



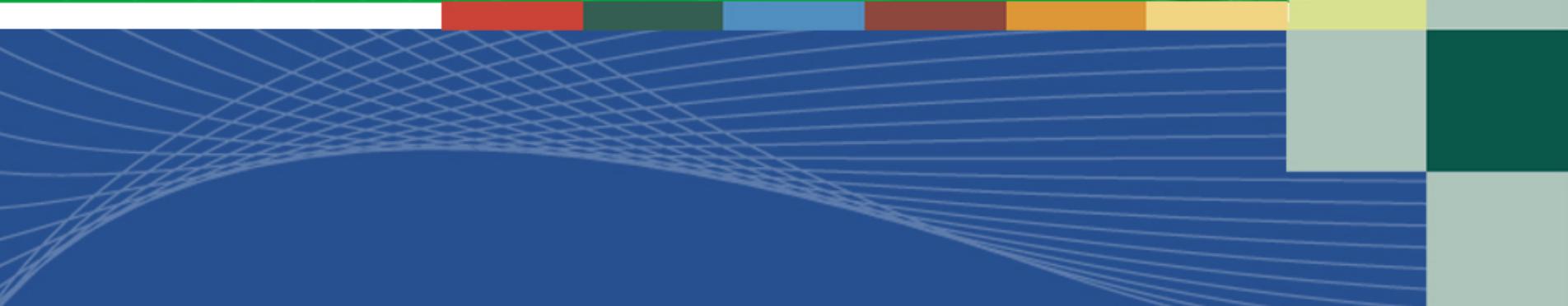
The National Land and Water Information Service

Pedological Sampling Adds Value to the NPK Study in the Agricultural Soils of the Lower Fraser Valley of British Columbia, Canada

