Windbreaks and Shelterbelts: Benefits Trenton Woodlot Conference

Batawa Community Centre, Batawa November 24, 2017







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Ministry of Agriculture, Food and Rural Affairs

Presentation Outline

- How Windbreaks Work Achieving the Windbreak Effect"
- Quantitative and Qualitative Values of what they do:
 - Reduce Soil Erosion
 - Increase Crop Yields
 - Offer Wildlife Habitats
 - Create energy savings around homes & buildings
 - Provide on-farm sources of Income
- Examine briefly values Windbreaks have to offer
- Windbreak Costs Establishment, Planting & Maintenance
- Future Opportunities –On-line windbreak design tool
- View a windbreak Video all can be seen on you tube.

https://www.youtube.com/results?search_query=windbreaks+ontario



What are Windbreaks and Shelterbelts?

- They are rows of trees, shrubs and/or infrastructure (fencing etc.), when properly located they:
 - Reduce the force of wind
 - Reduce soil erosion & increase crop yields
 - Protect livestock from heat and cold
 - Offer income potential (as posts, fuel wood and timber)
 - Beautify the landscape and your homestead
 - Provide travel routes and habitat for wildlife
- Windbreaks and shelterbelts can shield buildings and roads from drifting snow
- Planted as more than 3 rows they are known as
 - Shelterbelts





How Do They Work

- Windbreaks & Shelterbelts reduce wind speed, modify climate in the areas they shelter
- The benefits of reduced wind speed are:
 - Moderation of soil and air temperatures
 - Increase/decrease relative humidity
 - Reduction in evapo-transpiration and increased soil moisture
 - Change in the distribution of snow
 - Reduce heat loss





Windbreak Considerations

There are many design factors to consider when establishing a valuable windbreak some factors to consider (9) are:

- Choosing the right location
- Height and length desired
- Direction of prevailing winds
- Distance from buildings and access lanes



Farmstead windbreaks provide the most protection when they are planted on the north and west sides and 20 to 30 metres from a building.

- Proximity of neighbours (are livestock odours a factor ?)
- Presence of ditches, field tiles, utility lines + other obstacles
- Number of tree rows, spacing, species matched to hardiness zones/soil type
- Density- Need to manage spacing between and within the rows
 - $\checkmark\,$ Density can be managed by species and between row spacing
 - $\checkmark\,$ Closer the spacing the greater the wind reduction
 - Less dense plantings(more space between trees) offer different levels of protection
- Ordering of trees/shrubs and site preparation



Values and Benefits of Windbreaks

- 1. Aesthetics add value to your home
- 2. Odour reduction extension of odour plume by up to 33 %
- 3. Heating costs reduced by up to 25 %
- 4. Livestock protection from cold winds and sun = livestock weight gain
- 5. Noise and dust interception = reduced complaints about farm operations
- 6. Reduction in snow removal costs





Multiple Benefits of Windbreaks & Shelterbelts

Some multiple benefits include:

- Mitigating soil loss from wind erosion
- Providing higher yield and product quality over parts of cropped fields
- Mitigating the effects of pesticide spray drift
- Permitting better crop pollination by reducing wind speeds
- Reducing irrigation needs and assist with disease control
- Protecting crops from early frost damage by circulating air
- Reducing energy consumption and odour control around livestock barns



Multiple Ways to Achieve Reduce Soil Loss

Windbreaks



Photo Source: Controlling Soil Erosion on the Farm: A Practical Guide to Help Ontario Farmers Solve Soil Erosion Problems,

Benefits of Homestead (Shelterbelts)

- Increased Property Values
- Lowered farmstead heating and cooling costs
- Less blowing snow, dust, and odours and reduction in noise
- Enhanced accessibility by control of snow/ice
 - Farmer, Mike Downey, Alma Wellington County demonstrates the value of windbreaks on his farm laneway by stating:
- "Before the windbreak was planted here, it was nothing to have 4-5 feet of snow up through the driveway – and this year with all the snow, I'm thrilled with it. It's done everything it's supposed to do and probably more."





Wildlife Benefits of Windbreaks

- "Invite" more biodiversity especially when they contain multiple rows and multiple species
- Act as corridors between larger woodlots, & help to minimize crop damage
- Improve game and non-game fish and wildlife habitat
- Increase hunting opportunities
- Provide cover, food and nesting areas for upland game and song birds
- Can provide nectar and pollen sources for pollinators





Benefits and Values Not Always Seen?

