



Small Farm Field Day

Funding provided by Golden LEAF Inc.

NO-TILL VEGETABLE PRODUCTION

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OBJECTIVE — The purpose of this demonstration is to show that no-till production of vegetables in killed cover crops is a viable management tool for vegetable producers and contributes to soil quality.

OPPORTUNITY — Wind and water erosion, depletion of organic matter, and nutrient losses by runoff and leaching are commonly associated with poor quality soils and symptoms of poor soil management.

Extensive cultivation clearly contributes to organic matter and nutrient losses from soils and to erosion. Accompanying these losses has been a degradation of soil physical properties; for example, decreased porosity, aggregation, and water-holding capacity. Leaving crop residues on the soil surface protects soil from the erosive forces of heavy rains, particularly on highly erodible Southeastern soils. The proper incorporation of sound, sustainable principles for crop production, in conjunction with conservation tillage, offer a primary opportunity for maintaining and enhancing soil quality and long-term sustainability of Piedmont soils cropped to vegetables.

METHODS — Crimson clover, hairy vetch, and cereal rye cover crops were seeded into a highly erodible field in the fall. In May, the cover crops were killed by rolling, mowing, and chemical burn down. The field was seeded with sweet corn and pumpkins into killed strips. Pumpkins were also seeded into killed foxtail millet, which was seeded into a section of the killed winter cover in early June. Vegetable seed was planted with a Monosem, no-till seeder with appropriate plates.

DISCUSSION — Switching from conventional tillage to a no-tillage system increases soil organic matter content, especially at the surface and in the top 2- to 4-inches. Plant roots, therefore, tend to proliferate in the top two inches. Under no-till cultivation soil organic C, total N content, and soil microbial biomass C and N are increased, even in the absence of additional organic amendments. This stands in stark contrast to long-term conventional tillage, which usually causes decreases in these parameters. In many cases, soil organic C concentration can be as much as 50% greater under no-till than under conventional tillage. Knowledge of seasonal changes in active C and N pools is important for understanding how production systems can be better managed to minimize losses of inorganic soil N and to increase soil N availability. Increases in soil organic matter that result from no-till practices are central to nutrient cycling in C and N pools by soil microbes. Adoption of conservation tillage practices may also result in decreased atmospheric CO₂ emissions because of sequestration of C in soil.