Champlain Valley CROP, SOIL & PASTURE Team

UNIVERSITY OF VERMONT EXTENSION

In This Issue FALL 2016

A YEAR WITH THE CHAMPLAIN VALLEY CROP, SOIL & PASTURE TEAM

By Jeff Carter, Agronomy Specialist & Champlain Valley Crop, Soil & Pasture Team Leader

This has been a busy year for our Extension team in Middlebury. I prepared a summary for my boss, and during this past year we offered 72 workshops, conferences, classes and field day events and tallied 8,143 "educational contacts" who came to our programs. Many farmers and ag business members came to more than one event. We also provided 1,873 individual consultations this year for one-on-one education and production technical assistance. I hope you were able to be there. We have several new projects starting this fall and look forward to many more farm demonstrations with new cover crop mixes planted, no-till corn strategies, calcium sulfate (gypsum) and other soil health amendments, reducing compaction in clay soil, actual farm crop budgets and whole-farm mass nutrient balances. This winter will be just as busy with meetings and classes for no-till corn, cover crops and soil health, pasture and grazing, manure applicator training, nutrient management plans, updates on farm environmental laws, and regular meetings of the Champlain Valley Farmer Coalition.

Farmers and UVM Extension professionals discussing new no-till corn at an early summer crop patrol.

Have a question for Jeff? Jeff Carter (802) 388-4969 ext. 332 • jeff.carter@uvm.edu

NEW RAP LAW COMES INTO EFFECT THIS FALL

The rules have changed again for Vermont farmers this fall with the new RAP laws (Required Agriculture Practices) going into effect before the snow flies. Once these rules clear the last legislative hurdle, this will be a dramatic change to meet the demands for cleaner water for the future of Vermont. Not so big news if you have been following the progression of increasing restrictions on how soil and farm nutrients will be kept on the farm and not lost to our lakes and streams. All farmers need to know how this will affect them and the Agency website has all the latest news regarding these new rules for farmers:

agriculture.vermont.gov/water-quality/regulations/rap

CROP INSURANCE UPDATE

By Jake Jacobs, Crop Insurance Education Coordinator

According to the 2012 Census of Agriculture, two fifths of all land in the United States is farmland, which equates to 915 million acres and 2.1 million farms and ranches.

Of the 915 million acres of land in farms in 2012, 45.4 percent was permanent pasture, 42.6 percent was cropland, and 8.4 percent was woodland. The remaining 3.6 percent was land in farmsteads, buildings, livestock facilities, etc. **Although the amount of cropland overall was down 4 percent, the amount of cropland harvested was nearly 2 percent more in 2012 than 2007.** (www.agcensus.usda.gov)

There are 389.7 million acres of cropland in the United States. Cropland includes areas used for the production of adapted crops for harvest. Two subcategories of cropland are recognized: cultivated and non-cultivated. Cultivated cropland comprises land in row crops or close-grown crops and also other cultivated cropland, for example, hay land or pastureland that is in a rotation with row or close-grown crops. Non-cultivated cropland includes permanent hay land and horticultural cropland.

Cover Crops It's that time of year to think about cover crops. They include grasses, legumes and forbs for seasonal cover and other conservation purposes. Cover crops are primarily used for erosion control, soil health improvement, and water quality improvement. A cover crop managed and terminated according to these guidelines is not considered a "crop" for crop insurance purposes. The cover crop may be terminated by natural causes such as frost, or intentionally terminated through chemical application, crimping, rolling, tillage or cutting. Cover crops may be grazed or harvested as hay or silage, unless prohibited by RMA crop insurance policy provisions. Cover crops cannot be harvested for grain or seed.

If you have questions about crop insurance coverage for your cover crops, contact your insurance agent. Find a USDA licensed agent in Vermont at:
www.rma.usda.gov/tools/agent

Dairy MPP The registration period for MPP-Dairy coverage for the year 2017 began July 1, 2016. In an effort to allow dairy producers to make well informed coverage election selections suitable to their operation's needs, the registration and coverage election deadline has been extended to December 16, 2016. Contact your local FSA office for information and registration.

