The background of the slide is a close-up photograph of dry, cracked soil. The soil is a light brown or tan color, and the cracks are deep and irregular, forming a network across the surface. Some small, light-colored pebbles or clumps of soil are visible within the cracks and on the surface.

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**

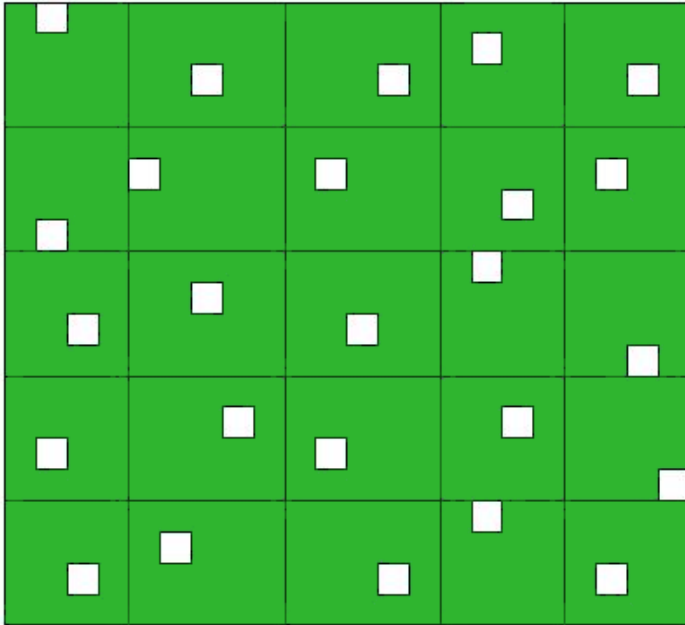
Random sampling design



- uniform management
- uniform soils

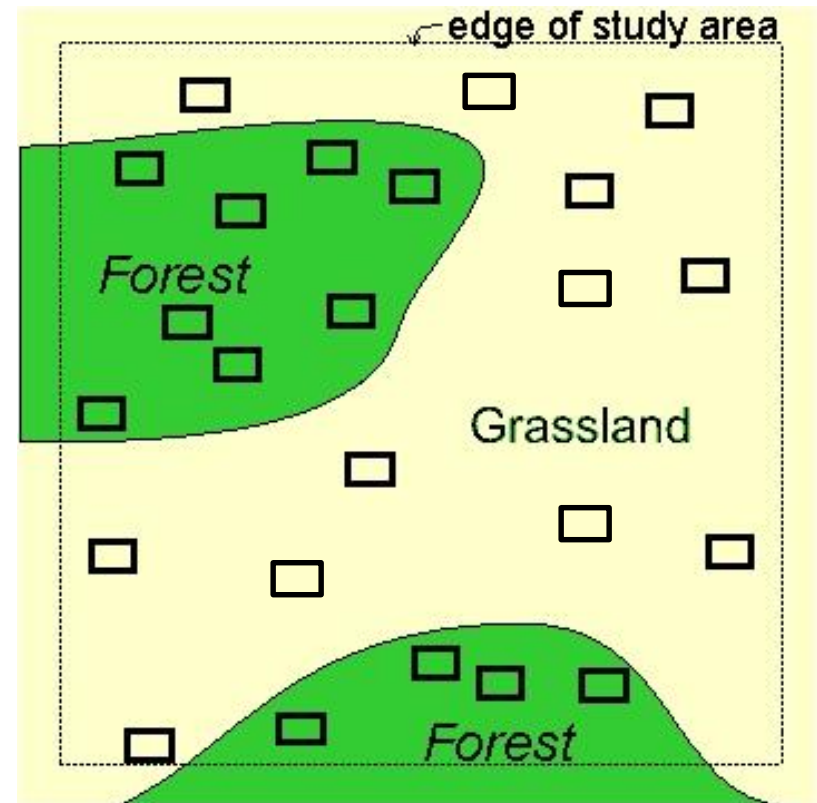
Source: Ministry of Agriculture and Lands. 2010. Nutrient Management Factsheet – No. 2. Soil Sampling for Nutrient Management

