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Division of Resource Conservation & Forestry

## Windbreaks in Agriculture Provide

### Soil and Water Conservation

- ◆ Soil stabilization
- ◆ Snow deposition

### Field Windbreaks

- ◆ Increased crop yield
- ◆ Increased crop quality
- ◆ Greater habitat diversity

### Livestock Windbreaks

- ◆ Less cold temperature stress
- ◆ Improved animal health
- ◆ Increased feed efficiency
- ◆ Improved reproduction

### Farmstead Windbreaks

- ◆ Reduced energy costs
- ◆ More efficient and safer work area
- ◆ Snowdrift management
- ◆ Recreation area
- ◆ Added value to farmstead

### Agroforestry Products

- ◆ Firewood
- ◆ Post and poles
- ◆ Fruits and nuts
- ◆ Wildlife habitat
- ◆ Animal bedding
- ◆ Landscape and garden mulch
- ◆ Christmas trees and nursery stock

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# Windbreaks in Sustainable Agricultural Systems



**South Dakota**  
**Department of Agriculture**  
Division of Resource Conservation  
and Forestry

Sustainable agriculture is a system of whole farm resource use balanced with whole farm productivity. The overall achievement level of productivity is dependent upon the ability to coordinate and manage the soil, water, plant, and animal resources simultaneously within climatic and economic limits. The amount and kinds of plants and animals supported by the system are important, and play significant roles, both individually and collectively in maintaining a healthy farm environment. Integrated systems will help reduce human impact on resources in the future, while providing sufficient supplies of high quality food and fiber.

Trees and shrubs have an important role to play in integrated agricultural systems. Riparian forests provide wildlife habitat and timber, erosion protection for river and stream banks, and act as filter strips for agricultural runoff, protecting water quality and fish habitat. Trees and shrubs planted in windbreaks provide wind erosion control, improve crop yield, and enhance crop quality of wind-sensitive crops. Farmstead windbreaks protect the home site and reduce energy needs. Livestock windbreaks can reduce livestock stress, improve weight gain, and reduce mortality of young animal. Properly designed windbreaks can provide additional income from wood products, tree crops, and fuelwood. Finally, windbreaks add beauty to the landscape and increase land values.

### **Soil and Water Conservation**

Soil and water conservation is aided in natural ecosystems by a high proportion of perennial plants and their established root systems. In agriculture, crops and their stabilizing root systems are often removed each year leaving little to protect the soil from erosion. Properly spaced and managed trees, shrubs, and grass strips located within fields of annual crops help provide many of the same benefits as complete perennial cover. Soils susceptible to wind erosion are protected by reduced wind speed. In addition, windbreaks assist with deposition of wind-borne soil and snow, building fertility and soil moisture. When combined with conservation tillage methods, significant soil benefits are achieved.

### **Field Windbreaks**

Field windbreaks reduce wind speed and change the field environment. Benefits to crop growth and devel-

opment are dependent on the crop, type of soil, and local climate. In some areas, winter protection and snow cover are critical. Uniform snow distribution adds soil moisture for spring crops. Temperature and humidity changes may lower evaporation and increase crop water use efficiency and photosynthesis.

While windbreaks require some land to be removed from crop production, it results in a net increase in total crop yield and crop quality. Overall, the net economic return is positive, input costs are reduced, and environmental conditions are improved.

Another important benefit is the opportunity for greater diversity in crop choice. Greater crop diversity has the potential to increase natural control of pest outbreaks and contributes to the stability and resilience of the farm ecosystem.

### **Livestock Windbreaks**

Livestock have a dual role in sustainable agricultural systems. They convert grass, grain, crop residues, and other non-economic by-products, into high quality commodities like milk, eggs, and wool. They provide a valuable method for cycling nitrogen, reducing the demand for external inputs. Windbreaks designed to protect feedlots, pastures, or range increase their production on an integrated farm operation.

Livestock in protected areas experience less cold temperature stress, improved health, increased feeding efficiency and improved reproductive success.

Whenever livestock have access to windbreaks, fences are needed to eliminate destructive grazing. Without fences, livestock will destroy windbreak effectiveness.

### **Farmstead Windbreaks**

Farm or ranch building protection is a sure way to reduce heating and cooling costs associated with these structures. During winter months, multi-row windbreaks reduce the effect of cold winter wind and provide energy savings of 10 to 40 percent. Windbreaks reduce the effects of wind chill on humans, making outdoor work during winter months less stressful, more efficient and safer. Properly placed windbreaks reduce snowdrifts in driveways and work areas, save snow removal costs, and add to the value of the farmstead.

Shade provided by windbreaks can reduce air-conditioning costs during the summer and provide a cool outdoor family

recreation area.

Windbreaks not only conserve energy, but also produce energy in the form of firewood. In addition to home heating, fuelwood may be used as fuel for biomass burners providing an alternative to propane for drying grain and other on-farm operations. As large commercial heating systems using wood chips as fuel become more common, a potential market may be provided for excess wood.

### **Agroforestry**

Windbreaks can be designed and managed to provide an assortment of wood products while continuing to provide their primary benefit – wind protection. These windbreaks generally require intensive management and special care must be given to maintain the overall structure of the windbreak. The structure is what reduces wind speed.

Multiple row windbreaks can provide wood products like firewood and lumber for crates and pallets. Cedar and Juniper are resistant to decay and can provide post and poles. Cedar can be chipped for animal bedding. Other types of woods can be used for livestock bedding, landscape and garden mulches and fuel. While not for everyone, Christmas trees and nursery stock production can be part of a windbreak system. These crops are very specialized and labor intensive.

The planting of fruit or nut trees and shrubs integrates the wind blocking function with food production. The harvesting of fruits for personal use or for sale helps add value to the windbreak land. High-quality fruit and nut crops require intensive management and generally include irrigation systems and a high level of pest control. Less intensive management results in lower quality and inconsistent crop size.

The integration of Agroforestry practices into sustainable agricultural systems can provide many rewards. It requires, however, careful consideration of all aspects of your operation, an understanding of basic ecological principles and a working knowledge of local conditions and markets.