Improving Compost Use
in
High-Value Horticultural Systems

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Dec 2nd 2010

Market Opportunities

- Commercial Growing Media
- Organic Vegetable Production
- Highbush Blueberry Production

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Funding Support

- Resource Recovery Fund Board
- Envirem Technologies Inc. (Fredericton, NB)
- Nova-Agri Inc. (Centreville, NS)
- Louisiana Pacific (Chester, NS)
- Colchester County Municipality
- NSDAF Technology Development Fund
- Natural Sciences and Engineering Research Council
- Canada Research Chairs Program

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Novel Growing Media from Composted PMB

Context for Potential:

- Clean and Consistent Compost
- Expanding High Value Markets
- Regional Peat Policies
- Novel Technology (dehydration)

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Novel Growing Media from Composted PMB

- Commenced in 2007 (MSc thesis of S. Thissaverasingan)
- PMB compost (1) raw (2) dehy. (3) dehy. + screened (4) blended with peat
- Examining (i) physio-chemical and biological properties and (ii) crop response

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Compost Quality

Physio-chemical and biological properties:

- ash, pH, EC, mineral N, total C and N
- bulk density and water holding capacity
- Maturity: Dewar flask, soluble C, microbial biomass

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Ash content and water holding capacity

	------- WHC (%)-------		----------Ash (%)----------	
Treatment	Clarendon	Miramachi	Clarendon	Miramachi
Raw	283	296	73. 3	67.2
NS	168	307	72.8	63.9
NS 50	346	545	62.8	48.2
NS 75	435	719	52.6	35.4
S	214	280	65.6	67.1
S 50	365	503	55	51.6
S 75	623	761	37.4	29.3

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EC, pH and C:N ratio

Treatment	EC	pH	C:N
Raw	289	7.4	41.3
NS	863	7.3	42.4
NS 50	641	5.5	52.5
NS 75	475	4.6	62.8
S	998	7.4	44.7
S 50	682	5.6	53.5
S 75	531	4.4	68.4

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Plant Growth Response

- Greenhouse trials compared plant (tomato and lettuce) growth from peat, compost alone and compost mixed with peat on a 50% v/v basis
- Plants growing in compost alone grew poorly, with the exception of LP compost (Chester NS)
- PMB compost can be used as a growing media when mixed 50:50% v/v with peat
- In general, using a mix with both peat and compost produced similar results to the standard growing media (Promix) and should therefore be considered as a viable alternative to 100% peat

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Sustainable Organic Potato Production using Green Manures and Off-Farm Organic Amendments

D. Lynch, M. Sharifi, D. Burton and A. Hammermeister

Objectives

To examine the effects of:

- **green manure type and frequency in different organic rotation sequences**
- **organic off-farm amendments (e.g. source separated municipal food waste, paper mill biosolid compost)**

Organic Vegetable Production

- Commenced in 2006
- Four cropping sequences
- MSW and PMB composts applied to provide phosphorus plus organic matter.
- Gauging benefits to soil, crop and air.

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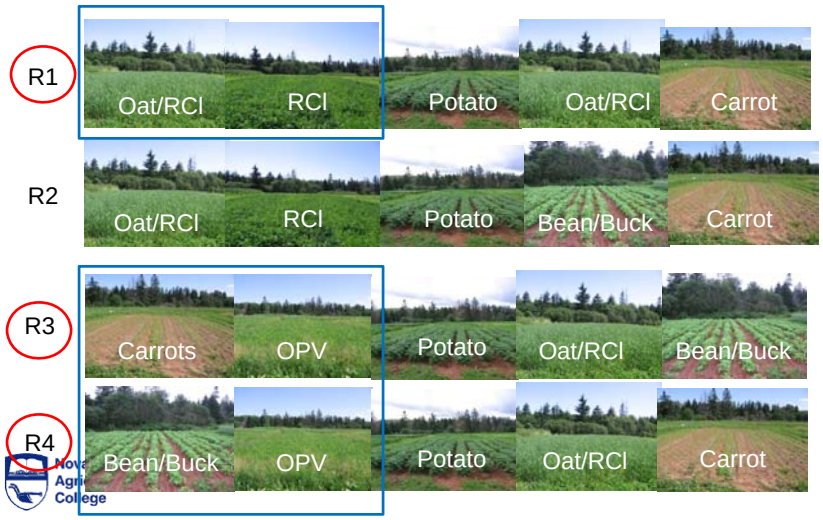
Rotation treatment



