

## Conservation Tillage Systems and Liming Materials

Gene Stevens and David Dunn

### Objective:

- (1) Determine the soil depth that surface applied lime in conservation tillage systems will neutralize soil acidity on clay and silt loam soils.
- (2) Evaluate calcitic (white) lime and dolomitic (red) lime materials in no-till and strip-till corn/soybean rotation systems.

### Current status/importance of research area:

The adoption of conservation tillage systems continues to increase across Missouri. However, no-till and strip-till farmers have expressed concern that lime may need to be incorporated with conventional tillage equipment to neutralize soil acidity below the 0 to 2-inch soil depth. Research at the University of Tennessee Milan Experiment Station showed that surface applied lime on a no-till field effectively increased soil pH in the soil profile. However, this study was conducted on a loessial silt loam soil with good internal drainage. Whether the same would be true on a poorly drained Sharkey clay soil is not known. Solubility of the liming material may also be a factor. Tests with conventional till cotton at the University of Missouri Delta Center showed that dolomitic lime increased soil pH slower than calcitic lime, but both types of lime resulted in the same amount of cotton yield increase.

### Procedure:

Tests will be conducted at two locations with low soil pH levels (less than 5.0). Fields on the University of Missouri-Delta Center with Sharkey clay and Tiptonville silt loam soils will be used. Soybeans and corn will be grown in rotation with soybeans planted on one site and corn planted on the other site in 2002. A split-plot design will be used with no-till, strip-till and conventional till main plots. Soil  $\text{pH}_{\text{salt}}$  and Woodruff buffer pH will be used to determine the recommended amount of ENM needed to raise the pH to the 6.1 to 6.5 range. Liming materials will be obtained from local dealers and tested for ENM value. Sub-plot treatments will be the recommended rate of calcitic lime, recommended rate of dolomitic lime, and an untreated check. These will be surface applied in the Spring of 2002 before any tillage is done.

At planting each year, soil cores will be collected from the 0 to 36-inch soil depth. The cores will be cut into 2-inch increments and tested for soil pH and extractable Mn. During the growing season soil samples will be collected and tested bi-weekly from the 0 to 2-inch, 2 to 4-inch, and 4 to 6-inch soil depths. Soybeans or corn leaf tissue samples will be collected at the beginning of reproduction each year. Samples will be tested for Mn and Al contents in the tissues. Plots will be mechanically harvested for yield.

**Timetable for proposed research:** The study will begin on April 1, 2002 and end December 31, 2004.

**Strategy for application/transfer of knowledge:** Preliminary results will be shown at extension grower conferences and at the annual Delta Center field day. When the test is completed, a final report and extension bulletin will be written. If needed, results will be used to modify soil test recommendations.

**Proposed budget:**

Expenses	Year		
	2002	2003	2004
Res. Specialist salary (0.4)	\$12,000	\$12,360	\$12,731
Fringe benefits	\$3,000	\$3,090	\$3,183
Supplies	\$1,000	\$1,030	\$1,061
Plant analysis	\$700	\$721	\$743
Travel	\$500	\$515	\$530
Total	\$17,200	\$17,716	\$18,248

Funds are needed to support the salary of a research specialist to help with the fieldwork. Supplies such as fertilizer, seed, herbicides, and chemicals in the soil test lab will need to be purchased. Travel funds will be needed for travel to research plots and to present results at meetings. Expenses are increased 3% annually for inflation.