

# Understanding Soil Compaction Can Up Your Yields

RACINE, Wisc. — Many misconceptions exist on how and why soil compaction takes place, which often leads to overly simplistic claims about cropping methods as well as agricultural equipment choices.

The most popular misunderstanding may be that all soil compaction is harmful. However, some compaction is vital for optimum crop yields.

Harmful compaction has many causes. No single factor, such as tractor weight, accounts for the different kinds and degrees of soil compaction. For example, some soil structures are quite susceptible to compaction. Other structures resist compaction. Some soils gain and lose compaction readily.

Farmers can better manage their choice and use of equipment when they understand soil compaction tendencies.

### Soil Structure

Soil particles vary in size from the coarsest sand grains to fine silt. Combined, these different sized particles create a countless range of soil mixtures that can create compaction occurring separately and simultaneously. Possible compaction locations are:

- a thin surface crust,
- throughout the tillage depth,
- a thin layer at the bottom of the regular tillage depth,
- in the subsoil.

Some soil compaction, properly located in the soil profile, is necessary for best crop yields. For example, surface soil must be adequately compacted around seeds to ensure that they are moist enough to sprout. Farmers want to manage equipment to enhance this

beneficial compaction without producing harmful soil compaction.

### Compaction Tendencies

To properly manage equipment, farmers learn and adjust to local soil compaction tendencies. Some examples of soil compaction tendencies are:

- coarse soils that may lack adequate seedbed compaction;
- coarse subsoils that may lack normal water holding ability (traffic can then actually increase yields);
- over-compacted silty-soil seedbeds that may cause seed rot;
- tillage depth compaction (plow pan) that can halt root growth;
- compacted subsoils with poor drainage that may prevent air from reaching plant roots and slow soil drying needed for harvest; or
- surface soils that tend to form large, hard clods, which can prevent proper planting and require wasteful tillage.

### Timing

Research has demonstrated that the timing and frequency of farmers' equipment use are more important factors in controlling harmful soil compaction than equipment size, tire choices or using tracked equipment.

The time available to plant or harvest without harmful soil compaction is often measured in hours rather than days. To help avoid problems encountered by unpredictable weather, many farmers choose high-horsepower, high-production machines.

"High horsepower-to-weight ratio tractors are prime examples of machines designed to help prevent harmful soil compaction," according to George Mueller,

manager of product information and training at Case IH.

"They enable farmers to quickly accomplish planting and harvesting in the narrow window of time that produces optimum yields."

These tractors are designed to operate efficiently at faster field speeds, producing high tractive efficiency with minimal harmful soil-compacting weight. Using the fastest appropriate field speed also reduces the amount of time the soil is compacted by tractor and implement weight. For example, a wheeled tractor farming at five miles per hour compacts any single soil location for only 0.4 seconds, which allows farmers to start and finish operations while reducing the possibility of creating harmful compaction.

Tractors with good horsepower-to-weight ratios also help farmers balance the pressure to plant early with the need to avoid working in compaction-producing conditions, such as waterlogged fields (see chart). Properly managing this balance applies year-round to all sizes and types of equipment, including fertilizer spreaders, tracked vehicles, combines and grain carts, Mueller said.

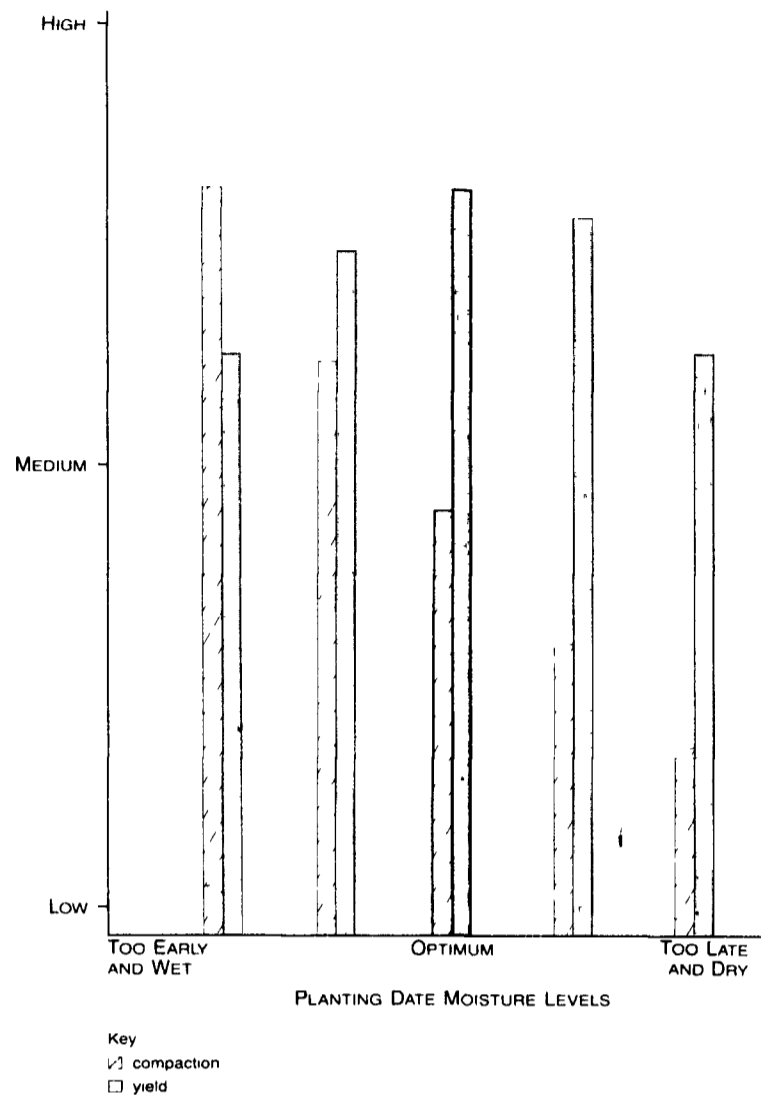
### Field Traffic

Another immediate benefit to using high-horsepower-to-weight tractors is a reduction in the number of necessary field trips. Such tractors not only operate wider implements, but can also operate more implements at one time to reduce compaction-causing field traffic.

"Harmful soil compaction is inevitably reduced or even eliminated when field trips are kept to a minimum," Mueller said.

"Tillage, planting and harvesting wheel tracks." For example, a six-row-wide equipment that works a wide swath helps reduce the number of (Turn to Page A18)

TILL AND PLANT TO DEVELOP MODERATE COMPACTION AND HIGH YIELD



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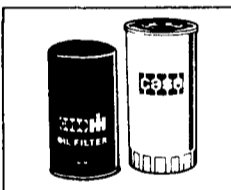
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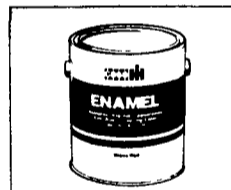
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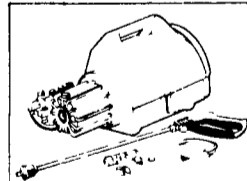
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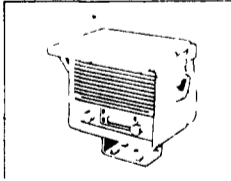
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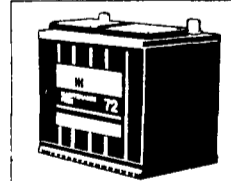
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