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WHAT'S YOUR WATERSHED? A LOOK AT LAKE CHAMPLAIN & MCKENZIE BROOK

By Kristin Williams, Agronomy Outreach Professional

With the ever-present focus on water quality in the state of Vermont, now is a good time to know where you sit on a map. A watershed is an area of land where the brooks, streams, and rivers all drain together into a lake or larger river. A drainage basin is the larger watershed unit; watersheds and sub-watersheds are a subdivisions of basins.

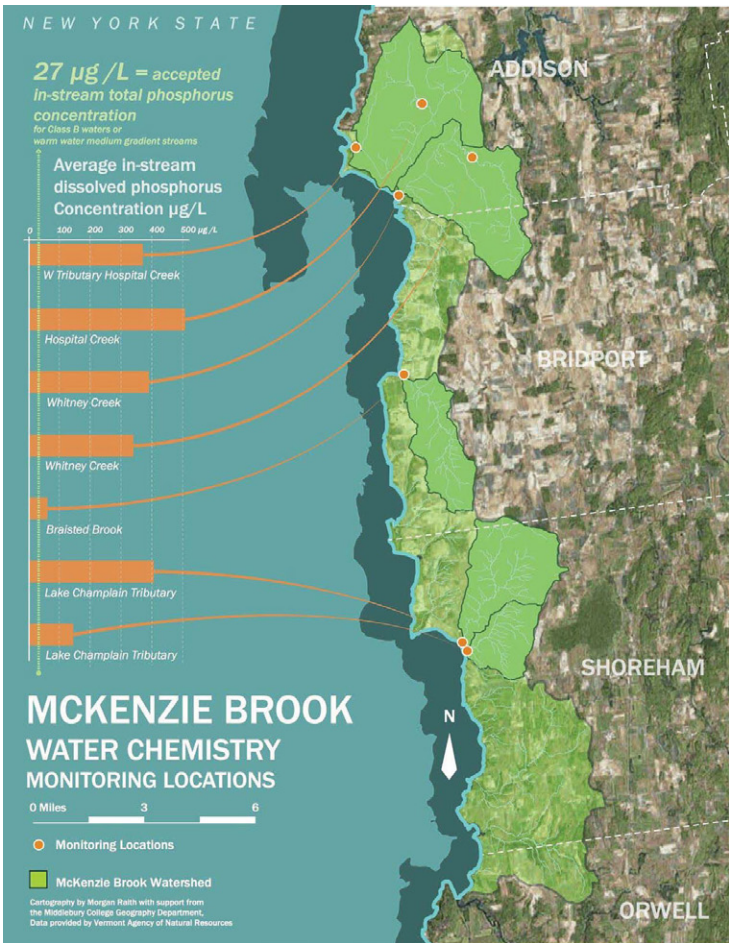
Lake Champlain is subdivided into management sections such as South Lake, which includes the McKenzie Brook watershed. Recent efforts in Vermont focus on these smaller watersheds to effect a reduction in phosphorus loading on Lake Champlain. Part of this effort is a funding focus from the Natural Resources Conservation Service (NRCS). This approach is piloted this year to demonstrate whether more success can be gained from a targeted geographic strategy with focused allotment of money and time. These "targets" will likely move as successes are reached. Among the watersheds in NRCS focus are Pike River, Rock River, McKenzie Brook and St. Albans Bay.

The Champlain Valley Crop, Soil and Pasture Team has been gathering data at the McKenzie Brook watershed. Although McKenzie Brook is located in New York, its watershed includes parts of Vermont. It extends north above the Crown Point Bridge to the DAR State Park in Addison, Vt; and south to Route 73 in Orwell, Vt; and it covers a narrow geographic region including Hospital Creek, Whitney Creek, Braisted Brook and Lake Champlain Tributary.