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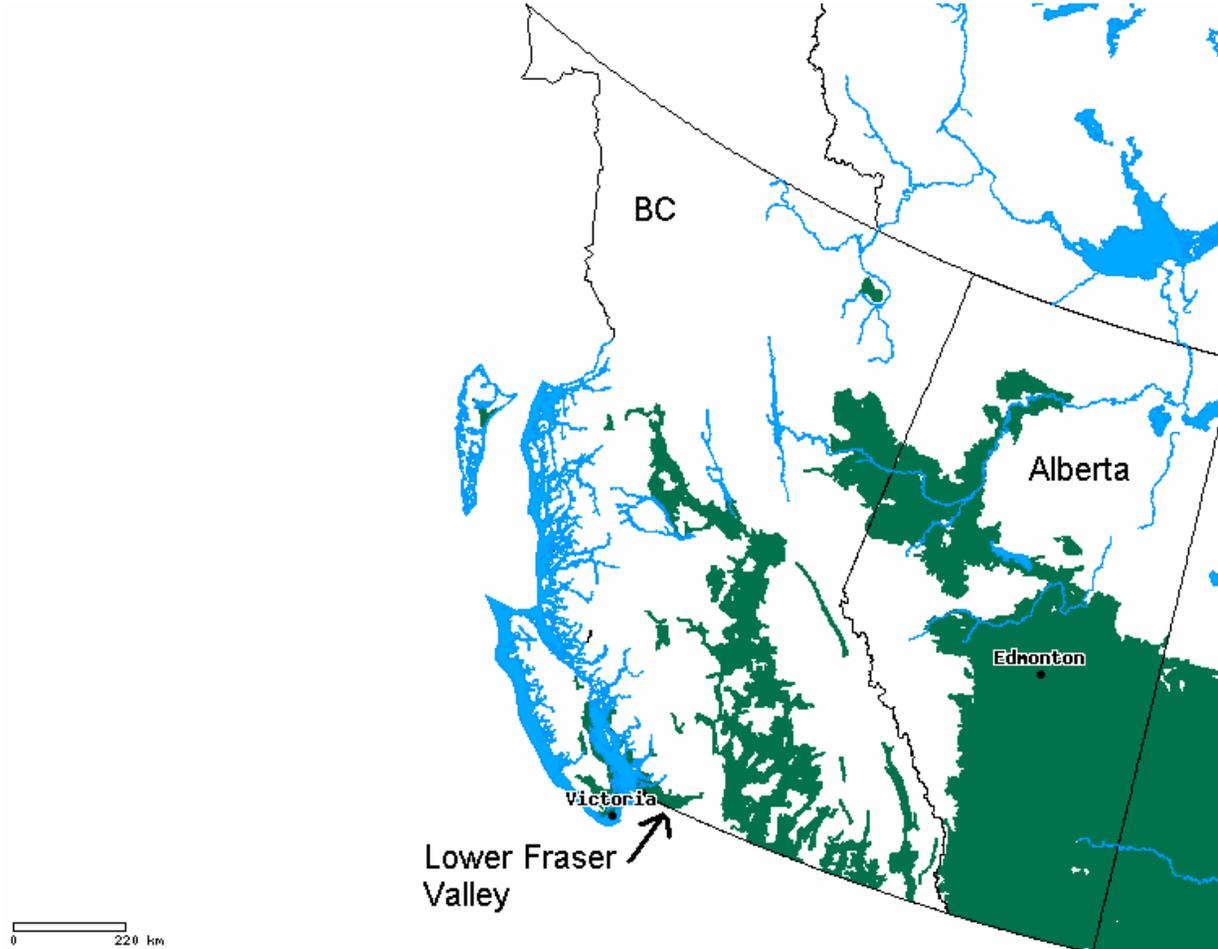
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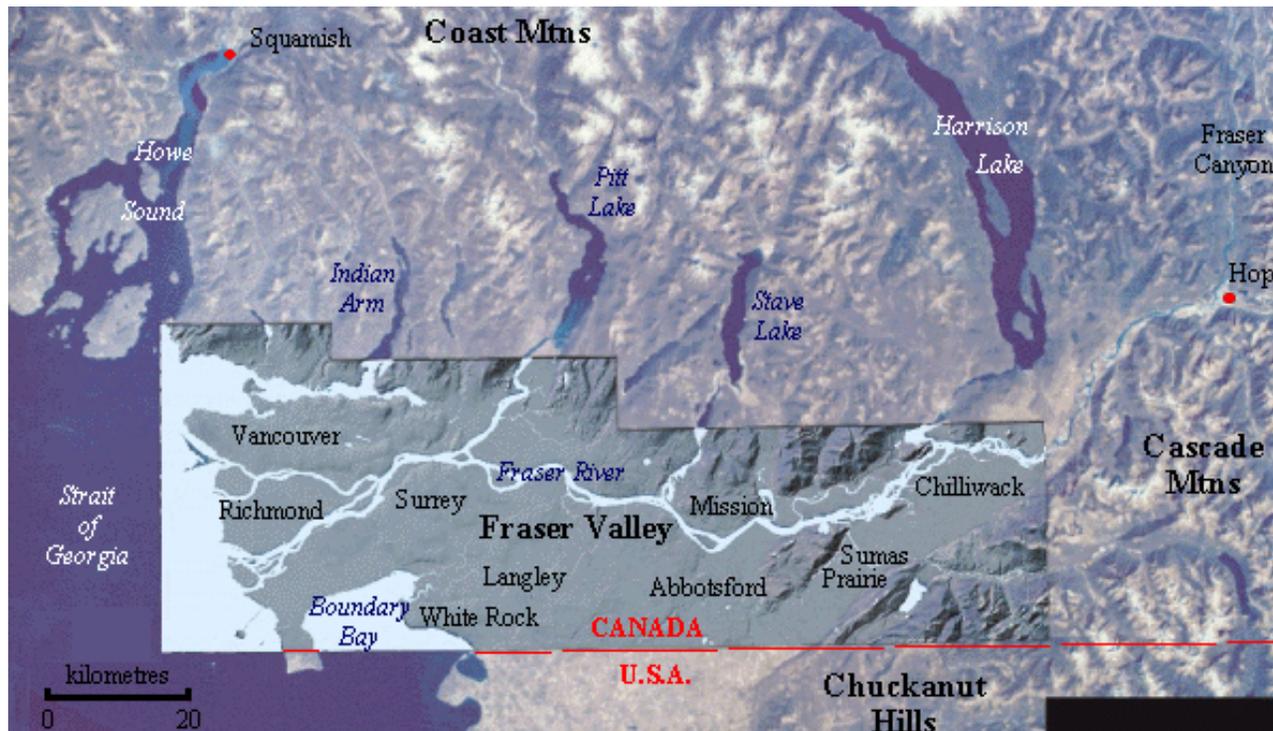
Overview of Location





Setting of the Lower Fraser Valley as viewed from space.

(http://gsc.nrcan.gc.ca/urbgeo/geomapvan/images/space_600e.gif)





Background to the Study

- The Fraser Valley is a region that generates \$1.4 billion in annual farm gate receipts.
- Climate and soils in the region support a wide range of intensive agricultural operations.
 - dairy and poultry dominants the livestock industry,
 - principle field crops: forage grasses, silage corn, raspberries, blueberries, potatoes, field vegetables, and ornamental nursery crops.
- Fraser Valley agriculture census data indicates:
 - nutrient applications > crop requirements
 - based on \sum (animal manures and commercial fertilizers) regionally



Objective

- Obtain baseline data on soil N, P, & K status for future evaluation of the effectiveness of the Canada-BC Environmental Farm Plan Program.
- Obtain detailed pedon descriptions and soil samples for a number of the main agricultural soils of the Lower Fraser Valley to aid in interpretation of soil nutrient analysis and incorporate the results into the National Pedon Database.



