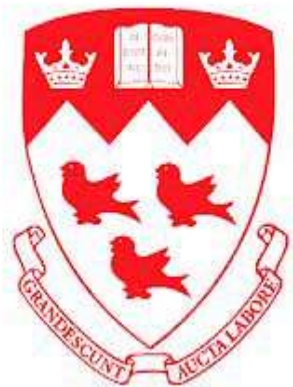




Improving the Nutrition and Health of CARICOM Populations (CARICOM)

BASELINE RESULTS FOR SOIL AND WATER ANALYSIS COMPONENT IN ST. LUCIA AND ST. KITTS



Presenter: Alexandra DuBoulay
Laboratory Supervisor

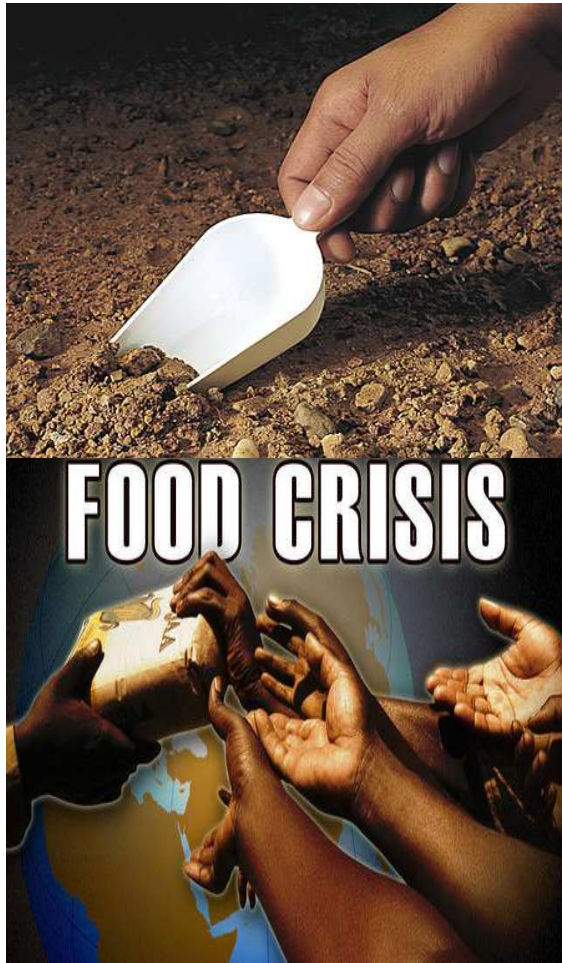


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Overview

- CEHI's role in Project
 - Project locations
 - Sampling regime
- Results
- Suggested Next Steps