One recently completed project in the McKenzie Brook watershed assessed farmers' located nutrient management plans and helped them navigate the process. An ongoing grant assists farmers in signing up and following through with NRCS Environmental Quality Incentives Program (EQIP) contracts to implement best management practices (BMPs). Thus far, NRCS has obligated $800,000 of a potential $1 million for conservation practices in McKenzie Brook watershed.

We will continue to assist farmers in signing up and implementing practices. In addition, we are happy to help farmers try projects on small plots that may be outside the payment structure of NRCS. We hope to quantify both NRCS and non-NRCS funded practices in McKenzie Brook to demonstrate conservation success over time. We also have demonstration projects set up specifically in McKenzie Brook; look for upcoming events on our events webpage.

However, you don't have to be in McKenzie Brook to try a new practice. We have a lot of work going on in Chittenden, Addison and Rutland Counties, and imagine that "targets" may eventually move to other areas within the South Lake region.



The McKenzie Brook watershed. Water sampling points correlated with average dissolved phosphorus concentrations. Data collection 2012-2014 by VT Agency of Natural Resources; cartography by Middlebury College students Emma Homans, Hilary Niles, Ben Harris and Morgan Raith.

This spring we also began a unique collaborative project with Middlebury College and the Department of Environmental Conservation to quantify water quality in the McKenzie Brook watershed. During the spring semester, Middlebury College environmental studies students performed water quality sampling, mapped data, distributed water quality surveys, and presented findings to farmers. This fall, another group of students will continue this work.

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SUCCESSFUL NO-TILL ALFALFA ON CLAY SOILS

By Nate Severy, Agronomy Outreach Professional

This year there were a number of farmers who no-tilled alfalfa in clay and silty soils throughout Addison County. While this was a difficult year for good alfalfa establishment due to our dry, hot weather, all of the no-till alfalfa farmers had successful stands. Below is a summary of what these farmers did that contributed to their success:

All farms planted during a "window of opportunity." While all farms managed their fields differently, there are generally 3 times through the year where there is a "window of opportunity" in which you can successfully plant alfalfa into your cover crop. These are: early April before green-up, mid-late May immediately after harvesting your cover crop for forage, or August after you combine and harvest grain and straw. One positive aspect about no-till seeding is that in the spring only the top inch of soil needs to be dry in order to plant, as opposed to the entire plow layer with conventional field prep. This means you can seed much earlier in the spring without the risk of turning your clay soil into moon rocks.

All farms fertilized, prepared good/level seedbeds, and planted a cover crop last fall after short-season corn silage. Cover crop planting dates ranged from early September to the beginning of October. If you are planning on harvesting your winter rye/triticale/wheat as forage, the earlier you can plant in September, the better your spring yield will be. That means you will want to make sure you plant a corn silage variety that can be harvested early enough that you have adequate time to prepare a proper seedbed. If you do not want to harvest forage from the cover crop, either plant at a lighter rate or plant a mix that has a winter cereal with a winter-kill crop like oats or radishes.

All farms planted at the proper seeding depth. For winter cereal grains, planting depth should be between 1-1 ½ inches, which means you need to plant with a grain drill. Broadcasting and lightly tilling it (followed by a roller) can work, but there is a very fine line between incorporating your seed and burying it. Broadcasting and only going over the field with rollers is not recommended. The seeding depth for alfalfa should be between ¼ to ½ an inch. Most farms used a grain drill, but it is possible to broadcast your seed if you "aggressively scratch" the field before seeding and pack it several times afterwards.

All farms planted alfalfa into a low-competition environment. Some farms planted into their cover crops in mid-April before there was much spring growth, a farmer planted his alfalfa in May after harvesting the cover crop as forage, and a few farms planted alfalfa in April, spraying and killing their cover crop immediately afterwards. You can have good alfalfa establishment in a thick cover crop/nurse crop, but you will have less first-year alfalfa yield when compared to a light cover crop/nurse crop.

