Climate Action Initiative
BC AGRICULTURE & FOOD

Farm Adaptation Innovator Program

Digital Soil Mapping of Soil Workability in Delta, BC

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Geographic Applicability	This study was conducted in Delta; findings should be applied only to locations with humid maritime climate and poorly drained, silty soils
Commodity Relevance	This study was conducted on blueberry and vegetable crop fields but findings may also be applied to other crops
Time Frame	Fall 2015 – Spring 2017

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Background

Soil workability is defined as the upper limit of soil water content above which there is a potential risk of soil degradation from the use of heavy equipment. Excessive precipitation during the spring during planting and fall during harvest can reduce the period of time when soil is workable. Climate models predict that precipitation is likely to increase in these critical shoulder seasons. The installation of tile drains, ditch improvements and water conveyance infrastructure can help mitigate this problem but currently the data available for evaluation and planning of fields at risk is limited to coarse resolution soil survey maps published in 1980. Some soil properties that influence workability are unlikely to change, such as soil texture, but soil organic matter, which is a key determinant of workability, is highly dynamic. This project developed digital soil maps to enhance planning and evaluation for climate adaptation strategies and to provide an important monitoring tool for soil quality.

Study Objectives

- Produce field and landscape scale digital maps of soil organic carbon (%) and clay (%) using remote sensing and field soil data
- Generate field and landscape scale soil workability threshold maps
- Highlight how these maps can be used to identify areas with low workability thresholds; these areas will be more likely to be impacted by changes in precipitation and would benefit the most from enhanced soil management

Results

Field-scale: Demonstration Trial

- Field scale map of the soil workability threshold (in gravimetric moisture content (%)) was produced with high accuracy
- There was a 90% correlation, and a low amount of error between values predicted with the digital soil map and those observed from sampling in the field
- Using this map, areas with a low threshold value (e.g. 12%) and high thresholds (e.g. 41%) could be clearly identified and delineated (Fig 1a)

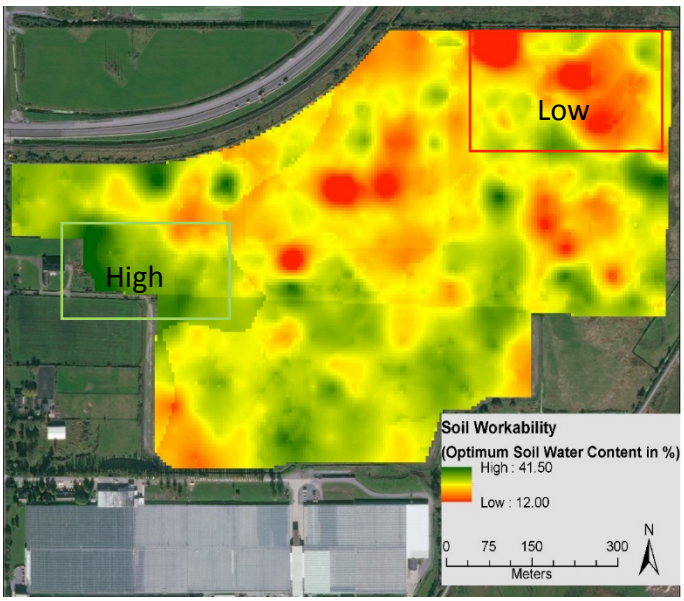
Landscape-scale: Delta's Agricultural Lands

- At the landscape scale, digital soil mapping also had a strong correlation between mapped workability and field measured values (92%) with low error
- Results show the gravimetric soil workability threshold ranges from 20 to 42% across Delta, and 60% of the landscape was between 30-35% (Fig 1b)
- This digital soil map is available online (on the Sustainable Agricultural Landscapes Website, right) and can be zoomed to evaluate specific regions of the landscape

Definitions

gravimetric moisture content: a measure of soil moisture determined by the ratio of water weight to dry soil weight

a.



b.

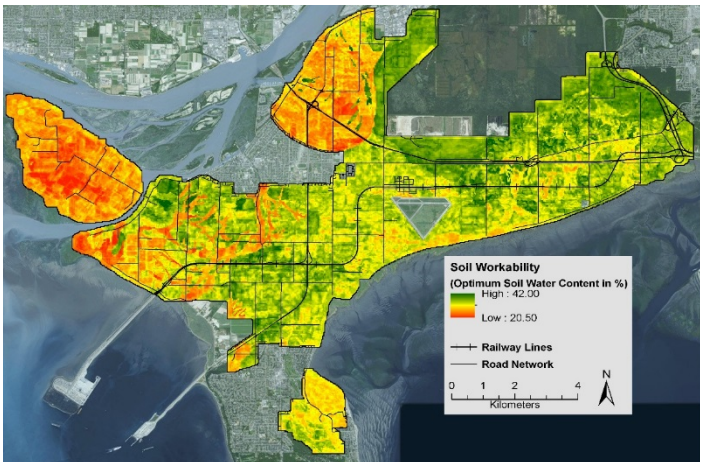


Figure 1. Digital soil map of soil workability for (a.) a field demonstration trial and (b.) across the agricultural lands of Delta, illustrating areas with a low workability threshold (in red) and areas with a high threshold (in green).

For more information:

For more details on the results of this project visit the Climate Action Initiative website:
http://www.bcagclimateaction.ca/faip-project/fi13/

and the Sustainable Agricultural Landscapes Lab:
http://sal-lab.landfood.ubc.ca/projects/delta-drainage-project/

For more information on drainage management visit the BC Ministry of Agricultures website:
http://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/water/drainage

Funding for this project has been provided in part by:

Growing Forward 2 · Investment Agriculture Foundation of British Columbia · ardcorp · Climate Action Initiative BC AGRICULTURE & FOOD · British Columbia · Canada