Subsoil Injection of Concentrated Organic Pellets

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Subsoil compaction

 A growing problem
 More persistent
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Subsoil compaction

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Increases roots and bio processes
 Decreases compressibility

o Creates sustainable pores - macropores

Our approach Break a compacted layer and inject OM pellets Increase rooting depth Nutrients – efficiency - pool Water infiltration and storage Sustainable structure Why pellets? Transportation, application consistency No pathogens and weeds

10 to 20 t/ha injection

- Agricultural increase in biomass and yield
- Moisture and nutrient uptake efficiency
 3-5 yrs of organic fertilizer
- Environmental
 - Carbon sequestration
- Waste management option (Water and air quality reduce NO₃ to runoff, particulates, ammonia, odour)
- Expedites reclamation of problem sites

Environmental benefits

Carbon sequestration



Technology development

Bench scale research
Crop response studies – green house
Field trials - '08 and '09 sites
Injection system
Air permeameter for monitoring soil structure



Bench scale tests: compaction, subsoiling, and pellet injection





Pellet processing





Green house crop response study



Green house crop responses

3

2

0

а

С

Grain yield (Mg ha⁻¹) 1 1 7 7



First crop - barley





b

SS

Treatments

 $\frac{\mathbf{I}}{a}$

SP

ab

SPC

Second crop - Canola

Field calibration: rate, depth, speed, etc









Preliminary field trials: depth, rate, speed, etc



Results so far - '08 and '09



Control = C

Subsoiled = SS

Subsoiled + Pellets = SP

Results so far - '08 and '09















2008 plots - second season









Results so far - '08 and '09

- Crop response significant in '08
 - 20 to 30% increase in yield and biomass
 - Root development
- Poor soil moisture in '09 affected trial results

Both '08 and '09 sites are expected to show even higher response in 2010 if moisture condition is good

Soil structure monitoring in 2010+

New sites - TransCanada





 Established in July 2009

- South
 Edmonton
- Significant responses are expected from TCPL3 and 4
- Higher bulk density and clay

New sites - TransCanada



Lower OM and total N







Pellets and Roots, Oct.



Pellets and roots in subsoil



Abundance of roots around pellets



Consortium members and partners Government institutes University Oil and gas operators

















