FOR-114

UNIVERSITY OF KENTUCKY College of Agriculture

Agroforestry **Windbreaks**

Deborah B. Hill, Department of Forestry

Windbreaks were first used extensively in the United States in the 1930s, after the Dust Bowl days made it clear that certain agricultural practices tended to facilitate the loss of topsoil by wind erosion. To protect those same lands, the Soil Conservation Service (now Natural Resources Conservation Service, or NRCS) recommended that landowners plant rows of multi-species trees to create barriers to prevailing winds. Such barriers reduced the amount of transpiration from the crop plants and therefore increased crop yields on the protected lands. Since those days, windbreaks have been grown largely in open areas such as prairies, but they are certainly a practical agroforestry technique in any location where there are significant prevailing winds. Windbreaks are used to manage snow, improve irrigation efficiency, screen views and reduce noise, protect farm crops and farm buildings, protect free-ranging livestock, provide wildlife habitat, and provide non-timber forest products (e.g., berries, woody florals).

The mixture of tree and shrub species for windbreaks should include at least one row of coniferous trees so that there will be some trees that hold their foliage throughout the year. Most commonly, windbreaks are three to seven rows in depth. Coniferous trees will provide the greatest density to reduce wind speed, and inclusion of a variety of broadleaved tree species adds diversity and may give needed height in a shorter period of time. The outside rows should be shrubs (similar to the pattern for riparian buffer strips [see FOR-112]). Shrubs can also be chosen for diversity, to create dense foliage closer to the ground surface than the tree species, and to provide some marketable non-timber forest products or wildlife food such as berries.

The purpose of a windbreak is literally to "break" or diminish the power of the wind (**not** to stop it altogether). Seven features are important for an effective windbreak.

- Height: Often 30 to 60 feet when mature. The effectiveness of the windbreak is measured in "H's", referring to height. A desirable effective zone is 20 to 30 H's.

- Density: 60 to 80 percent is most desirable. In this case, more is **not** necessarily better.
- Orientation: The rows should be planted perpendicular to the prevailing wind direction during the growing season, when crops are most susceptible.
- Length: The rows should be 10 times longer than they are tall, so if you are planning a 60-foot height in the tallest rows, the row should be 600 feet long.
- Width: This depends on the number of rows, but there is no further value if the windbreak is wider than 5H's; five rows may be optimal.
- Continuity/uniformity: Windbreaks will be most effective if there are no gaps. If it is essential to have a path through the windbreak, it should be at an angle so that the wind cannot just funnel through the opening.
- Cross-sectional shape: With tallest trees in the middle rows, the shape is usually triangular, with shorter trees and/or shrubs on the outsides.

What kinds of trees should you plant? You want trees that are preferably native to the area, fast-growing, long-lived, with dense crown development and that are resistant to both disease and breakage. If you want your windbreak to provide economic benefit in

addition to protection, select tree and shrub species that can provide another commodity.

Windbreaks are a long-term project. Establishing one will take several years. The year prior to establishment, you should prepare the site for tree planting, and either mulch or use some kind of weed barrier or chemical control in the first few years to give the tree species the best opportunity for survival. Replace lost trees in the first three years. Make sure the trees are spaced in such a way that you can mow or otherwise manage between the trees with your own equipment. Protect the new seedlings from livestock browsing or trampling.

Spacing for the trees is usually 6 to 15 or 20 feet within rows (conifers a little closer to each other than broadleaves) and 12 to 16 feet between rows. Shrubs are planted 3 to 6 feet apart within rows. Also leave a clear zone (native grasses or forbs) of 20 to 50 feet on either side of the windbreak between it and the crops.

Caring for a windbreak is much the same as for any crop. Keep the young trees and shrubs as weed-free as possible while they are becoming established, monitor for insect and disease problems on a regular basis, and treat as needed. Harvest non-timber forest products when they are ready if they have been included in the species mix.

Growing windbreaks to protect crops and livestock has been shown to have a significant positive impact on crop yields and on general health and weight gain of livestock. Placing windbreaks around buildings reduces indoor climate costs (heating/cooling), filters airborne pollutants, and reduces noise.

Agroforestry in Kentucky

Alley Cropping (FOR-111)

Riparian Buffer Strips (FOR-112)

Silvopasture (FOR-113)

Windbreaks (FOR-114)

Forest Farming (FOR-115)

http://dept.ca.uky.edu/agc/pub-dept.asp?dept=Forestry

Educational programs of Kentucky Cooperative Extension serve all people regardless of race, color, age, sex, religion, disability, or national origin. Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, M. Scott Smith, Director, Land Grant Programs, University of Kentucky College of Agriculture, Lexington, and Kentucky State University, Frankfort. Copyright © 2009 for materials developed by University of Kentucky Cooperative Extension. This publication may be reproduced in portions or its entirety for educational or nonprofit purposes only. Permitted users shall give credit to the author(s) and include this copyright notice. Publications are also available on the World Wide Web at www.ca.uky.edu.

Issued 8-2009