A New Plan for Shelterbelts/Windbreaks: TR-HD (Twin Row-High Density)

Cooperative Extension South Dakota State University

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A new plan for Shelterbelts/Windbreaks:

TR-HD

(Twin row-High density)

Cooperative Extension Service
South Dakota State University
U.S. Department of Agriculture
What a windbreak should do

*Divert and slow winter winds so you and your livestock are more comfortable outdoors.

*Stop and store wind-driven snow inside and adjacent to the planting so the drifts don't pile up in your driveway, feedlots, or around the buildings.

*Benefit wildlife, enhance the appearance of your property and increase its sale value, and perhaps provide a steady source of firewood. But these benefits are secondary. Keeping wind and snow out of the farm yard is the primary reason to have a windbreak.

High density refers to the close spacing of trees or shrubs in each twin row. The two rows of a twin row are spaced 6 feet apart, and trees in a row are 5 feet apart. The trees alternate in a check pattern; when mature each twin row will appear to be a single thick row of trees.

The open space between twin rows can vary from 25 to 50 feet, and there can be from one to four twin rows in a windbreak. That makes it easy to custom design a windbreak for your particular needs.

Wind tunnel studies show there is very little difference in the amount of wind protection between this new design and the old solid windbreaks when both tree populations are compared at their maximum height and density.

Reasons for a new design

*Many older solid block systems are aging and dying. If you try to plant within, you don't have room to maneuver. If you try to plant alongside the old windbreak, the wind protection patterns and snow depositions change.

Replacement of TR-HD windbreaks is easier; there is space to work in between the sets of rows.

*The spaces between rows in solid block plantings don't match the size of the
cultivating equipment a farmer usually owns. So he either stops maintenance, resulting in grasses and weeds taking over so that the trees suffer from water stress, or he plants rows of trees so far apart that the trees never achieve crown closure.

Twin sets close canopies in 3 to 5 years for fast growing species and 8 to 12 years for the slowest growing species, thus reducing the amount of cultivation needed. Weed control between the twin rows must continue, however.

*Windbreaks require varying degrees of management during their lifetime.

The TR-HD windbreak allows access to individual trees in the system and flexibility in the management program.

Locating the TR-HD windbreak

It should be to the north and west of the area in need of protection. The most northerly and westerly rows should be about 200-250 feet away from the principal area of protection (PAP). The other twin sets are then established at 25- to 50-foot intervals to the south and east of this set.

Determining species

*Plant dense crowned trees (like Siberian elm or redcedar) or tall shrubs in the first set.

*Plant the species most susceptible to snow breakage (like pines) in either the most windward or leeward sets.

*Plant the species most resistant to snow breakage (like deciduous trees) in the second set.

*Plant the tallest growing species in the most leeward set to provide the best downwind protection.

*Wildlife species should be planted in the third or fourth set from the windward side, since the least amount of snow will accumulate in that area.

Managing the TR-HD components

The plant components (the sets). Weed control in this 6 feet of space is very important until crown closure is achieved. Use a row crop cultivator or garden tractor to control weeds the first growing season.

In the fall (mid-October to mid-November) apply a preemergence chemical across the 6-foot width plus 2 feet on each side of the row (a 10-foot band). Re-apply the chemical (usually in 1 to 2 years) when weeds again start to show up.

Replace dead trees the first year to avoid "holes" in each windbreak wall.

Once the tree crowns touch and the ground becomes shaded, weed control
should not be necessary in the interior 6-foot space.

The snow storage or management access component (the gaps). This is the area between the twin sets. There will be 25 to 50 feet of space in this component. Anything less than 25 feet reduces total snow storage capacity and access as the trees mature.

The management of this component influences the performance of the trees as they mature. Keep it cultivated and free of deep rooted plants that might rob the trees of moisture. It is also the area where eventually a new windbreak will be planted when the old one matures and weakens.

The isolation strip component. This is at least 12-16 feet of space around the perimeter of the entire planting. It should be maintained during the life of the planting for fire protection and moisture storage for the outside rows of trees.

Minimum site preparation

There is still a need to prepare the planting site. On soils where wind erosion may be a problem, prepare 14-foot strips initially. As the trees grow taller the vegetation in the management access components can be eliminated.

Vegetation control

During the first year, remove the weeds in the plant component area with a row crop cultivator, small garden tractor and cultivator, or an over-the-row cultivator (spring tooth harrow).

Apply a preemergence chemical over a 10-foot band in the plant component area during the fall of the first season.

Cultivate the access component to provide the dense population of trees with moisture necessary to keep them vigorous.

Planting and species composition

Each twin set requires plant materials that have similar growth rates, crown form, and life spans. Very often they will be the same species.

Trees that branch prolifically and grow tall will provide especially good winter-time windbreaking effects.

Employ good planting procedures for good survival. All dead materials must be replaced the same or following season.

For the least amount of problems, all the sets should not be of the same species. An example of a twin-set species arrangement would be one set of each of the following: Siberian elm, green ash, spruce, and pine.

Design fundamentals

One twin set alone can offer wind protection, but it will lack snow storage.

Quick and long lasting protection can be offered in a planting composed of four twin sets–two sets of fast growers and two sets of long lived trees.

Snow will accumulate more in the windward sets. Pines are sensitive to snow; their lower branches will break off under the weight of drifts. Plant the pine rows in the most leeward set to avoid snow damage.
The total width of the planting should not exceed 150 feet, nor be less than 75 feet.

Snow piling in average years will be greatest in the second set area, and least in the third and fourth sets.

Extend the windbreak length 25 to 50 feet beyond the area in need of protection.

Energy features

If three or four twin sets are used in the design, the fourth or a fifth set can be planted 25 to 50 feet from the buildings to almost eliminate the winter-time wind. Energy costs can be reduced 25 to 30%, according to figures taken from earlier studies.

If the site permits, fast growing species can be planted to initiate a 15 to 30 year harvest rotation of the sets to produce firewood.

Custom designs

Design the TR-HD windbreak to meet special situations and needs. Here are some examples.

*Windbreaks for livestock feeding and protection (three or four sets in a horseshoe shape).

*Windbreaks for difficult soils and/or growing situations (Siberian elm and Russian olive).

*Quick but short-lived windbreaks (Siberian elm, poplars, and willows).

*Slow growing but long lived windbreaks (evergreens, oak, hackberry).

*Fast growing but short lived, and slow growing but long lived windbreaks on the same site (Siberian elm and evergreens).

*Windbreaks for snow control (tall growing shrubs or plum).

*Energy saving and/or producing windbreaks (three or four sets with a fourth or fifth close in).

*Windbreaks for limited space (evergreens only).

*Windbreaks for wildlife (junipers, spruce, fruit producers).

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