Developing Switchgrass and Big Bluestem as easy to grow/low cost crops for the bio-based economy

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Advancement in Switchgrass and Miscanthus Value Chains,
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REAP-Canada
Resource Efficient Agricultural Production
Breeding Goals

- Since 1992, develop improved biomass cultivars of switchgrass & big bluestem
- Adaptability to less than best lands to reduce land competition
- Easier to grow and faster to establish
- Higher yielding
- Widen maturity range to better supply markets
Native Grasses were not Field Crops!

In the 1990’s, Canadian field scale up results were modest with low start up income for farmers. The crops required domestication.
REAP-Canada worked intensively to complete annual breeding cycles to improve seedling vigor over a 15 year period in SG and BB.
| 1<sup>st</sup> year space plant nursery following fall 2006 seed collection of old field in QC | Annual transplants uniform and erect by August 2015 | By August 2016, mature stand of upland switchgrass has been transformed to an erect canopy like lowland switchgrass |
New Ideotype of Upland Switchgrass

- Tall height
- Reduced tillers
- Wide erect leaves
- Wider maturity
- Glaucous bloom (blue green colour from epicuticular wax)
REAP-Canada’s Breeding Program is Making Excellent Yield Progress

Noteworthy success with intensive morphological selection for enhanced seedling vigor and yield in upland switchgrass.
# Maturity Range of New REAP Cultivars

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Maturity Range</th>
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</thead>
<tbody>
<tr>
<td>RC Blue Jacket</td>
<td>130 days</td>
</tr>
<tr>
<td>RC Tecumseh</td>
<td>135 days</td>
</tr>
<tr>
<td>RC Sundance</td>
<td>141 days</td>
</tr>
<tr>
<td>RC Chippewa</td>
<td>146 days</td>
</tr>
<tr>
<td>RC Big Rock</td>
<td>155 days</td>
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130 135 140 145 150 155

(# Days to Seed Maturity from May 1)

* Cave-in-rock is 146 days to seed physiological maturity (~Sept 23rd). New materials provide a maturity range of ~ 25 days. Late materials are for fall mow and spring baling systems. Early maturing varieties are better suited for fall harvesting.
Performance Trials are being carried out at 12 locations in North America of new REAP-Canada Cultivars
The new varieties, combined with no-till seeding & pre-plant/pre-emergent herbicides are providing exceptional, reliable and fast field establishment
New Varieties Seeded in 2019 and 2020 by Seed Growers

Don Nott, Clinton, Ont.
RC Big Rock II

Normand Caron, Valleyfield, QC
RC Sundance

Ron Toonders, Williamsburg, Ont.
RC Chippewa
Upland Switchgrass is Becoming an Easy to Grow Biomass Field Crop and suited to Fibre, Feed and Straw markets

RC Big Rock at Nott Farms
July 2020
Spring Harvest in Eastern Canada

High yielding late maturing materials are fall mowed, overwintered in windrows and spring baled.
Fall Harvesting is Getting Easier

New high yielding early maturing switchgrasses can reach physiological maturity in mid-September
The crop at the farm of Don Nott in Clinton, Ontario was cut Sept 17 into a wide swath & baled Sept 21
The field was raked the morning of baling
The field yielded 6 ton/acre (13.3t/ha) and the bales weighed 960 pounds at 8% moisture.
In 2021 REAP-Canada had First Elite Seed Exports to Europe
NEEDS

- Sector needs to recognize competition for land is severe and to develop less than best lands
- Carbon offset programs for growers
- Market development of emerging opportunities in both Agri-Food & Bioeconomy sectors
- Support for breeding & trials on less than best lands
Research Partners in WSG Plant Improvement