Working Trees Info

Can windbreaks benefit your soil health management system?

Photo courtesy of NRCS

Soil health management systems can include single or multiple conservation practices that contribute to the four basic soil health principles:

- Use plant diversity to increase diversity in the soil
- Keep plants growing throughout the year to feed the soil
- Manage soils more by disturbing them less
- Keep the soil covered as much as possible

The most common practices include conservation crop rotation, cover crop, no-till, mulch tillage, nutrient management, and pest management. Implementation of other conservation practices, such as field windbreaks, can also improve soil health and provide long-term environmental and economic benefits.

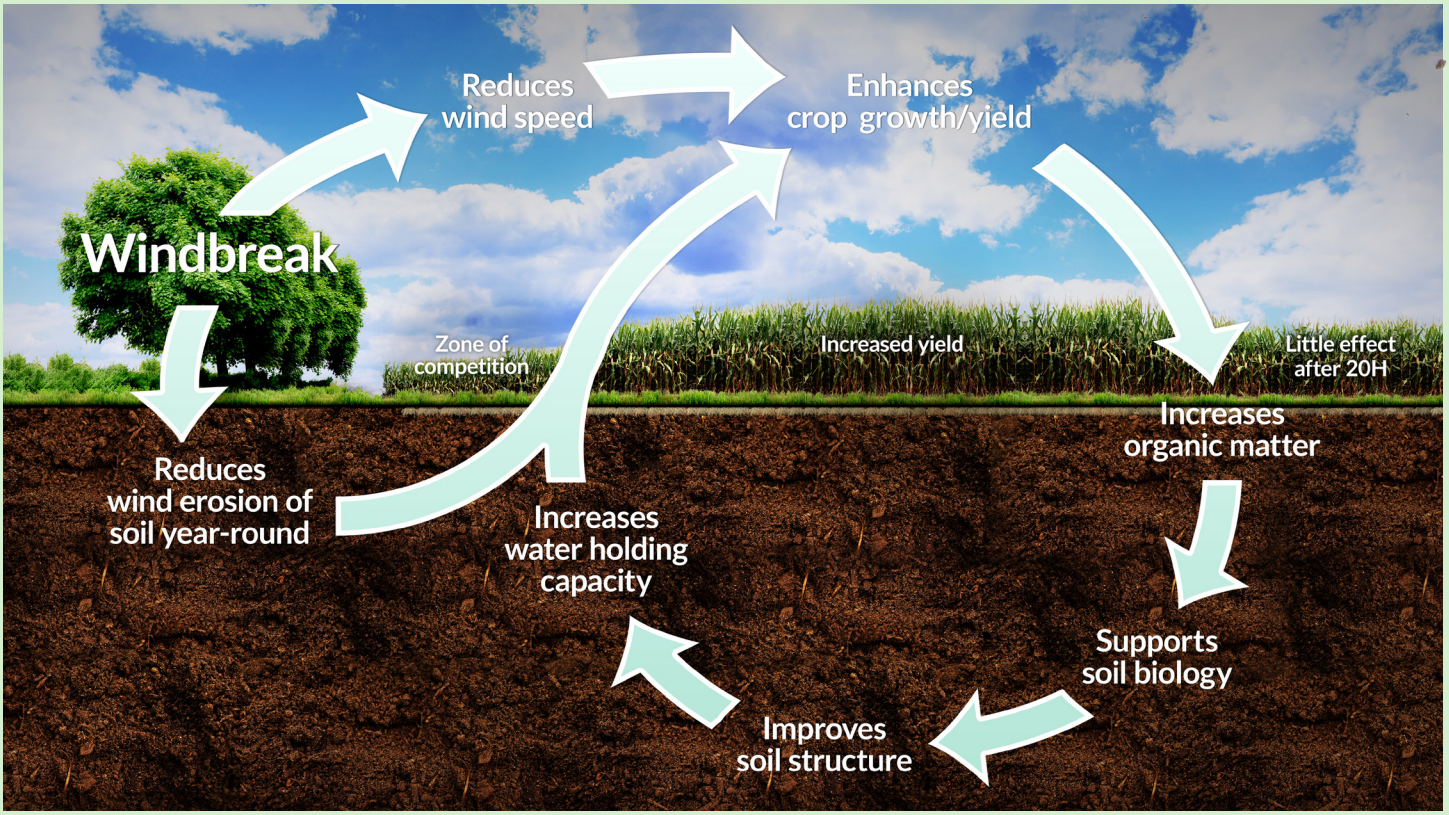
Windbreaks are strips of trees and/or shrubs planted and maintained to alter wind flow and microclimate, thereby protecting a specific area. Field windbreaks can protect a variety of wind-sensitive crops, control wind erosion, and increase bee pollination and pesticide effectiveness. It has long been known that while establishment of windbreaks requires taking some land out of crop production, the result is typically a net increase in crop production. It is important to note that windbreaks also have the potential to positively influence soil health on the protected cropland acres.

Field windbreaks reduce wind erosion by providing a zone of wind reduction on the leeward side of the trees and shrubs. The size of the area protected is determined by windbreak height and density. Windblown topsoil can contain high levels of organic matter which plays a key role in providing nutrients to plants, improving soil structure, increasing available water capacity, and feeding soil microorganisms. Windbreaks with properly-spaced tree and shrub rows reduce erosion across the field and keep organic matter on field where it benefits both the crops and soil biology.

Windbreaks also improve water-use efficiency by lowering soil evaporation rates across protected areas.

Windbreaks and the Soil Health Cycle

Windbreaks positively influence microclimate on an area much greater than the space they occupy. These influences extend into fields about twenty times the height of the windbreak (20H) and affect crops and soil environment.



Adequate soil moisture contributes to the formation of organic matter through the breakdown and consumption of plant residue by micro- and macro-organisms. This creates a beneficial "circle" of soil health improvement: as soil structure develops it results in improved bulk density and increased available water holding capacity. These improvements lead to increased crop growth and productivity and reduced water erosion.

Biological organisms in a healthy soil require the same resources as terrestrial creatures: food, water, cover, and air. Food for these organism is generally provided by two sources: root exudates from living roots and decaying crop roots and residues left in and on the soil. Soil health management systems that include windbreaks provide a more diverse, year-round living root food source for soil organisms. Leaf-drop from these woody plants also provides increased cover for the soil, resulting in winter cover that complements the crop residue. Tree roots also contribute to soil organic matter development and diversification.

With the increased frequency of extreme weather events, windbreaks used in combination with other conservation practices in a soil health management system can create a microenvironment that increases soil biology; reduces evapotranspiration, wind erosion, and water erosion; protects our natural resources; and provides economic security to America's farmers through increased crop resiliency.

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

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