Three farms successfully frost seeded 5 lb/ac red clover in March into their cover crops. Frost seeding can be an effective way to introduce crops into fields. However, you need three things to happen perfectly: very small seeds, soil that will freeze-thaw, and bare ground. These cover crop fields seemed to be good candidates for frost seeding 5 lb/ac red clover in March, and by August you could definitely see where we did and did not frost seed.

Planting alfalfa and other hay crops is risky no matter the year. Hopefully more farms try this method of seeding so we can learn more about the best way to establish and maintain this valuable crop.

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No-till alfalfa being planted into a cover crop and corn residue

GRASSLANDS FACE TROUBLING TIMES: HOW TO RESTORE THEIR PERCEIVED VALUE

By Cheryl Cesario, Grazing Specialist

A recent study published in the scientific journal *Nature* examined the importance of species diversity in grassland ecosystems. The German-based study included dozens of researchers collecting data along various levels of the grassland food chain. The data was collected on a total of 4600 species, the most extensive ecological sampling in Europe to date. These species, they found, interact and rely on each other to provide critical grassland "ecosystem services," such as food production, soil development, carbon storage, and flood and drought mitigation, among other climate regulatory functions. The study emphasizes the importance of maintaining biodiversity across all levels of the grassland food chain, which provide synergistic effects that ultimately benefit the planet and humanity as a whole.

So if grasslands play such a critical role in our planet's health, why are they disappearing at an alarming rate? The same month the *Nature* study was published, the Union of Concerned Scientists published an article about the continued reduction of grassland acres across the U.S. From 2008-2012, extensive acreage was cultivated for the first time, mostly planted to annual crops. This phenomenon was greatest in the Great Plains and western Corn Belt, where 77% of new cropland was borne from grasslands. Several crops took their place, led by corn, wheat and soybeans. These grasslands are being traded for crops that require irrigation.

Contrast this with the *Nature* study regarding the importance of grassland biodiversity and the role these ecosystems play in climate adaptation. The regions of the country with the highest loss of grasslands are also the same ones where flooding frequency has increased the most. This doesn't seem like the best strategy for building resiliency.

There are USDA programs designed to encourage and protect grasslands, such as the Conservation Reserve Program (CRP). CRP encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as native grasses, wildlife plantings, filter strips or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. However, enrollment peaked at 36.8 million acres in 2007, dropping to 24.2 million acres by September 2015. States such as Kansas, North Dakota, Montana and Texas have seen reductions of over 1 million acres each in CRP land over the past 8 years. For scale comparison, in Vermont our CRP acres total approximately 2,800 acres, mostly in various riparian buffer, filter strip and habitat plantings. While we don't have large swaths of native grasslands here in Vermont, we do import large amounts of grain from the Midwest to feed cattle and other livestock, so ultimately we are part of the grassland-biodiversity-climate adaptation issue.

When commodity prices are high, acres that transition out of the program are often not re-enrolled. The trend may continue: between 2020 and 2022, 11.6 million CRP acres are scheduled to expire nationwide and it remains to be seen what the future holds for those grassland acres. With more and more discussion and interest in adaptive, resilient and regenerative agriculture, one would hope that more policies and programs may be on the horizon to encourage biodiverse grassland ecosystems that provide so many benefits.

Basche, Andrea. "Why the Loss of Grassland is a Troubling Trend for Agriculture, in 11 Maps and Graphs." Union of Concerned Scientists [Blog]. August 10, 2016.

Schuessler, Ryan. "The enormous threat to America's last grasslands." The Washington Post: Energy and the Environment. June 16, 2016.

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Photo by Scott Bauer, USDA Natural Resources Conservation Service.