CEHI's role in project

Analysis of soil and water at project sites

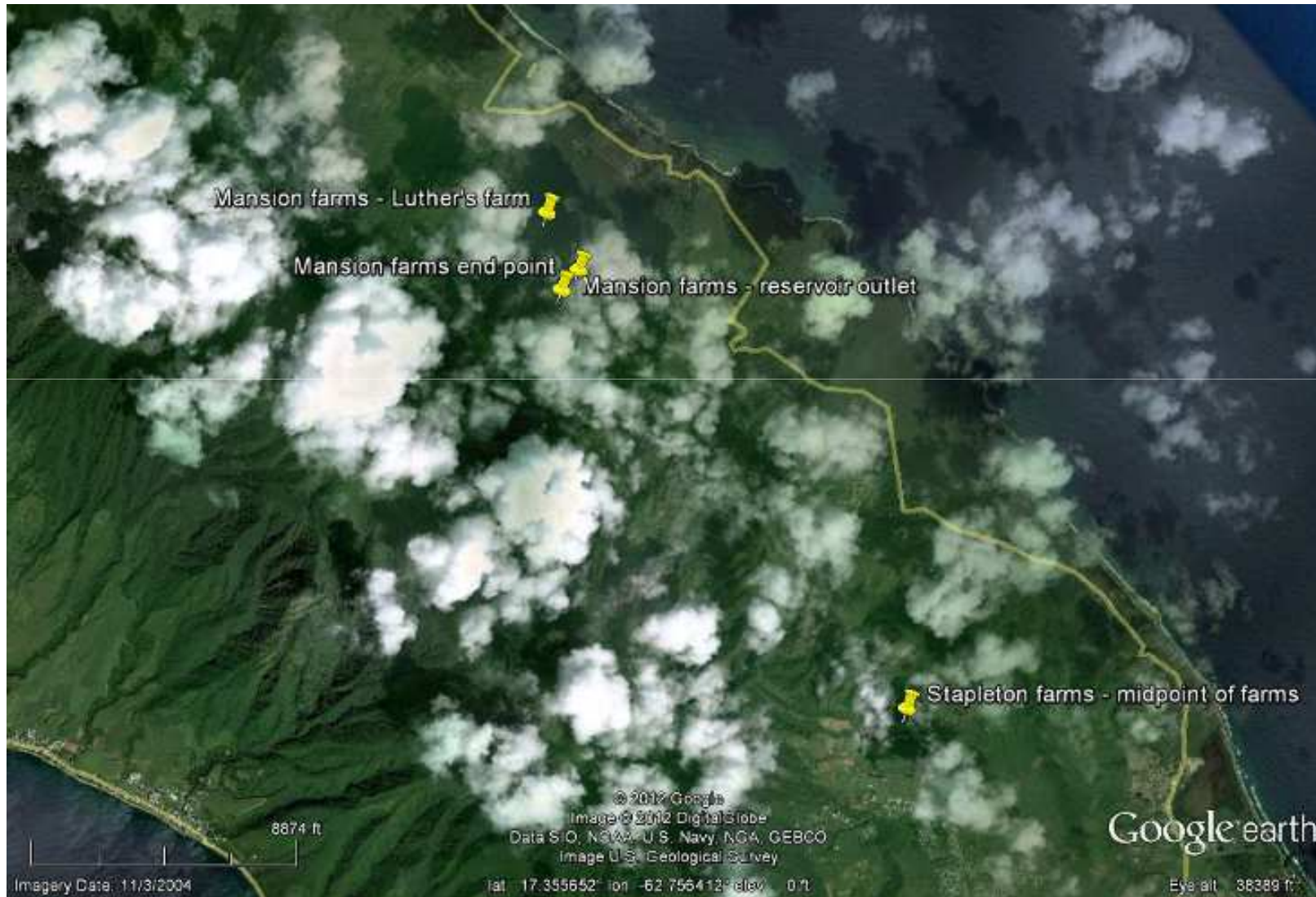
Decision making with regard to:

- Soil treatment methods for improved production (e.g. addition of lime)
- Water quality treatment suggestions for human contact
- Impact of possible contamination from water and soil on environment

