

Windbreaks – A basic understanding

Montana State University Extension - Gallatin County

This basic guide looks at windbreaks created through the planting of trees and shrubs. Windbreaks can also be constructed of wood and other materials. Windbreaks of planted trees and shrubs produce the same outcomes of constructed break but with several additional benefits.

Benefits of planted windbreaks for homes and residence:

- Improve comfort by reducing wind.
- Reduce and control drifting.
- Reduce energy used for heating.
- Shelter fruit trees during pollination and fruit ripening.
- Provide habitat for birds and other wildlife.
- Provide a level of sound barrier.
- Enhance aesthetics of a property.
- Provide firewood.

Benefits of planted windbreaks for feedlots:

- Reduce ill effects of storms on livestock.
- Reduce feed needed to maintain livestock health.
- Provide shade.

Benefits of planted windbreaks for fields:

- Reduce soil erosion.
- Reduce crop flattening.
- Influence storage of snow on field.

Benefits of planted windbreaks as a living snow fence:

- Control snow drift on driveways, roads, and highways.

At its most basic a windbreak is a fairly continuous row of trees and/or shrubs.

Height

- The horizontal distance protected on the leeward side is proportional to the height (H).
- At a horizontal distance of 5 times the height (5H), wind speed is reduced to 30%.
- At a horizontal distance of 10H, wind speed is reduced to 50%.
- Height needs to be twice as tall as the crop or structure being protected.

Density

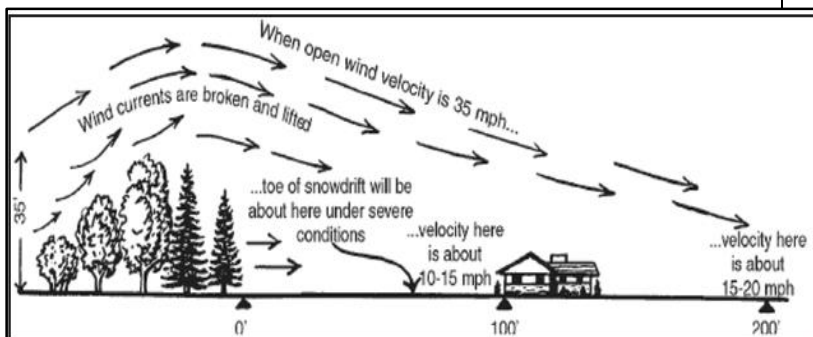
- Density is affected by the number of tree rows, tree architecture, and tree spacing within rows.
- Use a 1 or 2 row design to accumulate and distribute snow
- A 1, 2, or 3 row design can help protect crops and soil and improve air quality
- A 2, 3, or more row design can help protect structures, livestock, people, and screen noise.

Orientation

- Windbreaks should be developed at a right angle to the prevailing wind direction.
- Multiple-leg windbreaks can provide protection from several angles in places with variable-direction winds.
- A horizontal distance of 2H to 5H provides good wind protection, 15H to 35H good snow accumulation.

Length

- Wind curves around the ends of breaks.
- Length should be at least 10H of the windbreak.
- They should extend at least 100 feet beyond the protected area.



Species

Shrubs:	Height (ft)	Spread (ft)
<i>Native</i>		
Red-osier dogwood	5 - 10	6 - 7
Silverberry	3 - 9	
Skunkbush sumac	4 - 6	6 - 8
<i>Non-native</i>		
Nanking cherry	6 - 8	5 - 6
Hedge cotoneaster	6 - 10	6 - 10
Tatarian honeysuckle	8 - 10	8 - 10
Common lilac	20	18
Western sandcherry	4 - 6	3 - 5

Deciduous Trees:	Height (ft)	Spread (ft)
<i>Native</i>		
Bur oak	50 - 60	40
Douglas's hawthorn	12 - 18	
Green ash	50 - 60	30 - 35
Sugarberry hackberry	60	50
<i>Non-native</i>		
Golden willow	50 - 70	40 - 60
Siberian elm	40 - 50	25 - 35
White willow	50 - 70	40 - 60
Tall Deciduous Trees:		
<i>Native</i>		
Eastern cottonwood	60 - 70	45 - 50
<i>Non-native</i>		
Honey locust	35 - 70	
Silver poplar	70 - 80	35 - 40

