

The background of the slide is a close-up photograph of dry, cracked soil. The soil is a dark brown color and has formed large, irregular polygons separated by deep, dark cracks. The texture appears rough and brittle.

**AGRO403/SOIL503**  
**Soil Sampling**

# Soil sampling - outline

- **Research question – why?**
- **Sampling design – spatial**
- **Temporal sampling**
- **Sampling depth**

# Why do we sample our soil?

- **Field variability (i.e. within 1 field)**
- **Differences between management practices  
(e.g. different fertilizer application rates)**
- **Differences between land uses  
(e.g. agriculture vs. forest)**
- **Nutrient management  
(e.g. are we over fertilizing?)**

# Sampling design: spatial consideration

- **Random**
- **Stratified random**
- **Transect**
- **Composite sampling**

# Random sampling design

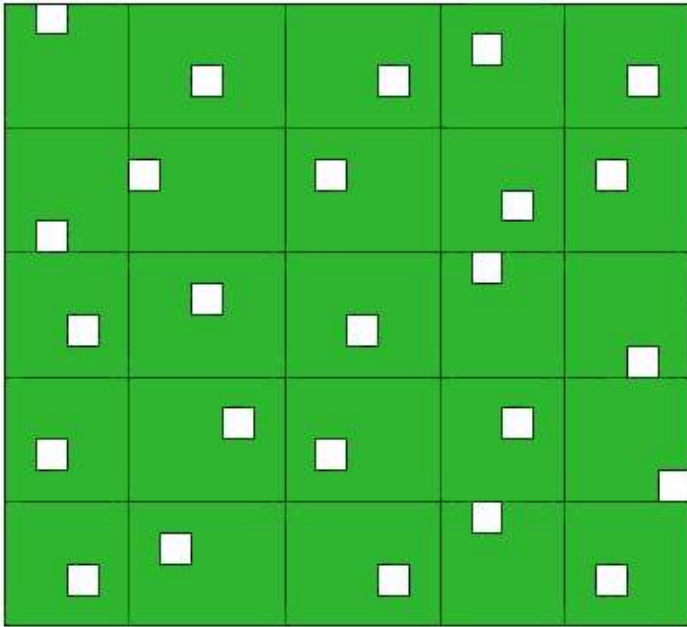


- uniform management
- uniform soils

Source: Ministry of Agriculture and Lands. 2010. Nutrient Management Factsheet – No. 2. Soil Sampling for Nutrient Management

