



Objectives: 1) To develop a comprehensive set of trials to look at effects of cover crops in both on-farm and REC sites, 2) To measure the effect of cover crops in scavenging N and sequestering nutrients in their biomass, 3) To evaluate the effect of cover crops on commercial crop stands and yields, and on economic returns, and 4) To evaluate the effect of tillage on crop and soil responses to cover crops.

Preliminary results:

Important -yet preliminary- results indicate that there exists a substantial amount of nitrate in the field during the fall and spring seasons yet the variability between years is now more evident (**Figure 1**), in particular following the corn crop (**Figure 2**). There are on average about 35 lbs/acre of nitrates in the top 2 feet of soils from fields during the fall of 2013, particularly important coming out of corn production. Yet the levels of nitrate went down to about 15 lbs/acre of nitrates the next fall 2014 with almost no differences between corn and soybean fields in the entire 3 ft of depth. The overall profiles of soil nitrate are strikingly similar for bare fallows and cover crop rotations (**Figure 3**). Yet the rotations including cereal rye seemed to do better at reducing soil nitrates particularly in the spring and fall of 2013.

Regarding cash crop yields, soybean was not affected by cover crop treatment showing yields between 51 and 52 bu/ac on average among locations and years. Corn yielded 180bu/ac on average, yields were in general higher under tillage, and it was slightly negatively impacted when grown after ryegrass regardless of tillage option. **Figure 4** shows the results on yield for the Urbana site where these effects are clearly shown. Please remember that this is preliminary data and having more years of research will allow us to have a realistic assessment of the cover crop potential to affect yields and scavenge N.

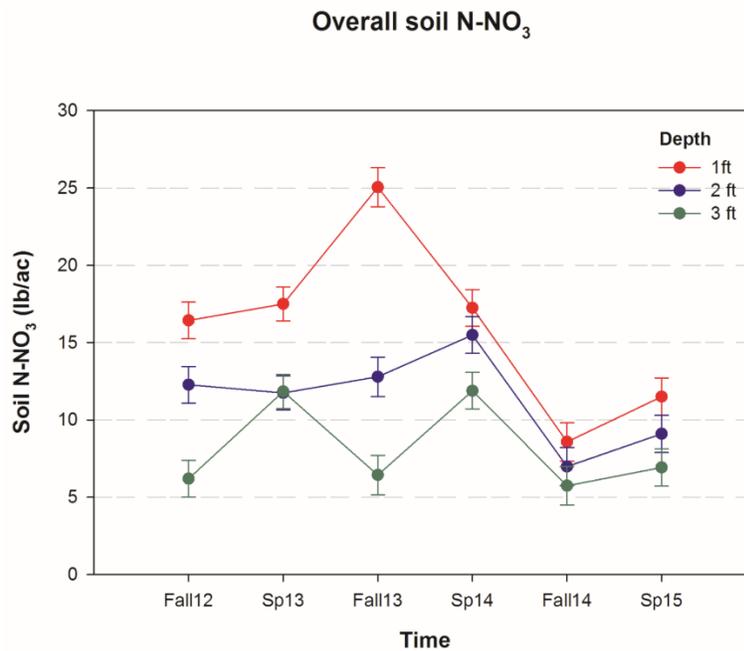


Figure 1. Soil nitrate concentrations at successive depths at each sampling time across four locations.

