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Growing Switchgrass on Marginal Grey County Farmland

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Overview of Presentation

- How it all started
- What is Switchgrass?
- Planting Switchgrass on marginal land
- Maintenance of Switchgrass, including weed control and fertilizing
- Harvesting of Switchgrass
- Market Opportunities of Biomass
- Summary
- Recommended Switchgrass References
- Acknowledgments
- Questions

How it all started!

- Mowing weed fields in 2008 and searching for a better way
- Discovered Switchgrass as a solution
- Impressed by positive environmental impact of Switchgrass
- Extensive Switchgrass research
- Guidance from REAP-Canada, Don Nott, OMAFRA, etc.

What is **Switchgrass**?

Notice the spelling:

Not Twitch or Witch, it is **Switch**!


Switchgrass
is a warm-season perennial grass
native to North-America

Characteristics of Switchgrass

- Grows 4’ to 6 ‘ tall and has deep roots
- Excellent CO2 sequestration capacity (provides a solution to GHG problem)
- Converts solar energy efficiently (Mother Nature’s “Solar Panels”)
- Ideal vegetation for our stressed environment
- Creates rich habitat for wildlife

SG from a Farmer's Perspective

- Improves soil quality
- Perennial with a life span > 10 years
- Requires minimal nutrients (often only N)
- Can grow on marginal farmland
- Produces 3-4 tonnes/acre of high quality biomass
- A "farmer friendly" crop from a planting, maintenance and harvesting perspective
- Common Forage Equipment used for entire cycle

Switchgrass on my farm in early June
(after 2,4-D application)

Cave-in-Rock SG on my farm in July


Cave-in-Rock SG in August

Cave-in-Rock SG in September

Cave-in-Rock SG in October

Switchgrass Cycle

- Planted between May 15 and June 15
- Cut after dormancy, late Oct / early Nov (2nd year & later)
- Bailed in April to mid May, the following year
- Weed control needed during 1st and 2nd year
- Fertilizer beneficial 2nd year and later (45 lbs of N / acre)

Switchgrass Calendar

2012

April

S	M	T	W	T	F	S
22	23	24	25	26	27	28
29	30					

May

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	19	20
21	22	23	24	25	26	27
28	29	30	31			

June

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15		
24	25	26	27	28	29	30

July

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14

August

S	M	T	W	T	F	S

September

S	M	T	W	T	F	S

October

S	M	T	W	T	F	S
21	22	23	24	25	26	27
28	29	30	31			

November

S	M	T	W	T	F	S
				1	2	3

December

S	M	T	W	T	F	S

Bailing

Planting

N Application

Mowing

Establishing Switchgrass

- Establishing Switchgrass is the toughest part of the production cycle!
- Highest costs in year of establishment:
  - **No** harvest in 1st year
  - 50% yield in 2nd year
  - 90% yield in 3rd year
- Effective weed management is a must
  - Weeds should be controlled **before** planting
  - Weeds in 1st year are often depressing!
- No fertilizing (Nitrogen) in 1st year (promotes weed growth)

Planting of Switchgrass

- Good results with 10-12 lbs of seeds/acre (high dormancy)
- Rows of 7" with seed drill
- Dormant seeds often germinate in 2nd year
- Possible Switchgrass Planting Methods:
  - Regular till and planting with seed drill (grass seed box)
  - Broadcasting (after good preparation of seed bed)
  - No-till seeding

My Seed Sources: - Nott Farms, Ernst Seeds, REAP-Canada

Regular Till and Planting

- Low impact till, like discing, is preferable
- Brillion Seed Drill best choice with regular till planting method
- Seed depth:
  - ¼ - ½ " is optimal (don't burry small seeds!)
  - broadcasting is better than excessive seeding depth
- Solid packing is essential, before and after seeding!

