

# [***FORAGING AHEAD TO IMPROVING SOIL HEALTH***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:6BM5-2M71-JCBF-S02D-00000-00&context=1516831)

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Written By: Maeve Gifford

UNH research finds that regularly cutting forage crops can improve ***soil health***

Key Research Finding

Cutting forage crops like grasses and legumes more often can lead to increases in the amount of carbon in the ***soil*** and greater ***soil health***. The research found that five cuttings per year resulted in increased ***soil*** carbon pools when compared with three cuttings per year.

Key Terms

Carbon pools: Refers to the various forms of organic matter storage compartments within the ***soil*** where carbon is sequestered and stored, contributing to ***soil*** fertility, structure, and overall ecosystem ***health***. Expand for more information

These pools include living organisms, decomposing plant and animal residues, and stable organic matter, all of which influence ***soil***'s capacity to retain moisture, nutrients and support healthy plant growth.

Defoliation: The process of removing or losing the leaves of a plant. Expand for more information

This can occur naturally due to factors like seasonal changes, pests, diseases or extreme weather conditions, or it can be a deliberate agricultural practice carried out by farmers or gardeners for various reasons. In livestock farming, grazing animals like goats and cattle can defoliate plants by consuming their leaves. Farmers can also cut these plants to feed their livestock during other periods of time. Proper management of grazing or haying is essential to prevent over-defoliation, which can harm the vegetation and ecosystem.

Hydrolytic enzymes: Also known as hydrolases, they are a class of enzymes that catalyze chemical reactions in which water molecules are used to break down large molecules into smaller ones by cleaving specific chemical bonds. Expand for more information

Hydrolytic enzymes play a crucial role in various biological processes, such as cellular waste removal and the recycling of complex organic compounds.

Perennial forage systems: An agricultural or farming system focused on cultivation and management of perennial (i.e., continually occurring) forage crops for feeding livestock. Expand for more information

In this system, farmers grow and maintain perennial plants, such as certain types of grasses and legumes, which provide a consistent source of feed for livestock year after year. Perennial forage systems are commonly used in livestock farming, particularly for cattle, sheep, and goats.

***Soils*** are fundamental to food production and for the 97 percent of New Hampshire farms that are small family-owned and operated businesses, proactively managing and ensuring healthy, productive ***soils*** is key to long-term sustainability and viability in the face of weather and market uncertainties. Carbon-rich ***soils*** that help farm businessesby, for example, reducing their need for additional fertilizersalso benefit the ecosystems and watersheds that surround those agricultural operations. Recent research by New Hampshire Agricultural Experiment Station (NHAES) scientists Jessica Ernakovich, Rich Smith and Serita Frey adds to the best practices food producers can use to increase carbon in ***soils*** by more frequent cuttings of legume-grass pasture landsa practice that can more effectively cycle carbon and other nutrients into the ***soil***.

"These findings improve our understanding of how agricultural practices affect ***soil*** organic matter and demonstrate how agricultural ***soil*** can sequester carbon from the atmosphere, helping New Hampshire farmers to apply more sustainable management practices," said Cristhian dos Santos Teixeira, a UNH postdoctoral researcher and study co-author. "More ***soil*** organic matter is associated with higher water-holding capacity and nutrient availability, reducing the need for synthetic fertilizers, which lowers production costs."

The research team assessed how the cutting frequency of pasture grasses and legumes impacted ***soil*** carbon levels and carbon cyclingthe process of moving carbon between plants, animals and microbes; minerals in the earth; and the atmosphere, according to the Department of Energy. By comparing the frequency of cuttingsthree times per year versus five times per yearthe researchers found that increased cuttings resulted in an increase in areas where carbon is stored in the ***soil***, or organic carbon pools. The more frequent cuttings increased the activity of the enzymes responsible for breaking down organic matter in the ***soil*** and ultimately improving ***soil*** quality and ***health***.

"We know that ***soil*** organic matter is critical to the cycling of nutrients and can help buffer cropping systems against the effects of drought and extreme rainfall, both of which are occurring more frequently because of climate change." ~ Rich Smith, professor of Natural Resources and the Environment

The paper was published in Plant and ***Soil***, which, in addition to Teixeira, was co-authored by associate professor Ernakovich, professors Smith and Frey, and a team of other scientists in the UNH College of Life Sciences and Agriculture. The findings are particularly relevant to New Hampshire's livestock producers who can more effectively plan and adjust their animals' grazing schedules to bolster ***soil health*** and improve forage production.

According to Smith, identifying agricultural management practices that lead to an increase in and greater retention of ***soil*** carbon levels offers several advantages.

"We know that ***soil*** organic matter is critical to the cycling of nutrients and can help buffer cropping systems against the effects of drought and extreme rainfall, both of which are occurring more frequently because of climate change," described Smith. "Additionally, we know that agricultural practices that take up and store more carbon in the ***soil*** will help reduce the amount of carbon in the atmosphere, which is the primary driver of climate change. So ultimately, there is the potential to create a positive feedback loop that will not only benefit farmers, but the environment and society at large."

"In the future, we hope to examine the importance of legume types and the ratio of legumes to grass to offer additional insight into the varying impacts of defoliation frequency," said Teixeira. "It's also important to determine the longevity of the effect of defoliation on ***soil health***, as we are searching for management practices that are beneficial to ***soil health*** in the long term."

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This work is co-authored by Cristhian dos Santos Teixeira (G'), Buck Castillo, Lukas Bernhardt (G'), Nick Warren, Claudia Petry, Jessica Ernakovich, Rich Smith and Serita Frey.

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