



# Hedgerows for Infrastructure

Photo Credit: Ben Russell

## Agroforestry fact sheet #3

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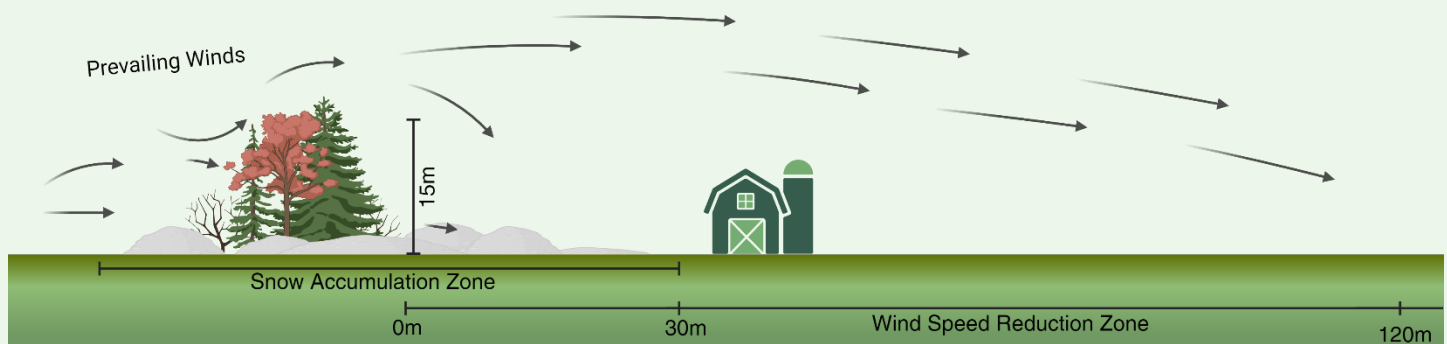


Fig.1 Hedgerow height and density affect both snow accumulation and wind speeds (Adapted from AAFC 2010)

As strong winds continue to increase in their severity and frequency, protecting farm infrastructure and investments from wind damage is critical. There are many efforts that can be implemented to retrofit or enhance the integrity of buildings and equipment, however, well placed, mature trees and shrubs can contribute to buffering the effects of extreme weather conditions. These natural protectors can come in many shapes and styles, which require careful consideration in their design, planting, and maintenance.

Like all agroforestry projects, defining the long-term goals of the project is a first step to implementation. Wind protection usually comes to mind first when considering hedgerows and other forms of natural shelter, however these trees and shrubs also provide environmental, financial and aesthetic benefits to the farm ecosystem and beyond. Snow control, improved habitat, odour mitigation, energy efficiency, and a potential for diversified income are just some of the additional benefits to consider when planning hedgerows to protect infrastructure on your farm.

### PROTECTION FROM DAMAGING WINDS

When planting hedgerows to protect buildings and equipment from heavy winds, consider the prevailing wind direction and hedgerow surroundings. Hedgerows should be planted perpendicular to the strongest winds and can also take a L or U shape for added coverage and protection of multiple outbuildings. On PEI, the prevailing winds tend to be from a Western direction, with significant winter storms generally blowing from the Northeast. As high wind events can happen throughout the year,

a mixture of deciduous (leaf bearing) and coniferous (needle bearing) trees can help ensure appropriate coverage in various seasons.

As a rule of thumb, the length of a hedgerow should be a minimum of 10x the height of the canopy (e.g. a hedgerow with a mature height of 20m should be at minimum 200m long), with the hedgerow extending a minimum of 30m past the target infrastructure to ensure full coverage. Hedgerow density plays a large role in wind protection, with plant spacing, species composition, and the number of rows planted all contributing. Generally, more dense plantings will more efficiently reduce wind speeds, with a shorter zone of wind speed reduction compared to less dense stands. Additionally, the negative pressure created directly leeward of hedgerows will increase with density, resulting in turbulent wind patterns for 1-2x the height of the hedgerow. For these reasons, a well-designed hedgerow for wind protection should be approx. 40-60% dense to reduce wind speeds for up to 10x its height, with the ideal shelter zone from 2-4x the height of the windbreak (fig.1). As no two projects are completely alike, determining the approximate mature density and height of your planting can help in properly defining the protected area.

As hurricane forces can shift wind directions suddenly, trees can fall in any direction so consider any sensitive nearby infrastructure when planning the hedgerow. Although fast

growing species (such as poplar, spruce) can help provide an early successional backbone to your hedgerow, they do not root as deeply as slower growing hardwoods, die off quicker and are more prone to being blown over. By planting an assortment of long and short-lived trees and shrubs in your hedgerow, you'll hedge your bets by creating a network of species, fostering biodiversity, reducing pest pressure, and protecting your investments for many years to come

### ENERGY EFFICIENCY BENEFITS

Hedgerows can also provide shade and shelter to temperature-controlled buildings, such as homes, shops, and barns. By protecting infrastructure from summer heat and winter winds, hedgerows can increase energy savings through temperature regulation, with some studies reporting a reduction in heating and cooling costs by up to 25% and 70% (respectively). Extra considerations, however, are needed when planning hedgerows near some types of on-farm infrastructure, such as naturally ventilated barns or greenhouses. With increasing summer temperature and humidity, any loss of natural ventilation for housed livestock can be detrimental to their health and should be avoided. Hoophouses, greenhouses, and other infrastructure that require natural sunlight (e.g. solar panels) also can be negatively impacted by hedgerow placement. As hedgerows can last many decades, be sure to consider any future infrastructure when planning and designing a new hedgerow.