Stratified random sampling design

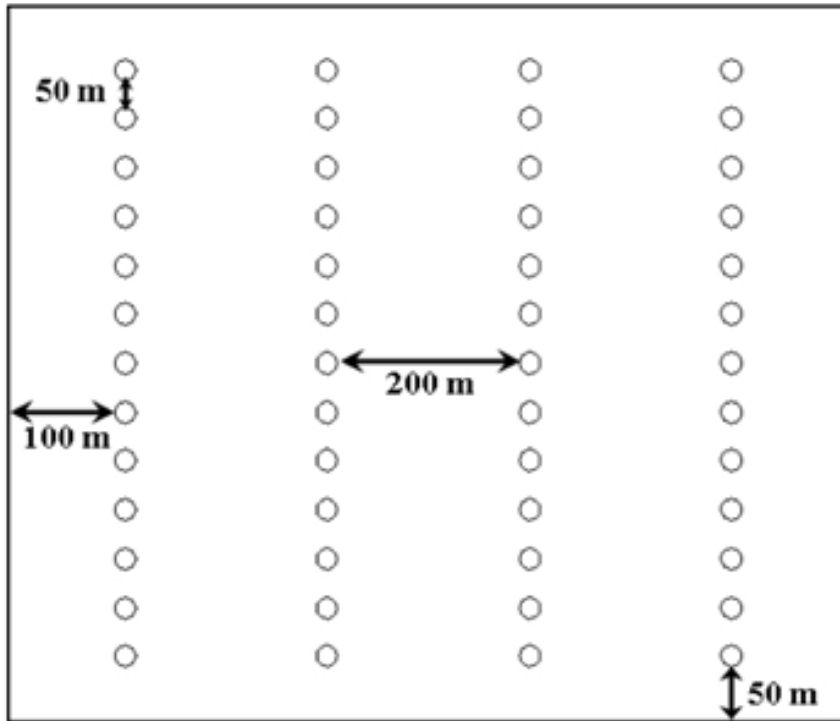


- interested in good spatial coverage
- in-field variability

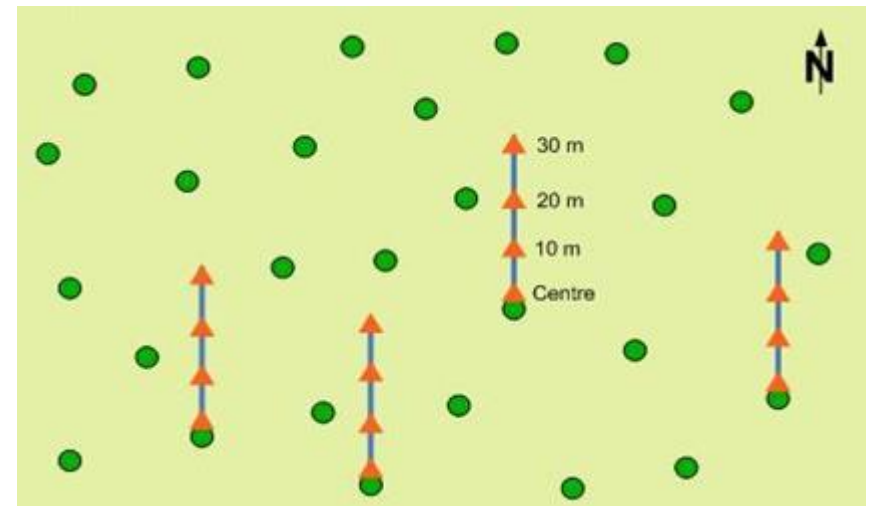
- can stratify by land use or management
- important to understand site management & site history



Transect sampling



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



<https://labmodules.soilweb.ca/soil-sampling/>

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 NO₃

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



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