Identifying cost-competitive greenhouse gas mitigation potential of Canadian Crop production

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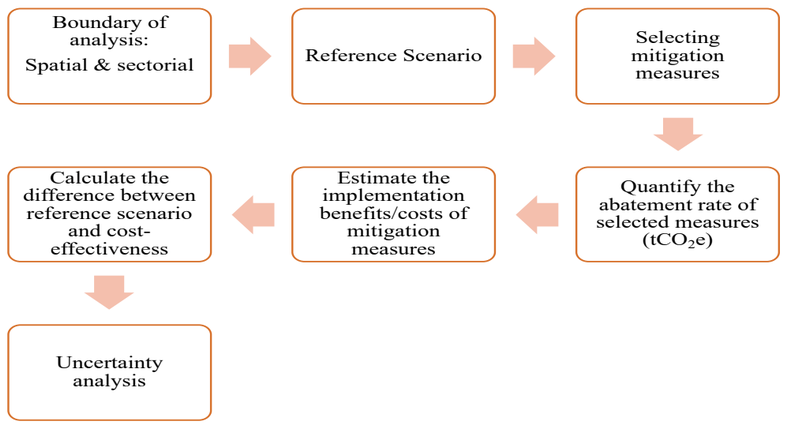
Introduction

The objective of this research is to
1.) Construct an Engineering Marginal Abatement Cost Curves (MACC) for Canadian agriculture that incorporates uncertainty.

2.) employ an Engineering MACC to identify cost-effective mitigation measures in Canadian crop production

Engineering MACC or "bottom-up" approach



Results

Table 1:Carbon sequestered as a result of mitigation measures

Practice	Abatement potential (Mg C/ha/yr)	Author
Nutrient addition via fertilizer	0.3	Desjardins et al., 2005
Converting cultivated lands to grasslands	1.01	Desjardins et al., 2005
Crop rotation with more legumes	0.75	Asgedom & Kebreab, 2011
Adopting conversation tillage	0.44	Smith et al. 2001
Conservation tillage	0.2- 0.35	McConkey et al., 1999
Reduction of summer fallow	0.123 – 0.185	Campbell et al., 2001
Improved grassland management	0.59	Conant et al., 2001

Table 2: Abatement potential: feasible estimate

Measure	Abatement per measure ($KtCO_2e$)	Cost-effectiveness (CA $/$tCO_2e$)
Mineral N timing	1, 150	-103
Organic N timing	1,027	-68
Full manure	457	-149
Reduced tillage	56	-1053
Improved N-use plants	322	-76
Avoid N excess	276	-50
Drainage	741	14
reduced N fertilizer	136	2045
Biological N fixation	8	14280
Nitrification inhibitors	604	294

Summary

- Nutrient management: split fertilizer application, right time, right placement or right product is crucial to N_2O reduction in agriculture
- Water management: E.g. controlled drainage coupled with fertilizer management is beneficial
- Nitrification inhibitors reduce emissions but at a high cost.

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