

# Integrating Cover Crops and Manure in No-Till Cropping Systems

**Blight Farms, Albion, MI**

**August 26, 2011 10a.m. -12 noon**

There are many soil and water conservation challenges to the environmentally sound and economically viable use of manures on agricultural land. Soil erosion can be a problem, due in part to the slow adoption of no-till cropping systems by livestock producers because of the need for intensive tillage to incorporate manure for efficient nutrient recovery. On the other hand, liquid manure is often applied on untilled ground after corn silage harvest even though the soil is compact from harvest traffic and there is little crop residue to protect the soil from runoff and erosion. Although cover crops can trap nutrients and provide a vegetative barrier to overland flow, producers are often too busy with harvest and manure application to seed a cover crop in a timely fashion. There is a need for new manure management options that are compatible with no-till planting and cover crops in livestock-based cropping systems.

A new, no-till compatible manure application and cover crop establishment method--*manure slurry seeding*-- has been developed at Michigan State University. Manure slurry seeding combines low-disturbance aeration tillage, liquid manure application and the seeding of cover crops in one efficient operation. In one pass, cover crop seed that has been mixed with liquid manure in the spreader tank is delivered through drop-tubes to the fractured and loosened soil behind each set of aeration tines. A cover crop soon emerges, capturing nutrients and forming a vegetative barrier to overland flow.

The demonstration plot at the Blight Farms is funded by a **Conservation Innovation Grant (CIG) from the USDA Natural Resource Conservation Service**. A companion site funded by the **Great Lakes Commission Soil Erosion and Sedimentation Control**



**Figure 1. Cover crop seed is mixed directly with the nutrient-rich slurry.**



**Figure 2. Oats and turnips slurry seeded with swine slurry on August 6, 2010. Picture taken September 17, 2010.**

**Task Force** is evaluating nitrogen cycling in no-till/cover crop systems at Crumbaugh Farms in Gratiot County, MI.

In early August, 2010, strips of oil seed radish (OSR) alone, or an oat/turnip combination were sown at the Blight Farm by slurry seeding or by no-till drilling and applying 3000 gal/acre swine slurry over the top of the drilled crop with aeration tillage. The seeding rate with both was 12 lb/acre OSR or 2 bu/acre oats plus 2 lb/acre forage turnip. The cover crop yield with each seeding method was similar (Figure 5). In 2011, based on what we learned at the Crumbaugh Farm site in Gratiot Co., we added a grass cover to the OSR to improve nitrogen retention and release in synchrony with crop needs.

Slurry seeding is an environmentally sensitive option for manure management in no-till cropping systems and soil and water quality improvement in all cropping systems. This new process alleviates seedbed compaction; reduces erosion by increasing surface roughness, improving water infiltration and conserving crop residues; improves nutrient cycling; and mitigates contaminant loss to the environment through tile drains by disrupting the continuity of soil macro-pores. Soil quality is enhanced by reducing tillage intensity and adding organic inputs - manure and cover crops-- that stimulate soil building biological processes. Because slurry seeding combines low-disturbance tillage, manure application and seeding in one operation it provides fuel savings (more than 2 gal per acre) and labor savings (more than 0.35 hr per acre) compared to conventional cover crop seeding practices.

A short video of the cover crop seeding at Blight Farms in 2010 is available on YouTube at [http://www.youtube.com/watch?v=3st0qZ\\_3vH0](http://www.youtube.com/watch?v=3st0qZ_3vH0) Or, navigate to YouTube and search for “Slurry Seeding Blight Farms”.

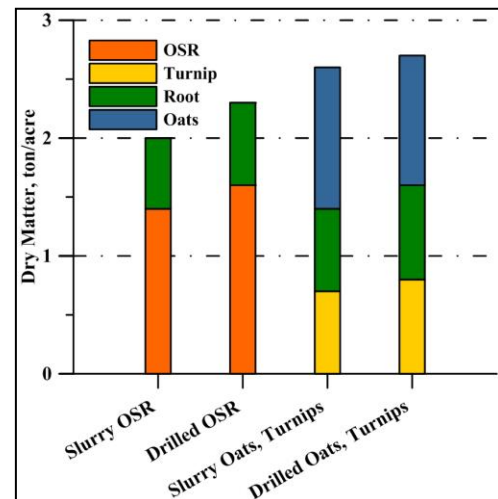
The authors are: **Dr. Tim Harrigan**, Biosystems and Agricultural Engineering; **Ms. Natalie Rector**, MSUE Extension, and **Dr. Dale Mutch**, Kellogg Biological Station and MSU Extension, Michigan State University. August 26, 2011.



**Figure 3. Oat/turnip mix no-till drilled with slurry and aeration tillage after drilling. Sept. 17.**



**Figure 4. OSR (left) and forage turnip root growth, Sept 17.**



**Figure 5. Cover crop biomass yield, 2010.**