Table 1: Soils Identified for Sampling in 2005 Fraser Valley Soil Nutrient Assessment

General Geographical Area	Soil Parent Material	Soil Management Group
Agassiz	Fraser River floodplain	Fairfield, Monroe, Page, Grevell
Chilliwack	Fraser River floodplain	as above
Nicomien Island / Matsqui Prairie	Fraser River floodplain	as above
Sumas Prairie	Lacustrine	Sumas
West end of Sumas Prairie & North of Hatzic Lake	Local stream deposits	Carvolth
Abbotsford Airport	Outwash	Abbotsford, Bose, Columbia, Lehman, Heron, Summer
Abbotsford / Langley Uplands	Glacial Marine or Glacial till	Whatcom, Scat, Berry
Cloverdale / Nicomekl drainage area	Marine	Cloverdale (and shallow organic soils)
Delta / Westham Island	Deltaic	Delta, Benson, Crescent, Ladner



Nutrient Study – Pit sampling

- 54 fields selected to represent:
 - 9 major geographical areas (GA)
 - 2 intensities (high and low nutrient use) and 3 reps of (GA x intensity)
- 3 pits excavated within field – one cubic metre in size
- 3 depths from each pit sampled – three faces of pit bulked
 - 0-15 cm, 15-30 cm and 30-60 cm





Why Add Pedon Sampling to NPK Project

- Collect pedological data to assist in explaining:
 - nutrient status of the soil
 - potential environmental risks associated with elevated nutrient levels
 - assign sample sites to appropriate soil series



Minimum Dataset for Soil Name Verification

Project ID: LFV_NPK_05A

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Plot NO: Field #: Pit #:

Surveyor

Horizon #	Horizon Designation		Horizon Depth cm			Soil texture *	Mottles *		
	Master Horizon	Horizon Suffixes	Upper Depth	Lower Depth	% coarse fragments by volume		Abundance Few (F) Common(C) Many (M)	Size : Fine (F) Medium (M) Coarse(C)	Contrast Faint (F) Distinct (D) Prominent (P)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

* see cheat sheets



Detailed Pedon Data Collected

- full soil pedon description for 29 representative sites (including photos)
- soil horizons sampled (including bulk density, AWSC, soil structure and texture)
- 153 samples





Pedon Data Sheets Site

SITE DESCRIPTION FORM FORM NUMBER - 8 0

PAGE 1 OF

Mark a cross (X) over parameter number when not considered.
Mark a slash (/) over parameter number when not found. Parameters which must be filled in are circled.

1. Proj. ID LFV NPK 05A 2. Plot No. Fidd 3. Date (Y/M/D) P.P.

4. NTS Sheet 5. Lat. 6. Long.

7. Location

8. Photo number and Co-ord. flight line photo no. X Y

9. Aspect 10. Slope percent 11. Elevation feet

12. Terrain classification Year 13. Physiographic Subdivision

Terrain Texture	Genetic Material	Qual. Desc.	Surface Exp.	Mod. Proc.

14. Zone/Subzone 15. Landscape Type

classification system classification system

16. Vegetation Type 17. Soil Classif. Year

Phase Family P.S.

18. Plot representing

19. Site position macro 20. Site position meso 21. Site surface shape 22. Microtopography

a. apex b. face c. upper slope d. middle slope e. lower slope f. valley floor g. plain

a. crest b. upper slope c. middle slope d. lower slope e. toe f. depression g. level.

a. concave b. convex c. straight

a. smooth b. micro mounded c. slightly mounded d. moderately mounded e. strongly mounded f. severely mounded g. extremely mounded h. ultra mounded

23. Meso slope length = 24. Meso up-slope length =

25. Site position diagram (refer to data form no.)

photo roll no. Direction

photo no.

scale 1 =

26. Exposure type

a. not applicable b. wind c. insolation d. frost e. cold air drainage f. saltspray g. atmospheric toxicity z. other

Comments:

27. Ecological Moisture Regime 28. Nutrient Regime 29. Soil Temperature Class 30. Soil Moisture Subclass

a. very xeric b. xeric c. subxeric d. submesic e. mesic f. subhygric g. hygric h. subhydric i. hydric

a. oligotrophic b. submesotrophic c. mesotrophic d. permesotrophic e. eutrophic f. hypernutrophic

a. extremely cold b. very cold c. cold d. cool e. mild

a. xeric b. arid c. subarid d. semiarid e. subhumid f. humid g. perhumid h. subaqueic i. aquatic j. peraquic

Plot

31. Soil drainage 32. Perviousness 33. Free Water 34. Flood hazard

a. rapidly b. well c. mod. well d. imperfectly e. poorly f. very poorly

a. rapidly b. moderately c. slowly

a. present b. absent

a. frequent and irregular b. frequent c. may be expected d. rare e. no hazard

35. Depth to (cm) 36. Bedrock type 37. Bedrock structure

a. water table

b. rooting (effective)

c. root restricting layer

d. frozen layer

e. bedrock

f. carbonate

g. salinity

38. Coarse fragment lithology

a. type (in order of dominance) b. mixed

39. Successional Status

Present Stage: PS, YS, MS, OS, YEC, YCC,

MCC, MEC, DC, NW

Expected climax 42. Humus Form Class.