• The zone of Influence for a Windbreak is not always easy to assess



- Windbreaks affect gains in crop yields are most often realized with the use of geo-referenced yield monitor data
- **Yield losses** are usually experienced within the first 2-3 rows in cropped fields making their adoption often "a difficult sell" to some farmers/landowners

Windbreak Costs

Windbreaks have associated costs, which in part can be cost shared, such as:

- Establishment and monitoring (every tree counts)
- Maintenance Pest and weed control (mowing)
- Many CA's have Tree planting programs
 - These help to off-set some costs
- Some costs must be incurred on your own



 Weed removal, inspection for diseases, replacing dead trees, pruning & thinning and protection from browsing & rodents





Average Costs Windbreak Trees

Costs for 5 Conservation Authorities

Conservation Authority	Cost Per Tree white cedar	Cost per tree spruce	Cost per tree hardwoods	Cost per tree wildlife shrubs	Cost for Planting including herbicide application	Minimim number of trees for CA planting program
Grand River	\$1.00	\$0.85	\$0.95	\$1.05	\$1.00	500
Essex Region CA	\$0.69	\$0.69	\$1.10	\$1.10	\$0.65	500
Ausable Bayfield CA	\$1.30	\$1.10	\$1.50 - \$2.00	\$1.50-\$2.00	\$1.25	100
Rideau Valley	\$0.58	\$0.58	\$0.90	\$1.00	\$0.70	1000
UTRCA	\$0.80	\$0.65	\$1.00	\$1.10	\$0.85	500
AVERAGE TO USE IN PORTAL APPLICATION	\$0.85	\$0.75	\$1.10 for hardwoods and shrubs		\$0.89 Average	

Compiled by: John Enright (UTRCA) & Jessica Robbins (GRCA), February, 2016

Windbreak Planting Costs-Plastic Matting

			Plastic matting adds 3 significant cost (3x)			
Expenses for a 1km windbrea	ak into Plastic Mattin	 Costs of layer, 				
<u>Expense</u>	<u>Qty</u>	<u>Cost</u>	Purchase matting			
Coniferous trees	500	\$425	Planting into matting			
Plastic mulch layer rental (\$90/day)	1	\$90				
Plastic mulch (1500' rolls @ \$160 ea.)	3	\$480	Outcomes positive: •Tree growth with vs. without			
GRCA Planting-into-Plastic Fee (\$3/tree)	500	\$1,500	•Source of moisture under matting			
Sub-Total		\$2,495				
Less RWQP Cost-share (75% in Waterloo, Brant & Upper Grand, 80% in Wellington & Haldimand)		\$1,871				
HST (13%)		\$324.35				
TOTAL		\$948.10				
Source Statistics: Joe	Heeg, GRCA, Feb					
10	Million danie					



Windbreak Costs-Bare Ground Planting





Windbreak Income Sources

- Diversified source of income
 - Fuel wood, Christmas Trees, saw logs, fence posts
- Profits from valuable speciality crop (nuts and berries)
- Improved financial returns from on-farm value added activities
- Store Carbon Part of a strategy to meet greenhouse gas reductions/carbon markets ?





Mature Windbreak

Into Dimensional lumber



On-Line Windbreak Design Tool

What Will the windbreak tool permit landowners/farmers to do?

• Design a windbreak on line and seek advice from a CA forester/specialist based upon a preliminary plan from the design.

The Process:

- Use the Ministry's AgMaps Portal
- Examine assessment parcel data, farm tax parcels, drainage data, aerial imagery and soils information to design a windbreak suited to needs such as:
 - Livestock odour control,
 - Create a visual barrier
 - Mitigate soil loss
 - Enhance crop production
 - Reduce snow dumping on property laneways
- The data model will contain information on:
 - Soil texture, hardiness zones and drainage class
 - All these are important to placing species of trees under conditions they will grow best
 - www.ontario.ca/agmaps

Summary and Conclusions

- We reviewed how to reduce wind & soil erosion using windbreaks
- We assessed how the "Windbreak Effect" is achieved in different contexts
- We discussed how benefits & values of windbreaks are not always readily seen
- We scanned different windbreak functions and how they perform in different contexts cropped fields, buildings, livestock, wildlife & laneways
- We looked at factors of planning & establishing windbreaks as well as the need to maintain them and the associated costs
- We briefly examined the income potential windbreaks offer
- We examined an upcoming on-line tool







2 Windbreak Videos

Benefits and Planning



Planting





Value of Windbreaks



Trenton Woodlot Conference 2017



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