No-Till Planting

- No-till is optimal method based on my experience
- Major no-till advantages:
  - least labour intensive
  - minimal disturbance of soil, ➜ lower germination of weed seeds
  - ideal on stony fields
  - precise seeding depth
  - consistent seeding rate

Cave-in-Rock SG end of August, 1st year, no-till

Planting with Nurse Crop

- Used spring wheat as nurse crop using no-till seed drill
  - 2 seeding passes in my case
  - 70% wheat seeding rate seems optimal (I only used 50% rate)
  - Planting in mid May (compromise of seed date)
  - Combining wheat 2nd half of August, cutting height 10-12”

- Benefits:
  - Great way to minimize unwanted weed growth
  - **Revenue** during year of switchgrass establishment

Cave-in-Rock SG, 1st year, no till with spring wheat nurse crop (mid August)

Cave-in-Rock SG mid September, 1st year, no till , after combining of spring wheat

1st year C-i-R SG, left side regular no-till, right side no-till with spring wheat nurse crop (after harvest mid September)

1st year C-i-R SG, left side regular no-till, right side no-till with spring wheat nurse crop (October)

Weed Control

- Weeds are major challenge, especially on pasture land
- Switchgrass starts growing only at > 55°F soil temperatures

  ⇒ Advantage weeds!

- Weed Control:
  - Mechanical, i.e. clipping weeds
  - Using herbicides
- Switchgrass will ultimately shade out most weeds in 3rd year and later


Quiz Question:
Where is the Switchgrass?

Mechanical Weed Control

- Clip weeds above Switchgrass
  (most weeds are taller at the beginning of growing season)
- Mechanical weed control useful in 1st & 2nd year
- 1st mowing in June, 2nd time in late July
- Timing is critical
- Mechanical weed control is more art than science!

Weed Control with Herbicides

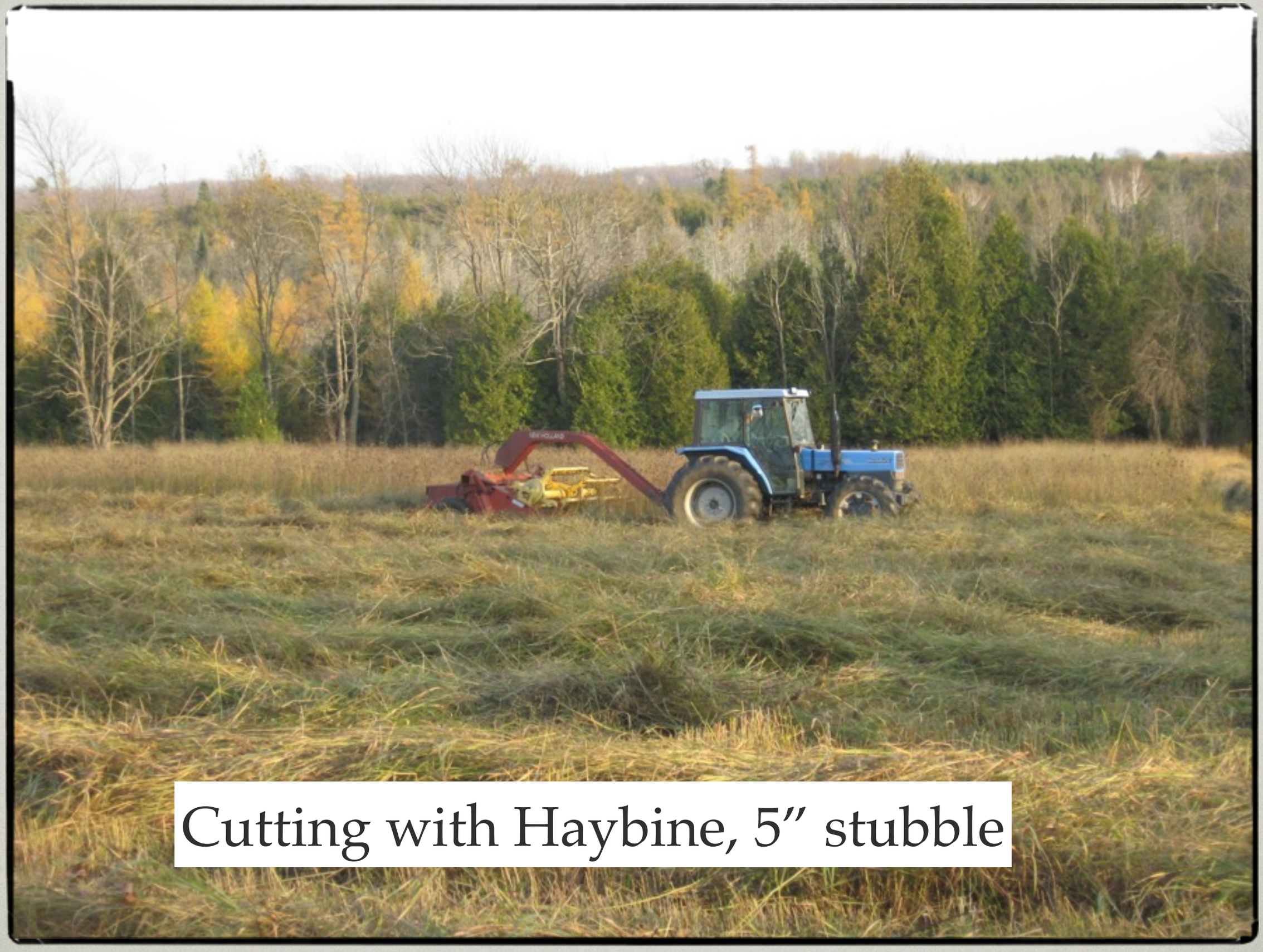
- No registered herbicide for Switchgrass available in Ontario
- Paramount™ from BASF is used successfully in U.S. as post-emergence herbicide
- Herbicides are normally only needed during 1st & 2nd year
- Broadleaf herbicides (e.g. 2,4-D) are currently the practical options in Ontario
- Very difficult to eradicate weed grasses
- Best timing for broadleaf applications is early in the season