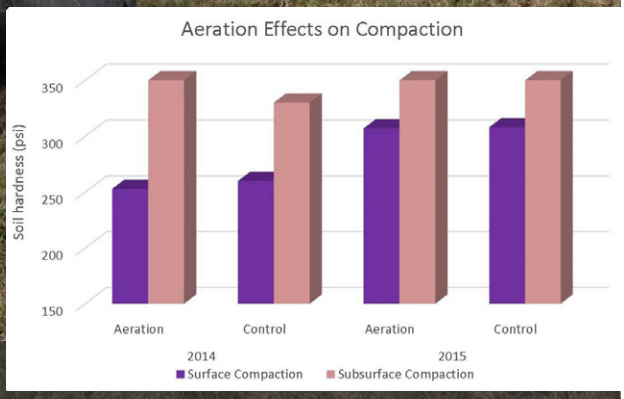
AERATION TILLAGE: EFFECTS ON HAY YIELD AND SOIL COMPACTION

By Rico Balzano, Agronomy Outreach Professional

In the Champlain Valley of Vermont, Vergennes and Covington clay soils used for grass hay production are subject to soil compaction over time as equipment travels over the crop for multiple passes for maintenance and harvest operations. The Champlain Valley Crop, Soil, & Pasture Team received a Northeast SARE grant to investigate the potential benefits of regular and consistent aerator use on permanent hay fields to help alleviate compaction and maintain consistent yields over time.

Treatments

Three field sites were selected in Bridport and Addison to impose repeated aeration tillage treatments using a Gen-Till aerator, a single-axle Aerway, or a tandem-axle (T-axel) Aerway aerator tillage implement on hay fields. Data was collected in 2014, 2015 and for the first cut of 2016 at the Addison site; and 2014 and for the first cut of 2015 at the Bridport site.



Comparison of aeration and control on average soil compaction in 2014 and 2015 at both sites.

Treatments at the Addison site were no aeration, aerated one year (2014), and aerated two years (2014 and 2015). The 2015 growing season was unusually wet in June with over 8.5" of rain.

Hay Yield

The aeration appears to have positively affected yield in 2016 for aeration in 2014, but negatively affected yield in 2016 for aeration in both 2014 and 2015. The second year of aeration, soil was saturated during the growing season. Aeration treatments had greater yield than the control in 2014 for all three cuts, but similar or lesser yield than the control in 2015 for both cuts. It is well known that clay soil is susceptible to compaction under saturated conditions, and these results are likely reflecting those conditions.

Compaction

Soil samples were collected from each treatment block in November 2015 and sent to Cornell Soil Health Test lab for analysis. Soil compaction in the treatment areas was measured using a manual soil penetrometer to record the maximum pressure (psi) required to penetrate the soil from 0 to 6 inch depth and 6 to 18 inch depth as part of the Cornell Soil Health Test field procedures.

Surprisingly, average surface compaction measurements were not significantly different as a result of the aeration treatments. Subsurface compaction showed a slight increase under aeration, though aeration tillage is not expected to change soil compaction at that depth.

Precision Agriculture

The farmer at the Addison site, Doug Gould, used the FM-750 GPS steering guidance unit that we provided to track aeration tillage activities in the field. As a result, he has purchased his own GPS guidance system to use while aerating or during fertilizer application to improve field efficiency of machinery operations.

Conclusions

The soil conditions during the time of aeration will likely have an impact on compaction and yield. If the soil is wet at the time of treatment, aeration may be less effective and even counter productive. If the soil is dry at the time of aeration, aeration may benefit compaction and yield.

