ILLINOIS NREC
Quarterly BULLETIN
ILLINOIS NUTRIENT RESEARCH EDUCATION COUNCIL

Fall 2017

On the Go:

Bioreactor Field Day – Mercer County

In August, more than 40 people attended an open house on NREC Chairman Jeff Kirwan's farm in Mercer County. They were there to see Jeff's not-quite-finished bioreactor before he covered it with soil to let it start working. In attendance were media, area farmers and representatives of the Illinois Farm Bureau and the Mercer County Soil & Water Conservation District (SWCD).

Jeff Kirwan discusses the bioreactor with Dr. Laura Christianson, whose research on bioreactors is funded in part by NREC.

Jeff had accomplished much of the construction himself with plans provided by the Illinois Natural Resources Conservation Service. He sourced wood chips from a local utility and installed the upstream and downstream water level control structures himself. Some of his cost was offset from a grant from the Mercer SWCD.

This long view shows the bioreactor hole, lined with plastic and filled with wood chips. The bioreactor will then be covered in soil.

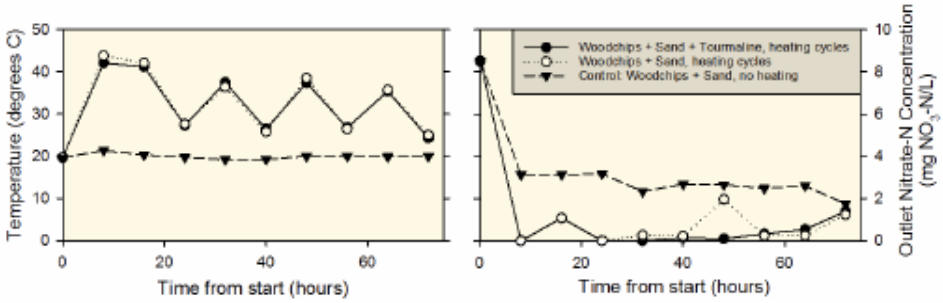
Wood chips were sourced locally and are the cellulosic component of the bioreactor. Dr. Laura Christianson took some of the wood chips back to her lab to determine whether the inconsistency in texture, size and density of the chips affected their efficiency.

In the Know:

Dr. Laura Christianson, working with a contractor, installed a bioreactor at the University of Illinois' Monmouth Research and Demonstration Center. The structure has two chambers – one for low flow that will remain continuously flooded and almost always flowing and a "high-flow booster" that receives only tile drainage water during high flow events. The low-flow bioreactor is 60 x 20 feet. The high-flow chamber is 40 x 20 feet. Two additional bioreactors (ditch-associated) are planned on private farm land.

With additional funding from the Illinois Farm Bureau and Henry County Farm Bureau, Dr. Christianson and her team are testing woodchip longevity. Woodchips in small bags are being deployed in the Monmouth bioreactors and will be harvested over time to analyze changes in mass and woodchip nutrient content.

Dr. Christianson is also examining how heating bioreactor fill material could increase bioreactor nitrate removal. This idea is first being tested at the lab-scale prior to full-size bioreactor construction. Preliminary data from these lab-scale bioreactors amplifies the importance of water temperature.



Cereal rye being terminated on a farm in Mercer County

"Considerations for First Time Cover Crop Adopters" is a new publication available from NREC. An electronic copy is available from the NREC web site under RESOURCES.

Cereal Rye and N

With funding that began this year, Lowell Gentry along with Dan Schaefer and Dr. Emerson Nafziger are looking at the effects of cereal rye as a cover crop after corn. The main objective of this study is to learn how to best manage cereal rye as a winter cover crop before corn in either a corn/soybean rotation or in continuous corn.

The experimental design allows investigation of N release from the cover crop under various N fertilizer regimens and evaluation of N immobilization vs. allelopathy in regard to negative cover crop effects on the subsequent corn crop.

Preliminary results come from a farm in Champaign County being planted in a soybean field with a cereal rye cover crop in October 2016. Following spring cover crop termination, the field was planted with corn. Cereal rye was planted in the fall of 2017 at a farm in Piatt County to afford a full year of study.

Long-term Evaluation of Nitrogen Application Timing with Cover Crops

Questions:

1) Does cereal rye reduce the amount nitrogen loss through drainage tile?

