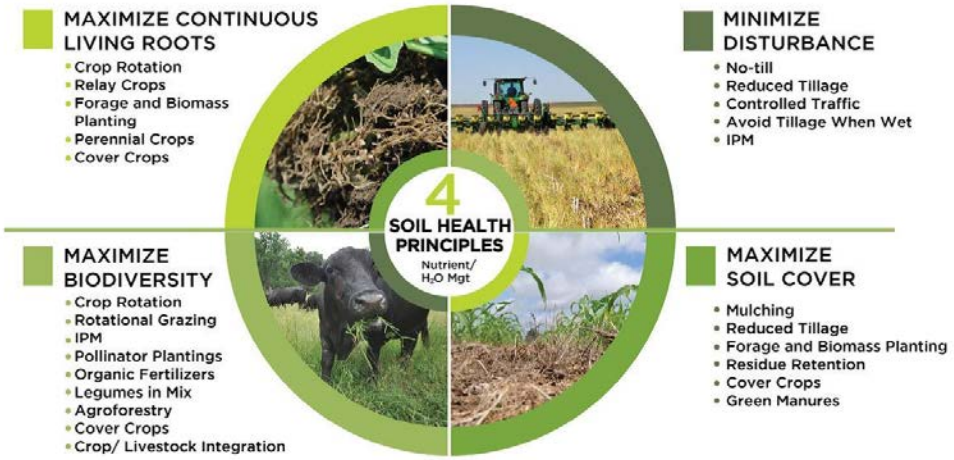
June 2023

Soil Health

Global Position

The Issue

Soil health is the continued capacity of soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain biological productivity, maintain environmental quality, and promote plant and animal health[1]. Improving soil health results in enhanced water and air quality, soil structure, biodiversity, soil organic carbon sequestration, disease suppression and greater productivity of food, feed, fiber, and fuel[2]. Soil health is critical to define long-term productivity, sustainability and profitability of agroecosystems in a changing climate.



[3] Management plans that include minimizing disturbance of the soil while maximizing soil cover, biodiversity and the presence of living roots are interdependent principles that optimize soil health.

Nutrien's support of the Natural Resources Conservation Service four Soil Health principles[4], as shown above, is embedded in our company's purpose to grow our world from the ground up. Healthy soil is the foundation for life on this planet and is a grower's greatest asset. Our leadership in nutrient management and environmental science supports our growers in cultivating healthy soils. Nutrien Ag Solutions, has acquired tools and expertise that utilize technology, data, analytics and agronomic experience which allow us to work with our growers to enable best decision-making for long term integrated soil health management.

Our Approach

Focusing on soil health requires an integrated systems approach. Nutrien Ag Solutions is able to provide our customers a broad suite of proprietary products and solutions, customized to each grower to optimize their soil's health and productivity for today and in the future. Nutrien Ag Solutions has direct access to innovative technology, products and diagnostics, along with the leading team of experts committed to advising growers on agronomic solutions to optimize soil health. We have more than 3,300 agronomists and field experts working directly with growers from 2,000 global locations. Our experts, in partnership with our grower customers, provide agronomic advice each growing season. Agronomists follow the 4R nutrient stewardship framework of nutrient management and conservation:

- Using the right source of nutrients;
- the right rate;

[1] Doran, J.W., Zeiss, M.R., 2000. Soil health and sustainability: managing the biotic component of soil quality. Appl. Soil Ecol. 15, 3–11.
[2] North American Project to Evaluate Soil Health Measurements, Soil Health Institute, April 2020, https://soilhealthinstitute.org/north-american-project-to-evaluate-soil-health-measurements/
[3] Soil Health Management to Reduce Climate and Weather Risks in the Northwest, USDA, May 2020 https://www.climatehubs.usda.gov/image/soil-health-principles
[4] https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health

- at the right time; and in
- the right place,

to achieve balanced soil nutrition, maximize nutrient use efficiency, increase soil health and minimize environmental impact from direct and indirect GHG emissions.

With 7 agricultural labs in North America that test field materials (soil, plant tissue, and water), Nutrien's analytical testing capabilities allow for a comprehensive approach to providing a custom solution for our clients. Soil testing is one of our diagnostic tools that enables us to make site-specific recommendations for growers with products that supplement and optimize nutrient balance and recycling in the soil. Digital agronomy combines geographic (location, field history) and agronomic information (crop physiology, soil characteristics, pest/disease impact), environmental data (precipitation, temperature), weather forecasting to make field specific recommendations for growers. Through our industry-leading platform, the Nutrien Ag Solutions Digital Hub, crop advisors can access location, data science and agronomic information to provide the best advice to growers on which products to apply, how to apply them, when to apply them, and at what use rates, based on current and predicted conditions.

Mineral and organic nutrient sources provide biological system support. Nutrien continues to develop and support the use of a variety of biological products, enhanced-efficiency fertilizers to reduce nitrogen losses to the environment according to site-specific soil, environment, and management conditions.

When fertilizers containing nitrogen and phosphorus are improperly applied to crops, some nutrients may leach into groundwater or reach surface water by runoff. Nutrient enrichment of water bodies contributes to excess algae growth and reduced oxygen availability, which can adversely affect water quality and aquatic life. Fertilizer production and use have complex and conflicting impacts along our value chain. Fertilizer, especially nitrogen, generates GHG and NH3 emissions. However, nitrogen is critical for healthy crops, soil organic carbon sequestration and increasing yields.

Summary

Nutrien promotes responsible management practices and nutrient-efficient products where appropriate to minimize the risk of nutrient runoff and leaching. Nutrien's integrated business enables us to utilize our strong connections with growers, as one of the ways to create meaningful reductions in GHG emissions through effective nutrient management and soil organic carbon sequestration at the field and farm level. We promote sustainable nutrient management for increased food production in an economically viable way while retaining the ecological integrity of food systems. We provide advice to growers that promotes the adoption of best practices in fertilizer application as well as the data and tools to calculate the nutrient needs of their soil and the return on their investment (ROI).

For additional information regarding Nutrien's ESG governance, risk management, strategy and performance related to product stewardship, please reference Nutrien's current ESG Report. Download here.