Dense Evergreen Trees:	Height (ft)	Spread (ft)
<i>Native</i>		
Rocky Mountain juniper	10 - 15	8 - 10
White spruce	40 - 60	15 - 20

<i>Non-native</i>		
Austrian Pine	50 - 60	20 - 35
Tall Evergreen Trees:		
<i>Native</i>		
Douglas-fir	80 - 100	20 - 30
Limber pine	50 - 60	35
Ponderosa pine	60 - 70	40 - 50
<i>Non-native</i>		
Colorado blue spruce	80 - 120	20 - 30
Scotch Pine	60-70	25 - 30

Fruit Trees:	Height (ft)	Spread (ft)
<i>Native</i>		
American plum	10 - 12	10 - 12
Buffaloberry	8 - 10	8 - 10
Common chokecherry	6 - 18	
Golden currant	4 - 6	6 - 7
<i>Non-native</i>		
Siberian Crabapple	10 - 15	
Manchurian Crabapple	10 - 15	

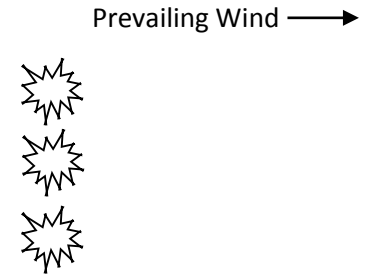
Other Considerations

- Single row windbreaks can be effective when space is limited. Gaps must be filled because other rows do not exist to fill them.
- Another limited space option is a staggered two row design where one row fills the gap in the next row.
- Tighter spacing can be used; however, this will increase the maintenance needed to keep a healthy planting.
- Use several different species will decrease the likelihoods of serious disease or insect outbreaks and improve the windbreak's wildlife value.
- Visit with you neighbors to see which species has worked best for your microclimate.

Designs

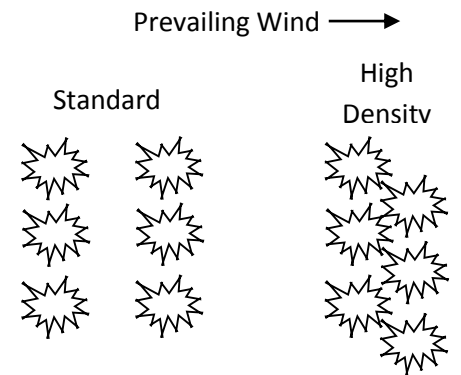
Single Row

- Tight spaces
- Plant densely – 6’ to 8’ tree spacing within row
- Maintain and avoid gaps
- Use dense evergreens or densely branched deciduous trees



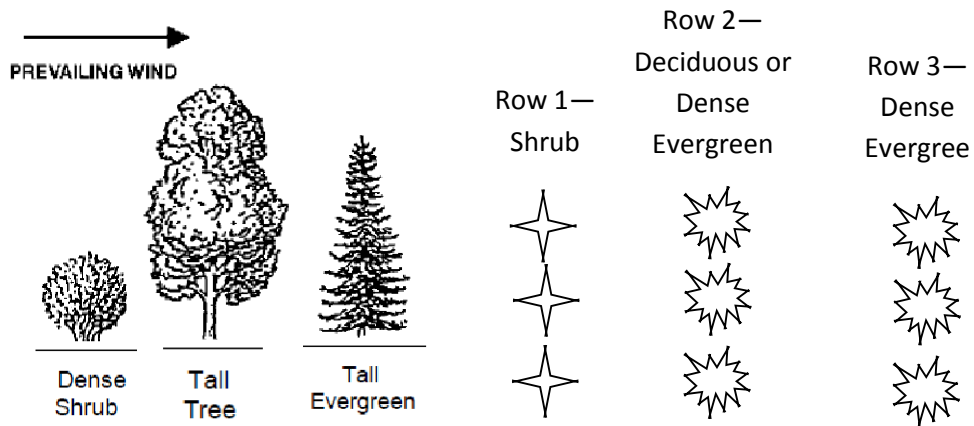
Two Row

- Tight spaces
- Plant densely – 6’ to 8’ tree spacing within rows
- Use two rows of dense evergreens or one row evergreen and one row deciduous
- Standard between row spacing of 12’ – 20’ which allows space to control weeds and reduces competition for moisture; High Density should be same as within row spacing (6’ – 8’)