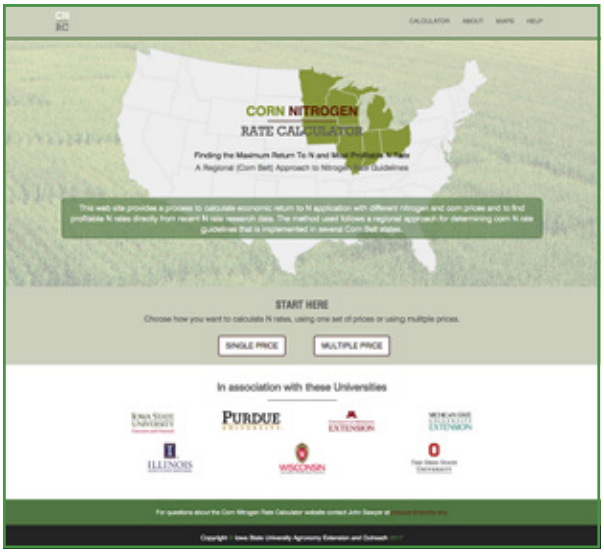
2) How much nitrogen does the cereal rye keep for the following crop?

3) Is the nitrogen captured by the cereal rye available at the right time for corn and soybeans?

Dr. Shalamar Armstrong and his team of researchers are working in Lexington, Illinois on the Illinois State University Nitrogen Management Research Field Station to answer these three questions. Their preliminary findings from January to May 2017 show that despite an N management system cover crop drastically decreased N loading via tile drainage. Cover crop took approximately 38% of N applied as fertilizer. In a wet and warm spring cover crops reduced nitrate nitrogen concentration below 10 ppm.

The table below shows cover crop biomass and N uptake from 2014 fall to the spring of 2017. (2014/2015 going into corn, 2015/2016 going into soybean, 2016/2017 going into corn).

	Cover Biomass (lbs A^{-1})			N Uptake (lbs A^{-1})		
Sampling Date	Fall N + CC	Spring N + CC	Average Biomass	Fall N + CC	Spring N + CC	Average Uptake
2014 Fall	296	237	266	11.0	9.8	10.4
2015 Spring	1,052	922	987	54.8	40.7	47.8
2015 Fall	1,227	1,302	1,264	48.9	57.0	53.0
2016 Spring	1,631	1,946	1,789	54.6	63.4	59.03
2016 Fall	**490**	**612**	**551**	**18.7**	**22.0**	**20.4**
2017 Spring	**2,150**	**2,012**	**2,081**	**86.2**	**67.6**	**76.9**



Using the N rate calculator

One tool available to Illinois farmers to help make decisions on the amount of nitrogen to apply is available online. The calculator uses the trial data from each region in Illinois for trials with corn following corn and corn following soybean to produce “maximum return to N” (MRTN) values and ranges. The calculator runs on data updated through 2016. This approach is an economic one, so requires the user to enter prices for corn and for N. The current version of the calculator that produces the MRTN values based on the latest N response data is located at http://cnrc.agron.iastate.edu/.

NREC has funded research to populate the calculator with data.

On the Go:

November 20: Constructed Wetland Show and Share in Princeton – The Wetlands Initiative (TWI) "show" was held at the Bonucci Farms Constructed Wetland and the Princeton Public Library. TWI presented on both the technical and communication aspects of the constructed wetland practice. Agriculture advisers working in government, education, non-profit and business attended.

December 2-5: Five NREC-funded researchers made "Micro Talks" presentations at the Illinois Farm Bureau's annual meeting in Chicago.

December 7: Ag Masters Conference in Springfield – Laura Christianson, Emerson Nafziger and Lowell Gentry will be speaking. Warren Goetsch of the Illinois Department of Ag will give an Illinois Nutrient Loss Reduction Strategy update. Dr. Christianson will speak on conservation drainage. Dr. Nafziger will address crop rotation.

December 12: The Wetlands Initiative is hosting an event in Princeton, IL where Jim Angel, Illinois State Climatologist, will speak about long-range weather effects and what farmers can do now and in the near future to minimize crop production risks due to changing weather systems. We will be discussing the constructed wetland practice in terms of reducing risk/increasing farm resilience.

January 16-18: Illinois Fertilizer and Chemical Association conference in Peoria. NREC researchers and Executive Director, Julie Armstrong will be making presentations. Also, NREC will exhibit at the trade show portion of the convention.

Illinois agriculture's investment in the safe, efficient use of crop nutrients.

ILLINOIS NREC

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