### MANAGING SNOW

When snow is blowing, the negative pressure created on the protected side of a hedgerow creates ideal conditions for snow accumulation, or drifts. When strategically placed, hedgerows can trap blowing snow, preventing it from accumulating in unwanted areas throughout the farm.

As a rule of thumb, it is generally suggested to provide a minimum of 30m of space between the hedgerow and any farm infrastructure to prevent excessive snow accumulation at or near the area. This includes laneways and other access points which require snow removal. As snow drift patterns are complex and can be difficult to predict, having a good idea of the historical drift placement can help inform areas that may benefit from hedgerow placement. Installing a temporary snow fence in the potential hedgerow site can be another way to see how snow accumulation may develop over a winter. Much like other hedgerows, more dense rows will trap snow more efficiently, but at a shorter length. Snow drift mitigation benefits particularly from the low growth found in shrubs and conifer species, which can be easily integrated into multi-species hedgerow designs. Large hedgerows can accumulate significant volumes of snow, which may cause issues in imperfectly drained or erosion prone soils. Consider the increased runoff potential during the spring melt and implement soil conservation measures if required.

Hedgerows and other forms of agroforestry can provide various ecosystem services while mitigating potential effects of climate change, however careful design, management, and maintenance is needed to ensure success. For more information on site/species selection and tree planting considerations see agroforestry fact sheet #1. Funding for the establishment of multi-species stands is available through the Agriculture Stewardship Program with compulsory enrollment in the Alternative Land use Services (ALUS) program. Single row and/or monoculture plantings are not eligible (except for willow plantations in riparian zones).

The provincial hedgerow planting program can also support the implementation and restoration of hedgerows in farm and residential properties over 1ha. For more information contact the J. Frank Gaudet Tree Nursery at 902-368-4683.

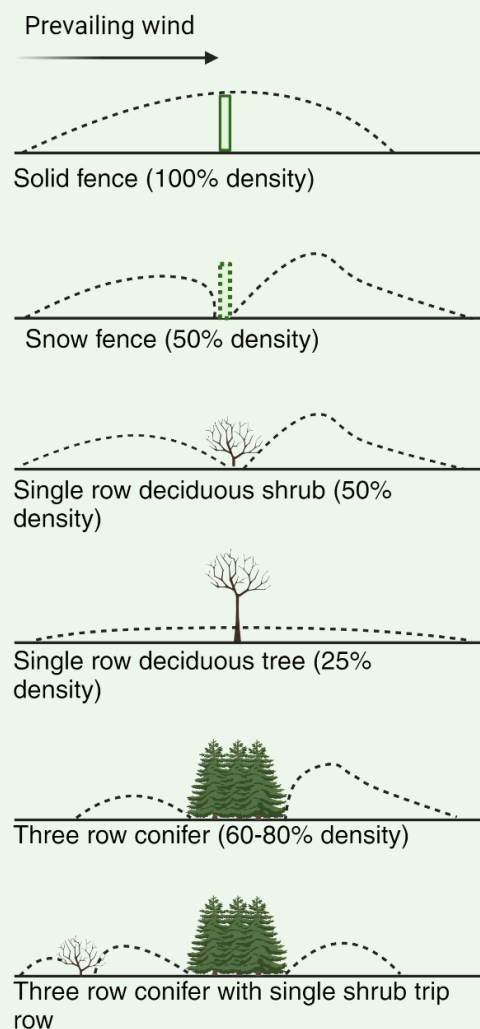


Fig 2. Snow accumulation patterns for living snow-fence design (Adapted from Bradle 2017)

### REFERENCES

- Agriculture and Agri-Food Canada (2010) Shelterbelt design and guidelines A125-2/2010E-PDF Available at <https://publications.gc.ca/site/eng/356936/publication.html>
- Brandle, J, Doak, N (2007) Windbreaks for snow management. University of Nebraska-Lincoln Extension: <https://www.fs.usda.gov/nac/assets/documents/morepublications/ec1770.pdf>
- Guttman, E., Dunn, C. (2023) Hedgerows for Rural and Working Lands in Western Washington. WSU Thurston County Extension [https://s3.wp.wsu.edu/uploads/sites/3250/2023/09/WSU\\_Hedgerows\\_8-16-23\\_web.pdf](https://s3.wp.wsu.edu/uploads/sites/3250/2023/09/WSU_Hedgerows_8-16-23_web.pdf)
- Schneider, G. Richman, R, Dacombe, L. Maclean, K, Shaw S, MacDonald S. (1994) Native Trees and Shrubs. Sir Andrew Macphail Woodlot Foundation. Available at: [https://immediac.blob.core.windows.net/macphailwoods/NativeTreesShrubs\\_OtherPublications.pdf](https://immediac.blob.core.windows.net/macphailwoods/NativeTreesShrubs_OtherPublications.pdf)
- Schaerer, P.A (1972) Control of Snow Drifting Around Buildings. Canadian Building Digest 1972-02. <https://doi.org/10.4224/40000702>
- Vezina, A (2005): Farmstead Shelterbelts: Planning, planting and maintenance. ITA, La Pocatiere Campus, ISBN 2-551-55563-0

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