Working Trees Info

Can alley cropping support soil health?

Photo courtesy of Dr. Mike Gold, University of Missouri

Wheat being harvested in between rows of Chinese chestnuts. The wheat provides income before the chestnuts are productive. In the future, wheat stubble will make it easy to collect nuts.

Alley cropping, the planting of rows of trees and/or shrubs to create alleys within which agricultural or horticultural crops are produced, can improve soil health and provide other benefits.

Alley cropping is one of several soil health management practices designed to increase organic matter, infiltration rates, water holding capacity, soil biological diversity and, with these changes, enhance crop yields. However,

> Alley cropping can be one strategy to improve soil health in temperate climates.

Alley cropping can be especially beneficial for highly erodible lands (HEL), or soils with low fertility. This practice can also help to diversify farm production and income.

In North America, alley cropping most commonly includes high-value hardwood trees along with crops that create annual income while the trees are maturing. In tropical areas, alley cropping systems use trees to restore and protect soil fertility.

alley cropping also offers something more: conservation that creates an additional source of income. The addition of perennial plants on the landscape creates short and long-term benefits to farm operations.

Here are some ways in which alley cropping can help improve soil health:

Photo courtesy of Richard Straight

Hazelnuts on the left and poplars on the right help protect young squash plants. This system produces nuts for harvest and potential woody biomass from the poplars for use on the farm.

Reduce wind erosion

When properly designed, the addition of trees and shrubs can reduce wind speed enough to stop wind erosion.

Reduce water erosion

When tree rows are planted on the contour they create a stable vegetated strip to help control water erosion. When implemented along with other conservation measures, water erosion can be halted.

Diversify organic matter

Trees interspersed with alley crops create a greater variety of organic matter. The modified microclimate may also increase the number of crops that may be economically grown on the site. This diversity can support a greater variety of soil microbes which can help increase nutrient availability and soil structure.

Reduce soil water loss

Tree and shrub rows help reduce wind speed, which in turn reduces evaporation of moisture from the soil and moderates soil temperature changes. These microclimate influences help create a favorable soil climate for soil microbes.

Wildlife habitat

The inclusion of trees and shrubs throughout the field increases plant diversity and wildlife habitat diversity. Wildlife, including pollinators, more easily disperse on the landscape because alley cropping provides habitat within fields, instead of being limited to the edges of fields.

Improve soil fertility

The use of nitrogen-fixing trees and shrubs can help add available nitrogen to the soil and improve crop growth. Improved crop growth helps to create additional organic matter above and within the soil.

Improve crop growth

The modified microclimate created by trees and shrubs can also help improve crop growth, yield and quality. This increased growth helps produce additional organic matter in the soil.

Alley cropping is one approach to improving soil health and diversifying farm income. It can be particularly beneficial on lands where conventional cropping systems are not very economical or where erosion problems are occurring. In the right place, at the right time, it can be a promising alternative for enhancing soil health management systems.

Resources

Alley Cropping: An Agroforestry Practice
http://bit.ly/2vp8yb5

Can windbreaks benefit your soil health management system?
http://bit.ly/2ulBEop

NRCS - Soil Health
http://bit.ly/2jlWwzL

Soil Health Institute
http://soilhealthinstitute.org

Contact: USDA National Agroforestry Center, 402.437.5178 ext. 4011, 1945 N. 38th St., Lincoln, Nebraska 68583-0822. https://nac.unl.edu

The USDA National Agroforestry Center (NAC) is a partnership of the Forest Service (Research & Development and State & Private Forestry) and the Natural Resources Conservation Service. NAC's purpose is to accelerate the development and application of agroforestry technologies to attain more economically, environmentally, and socially sustainable land use systems by working with a national network of partners and cooperators to conduct research develop technologies and tools, establish demonstrations, and provide useful information to natural resource professionals.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance. (Not all prohibited bases apply to all programs.)

Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call toll free 866-632-9992 (voice). TDD users can contact USDA through local relay or the Federal relay at 800-877-8339 (TDD) or 866-377-8642 (relay voice). USDA is an equal opportunity provider and employer.

First Edition August 2017