

Crop Fertilization Helps Stabilize Carbon in the Soil

The primary role of crop fertilization has been and will continue to be that of increasing crop yield and quality. An additional benefit is improved environmental protection. It has been shown that proper fertilization results in fast growing, vigorous plants that rapidly close their above-ground canopy to protect the soil from the effects of wind and water—and thus runoff and erosion. Also, healthy crops develop massive root systems that help to hold the soil in place.

Another environmental benefit of fertilization is that it contributes to the stabilization of carbon (C) in the soil. Carbon dioxide (CO₂) is one of the three primary global warming gases. When C is tied up or stabilized in the soil, the release of CO₂ into the atmosphere is lowered, thus reducing the potential for global warming.

There is strong evidence that there is a relatively stable sink of CO₂ in North America. For example, the U.S. exports more C in agricultural and wood products than it imports. Further, it stores about 500 million tons of C annually in forest and non-forest soils. Indications are that the agricultural sector is storing more C in soil organic matter and crop residues than it once did, in part due to use of conservation tillage and crop fertilization.

A proper nutrient management system, one that considers existing soil fertility and the need for supplemental fertilization, aids in the capture of atmospheric CO₂, improves photosynthesis, enhances the release of oxygen into the atmosphere, and increases soil organic C. For example, research conducted by the U.S. Department of Agriculture (USDA) has shown that nitrogen (N) fertilization increases both soil organic C and the soil's productivity.

Extensive reports from long-term research indicate that whenever N fertilization results in higher crop yields, the accumulation of C in soil organic matter also increases. Furthermore, there is evidence that N itself is chemically involved in the stabilization of soil C. It is thought that N compounds are involved in the formation of humus and, as a result, help to stabilize C in soil organic matter. Other long-term studies have shown that soil organic C levels are highest when conservation tillage is combined with rotations of high residue crops and adequate fertilization to increase yields.

The role of crop fertilization in protecting the environment is undeniable. Helping to stabilize C in the soil is an important example. The key to the total benefit of crop fertilization—for yield and quality increases and environmental protection—is a sound fertilization program. **Proper nutrient management should be an integral part of every farmer's overall management program.** **EB**



Combining high residue crops with conservation tillage and sound crop fertilization contributes to an increase in soil C.