Shelterbelts in Large-Scale Agriculture

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Introduction
A Brief History of Shelterbelts in the Area

- Shelterbelts have been planted since settlement (late 1800’s)
- Most Shelterbelts were used for windbreaks around homes
- Peak establishment was during the 1930s

Multiple Uses:
- Soil Erosion
- Protection of crops and livestock
- Wildlife Plantings
- Odor control (lagoons, hog barns)
The Modern Large-Scale Farm
What are we considering to be a large farm?

- Average farm size in Manitoba in 2011 was 1135 acres (Census of Agriculture)
- Large farm = 2000 acres+
- For our purposes, focus on annual crops, not livestock
Changing Value of Farmland

- Major increases in land values
- Result is the need for all farmers to maximize land use
Changing Technology

- Machinery, computers, chemicals
- GPS guidance, satellite imagery
- Laser leveling, measurements
- Most large farms have more equipment than a municipality

The technology is available if you have the money.
Development of the Potato Industry

- Growth of Industry
- Concentration in the Assiniboine Delta Aquifer Area
- Demand for Quality
  - Irrigation
  - Consistency
- Storage, Year-round Delivery
- Disease and Pest Management
- Consolidation and Growth in Farm Size
The Key to Success

- Money
- Significant portions of operation are being contracted out
- Farms are run as businesses, goal is making money

- Maximize Land Base
- Maximize Yield
- Maximize Consistency
- Maximize the Market Value
- Minimize Cost of Production
- Minimize Transportation Cost

Can shelterbelts fit into this equation?
Shelterbelts on the Large Farm
Shelterbelt Designs

• Problem Exists – Optimal spacing between shelterbelts is not economically advantageous on the large farm

What Designs will work?

Shelterbelts on half-mile lines
Yard shelterbelts
Property boundaries
Shelterbelt Designs

What Designs will NOT work?

• Roadside shelterbelts – snow drifting problems
• In-field designs using large trees
• Proximity to tile drains
• Interference with irrigation
• Susceptibility to herbicides
Irrigation and Shelterbelts

Some obvious issues

• Pivots can not pass over large trees
• Any in-field rows must use shrubs (and should not exceed 6-7 feet)
• Rows outside of pivot boundary must not interfere with pivot end guns
• Edge rows must not cause snow-loading on roads or impede vision at intersections

Also must follow general rules for design:

size of equipment, field access, maintenance, setback distance from crops, wind direction, herbicides, etc.
Shelterbelt Designs

In-field shelterbelt with pivot (lilac)
Whitemud Watershed Shelterbelt Program
Program History and Highlights

• The District has offered a shelterbelt tree planting program since 1975
• Establishment of over 1,680 miles of shelterbelts
• Weed control for 3 years - mowing and rotary tilling
• In 2001, plastic mulch was included
• WWCD also sponsors plantings with Scouts and local schools
Trends

WWCD Shelterbelt Program

• Reduced funding
• Increase in operating costs
• Increase in yardsite shelterbelts
• Correspondence to precipitation

Shelterbelt Miles Planted

Miles 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140
Challenges

• Rising cost of fuel
• Lack of awareness
• Sources of tree stock
• Continued Maintenance
• Protection of shelterbelts
• Landowner perspectives
• Public education
The Future

• Address Potential shortages in trees (PFRA)
• Expand our planting services
• Equipment available for rental
• Increase advertising of program
• Awareness of program through media
Emerging Local Concerns

- Development of Agricultural Practices – Potato Industry
Emerging Local Concerns

- Declining Population
- Changing Landscape
  - Loss of farmsteads
  - Loss of forests and shelterbelts
- Repeat drought cycle

Municipal Council conducted an internal review
What Role Can the Municipality Play?

• Develop programs to address issues – specifically shelterbelts
• Determine resources that are available
• Set short and long-term goals

• Strategies to achieve those goals
• Identify prospective partners and roles

Ultimate goal is to develop a program which is accommodating to landowners
Partners and Resources

• AAFC / PFRA
  • Shelterbelt knowledge and research
  • Treevitalize Your Landscape workshop

• WWCD
  • Publicity and promotion
  • Equipment and manpower
  • Demonstrations

• CMCDC
  • Demo shelterbelts
  • Crop research

• Other RMs
  • Similar concerns
  • Political Weight
  • Additional resources

RM of North Cypress
Problems to Overcome

• Review current RM Shelterbelt Policy
• Practical concerns – visibility, snow trapping on roads
• Planting configurations
• Conservation Corridors
• Publicity and Promotion
Approaches

• **Eco-friendly**
  - Carbon sequestration
  - Soil & Water Conservation
  - Water protection (Aquifer)
  - Wildlife & habitat corridors

• **Economic**
  - Timber harvesting
  - Improved soil quality & retention
  - Fruits and non-timber products
  - Road dust control