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Fertility treatment

80 kg N ha^{-1} (AN)
60 kg P ha^{-1} (TSP)

P-based

120 kg total P ha^{-1}

7 Mg ha^{-1} dry weight
82 kg total N ha^{-1}

10 Mg ha^{-1} dry weight
121 kg total N ha^{-1}

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Objectives

- **crop yield and quality**
- **P and N bioavailability**
- **soil health and quality indicators**
- **weed population and biomass**
- **greenhouse gas emissions**
- **over winter N losses**

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Soil quality indices

- **Bulk density**
- **Soil pH**
- **Available P and K**
- **Total organic C and N; POM C and N**
- **Mineral N at 0-60 cm depth**
- **Mineralizable N ($NaHCO_3$-205 and $NaHCO_3$-206)**
- **Plant Root Simulator (PRS) N flux**
- **GHG emissions**
- **Estimates of seasonal N losses**

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N fluxes using *In situ* Plant Root Simulator

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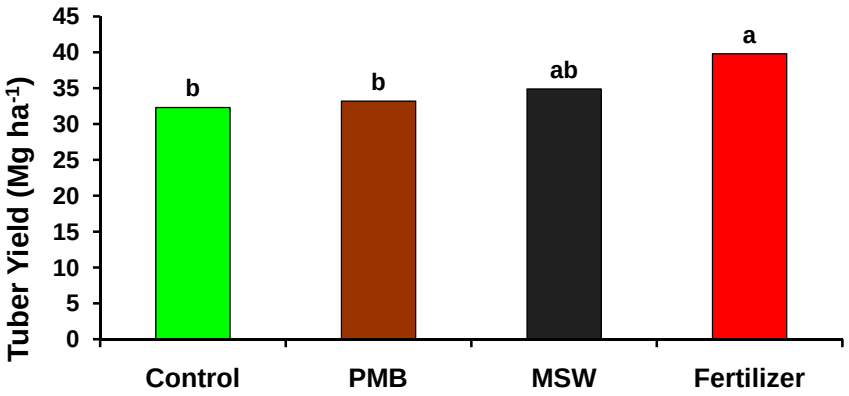
Results: Total Tuber Yield 2008



No significant effect of rotation on tuber yield but slightly higher values for RCl compared with POV.

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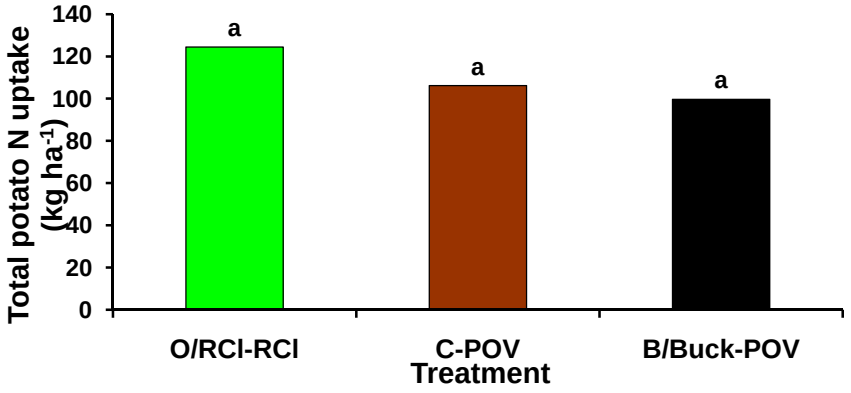
Total Potato N uptake



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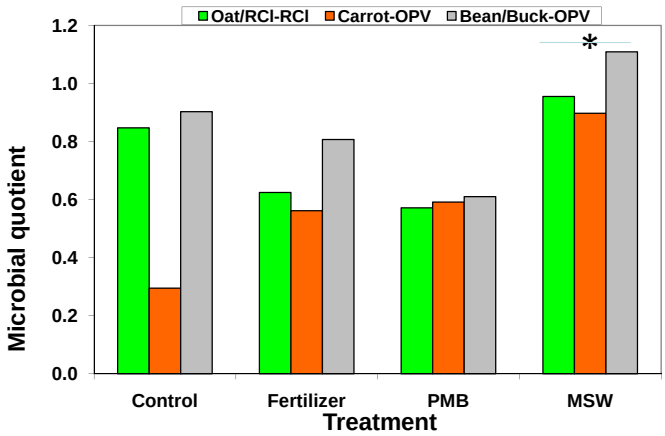
Microbial quotient



