

Workshop Title: How do Subsoilers Work in Various Soils?

Speaker & Title: Denis LaFrance, CETAB+

Executive Summary:

This presentation reviews the results of research conducted by CETAB+ focusing on a comparison of various types of subsoilers in various soils. The impact of the subsoilers is described and suggestions for producers are offered on successful subsoiling options.

Detailed Notes

Denis emphasized that compaction is a serious problem in agriculture. Often poor management decisions result in damage to the soil. Farmers need to be very sensitive to the affects their interventions have on soil structure.

Often the negative consequences of compaction don't show up right away in a field. The beneficial affects of subsoiling can disappear quickly if not properly maintained. One of the most important contributions of green manure crops to soil health is through the action of the roots of the plants. Good soil is characterized as fifty percent roots and air. Improved soil structure is the result of vigorous root development. Soils have to be loose and porous to facilitate good root development. Glacial soils like many of those in our region and in Quebec are naturally compacted.

Sometimes subsoiling is the only way to get good root development in clay soil. Analysis of soil is done primarily by preparing a soil profile this is done by digging a shallow trench (30cm to 60cm) in the soil to expose the soil structure. Denis recommends that all farmers should examine soil profiles on their farms so that they know the condition of their soils.

The goal of the research conducted over a three-year period was to use various subsoilers in established green manure plantings to determine their affect on soil structure.

Three straight leg narrow point subsoilers were used in the trials initially;

- Pan buster, mostly for hay fields and shallow application
- Parabolic type
- Yeomans

All tines were set at 20 cm spacing's and about 28 cm deep. The only one that went deeper was the parabolic machine.

Insufficient loosening of the soil profile was the result in the first trials. The next step was to work deeper with closer spacing of the tines. Deeper penetration results in a wider effect. The researchers had to develop a new machine with closer spacing of the tines and greater length of the tines. The pan buster was used in the second year as well as the Yeomans. In very compact soil the deeper tooth required the use of a 350 hp tractor.

**2015 ACORN Conference & Trade Show
Delta Prince Edward Hotel, Charlottetown, PE**

The project continued to research a wide range of subsoilers to find ones that would work well. Work with a high capacity parabolic subsoiler still did not produce results desired. It was found that at least 80 hp per tine was needed to pull the subsoiler. Still results were poor.

One solution was to go over the soil twice if the compaction was particularly heavy. Sandy soils would only require one pass. It was found that straight tines did not destroy the cover crop.

Closer spacing of the tines tended to break everything very effectively. The pan buster was found to be not great in clay soils. When wing points were added to the tines the soil breakage was much broader depending on the soil type. The ideal angle of the tines was 20-21 degrees. The greater the depth of the tines the greater the horsepower required to pull the subsoiler. A minimum of 50hp per tine for a 30cm depth was needed.

In general, it was found that subsoiling is site specific and results varied widely. Denis recommended that a producer should first dig a hole to examine the soil profile. Next try a subsoiler and examine the results. For a through treatment of this subject see the material available at CETAB.org. Denis prefers the parabolic subsoiler in most cases. The research team still has many questions.

Questions:

Q. Did you use tracked vehicles to pull the subsoilers?

A. No, we didn't but I expect that would provide more power and reduce the likelihood that the tines would just dig in.

Q. Did you see examples of slow incremental change on farms that stuck with this process?

A. Soil can be improved without using subsoiling but subsoiling is a tool we have available. Yes, improvements will result in general with continued use of subsoilers. Denis emphasized that caution needs to be taken when soil is moist or wet. Avoid being on the fields when they are wet. Serious damage is often the result of driving on wet soils.

Q. What does green manure bring into the system and what is its effect on soil structure?

A. Denis prefers to use rye grass. It is low in nitrogen but has a big effect on soil structure. Oats and peas have a much less positive impact on structure. Always select cover crops for what you want to accomplish in terms of soil improvement.

Q. Did your research include a control?

A. Yes.