NORTH JERSEY RC&D
Resource Conservation & Development

SOIL HEALTH DEMONSTRATION & RESEARCH TRIAL

Innovative Strategies for Cover Crop Termination

This farmer is planting corn into a field of crimson clover cover crop. The clover converts atmospheric nitrogen from the air into plant protein; when the plant dies, the nitrogen is released into the soil for the corn to uptake. This practice reduces the need for inputs.

Soil surface immediately after planting corn using “Planting Green” method.

An examination of innovative farming practices that aim to increase resilience and sustainability and lock more carbon into the soils

EXISTING COMMON-PLACE AGRICULTURAL MANAGEMENT PRACTICES

TILLAGE BASED SYSTEMS

Conventional tillage and organic management systems typically rely on tillage to prepare the soil for seeding: equipment like plows and disks turn over the top 6-10 inches of the soil, blending it with residues and fertilizer to create a loose, soft, uniform, aerated soil profile.

- **Destroys the soil's natural structure:** Loose and crumbling topsoil is prone to erosion and compaction. This reduces soil's productive capacity and increases stormwater run-off and erosion.
- **Accelerates organic matter decomposition:** The oxygen introduced during tillage accelerates organic matter decomposition, exacerbating carbon loses.
- **Does not require herbicide to kill cover crop and weeds.**

NO-TILL MANAGEMENT SYSTEMS

No-till farming does not disturb the soil's structure. Residues from previous crops remain on the soil surface, and seeds are planted in narrow slits using specialized equipment – either a no-till planter (above) or no-till drill.

- **No-till soils are more resilient** and better able to withstand both storms and droughts. Minimizing soil disturbance encourages a natural soil structure, that is less prone to erosion and better able to absorb and infiltrate water.
- **No-till management systems are more sustainable.** Nutrients are cycled more efficiently and are less prone to loss. Soil organic matter is more protected from decomposition.
- **Generally, no-till requires herbicide to kill cover crop and weeds**

COVER CROPS

Cover crops are typically grasses and clovers, seeded in the fall, destined not to be harvested -- but sown for the benefit of soil health. During the winter and early spring, cover crops suppress weeds, prevent soil erosion, and help build and improve soil fertility and quality.

Under traditional management, cover crops are killed through herbicide or tillage in the mid-spring, paving the way for corn, soybean, and vegetable crops.

The degree to which cover crops contribute to soil health improvements depends on the selection of cover crop species and the planting and termination practices used.

INNOVATIVE
AGRICULTURAL MANAGEMENT PRACTICES

PLANTING GREEN

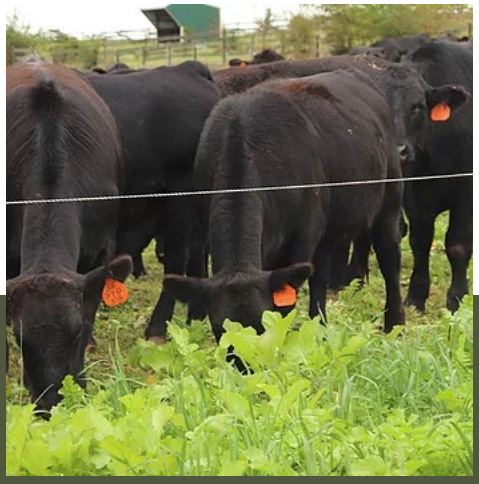
"Planting Green" is a type of no-till management wherein the "cash" crop is planted into actively growing cover crop before killing it with an herbicide. This advanced soil health practice allows cover crops to grow longer, maximizing above and below ground biomass.

This large quantity of cover crop creates a soil mulch that maximizes soil cover between developing cash crop seedlings. This prevents erosion, reduces soil evaporation, and discourages weeds.

ROLLER CRIMPING

"Roller-Crimping" is a means of mechanically terminating the cover crop by crushing and snapping the plant when the cover crop is more mature. Farmers use no-till equipment to plant directly into the thick mat of vegetation before, during, or after roller-crimping.

It is one of few no-till methods suitable for organic agricultural production because it doesn't rely on herbicide to kill the cover crop. Implementation is challenging because few cover crop species are suitable and the cover crops need to be very mature to be killed with crimping alone, thus preventing planting until late spring.



GRAZING COVER CROPS

Intensively grazing cover crop with livestock can provide high-quality feed for animals and fertilizer for fields. Integrating livestock into crop systems accelerates soil health improvements.

Fields need to have a water source and perimeter fence. Grazing alone will not kill cover crops. Farmers must use tillage or herbicide to prepare the field for planting after grazing.

BENEFITS OF INNOVATIVE PRACTICES

- **Carbon Sequestration:** Cover crop biomass can double in two weeks during the spring, dramatically increasing the amount of carbon captured from the atmosphere and the potential to sequester soil carbon.
- **Drought Resistance:** The thick mat of cover crop residues keeps soils cooler and reduces evaporation from the soil.
- **Protection from Extreme Storms:** The cover crop protects the soil from wash-outs during the growing season, preserving soil fertility and reducing the risk of excess nutrient run-off damaging local water quality.
- **Reduces Nutrient Application Needs:** As the cover crop decomposes, it slowly releases nutrients into the soil. Clover and other legumes will fix atmospheric nitrogen when allowed to reach maturity.

IMPEDIMENTS TO ADOPTION

- **Cover Crop Establishment can be Difficult:** Establishing a robust stand of cover crop in the fall requires specialized equipment and a timely harvest.
- **Equipment Expense:** Innovative cover crop termination requires specialized, expensive equipment which producers may be hesitant to invest in without experience implementing the practices.
- **Complex Nutrient and Pest Management:** Farmers need to adjust their nutrient and pest application practices in response to the larger and more mature cover crops.
- **Often delays cash crop planting,** particularly when roller-crimping or grazing, which reduces yield potential.

Photo Description: Farmers planted soybeans in both sides of this field the day before this picture was taken. In the "control" (left side) the cover crop was terminated early, weeks before planting. The "treatment" field (right side) has 4 foot tall cover crop into which cash crop was "planted green".

ON-FARM RESEARCH TRIAL

WHAT IS BEING STUDIED?
This trial will examine the economic, social and soil health impacts of alternative cover crop management strategies. Farmers enrolled in the study will compare their traditional cover crop management strategies against (1) planting cash crops through green, growing cover crops, (2) grazing cover crops, or (3) using a roller-crimper to kill the cover crops. North Jersey RC&D will carefully analyze farmer records, soil characteristics, and crops to determine long-term practice efficacy.

PURPOSE
This project will quantify the impact of the innovative treatments on soil carbon, microbial communities, and nutrient management dynamics. It will use the insights and experiences of 25 participants to hone practice implementation guidelines.

WHO ARE THE FARMERS
Twenty-five diverse farms are participating in this study, including grain farms, small- and mid-scale vegetable farms, and livestock operations – both conventional and organic -- spanning over 1500 acres in northern New Jersey in Hunterdon, Morris, Warren, Somerset, and Sussex counties.

PROJECT LEAD
North Jersey RC&D

PROJECT FUNDER
- USDA's Natural Resources Conservation Service (NRCS) CIG On-Farm Conservation Innovation Trial ($933,000)
- Additional funding for the project was provided by the William Penn Foundation and National Fish and Wildlife Foundation.