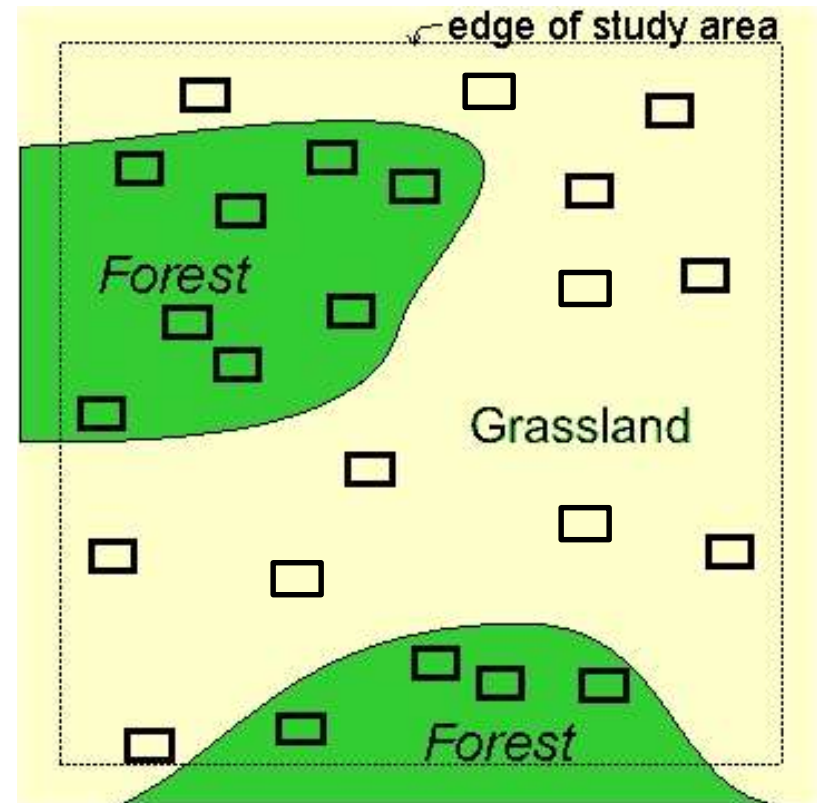


# Stratified random sampling design

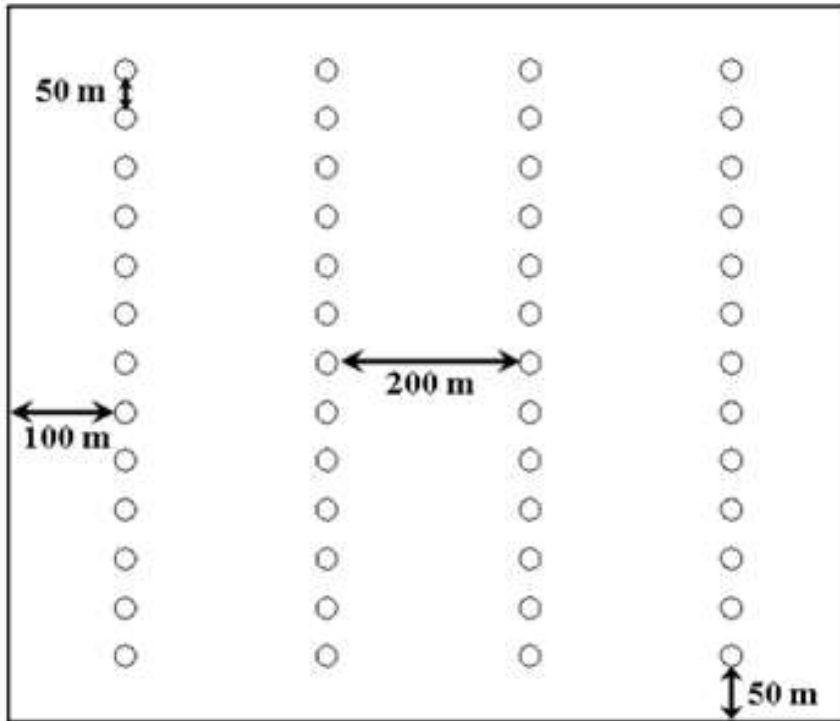


- interested in good spatial coverage
- in-field variability

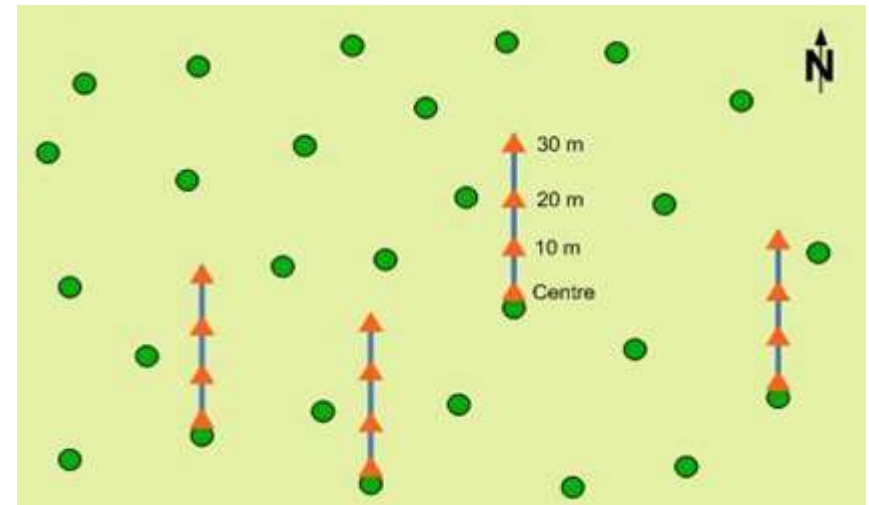
- can stratify by land use or management
- important to understand site management & site history



# Transect sampling



- Spacing relative to field size
- Typically 5+ transects per field
- 5+ samples per transect



# Composite sampling

- **composite or bulk sampling**
- **objective to represent average conditions**
- **discrete sub-samples (of equal size), thoroughly mixed (homogenized), draw sub-sample for analysis**
- **can be used to reduce sampling and analytical costs**
- **not appropriate for contaminated sites (hotspots)**





# Sample handling

- air dry samples (1-2 days)
- mix, sub-sample (in lab), bag and label  
sub-sample → lab  
retain sub-sample for additional analysis
- soil chemical analysis  
crush aggregates (wooden rolling pin) and  
sieve (2 mm sieve)



# Sampling design: temporal considerations

- **Predictive**  
e.g. do we need to add fertilizer?
- **Feedback**  
e.g. are we over applying fertilizer?
- **Monitoring**  
e.g. annual to track impact of BMPs

# **Predictive sampling: temporal considerations**

- **Agronomic predictive testing looks forward in time**
  - **Typically sample pre-planting**
  - **Interesting in knowing if have a nutrient deficiency**

# Feedback sampling: temporal considerations

- Agronomic feedback
- Environmental sampling
  - Typically post-harvest (i.e. end of growing season)



Surplus application  
e.g. leachable  $\text{NO}_3$

# **Feedback sampling: monitoring**

- **consistency in space and time**

**e.g. infiltration rates in wet and dry seasons**

- **consistency in laboratory methods used**
- **consistency in the lab where analysis is done**

**e.g. PSAI (Pacific Soil Analysis Inc.) for UBC farm**

# Soil sampling: depth

- **Research question**
- **Rooting depth**  
in agriculture often 0-15 cm
- **Soil mapping**  
sample by horizon



# Data analysis

**Consider data analysis & statistics  
when developing your sampling design**

- **# samples (replicates)**
- **within vs between site variability**
- **trade-offs # samples, budget, time**

# UBC Farm



<http://luitool.soilweb.ca/>