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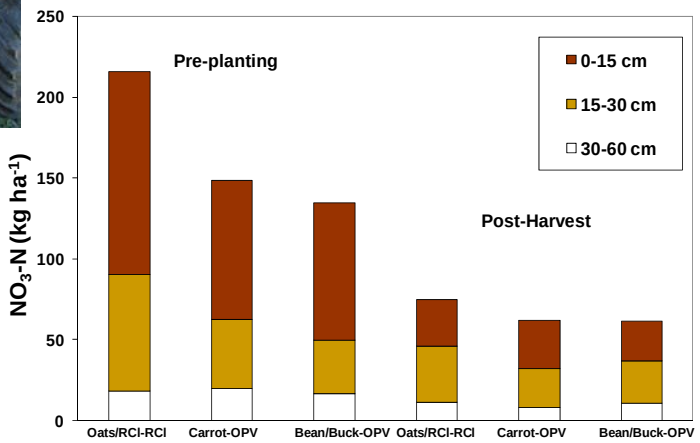
Soil nitrate – Seasonal change



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Greenhouse gas emissions

Using non-flow-through, non-steady-state (NFT-NSS) chamber method

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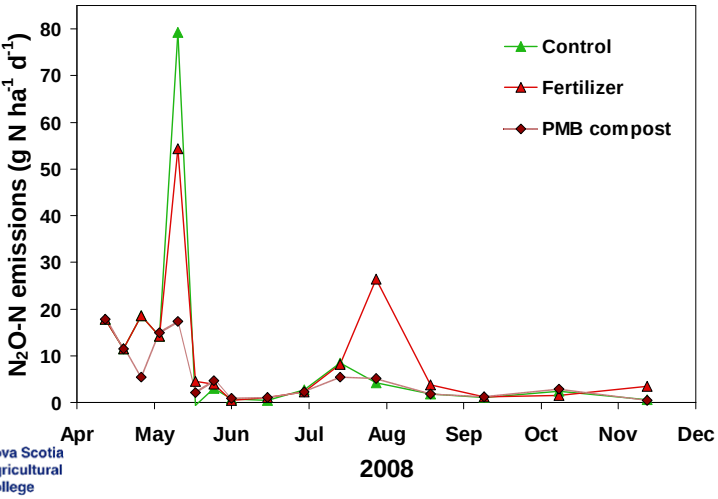
Nitrous oxide emissions in potato crop as affected by N fertilizer or PMB compost



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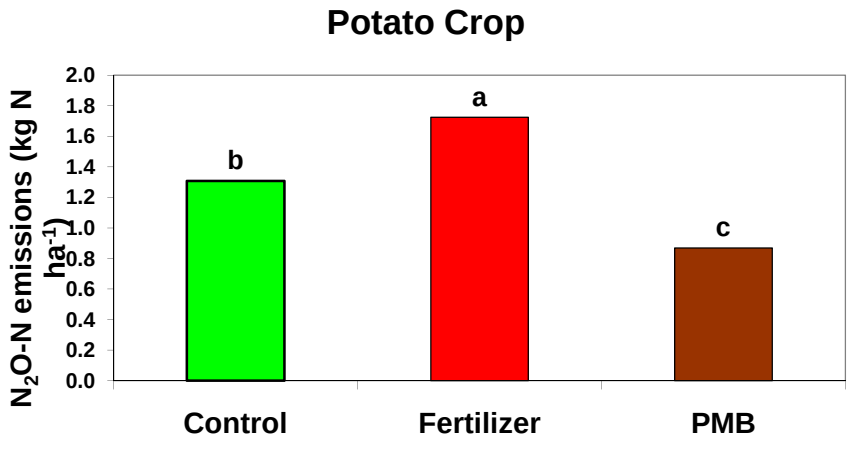
Nitrous oxide emissions (2008)- Fertility treatments



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Interim conclusions (2006-2009)

Extended rotations characteristic of organic production systems allow for acceptable yields of potatoes, with sustained soil C and reduced losses of N.

Regional N credits for green manures may need re-evaluation.

Selected organic amendments may play a role in maintaining soil quality and fertility in these systems.

Nitrous oxide emissions from organic potatoes can be mitigated using rotation crop and organic amendments.