Rate of succession Variants

a. very slow b. slow c. normal d. rapid e. very rapid

44. Profile Status 45. Profile Deviation 46. Soil Mapping Unit

a. modal b. variant c. taxadjunct d. undecided

a. none b. solus thickness c. colour d. texture e. drainage f. chemical g. horizon thickness h. land system z. other

47. Soil name 48. Associated soil

49. Profile No. 50. Project Coordinator 51. Agency

52. Type of Soil Sample 53. Veg. Sampling Tech.

A. Sampled 1. Chemical a. full b. partial B. No Sample 2. Physical a. full b. partial

SUBSTRATE	% COVER
Decaying Wood	
Bedrock	
Cobbles and Stones	
Mineral Soil	
Organic Matter	
Water	
Total	100%

54. Notes on Site Description



Pedological Data That Will Be Useful to Nutrient Study

- Soil Series Verification For Roll Up of Results
- Soil Texture
- Soil Structure
- Bulk Density
- Saturated Hydraulic Conductivity (Ksat)
- Available Water Storage Capacity (AWSC)



Determination Of Ksat



Photos courtesy M. Kolach Cantest Ltd. Winnipeg



Determination Of AWSC



Photo courtesy M. Kolach Cantest Ltd. Winnipeg

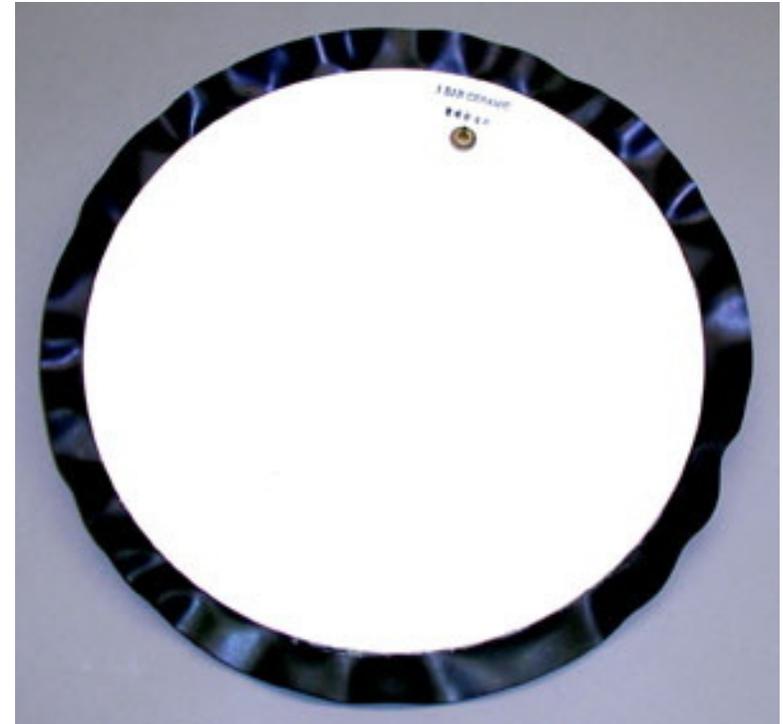


Photo from www.soilmoisture.com



Examples of LFV Pedons





Reminder of: conditions, concerns and objectives

Conditions:

Mild, wet weather and intensive crop and animal management results in high potential for water and air pollution

•Concerns:

–Environment

- pollution of water (surface and subsurface) and air
- physical or chemical degradation of soils

–Agronomic

- poor quality and quantity of produce from excesses or imbalances

•Objectives:

- Determine whether continuous applications of large quantities of N, P & K as fertilizer, manure or organic wastes to Lower Fraser Valley agricultural fields are:
 - currently causing or
 - will potentially cause
 - environmental or agronomic problems



Acknowledgements

- The Steering Committee is represented by the following agencies
 - BC Agriculture Council (dairy, poultry, and berry/vegetable industries)
 - BC Ministry of Agriculture and Lands
 - BC Ministry of Environment
 - Agriculture and Agri-Food Canada (including PFRA)
 - Environment Canada
 - Department of Fisheries and Oceans
 - University of British Columbia
 - University College of the Fraser Valley



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Canada