Windbreaks
Use Nature to Conserve and Protect Natural Resources

Purpose

Windbreaks, also referred to as shelterbelts, are generally established to protect or shelter nearby leeward (side away from the wind) areas by acting as obstacles to wind. Their function is versatile and many beneficial objectives can be met with a windbreak. Windbreaks can:

- reduce soil blowing and loss from wind erosion
- protect and improve production of crops and landscape
- help to reduce evaporation losses
- control snow distribution to reduce or prevent drifting around structures and in roads/driveways
- protect structures and livestock
- reduce heating costs
- provide cooling effects in the summer.
- provide wildlife habitat
- improve visual appeal of the property
- provide visual and noise screens
- can be designed to produce tree or shrub products such as wood, nuts and fruits.

Location and Layout

Windbreaks are located mainly on the windward side of the area being protected. In Western New York our winds typically blow in from a westerly direction and may shift from North to South depending on season. Multi-leg windbreaks may need to be considered for greater protection and for protection from seasonal wind shifts.

Windbreaks are created by planting trees, shrubs, or grasses in strips at right angles to the direction of prevailing winds. They are generally narrow and long, from a few feet up to 40 feet in width. They extend beyond the actual area to be protected in order to be effective at the ends and reduce the influence of end-turbulence on the protected area. Their height depends upon the objective of the windbreak and the kinds of plants chosen to meet the particular objective. Windbreaks reduce wind speed for two to five times the height (expected in 20 years) of the windbreak on the upwind side and up to 30 times the height of the windbreak on the downwind side. The area protected is a direct proportion to the height and can be up to 30 times the windbreak height on the downwind side and 5 times the windbreak height on the upwind side; e.g., a 20-foot windbreak will reduce wind speed up to 100 feet upwind and 600 feet downwind.

Typical windbreak row configurations: a) 6-row, b) 4-row, c) 2-row.
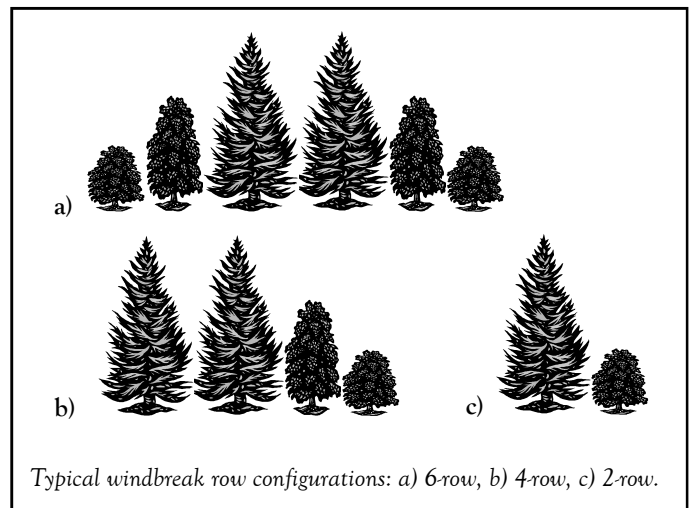
Design

The design elements of windbreaks or windbreak systems are dependent on identified purposes and site conditions and can be simple or complicated. A thorough evaluation of site conditions and landowner objectives is necessary to produce an effective windbreak plan. Situations that are typically evaluated for windbreak design are:

- Windbreak for structural protection (farmstead, feedlot, roads, buildings)
- Windbreak for field protection (crops, soil-erosion control)
- Windbreak for snow management

General considerations for windbreaks

Design proper row layout. The most effective windbreak planting is triangular in cross-section, wide at the bottom and narrow at the top. For example, for protection of large areas, two center

rows of evergreen trees (taller than 25 feet), bordered on each side by a row of large shrubs (taller than 10 feet) and then a row of low shrubs (shorter than 10 feet) is recommended. This creates a six-row windbreak that would be about 40 feet wide. Planting of shrubs in conjunction with the trees will form a more dense and effective barrier down to ground level than trees alone.
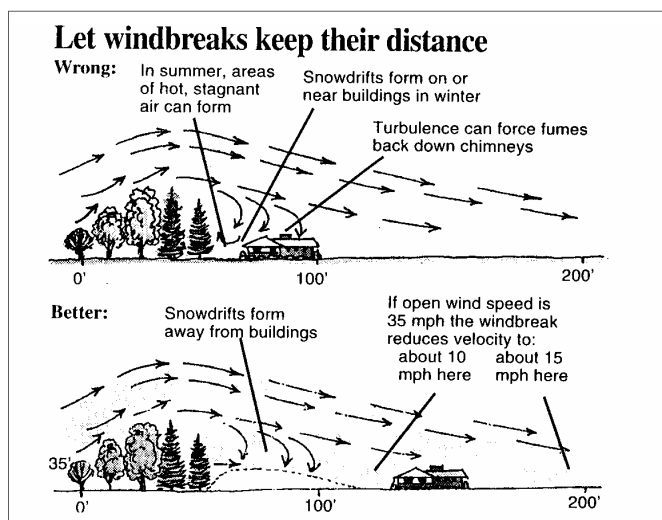
The spacing between rows in the windbreak is generally based on the need to fit equipment between the rows for maintenance purposes and is generally 12 to 20 feet but can be more or less depending on the windbreak management plan and plant type. Spacing between the evergreen trees in the row is generally 8 to 12 feet; 5 to 8 feet between the large shrubs; and 3 to 5 feet between the small shrubs. A general rule of thumb is that spacing should allow for crown closure within about 10 years without undue competition between adjacent plants in later years. All plants should be staggered with those in adjacent rows.

Other typical designs include a one-sided windbreak using 4 rows (30 feet wide) or a two-row tree and shrub type windbreak. Windbreak layout can vary from these general designs and can include virtually any variety of tree or shrub as long as height, length, and density requirements of the design are met. Fundamentally, the number of rows of trees and shrubs and varieties to use is best determined by consideration of the land use to be protected and the economic factors.

Comprehensive protection of larger areas may include the planting of a series of parallel windbreaks spaced at 5 to 20 times the height of each windbreak.

Maintain a continuous barrier. Gaps in the windbreak will serve as a wind funnel. Run driveways around the windbreak. If a lane must cut a windbreak, it should cut through the windbreak at an angle to prevailing winds to prevent funneling of wind and snow drifting.

Keep windbreaks at a suitable distance from homes and structures to avoid effects from stagnant hot air currents in the summer and drifting snow in the winter. In general, buildings should be no closer than 100 feet from the windward row of the windbreak, and areas to be protected (fields, roadways, etc.) should be within a downwind distance of 2 to 5 times the expected 20-year height of the tallest windbreak.

Let windbreaks keep their distance

Wrong: In summer, areas of hot, stagnant air can form / Snowdrifts form on or near buildings in winter / Turbulence can force fumes back down chimneys

0'   100'   200'

Better: Snowdrifts form away from buildings / If open wind speed is 35 mph the windbreak reduces velocity to: about 10 mph here about 15 mph here

35'

0'   100'   200'

Plant windbreaks in the spring. This timing usually ensures increased soil moisture and a full growing season for plantings to establish by the next winter.

Protect and maintain the windbreak. During the early years, weed control is essential to reduce competition for moisture and nutrients. After windbreaks mature, they need periodic thinning and removal or replacement of diseased trees to maintain them in a healthy state. Keep livestock and other nuisance animals out at all times.

The Erie County Soil and Water Conservation District and the USDA Natural Resources Conservation Service are available to help plan windbreaks. Please feel free to contact our office for more information and assistance.

For more information contact:

Erie County Soil and Water Conservation District
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(716) 652-8480