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Previous Research on Highbush Blueberries

MSc student Nicole Burkhard
Research conducted: 2005-2007

OBJECTIVES:

1) Determine weed control, mineral N release and effect on blueberry plant performance from thick (25cm) layers of organic mulch

2) Assess Plant Root Simulator (PRS™)-probes as a tool for predicting plant-available mineral N

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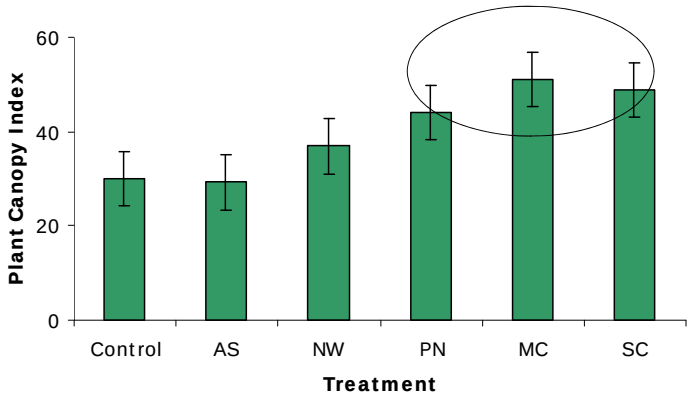
Enhanced Plant Growth, Berry Yield and Quality



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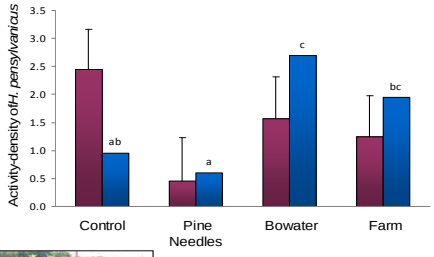
Effects of Mulch and Vegetation on Ground Beetles (Carabidae) in Highbush Blueberries

International Horticultural Congress
Lisbon, Portugal, 24 August 2010

J. M. Renkema
D. H. Lynch
S. J. Walde
C. G. Cutler
K. MacKenzie

Groundbeetle diversity and blueberry maggot management

J. Renkema,
PhD candidate



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Introduction

Mulching in highbush blueberries:

- weed control
- fertilization
- moisture retention

Ground beetles (Carabidae):

- bioindicative - react to agricultural practices
- biocontols - prey on crop pests

How does mulching in highbush blueberries affect ground beetles?

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Kentville

Soil

Pine needles

Papermill compost (Bowater)

Manure/sawdust compost

2007 & 2008

small plots (4.5m)

2009

large plots

(19 m x 4 rows)

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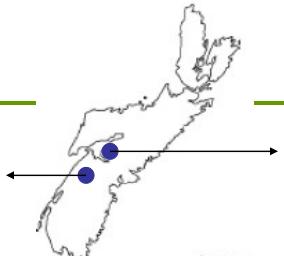


Rawdon

Soil

Pine needles

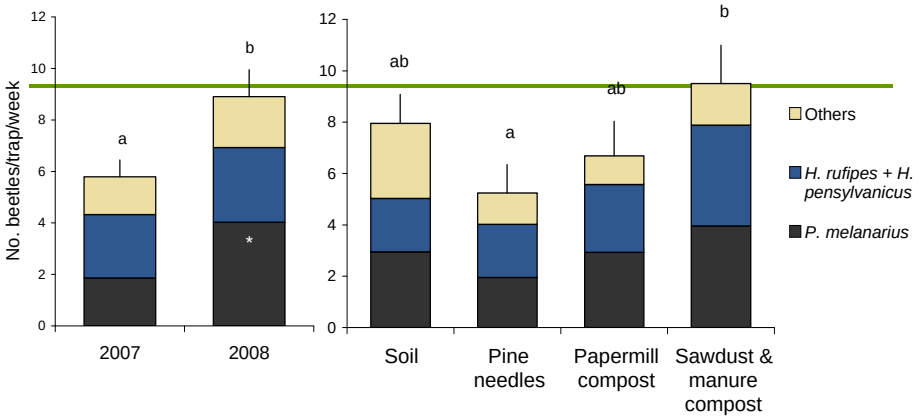
Papermill compost (Louisiana-Pacific)

weeded & unweeded

2008 & 2009

large plots (18 m x 3 rows)

Kentville 2007 & 2008



- increase in total carabids & *P. melanarius* from 2007 to 2008
- greater total carabids in sawdust & manure compost than in pine needles