Project Locations: St. Kitts



Project Locations: St. Kitts



Project locations: St. Lucia



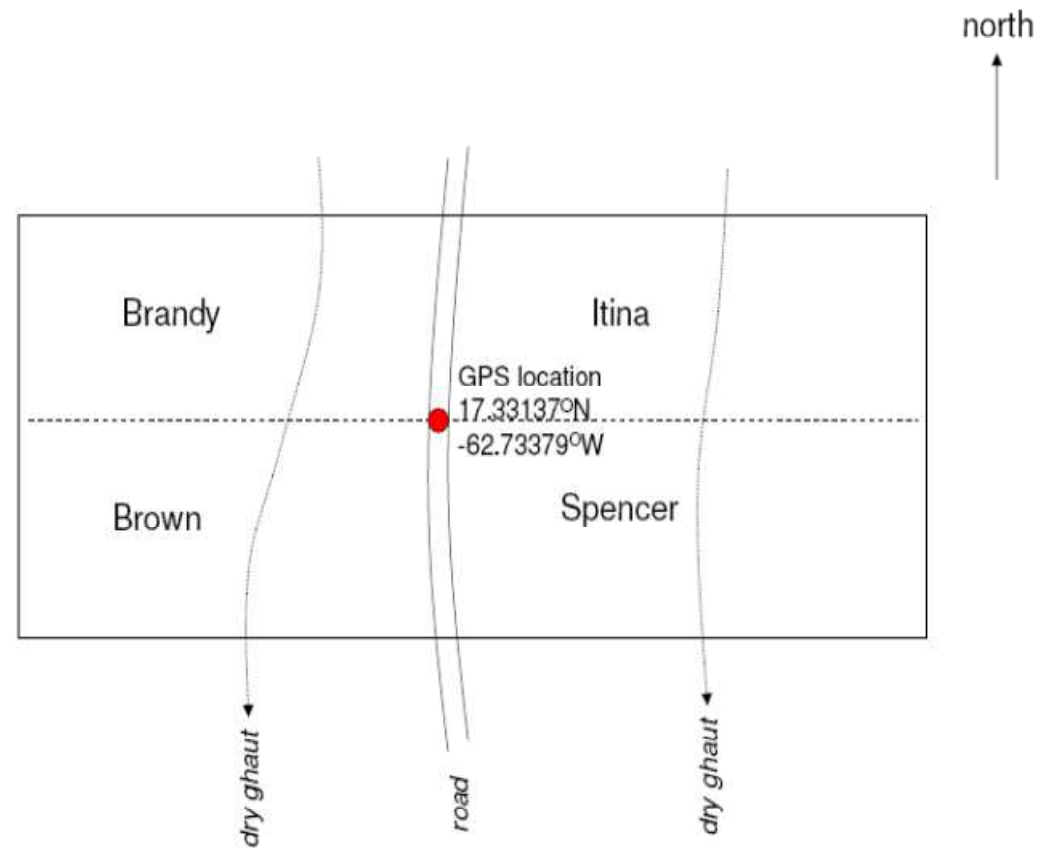
Project locations: St. Lucia



St. Kitts Plots

Stapleton

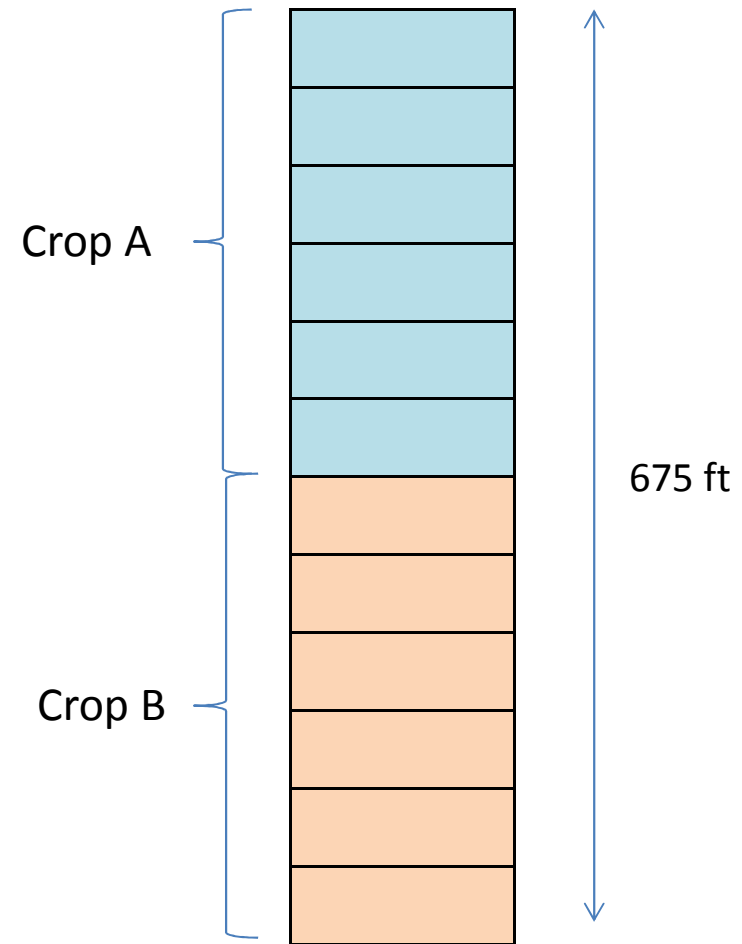
- 4 – 1 acre plots



St. Kitts Plots

MANSION

- 12 plots
- 2 crops



St. Lucia Plots

Black Bay

- $\frac{1}{2}$ acre plots
 - Divided into $\frac{1}{4}$ acres (different crops on each $\frac{1}{4}$ acre)



Year 1 (baseline) sampling

Soil

- One composite sample per plot at each depth- **chemical parameters, and particle size**
 - **STAPLETON- 8 samples- 4 at each depth**
 - **MANSION- 24 samples- 12 at each depth**
 - **BLACK BAY- 16 samples- 8 at each depth**



Soil sample depth

- 0-6 inches
- 7-12 inches



Year 1 (baseline) sampling

Soil

- One sample per plot at each depth- **bulk density**
 - STAPLETON- 4 samples
 - MANSION- 12 samples
 - BLACK BAY- 8 samples



Baseline Water Sampling

- E. Coli- 5 samples in 30-day period
- Other parameters- 1 sampling occasion per season



Water and Soil samples

- Tests performed on Water
 - Escherichia Coli (E. Coli)
 - Nitrogen
 - Phosphorus,
 - Organochlorine pesticides
 - electrical conductivity
 - pH,
 - total solids (TDS + TSS)



Water and Soil samples

- Soil
 - **Physical Properties**
 - bulk density,
 - particle size.
 - **Chemical Properties:**
