Windbreaks and Shelterbelts: Benefits

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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
- 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
  - Density can be managed by species and between row spacing
  - 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**

- **Wind strips**

- **Crop Residues**

- **Cover Crops**

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*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

<table>
<thead>
<tr>
<th>Conservation Authority</th>
<th>Cost Per Tree white cedar</th>
<th>Cost per tree spruce</th>
<th>Cost per tree hardwoods</th>
<th>Cost per tree wildlife shrubs</th>
<th>Cost for Planting including herbicide application</th>
<th>Minimim number of trees for CA planting program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grand River</td>
<td>$1.00</td>
<td>$0.85</td>
<td>$0.95</td>
<td>$1.05</td>
<td>$1.00</td>
<td>500</td>
</tr>
<tr>
<td>Essex Region CA</td>
<td>$0.69</td>
<td>$0.69</td>
<td>$1.10</td>
<td>$1.10</td>
<td>$0.65</td>
<td>500</td>
</tr>
<tr>
<td>Ausable Bayfield CA</td>
<td>$1.30</td>
<td>$1.10</td>
<td>$1.50 - $2.00</td>
<td>$1.50-$2.00</td>
<td>$1.25</td>
<td>100</td>
</tr>
<tr>
<td>Rideau Valley</td>
<td>$0.58</td>
<td>$0.58</td>
<td>$0.90</td>
<td>$1.00</td>
<td>$0.70</td>
<td>1000</td>
</tr>
<tr>
<td>UTRCA</td>
<td>$0.80</td>
<td>$0.65</td>
<td>$1.00</td>
<td>$1.10</td>
<td>$0.85</td>
<td>500</td>
</tr>
</tbody>
</table>

| 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

### Expenses for a 1km windbreak into Plastic Matting

<table>
<thead>
<tr>
<th>Expense</th>
<th>Qty</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coniferous trees</td>
<td>500</td>
<td>$425</td>
</tr>
<tr>
<td>Plastic mulch layer rental ($90/day)</td>
<td>1</td>
<td>$90</td>
</tr>
<tr>
<td>Plastic mulch (1500' rolls @ $160 ea.)</td>
<td>3</td>
<td>$480</td>
</tr>
<tr>
<td>GRCA Planting-into-Plastic Fee ($3/tree)</td>
<td>500</td>
<td>$1,500</td>
</tr>
</tbody>
</table>

**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

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Plastic matting adds 3 significant cost (3x)
- Costs of layer,
- Purchase matting
- Planting into matting

Outcomes positive:
- Tree growth with vs. without
- Source of moisture under matting
- Reduced herbicide costs

Source: Joe Heeg, GRCA, February 2016

Trees (Black Mulch/Matting) Background 2x height those foreground
## Windbreak Costs - Bare Ground Planting

Expenses for a 1 Km windbreak into Bare earth + herbicide application

<table>
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<tr>
<th>Expense</th>
<th>Qty</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coniferous trees ($0.85/tree)</td>
<td>500</td>
<td>$425</td>
</tr>
<tr>
<td>GRCA Planting fees ($0.85/tree)</td>
<td>500</td>
<td>$425</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td></td>
<td><strong>$850</strong></td>
</tr>
<tr>
<td><strong>Less RWQP Cost-share if applicable (75% in Waterloo, Brant &amp; Upper Grand, 80% in Wellington &amp; Haldimand) OR HSP grant (75%) if windbreak is along a waterway</strong></td>
<td></td>
<td>$638</td>
</tr>
<tr>
<td><strong>HST (13%)</strong></td>
<td></td>
<td><strong>$110.50</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>$323.00</strong></td>
</tr>
</tbody>
</table>

- 1/3 cost plastic mulch
- Survival is less
- Wood chips biodegrade quickly
- Weed control more of an issue

Source Statistics: Joe Heeg, GRCA, February 2016
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

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