

### ALFALFA: AN IMPORTANT PART OF AGRICULTURE'S FUTURE

*Emily Meccage, PhD., Forage Genetics International*

One of buzzwords around agriculture in recent years has been “sustainability” – what can farmers do to make their operations more sustainable for the future. Many are looking to incorporate cover crops, change up their continuous cropping rotations, or even add livestock where they previously were not used before. But one thing that is often overlooked is the benefit of adding a crop like alfalfa, and how it can affect your on-farm sustainability.



**AMERICA'S  
ALFALFA™**

There are many reasons why alfalfa has been known as the “Queen of Forages.” It is a highly nutritious crop, with many benefits to consuming livestock. It is a highly palatable forage, with high rates of digestion and elevated animal intake. Studies have shown that when alfalfa is included in a ration, dairy cattle will have higher milk protein production, as well as improved intake and digestibility. Additionally, because it is a great source of effective fiber as well as calcium, it also can carry a lower risk for rumen acidosis compared to higher-starch feeds. But besides these well-known animal benefits, what are other factors in alfalfa's case for sustainability?

Alfalfa's impacts on soil health have been widely studied for many years. Because it is a perennial, fields will require less tillage throughout the legume's lifetime, similar to perennial pastures. This decreased tillage often improves soil aggregation as well as carbon sequestration. Research has even found that when alfalfa is included as just a short-term rotation with corn and soybeans, the amount of soil organic carbon sequestered significantly increases over a continuous corn and soybean rotation. This increase in soil carbon means that soils can become a little more resilient to harsh environmental stresses, particularly important after what we have seen in recent years.

Another benefit of including a perennial like alfalfa is reduced erosion – a permanent loss of production potential. It achieves this not only by its perennial growth, but also because its extensive root systems help to hold the soil structure in place. This, on top of decreased cultivation, can help form a more stable soil environment. The deep and extensive root system of alfalfa also helps in improving water and nutrient penetration into the soil and improves overall soil tilth. It even helps build a healthy microbial system, as microbes are found in greater concentrations near roots compared to other areas within the soil. Also aiding in creating a more stable environment, alfalfa can help manage water tables, prevent nitrate leaching, and even mitigate chemical spills.

In the West, alfalfa is currently being used by many producers to help reclaim saline seep areas, or areas of very high salt concentration. These can occur for several reasons, but they are usually found in areas with high water tables that have a long history of cultivation. By planting alfalfa in what is called the “recharge area,” usually very close to the seep itself, alfalfa's deep taproots can help to lower the water table away from the soil surface. This helps slow the amount of salts moved upward through evapotranspiration to the surface.

Another huge benefit of alfalfa is the ability to add nitrogen to the soil via biological nitrogen fixation. As alfalfa is a perennial legume, it forms an important symbiosis with *Rhizobium* species. These *Rhizobia* form nodules on the taproots of alfalfa plants, which have the ability to utilize atmospheric nitrogen to convert to usable plant protein. When the nodules decompose, the nitrogen contained within them is then assimilated into the soil, available for the next plant.

When compared to other leguminous crops, alfalfa is queen in amounts of nitrogen added. If we take an annual legume such as soybean, research estimates that you can expect about a 40-lb nitrogen/acre credit, which is still useful when balancing fertilizer demands. However, when we compare this to alfalfa, research has found that it can provide up to 190 lbs nitrogen/acre, potentially over four times the amount of nitrogen produced from soybeans! Research has also found that this is not just a “one-time availability,” but rather there can be benefits seen for many years after the stand is terminated. While not every alfalfa stand will result in that much of a credit, as stand health, age, soil type, and management all factor in, it does demonstrate the tremendous role that alfalfa can play in fertilizer savings and management.

Those savings can lead to huge economic advantages when incorporating alfalfa into your rotation. In addition to helping diversify your on-farm portfolio, compared to a continuous cropping system, alfalfa also makes a lot of economic sense for many producers. Research has found that alfalfa productivity or yield is the largest determining factor in profit margins, but a healthy, vigorous stand that can be established quickly can significantly improve profits. Because alfalfa doesn't have a large nitrogen fertilizer requirement (except of course if you want to apply small amounts at establishment), this can help decrease overall costs of management. This does not mean that you can skimp on other nutrients, as alfalfa does have large requirements for nutrients like phosphorous, but it may allow you to cross one fertilizer off your list.

Alfalfa can be useful in not only adding nutrients to the soil but removing excessive levels of nutrients as well. Since it can consume high levels of nitrates in the soil, it has been used in fields that have a long history of problems with nitrates. This

can help decrease the amount of nitrates leaching into groundwater, as well as make fields “safer” when trying to grow nitrate-accumulating crops such as oats.

Finally, alfalfa is also an extremely important habitat system. It is home to hundreds of species of arthropods, as well as wildlife. Studies have found anywhere from 500 to 1,000 different species of insects living within a single alfalfa field! Wildlife also rely on alfalfa fields as sources of food, from insects to small mammals, as well as large areas for hunting. It provides great cover due to its dense canopy for insects and small mammals, which can in turn attract predators such as hawks, owls, and snakes. Mammals including deer and antelope often use alfalfa fields as a foraging source, which may or may not be a good thing depending on who you ask.

Pollinators also play a critical role in alfalfa production. Alfalfa is attractive to many different pollinator species. Alfalfa seed producers rely on species such as leafcutter and alkali bees to help with alfalfa pollination. Without these critical species, seed production as we know it would not be possible.

Overall, alfalfa has a lot to offer agriculture. It is a great source of nutrition for consuming livestock and wildlife and provides many soil benefits that we are just beginning to fully understand. Its perennial growth helps provide protection to soils as well as insects and wildlife, and makes fields more resilient to environmental stresses. Including alfalfa in your cropping rotations makes sense for many reasons. You won't be disappointed if you do.