

## ILLINOIS RECLAIMED SOIL PRODUCTIVITY: RESTORATION TECHNIQUES<sup>1</sup>

by

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**Abstract.** Consolidation Coal Co. (Consol) has nearly 8,000 acres of high capability and prime farmland reclamation responsibility in Illinois. It has been involved in research in the area of restored soil productivity since 1976 with the University of Illinois and Southern Illinois University, Carbondale. Consol maintains an intensive internal program to demonstrate and test deep tillage equipment.

The research and in-house demonstrations identified soil physical strength (compaction) as the main limiting factor to restoring a soil's productive capacity. There are two primary ways to address this issue, prevention and amelioration. The former was not an option for Consol because many acres were already reclaimed and the company had a major scraper fleet. Along with other operators in Illinois, Consol started an aggressive search for equipment and techniques that could loosen compacted soils.

In 1987 Consol was the first to use the D.M.I.-Super Tiger deep soil plow, originally developed and manufactured by D.M.I., Inc. of Goodfield, Illinois. This plow is composed of a single parabolic, static shank with a 44-inch wide sweep weighing 1,200 pounds. It is capable of plowing 48 inches deep while leaving the top soil in place. A Caterpillar D9L tractor with 460 horsepower is used to pull the plow. In 1990 the decision was made to commit to this equipment as the best technology currently available. In 1994 Consol received a patent waiver from D.M.I. to build its own plow. The Consol built plow has been in use since the summer of 1995. To date, Consol has plowed over 3,900 acres with a D.M.I. plow.

In summary, Consol's program for deep tillage after topsoil replacement is as follows:

- (1) Wheat is planted for the first two years. This allows for an intensive land leveling program following each harvest. During this time, the majority of surface water management structures (terraces and grass waterways) are constructed.
- (2) Alfalfa is established and maintained for a minimum of two to three years. Just prior to the plowing, the remainder of the build-up fertility is applied, based on variable rate technology sampling and application. Alfalfa roots can penetrate the dense clays and dry out the subsoils. This is important because the action of the plow is significantly enhanced when the subsoil is dry. The lifting motion of the sweep combined with the ground speed of the tractor does an excellent job of shattering the large massive blocks of high density clay, but only if the soil materials are dry.
- (3) The plowing season is limited to the driest part of the southern Illinois summers. Start-up is normally planned for the first two weeks in July, allowing time for the alfalfa to pump out the subsoil moisture gained during the last wet season. The plowing continues as late in the fall as possible. Consol plans to plow around 600 acres per year that normally includes one mobilization between mine sites. The best productivity for this combination of equipment has been around three quarters of an acre per hour. The contractor can usually run the plow for 20 to 24 hours per day.
- (4) After plowing, these fields are rough because the plow leaves a corrugated pattern in the soil surface. The soil peak in the plow path averages 21 inches above the original soil surface. The surface of the fields are re-leveled as quickly as possible through off-set discing and multiple passes with a field cultivator. If the field receives a three-inch rain or

less immediately following deep tillage, a long delay can result before an entry into the field is again possible.

The program, as described above, has been applied for over ten years and the cropping results have been very good. On soils that have been plowed with the D.M.I., there have been 130 fields, with a cumulative total of 4,000 acres, tested by the Illinois Agricultural Lands Productivity Formula. The results of this testing are as follows:

- (1) corn — 96 fields tested and passed 83.3 percent of the time;
- (2) soybeans — 20 fields tested and passed 85.0 percent of the time; and
- (3) wheat — 14 fields tested and passed 78.6 percent of the time.

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