 - Nitrogen,
 - Phosphorus
 - Metals including Potassium
 - Organic Matter
 - Organochlorine pesticides
 - electrical conductivity
 - pH.



Water samples

ST. KITTS: Mansion and Stapleton water samples taken from reservoirs at farm location.

ST. LUCIA: **Black Bay**-River water samples taken at the following locations.

- Upstream sample –(above pump)
- Downstream sample (downstream of farms)

Results: St. Kitts

WATER QUALITY

- E. Coli count is <1 CFU/ml
- Organochlorine pesticide concentration found to be below the MDL



Water Quality Results: St. Kitts

- Nitrogen and phosphorous

Laboratory Number	Sample Name	Total (mg/L)	N	Total (mg/L)	P
20120134-01	Stapleton reservoir	0.6		20	
20120133-25	Mansion reservoir	<0.5		0.24	
Limit based on LBS protocol		0.1		0.015	

Water Quality Results: St. Kitts

Total suspended solids and total dissolved solids

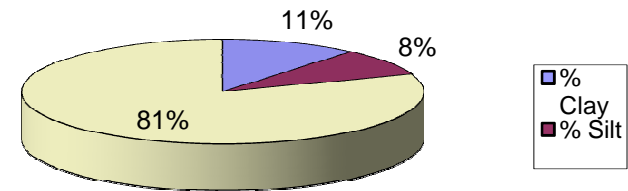
Laboratory Number	Sample Name	TSS (mg/L)	TDS (mg/L)
20120134-01	Stapleton reservoir	42	60
20120133-25	Mansion reservoir	11	56
Limit based on LBS protocol		30	Not specified

Results: St. Kitts

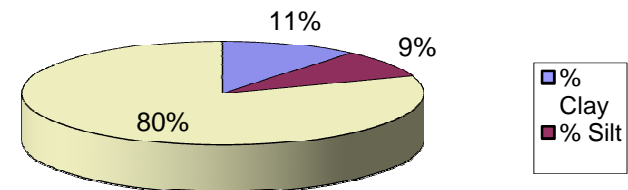
SOIL QUALITY

- Stapleton
 - Soil type-
 - Moderately to slightly acidic
 - Sandy loam
 - Approx 6% organic matter by weight
 - Bulk density - good for plant growth, does not inhibit root growth