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LEGUMES: GETTING MORE OUT OF YOUR COVER CROP

By Kirsten Workman, Agronomy Outreach Professional

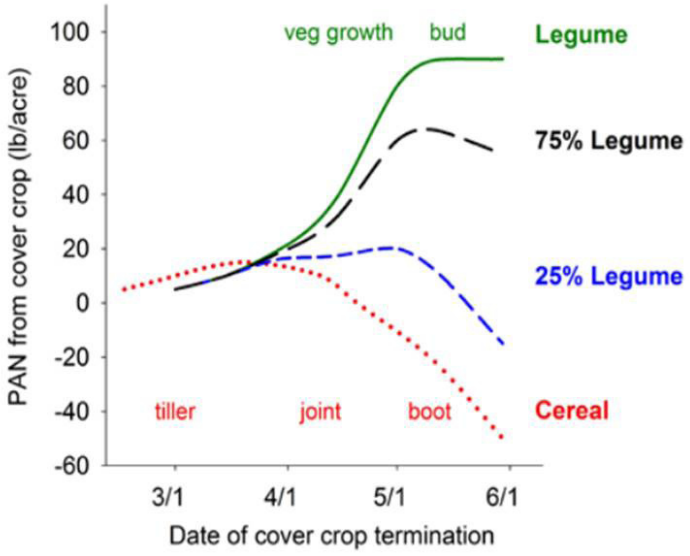
Legumes are unique because of their ability to fix nitrogen and contribute it back to the following crop. Legumes are in the family *Fabaceae*. Most farmers are familiar with species like alfalfa, clover, and trefoil, or those that are grown for grain like soybeans, peas, lentils and even peanuts.

Legumes also have a lower carbon to nitrogen ratio than cereal grains, so they decompose quicker making nitrogen more available. If you have ever plowed down (or killed) a nice stand of alfalfa and planted corn, you know how beneficial a legume in your crop rotation can be. Legumes can provide over 100 pounds of nitrogen credit per acre, which is why they are often called "green manures."

The legumes themselves are not responsible for nitrogen fixation. This happens because of a symbiotic relationship between the nitrogen-fixing bacteria that invade the plant root, storing nitrogen in root nodules. The plant provides the bacteria with nutrients and energy, and the bacteria provide the plant with nitrogen. These bacteria, called Rhizobia, are able to take nitrogen gas from the atmosphere (N_2) and convert it to ammonia (NH_3), which is then converted to ammonium (NH_4^+) and Nitrate (NO_3^-), the forms of nitrogen usable by plants. In order for good root nodulation and maximum nitrogen production, it is important to inoculate your legumes with the appropriate species of Rhizobia bacteria at planting. Some seed is available pre-inoculated, but many times you will need to apply the inoculant yourself. Your seed supplier should have inoculant available. Inoculants have a short shelf-life and are species specific.

Plant Available Nitrogen (PAN)

The amount of nitrogen your legume cover can supply to your subsequent crop depends on biomass and when you terminate the cover crop. This plant available nitrogen (PAN) becomes available roughly 4-6 weeks after cover crop termination. Cereal grains terminated late can immobilize nitrogen and create a PAN deficit, requiring increased fertilizer/manure nitrogen applications. A cover crop terminated too early will provide only minimal PAN. The chart here is a simple explanation of the differences between cereal grain and legume cover crops and the implications of when you terminate them.



From D. Sullivan & N. Andrews, Oregon State Univ. 2012.
"Estimating plant-available nitrogen release from cover crops."

Considerations When Planting Legume Cover Crops

Legume cover crops will need to be planted earlier than cereal grains to survive winter and maximize nitrogen production. Plant clovers by August 15, and winter peas and hairy vetch by September 15.

Rhizobia nodulation on pea cover crop roots.

If you are planting legume cover crops solely to replace nitrogen, the economics may not pencil out. Commercial nitrogen fertilizer is $45 for 100 pounds of nitrogen and a legume cover crop could cost you $70 for that same 100 pounds. Certified organic fertilizer, however, could run you $150 per acre, making the cover crop a wise investment. A legume cover crop provides more than just nitrogen. According to USDA this includes "yield improvements beyond those attributable to nitrogen alone. These may be due to mulching effects, soil structure improvements leading to better moisture retention and crop root development, soil biological activity and/or enhanced insect populations below and just above the soil surface." (Clark, SARE). They are great soil conditioners, and can provide early weed suppression.

Questions? Want to conduct a trial on your farm? Contact Kirsten:
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This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2014-68006-21864. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.