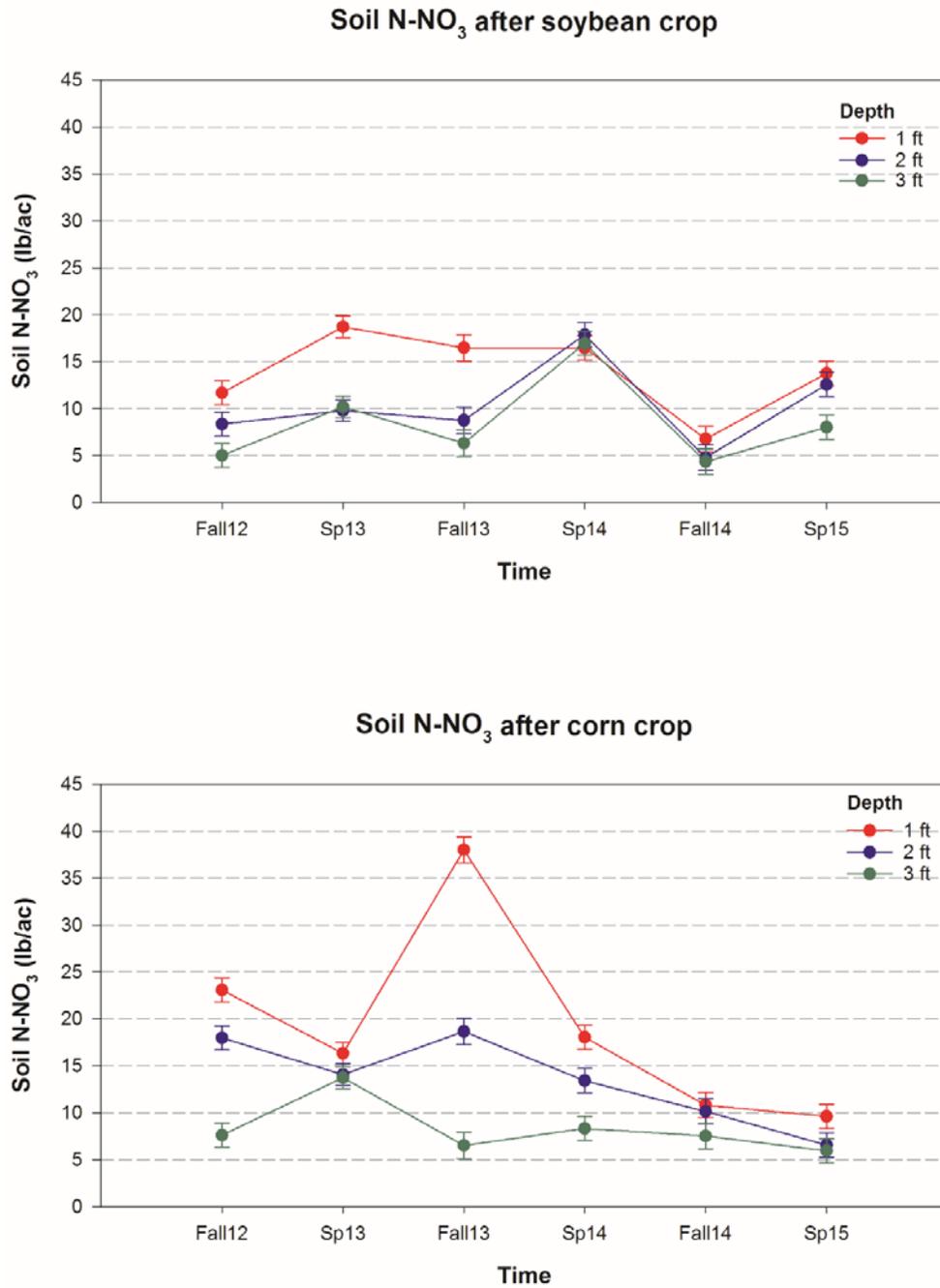
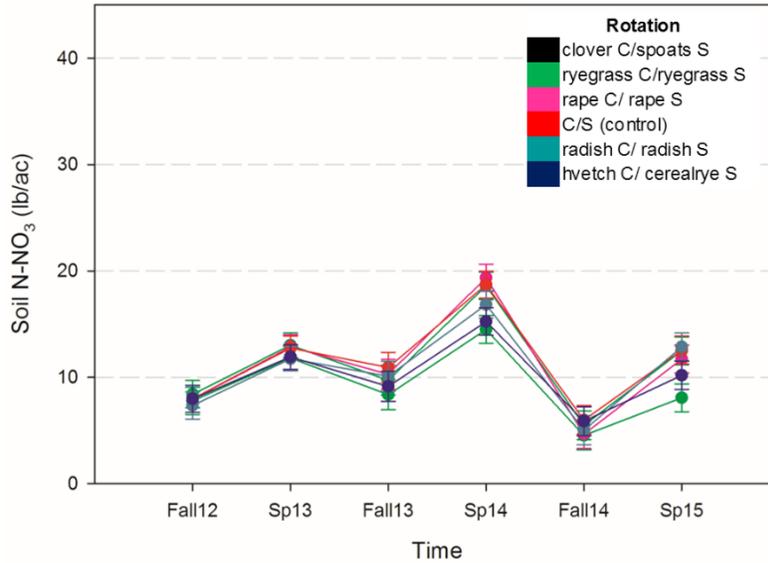


Figure 2. Soil nitrate concentrations at successive depths following the soybean and the corn crops at each sampling time and across four locations.