Average Particle Size Distribution for Stapleton Soil Samples taken at 0-6"



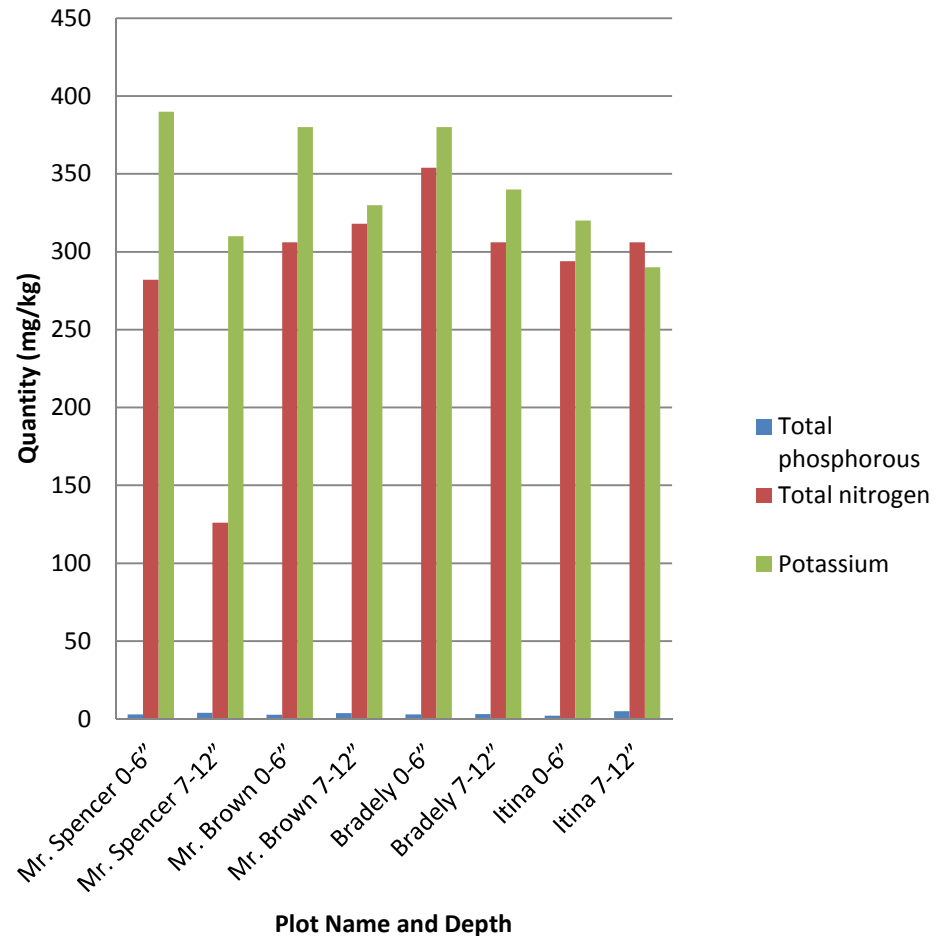
Average Particle Size Distribution for Stapleton Soil Samples taken at 7-12"



Stapleton- Chemical analyses

- **Nitrogen**- total nitrogen analysis was performed- this test is **inconclusive** as not all total nitrogen is available for plant uptake- **recommend nitrate-nitrogen analysis for future testing.**
- **Phosphorous**- average phosphorous level = 3 mg/kg- **this is low**
- **Potassium**- average K level = 300 mg/kg- this is **medium to high**