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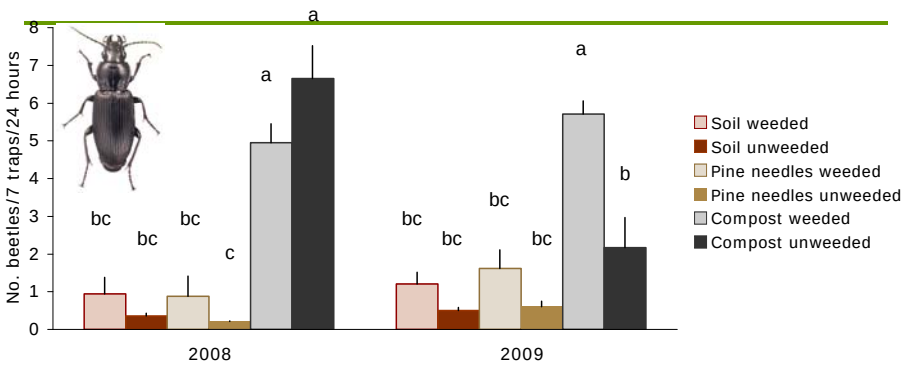
Rawdon 2008 & 2009

Pterostichus melanarius (Illiger)



- greater captures in unweeded & weeded compost in 2008
- greater captures **only** in unweeded compost in 2009

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New Research Directions

New Atlantic Innovation Fund (AIF) project:

'Bioproducts: Development, Testing and Commercialization'

NSAC research components led by:

Dr. Lynch – Novel growing media

Dr. Price – Biofertilizers

Dr. Yiridoe – Life Cycle Analyses

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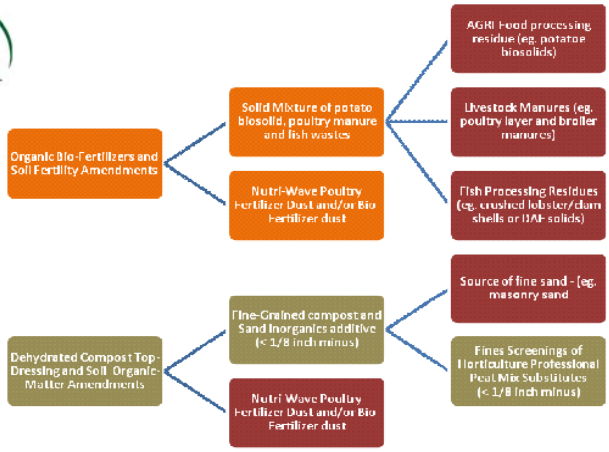
FEEDSTOCK MATRIX
AIF RESEARCH PROJECT

ENVIREM ORGANICS INC.



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Web: www.envirem.com

FEEDSTOCK MATRIX – AIF RESEARCH PROJECT

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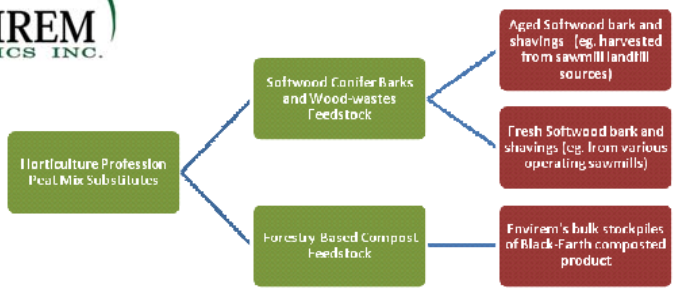

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Future Processing for Samples

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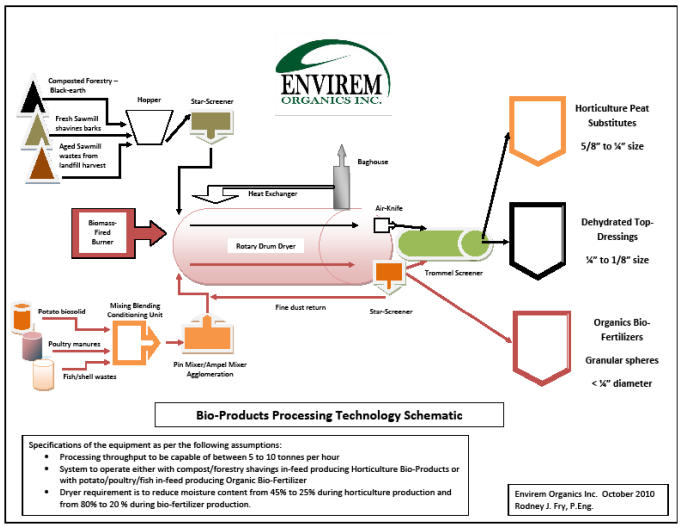

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Thank You

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- Canada Research Chairs Program
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- Louisiana Pacific (Chester, NS)
- Bowater-Mersey (Liverpool, NS)
- Many Farmers and Research Collaborators

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