Soil NO₃ for rotations after soybean crop



Soil NO₃-N for rotations after corn crop

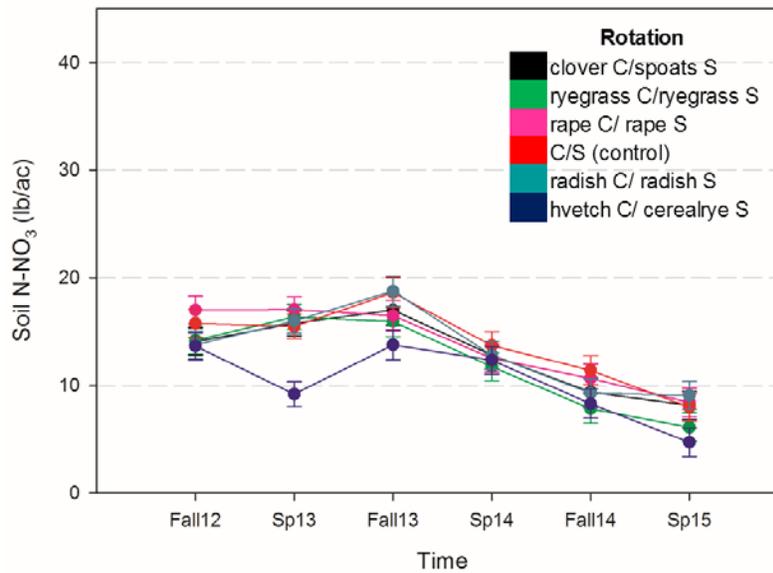


Figure 3. Soil nitrate levels following soybean (above) and corn (below) crops in each of the rotations including cover crops at each sampling time and averaged across the entire depth.



Crop yields in cover crop rotations

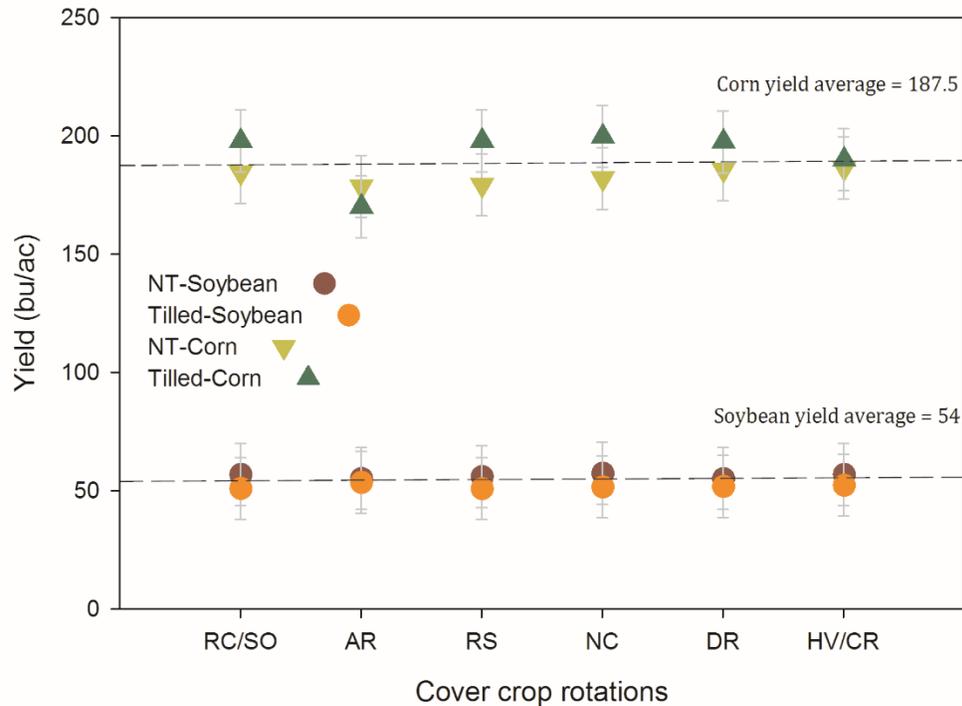


Figure 4. At the Urbana site, corn and soybean yields in rotations including cover crops with and without tillage and averaged over the last two years. RC/SO, red clover C/spring oats; AR, annual ryegrass C/ annual ryegrass S; RS, rapeseed C/ rapeseed S; NC controls with bare fallows C/S; DR, daikon radish C/ daikon radish S; and HV/CR, hairy vetch C/ cereal rye S.

Outreach:

Dr. Villamil had the opportunity of sharing results from this project at the Crop Management Conferences held at Champaign, Malta, Mt. Vernon, and Springfield, during Jan-Feb 2015.

- Cover Crops in Illinois Row Crop Production: Answers or Just More Questions? Crop Management Conferences.

Mr. Ivan Dozier presented the results of his MS thesis supported by this project at the ASA-CSSA-SSSA Annual conference in Minneapolis, MN, Nov 16-18:

- Dozier I, Tillage and Cover Cropping Effects on Soil Properties. Oral session.

Mr. Dozier has successfully passed his oral defense on January 2016. A manuscript summarizing his finding is under preparation for submission to *Agronomy Journal*.

Budget updates: A revised budget for Y4 has been submitted to the NREC Board.

Selected high resolution pictures from this project are in a folder in BOX with descriptions included in their titles. The folders are shared with this link

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