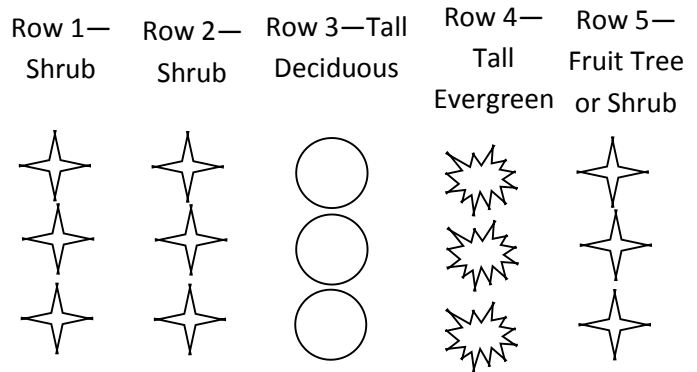
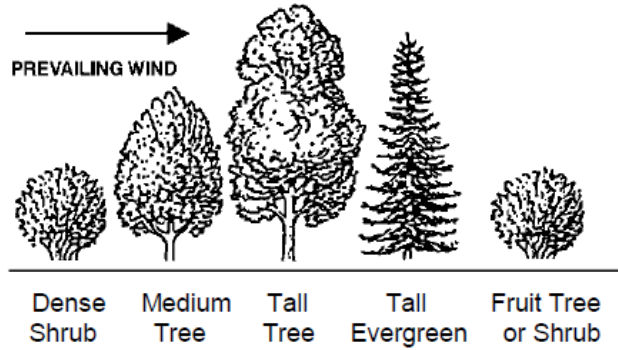
Three Row

- Standard between row spacing of 12’ – 20’ which allows space to control weeds and reduces competition for moisture
- Can alternate similar species within row
- Row one – shrub – 3’ to 6’ tree spacing within row
- Row two – Deciduous or dense evergreen (8’ to 18’ tree spacing within row; 8’ to 14’ tree spacing within row)
- Row three – Dense evergreen – 8’ to 14’ tree spacing within row



Five Row

- One or two rows of shrubs on windward
- Tallest tree in center
- At least one row evergreen on the leeward side to improve year round density
- Fruit bearing and shrubs plant leeward of evergreen
- Standard between row spacing of 12' – 20' which allows space to control weeds and reduces competition for moisture
- Can alternate similar species within row
- Row one – shrub – 3' to 6' tree spacing within row
- Row two - shrub – 3' to 6' tree spacing within row
- Row three – Tall deciduous tree (8' to 18' tree spacing within row)
- Row four – tall evergreen tree (8' to 14' tree spacing within row)
- Row five – fruit tree or shrub (species specific' 3' to 6' tree spacing within row)



Watering

In the first year supply 5 gallons per plant per week, 7 gallons per plant per week the second year, 10 gallons per plant per week the third, etc., until you approach what the mature, or 20 year water needs are of the plant.

Sources of Planting Materials

Contact the Montana Conservation Seedling Nursery – (406) 542 – 4255 and your local Conservation District. The Gallatin Conservation District – (406) 282 – 4350.

Sources

Daley-Laursen, Steven Brent, and Howard E. Hunter. Windbreaks for Montana: A Landowner's Guide. Cooperative Extension Service, Montana State University, 1986.

Kuhns, Mike. Windbreak Benefits and Design. Cooperative Extension Service, Utah State University, 2013.

NRCS, Windbreak/Shelterbelt Establishment (FEET), Specification MT 380-1, Natural Resource Conservation Service, 2013/



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