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Advances in seed and precision farming technologies are continuing to drive higher productivity and crop yields. Farmers are looking for any edge they can gain, and that's especially true during a time with commodity prices being low.

Research has shown that one of the most effective means of improving crop production is to reduce soil compaction. In recent years, tractors, sprayers and combines have all gotten larger. This trend toward bigger, heavier equipment has helped farmers cover more acres in less time, but often at the cost of increased compaction that can dramatically reduce crop production and yield performance.

When heavy equipment compresses the soil, the result can be restricted root growth, poor nutrient intake and stunted plant development, all of which can lead to lost yield. Compacted soil can also cause moisture runoff and soil erosion, taking a toll on environmental quality.

Benefits of low pressure tires

Heavy equipment, however, is only part of the equation. Contact pressure from equipment tires on the soil surface is another primary cause of soil compaction. Numerous studies have shown the benefits of IF (Increased Flexion) and VF (Very High Flexion) tires that can operate at a lower air pressure under increased loads, compared to standard radial tire technology.

Today's latest tire technologies enable farmers to carry up to a 40 percent heavier load at the same air pressure compared to standard radial technology, or the same load at 40 percent lower pressure. Reduced pressure results in a larger footprint, spreading the weight of the machine over a larger area to reduce compaction. The larger footprint also allows for better traction in the field, less slippage and improved fuel economy.

Results from two independent studies at Universities have proven yield gains using Michelin Ultraflex tires. Recent research has illustrated how designing agricultural tires to work at lower pressure can improve soil protection and thereby boost crop yields. For example, researchers at Harper Adams University in the U.K. studied the productivity gains achieved on sample wheat plots over three years using farm machinery equipped with VF tires compared to standard radial tires. The study revealed a yield increase of up to 4 percent. And a separate 3 year study conducted by the University of Illinois (2015-2018) concluded with results showing 4.3% yield gains in corn using Michelin Ultraflex tires.

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Managing compaction

The best way to protect crop yield and feed quality is to be aware of the factors that cause soil compaction and takes steps to minimize it. Here are recommendations that can help boost farm productivity, feed quality and profitability.

- Compaction is greatest in wet soil, since driving on it causes slippage, ruts and deep compression. If possible, delay field work for a few days to allow the ground to dry longer, since drier soil is better able to withstand high axle loads and tire pressure. However, there may be an economic trade-off to take into consideration, since delays in planting or harvesting might have more significant consequences than compaction.
- Decreasing axle load and using tires that can operate at lower air pressure are two of the most important ways to reduce compaction. Utilize equipment that is as light as possible for your operation, yet still efficient in transferring horsepower to the ground without slippage.
- Use radial rather than bias tires, and duals to replace singles to further distribute machine weight. Larger diameter tires can help increase the length of the footprint to decrease tire contact pressure.
- Where possible, minimize the number of trips over the field and reduce the area of your field that is touched by equipment.
- Controlled traffic is also an effective way to manage compaction. This involves limiting heavy machinery to the same lanes through the field, year after year. The lanes become compacted, but machinery is never operated on the soil between the lanes. This is a very common practice in Europe and has been proven to increase yield by minimizing compaction.
- Central Tire Inflation Systems (CTIS) are proving to be an effective method to optimize performance of farm equipment, allowing you to set road pressure and field tire inflation pressures with a touch of a button. Common practice today is to set air pressures to the highest speed and heaviest load that the machine may encounter in its normal operation. With CTIS farmers can now run their tires at minimum required air pressures in the field, protecting their soil and on road, maximizing fuel efficiency. Michelin offers a range of tires that are designed to work with CTIS.

Protecting the soil is one of the best investments farmers can make in maximizing their crop performance and yield potential. While it may not be possible to avoid compaction entirely, it can be successfully managed with the right equipment and proper management practices.

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