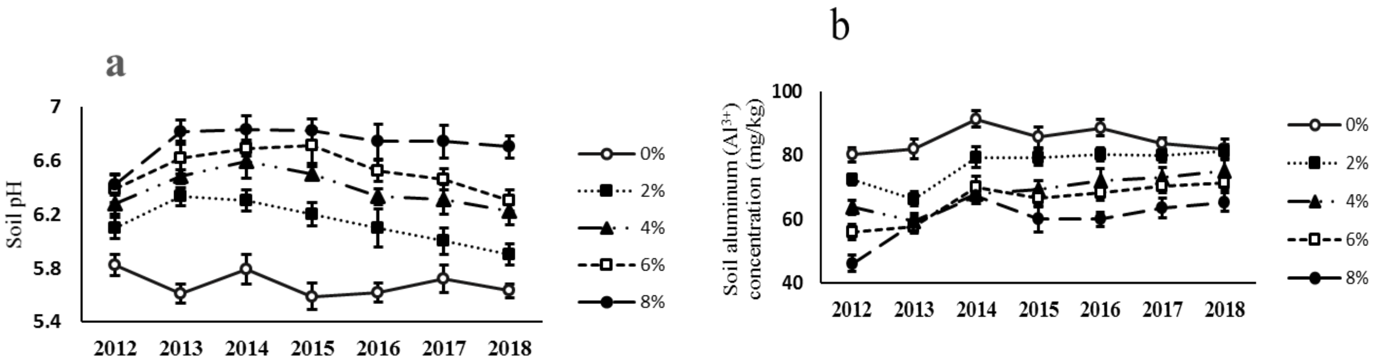

Fig 1: Annual assessment of soil acidity (a) and aluminum (b) in biochar amended soils

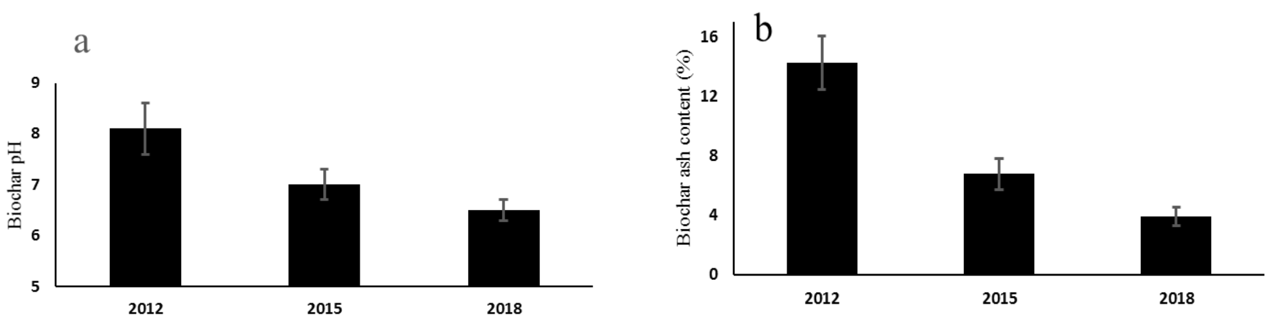

Fig 2: Assessment of biochar pH (a) and biochar ash content (b) every three years

Feed the Soil by Feeding the Microbes

Masoud Hashemi, Samantha Glaze-Corcoran and Alexa Smychkovich

Humus is a dark and very stable organic (i.e. carbon-based) component of soil that cannot be used as a source of food by soil microbes. Although humus is not a source of energy for microbes, it is considered the key to healthy agricultural soils; this is because humus provides many desirable characteristics necessary for soil health. These characteristics include soil moisture retention, improved aeration and drainage, and increased populations of soil organisms that help make soil nutrients available to plants. Many of us may think that humus formation occurs when we apply manure to the soil or leave plant residues in the field. The common perception is that over time, these organic residues will be transformed into humus. According to this view, leaving a lot of dead plant material in the field is the key to building soils. However, we now know that this is not the case.

In recent years, extensive research has provided strong evidence that humus, the most persistent form of soil carbon, is formed mainly from dead microbial bodies rather than from plants and other organic residues. It is correct that plants are the original source of soil carbon. However, soil microbes use the carbon from plants and other organic amendments for food and assimilate the carbon into their bodies. Therefore, the higher the microbial population and the greater their diversity, the more humus will be formed in the soil.

All living plants continuously release organic compounds that can be thought of as a buffet-style meal for soil microbes. These organic compounds consist of various sugars, organic acids, amino acids, and many other types of organic compounds. These chemicals secreted by plant roots serve important functions as chemical attractants and repellants to form a microbial community in the rhizosphere, which is a very narrow zone of soil immediately surrounding the root system. Plants may release up to 20% or more of their photosynthates (compounds made during photosynthesis) into the soil to encourage relationships with beneficial microorganisms, liberate nutrients that are attached to soil particles, and inhibit the growth of competing plant species. We can think of living plants as the only organisms on the planet that are able to capture atmospheric carbon and then funnel it into the soil to feed the microbial community. Microbes can use a simple compound like sugar and transform it into thousands of complex molecules found in soils. When microbes digest plant exudates and residues they use some of the material that they consume for building new biomass – that is, to fuel their own growth – and release some as carbon dioxide.

In a sustainable farming system, although leaving crop residues in the field is highly recommended, the soil microbial community also requires the exudates that come from living plant roots. Therefore, growing cover crops, especially a mixture of cover crop species, after harvesting commercial crops is crucial to building and maintaining a diverse community of soil microbes and thus soil health.

Another key to soil health is the minimization of soil disturbance. In no-till farming, the channels made by plant roots and worms remain intact. The next crop can extend its roots through these channels to grow faster and deeper into the soil, allowing greater access to water and nutrients. In no-till systems, the privacy and diversity of microbial communities is maximized. Healthy soils have the potential to contain microbiomes that help reduce disease, cycle nutrients, and reduce plant stress. Making soils healthier results in higher yields with fewer inputs and offers great potential to make farming more profitable while also protecting our air and water.

Top photo: No plant exudates are available to the soil microbes for nearly more than 7 months (October-May) in corn silage systems that don't use cover crops.

Middle photo: A mixed mix of cover crops after cash crop harvest ensures soil microbes will receive root exudates for a longer period of time and sustain the microbe population.

Bottom photo: In no-till systems, the channels created by plant roots remains intact and can be used by the next crop.
Photo credit: Dr. Ray Wile