

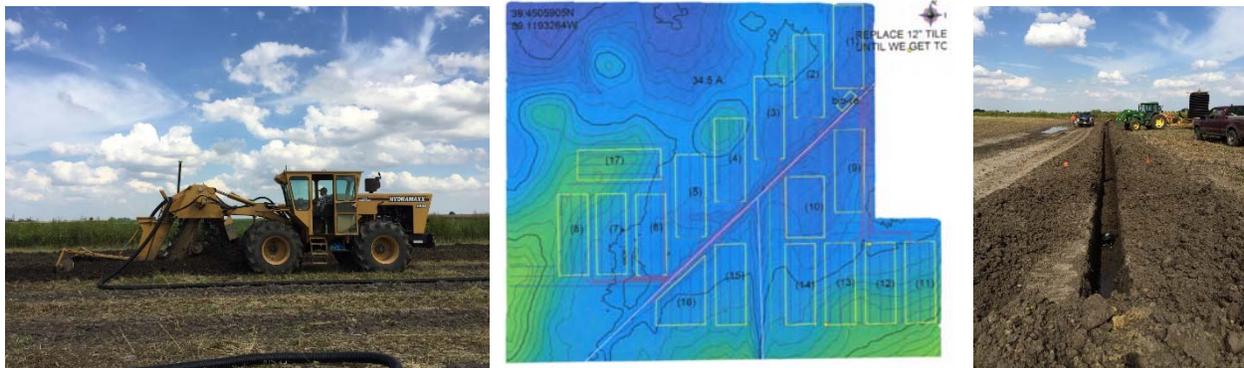
## Dudley Smith Initiative – Status Update

March 14, 2017

<b>Project</b>	Balancing water quality and nutrient management goals for the sustainable intensification of corn systems
<b>Participants</b>	Cameron Pittelkow, Laura Christianson, Rabin Bhattarai, Gary Letterly
<b>Length</b>	4 years (January 1, 2016 – December 31, 2019)
<b>Summary</b>	This project completed its first year of funding in 2016. Tile installation at the Dudley Smith research site was delayed until Sep/Oct 2016. However, the experimental site and tile drainage research infrastructure were successfully established. Baseline data collection will occur in 2017 with the first cover crop and N treatments being applied after harvest in 2017. The bioreactor was successfully installed and bioreactor research is ongoing. Tile drainage water quality and soil N <sub>2</sub> O sampling will start in Spring 2017. Automatic water samplers have been purchased and gas chambers are currently being constructed.

### *Accomplishments*

Research infrastructure at the site including the individually replicated tile drainage research plots and a bioreactor were successfully installed at the Dudley Smith farm in Sept/Oct 2016 (Figs. 1 and 2).



**Figure 1.** Dudley Smith experimental site showing tile drainage being installed and layout of individually drained research plots approximately 2 acres in size.



**Figure 2.** Aerial photographs of Dudley Smith experimental site showing individually replicated tile drainage plots approximately 2 acres in size (left) and bioreactor installation (right).

Accomplishments Include:

- In Feb 2016 a meeting was held between UIUC administrators and extension, the faculty research team, the tenant farmers operating the DS farm, and a potential tile drainage contractor to discuss long-term project goals and logistics of tile installation and crop management.
- A working relationship with the researchers and tenant farmers who will be responsible for planting, weed and pest management, and harvesting the experiment each year was established, and the lease between the tenants and the University was updated to meet the project goals.
- An initial tile drainage and bioreactor design was created and approved by project researchers in March/April 2016.
- A **field day** introducing the new project was conducted at the site on June 15<sup>th</sup> in combination with a cow-calf meeting. All four project participants presented and received good questions and feedback (Fig. 3).
- A **field day** was conducted on Aug 19<sup>th</sup> in combination with the Soil Health Partnership as well as the NREC Council, again with the goal of introducing the project and gaining feedback from local stakeholders.
- Additional proposals have been submitted to leverage the research infrastructure and make additional measurements at the site. **One proposal collaborating with the Christian County Farm Bureau was successful** (2017 Illinois Farm Bureau Nutrient Stewardship Grant), and another is in progress as part of a larger 4R nutrient management project covering multiple tile drainage research sites in the Midwest.
- The novel bioreactor design was **featured in the Spring 2017 AdvanCES in Research magazine:** *“Bioreactors are ready for the big time”* (Quinn, L.; pp. 48-49), available at: [http://research.aces.illinois.edu/sites/research.aces.illinois.edu/files/reports/2017\\_AdvanCES\\_in\\_Research.pdf](http://research.aces.illinois.edu/sites/research.aces.illinois.edu/files/reports/2017_AdvanCES_in_Research.pdf).
- Several meetings have occurred with different stakeholder to define representative 4R nutrient stewardship and cover crop practices that are recommended for reducing nutrient losses while maintaining or increasing yield in continuous corn systems.



**Figure 3.** Photos from the June 15<sup>th</sup>, 2016 field day at the site. Dr. Laura Christianson discussing the IL NLRs (left), poster describing overall goals of the experiment (middle), and Dr. Rabin Bhattarai discussing how models can be used to upscale results (right).

### *Benefits to environment, crop production, and economics of Illinois Agriculture*

Results from this project will provide much-needed information on the potential positive and negative impacts of water quality BMPs that growers are being encouraged to adopt as part of the IL NLRs. This experiment is the first of its kind spanning in-field nutrient management, in-field cover crop management, edge-of-field remedial practices, and modeling to provide a holistic assessment of promising pathways for reducing nutrient losses while maintaining crop production goals and economic profitability in Illinois agriculture.

Treatment	N rate	P and K mgmt.	Cover crop	Strip till	Fall N	N at planting	Sidedress N
Unfertilized control				X			
Conventional	MRTN	Broadcast		X	140 lb N (NH <sub>3</sub> )	60 lb N (UAN) <sup>1</sup>	
4R management	MRTN	Broadcast		X		60 lb N (UAN) <sup>2</sup>	140 lb N (UAN) <sup>2</sup>
4R + cover crop	MRTN	Broadcast	Cereal rye	X		60 lb N (UAN) <sup>2</sup>	140 lb N (UAN) <sup>2</sup>

**Table 1.** Description of N fertilizer and cover crop treatments to be implemented in Fall 2017. The MRTN rate for continuous corn in central Illinois is 200 lb N/acre. All plots will be strip tilled in the fall. <sup>1</sup>For the conventional treatment, UAN will be applied at planting as an herbicide carrier or 2x2 with the planter. <sup>2</sup>For the 4R treatments, a portion of N applied at planting or sidedress may either be UAN or a stabilized N source such as Agrotain.