Weed Control Wisdom

1st year switchgrass fields should <u>not</u> be used as showcase!

Switchgrass Harvesting

- After long Fall vs. Spring harvest debate, it is a combination of both:
  - Cutting in late fall, once SG goes dormant (4-5" stubble)
  - Overwintering in swaths
  - Bailing in Spring, once a moisture level of 8-12% is reached
- Discbine is implement of choice, Haybine can work, too
- SG can be cut with discbine even during adverse weather conditions
- Round or square bailer used, depending on market (transportation)
- Alternative to indoor storage and handling ➜ bail wrapping



Cutting with Haybine, 5″ stubble


Swaths will be bailed next spring

Biomass Markets

- Biomass production and markets are still in infancy stage
- Chicken and Egg situation, "What comes first":
    - Production or
    - Market opportunities
- Dilemma:
    - Farmers don't plant biomass without solid markets
    - No Biomass Industry will emerge without guaranteed supply

We need leaders in both camps!

Applications of Switchgrass

- CO_2 neutral Heat Energy (pellets, briquettes, loose, entire bails)
- Fuel, i.e. ethanol or biodiesel
- Bio-composite consumer products
  - Plastic products with 30-40% biomass content
  - Fibre boards for construction and furniture (> 80% biomass content)
- Livestock bedding (very absorbent ⇒ high quality compost)
- Kitty Litter
- Dairy Feedstock
- Landscaping (fertilizer, , mulch, organic matter)
- Substrate for Mushrooms

Summary

- Growing switchgrass for biomass in Grey-Bruce is feasible
- Purpose grown biomass, like Switchgrass, could become a reliable revenue stream for Grey-Bruce farmers
- Grey-Bruce land rental rates favour biomass production in our region
- With growing of switchgrass we make a valuable environmental contribution and put marginal farmland to good use
- Switchgrass improves soil quality

Biomass industry needs leaders from the farming community!

Recommended Switchgrass Reference Material

- Switchgrass Production in Ontario: A Management Guide (REAP-Canada)

  http://www.reap-canada.com/online_library/feedstock_biomass/2007%20SG%20production%20guide-FINAL.pdf

- Planting & Managing Switchgrass (BLADE Energy Crops)

  http://www.bladeenergy.com/Bladepdf/Blade-Switchgrass-Mgmt_2ed.pdf

- Native Warm Season Grasses & High Quality Biomass Production (Ernst Seeds)

  http://www.ernstseed.com/files/general_images/biomass/nativewarm1.1.16.10.pdf

- Switchgrass Enterprise Budget (OMAFRA)

  http://www.omafra.gov.on.ca/english/budgetsdev/bear2000/Budgets/Crops/Forages/switchgrass_static.htm

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Thank You

for your attention!

Questions?

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