Essential Nutrients in Soil at Stapleton Farm Plots

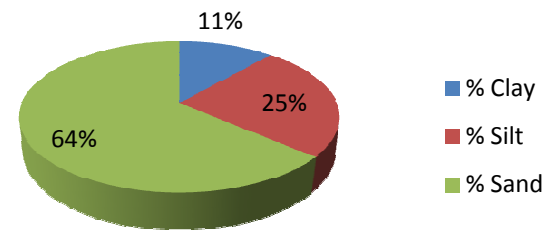


Results: St. Kitts

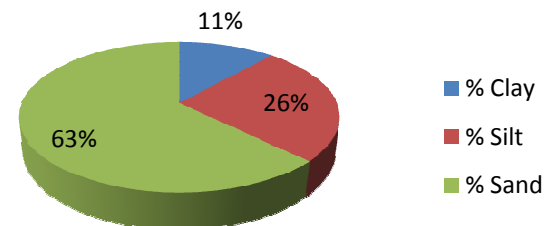
SOIL QUALITY

- Mansion
 - Soil type-
 - moderately to strongly acidic
 - Loamy sand
 - Approx 7% organic matter by weight
 - Bulk density- good for plant growth, does not inhibit root growth

Average Particle Size Distribution for soil samples taken at 0-6" at Mansion



Average Particle Size Distribution for soil samples taken at 7-12" at Mansion



Mansion Chemical Analysis

- **Nitrogen**- total nitrogen analysis was performed- this test is **inconclusive** as not all total nitrogen is available for plant uptake- **recommend nitrate-nitrogen analysis for future testing**
- **Phosphorous**- average phosphorous level = 2 mg/kg- **this is low**
- **Potassium**- average K level = 450 mg/kg- this is **medium to high**



St. Kitts- Chemical analyses

- Samples from both Mansion and Stapleton contained adequate levels of the metals tested.
- Levels of organochlorine pesticides from both locations were below the method detection limit.

Results: St. Lucia

WATER QUALITY

- E. coli- both upstream and downstream samples far exceeded acceptable limit for contact.

	Upstream samples E. Coli Count (CFU/mL)	Downstream samples E. Coli Count (CFU/mL)
	4700	3600
	4300	3700
	2000	26
	630	970
	58	26
GEOMETRIC MEAN	404	953



Water Quality Results St. Lucia

Nitrogen and phosphorous

Laboratory Number	Sample Name	Total N (mg/L)	Total P (mg/L)
20120129-01	Upstream Sample	<0.5	0.4
20120129-02	Downstream Sample	<0.5	0.45
Limit based on LBS protocol		0.1	0.015

Water Quality Results St. Lucia

- Total suspended solids and total dissolved solids

Laboratory Number	Sample Name	Date Collected	TSS (mg/L)	TDS (mg/L)
20120129-01	Upstream Sample	2012.06.25	3	212
20120129-02	Downstream Sample	2012.06.25	2	225
Limit based on LBS protocol			30	Not specified

Water Quality Results St. Lucia

- Organochlorine pesticide concentration found to be below the MDL

Results: St. Lucia

SOIL QUALITY

- Black Bay
 - Soil type-
 - slightly acidic to neutral
 - Sandy clay loam
 - Approx 9% organic matter by weight
 - Bulk density– good for plant growth, does not inhibit root growth



St. Lucia- Chemical analyses

- Samples from Black Bay contained adequate levels of the metals tested.
- Levels of organochlorine pesticides from both locations were below the method detection limit.

Suggested Next Steps



Suggested Next Steps

- Mid term testing (year 2)
 - Test for specific parameters
 - E. Coli
 - Nitrate-nitrogen, Phosphorous, Potassium
 - pH
 - Electrical Conductivity
 - Once monthly testing of source water for E. Coli

Suggested Next Steps

- Final Year testing
 - Repeat of baseline study



Suggested Next Steps

- Guidance with best management techniques where high levels of contaminants have been found.
 - Working with farmers to minimize risk from contact with contaminated water (E. Coli found in Black Bay water samples)
 - Advice to other contributors of pollution in watershed that may affect water used. (e.g. working with pig farmers to reduce pollution)

Thanks for listening.....

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