• **Livestock**
  - Feeding area protection
  - Riparian protection & enhancement

• **Aesthetics**
Research to Sell the Program

- Planting configurations for row-crop agriculture
- Dust control
- Set-back distances
- Reduction of crop yields adjacent to shelterbelts
- Evaluation of economic impacts
- Optimal Porosity
- Disease and pest management
Shelterbelt Incentive Program to start in 2013

- Incentives for planting field shelterbelts
- Pilot project to start in 2013
- $500 per mile, up to $1000 per landowner
- Shelterbelts will be planted by WWCD
- Outside Whitemud District, RM will provide tree planter
Landowner Perspectives
On Shelterbelts

Trees are good \textit{but}....
Main Deterrents of Shelterbelts

- Loss of productive land
- Shading and excess moisture
- Potatoes or other crops requiring irrigation - moisture problems
- Other crops – some shading effects
- Main problem – Adaptability to equipment
- Shelterbelts become “weed traps”
- Aerial spraying is difficult
Have you experience soil loss due to wind erosion?

Yes.
Do you notice more erosion after trees are removed?

Sometimes.
Do you notice more erosion after trees are removed?

Sometimes.
Soil Erosion

Current practices that help to prevent erosion

• If cover crops and minimal tillage used properly, there should be very little soil erosion

• Not the final answer
Soil Erosion – Effectiveness of Shelterbelts

• Trees are still the most effective means of preventing wind erosion
• If ground is broken, soil will blow

• Optimal spacing and effectiveness of shelterbelts different in every situation
• No one-size-fits-all solution
Practicality of Shelterbelts

Maintenance can be a problem

- Shelterbelts can become “Weed Traps”
- Average landowner does not have time to maintain shelterbelts
- Mowing, hand weeding, potential watering, pruning, cleanup
- Maintenance costs money
Practicality of Shelterbelts

Large farms are not static. To remain competitive, they must constantly be growing and evolving.

Shelterbelts are not easily adapted to these changes.
Renovation vs. Removal

• Removal is easy, renovation is not
• Trees take a long time to grow
• Resources for renovation are becoming more difficult to source
• Most shelterbelts are not self-sustaining
Renovation vs. Removal

When removed, how many are actually replanted?
Planting Programs

Do Large Farms Need Monetary Help to Plant Shelterbelts?

• No, but incentives always entice more farmers
• Could sway those that are “on the fence”
Planting Programs and Incentives

Do you think your operation would benefit from Shelterbelts?

“From a “hard numbers” standpoint, no. The cost of having to work around the trees will far outweigh any ecological benefits to the farm. However, shelterbelts are good for aesthetics. People like seeing trees – when you have them, people are happy; neighbors are happy, workers are happy. When your workers are happy, they are productive, and when your workers are productive, you make money. That’s the real benefit.”
A Look at the Numbers

The Economics of Potatoes

2010 production: Average yield = 12.7 tonnes/ac, $210.22/tonne = $2670/ac *

*Gross income data obtained from Statistics Canada – Catalogue no. 22-008-X: Canadian Potato Production 2012 (Preliminary Data)

The net income from this should be around 1%-2% of this figure - $50-$60/acre.
A Look at the Numbers

The Economics of Shelterbelts

Example: 4 row shelterbelt, spaced evenly though quarter-section

Cost of planting = $1000 (under current program w/ 2 free rows)

Each tree row is 16ft wide (8 feet either side for mowing), and 2400 feet in length. This means that 4 rows will occupy an area of roughly 3.5 acres.

Therefore, 1 acre of shelterbelt costs $285.71 to establish

First 3 years maintenance: $1500 ($143/ac/year)
Annual maintenance after year 3: $250 ($71/ac/year)

This isn’t a big cost if the surrounding crops are improved...
A Look at the Numbers

The Economics of Shelterbelts vs. Potatoes

Shelterbelt: -$71/ac/year

Potatoes: +$50/ac/year*

*Net revenue

This is a difference of roughly $121 per acre, every year. This net revenue per acre is equal to about 265 tonnes of potatoes for the farm. To make this up, the shelterbelts would have to provide roughly a 1.7 tonne/acre improvement over the entire quarter.
Where do we go from Here?
Sustainability

• How can this type of farming be sustainable?
• How can any kind of shelterbelt program be sustainable?

Where do we go from Here?
Sustainability

• It is our jobs to bring awareness to the benefits and need for shelterbelts
• A new approach may be needed
• Sustainability comes with education
• The work that is done is not credited enough, and we need to promote the accomplishments that continue to happen today

Where do we go from Here?
Where do we go from Here?

Sustainability

Economic
Social
Ecological
Where do we go from Here?

Economic

Sustainability

Social
Where does the balance lie?

Ecological

Where do we go from Here?