

Soil Sampling Methods
Conventional and Geospatial
Approaches

Why soil sample?

- Higher yields
- More efficient production
- Constantly changing soil conditions
- Track nutrient changes
 - Crop uptake
 - Runoff
 - Leaching

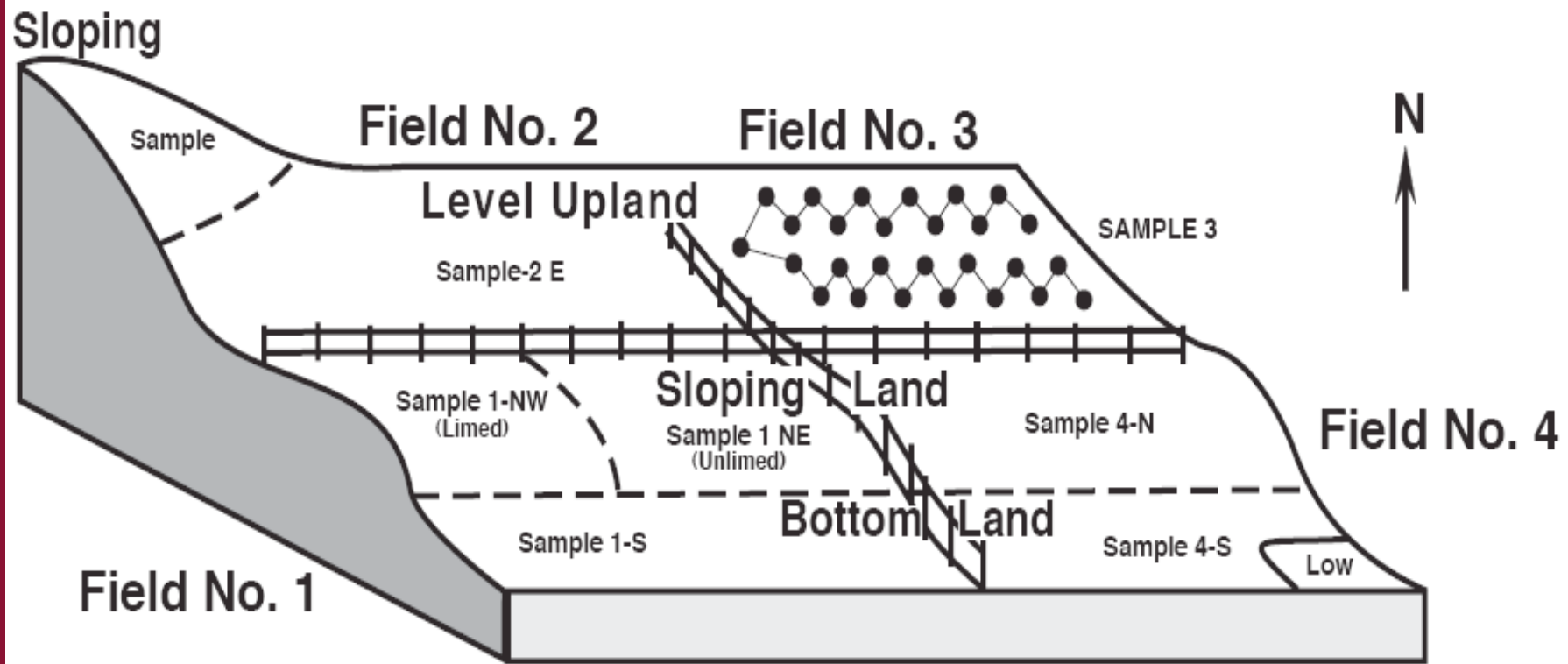
Soil Sampling: Conventional Approaches

- Divide fields into uniform areas
 - Soil series (NRCS Soil Survey, Web Soil Survey: <http://websoilsurvey.nrcs.usda.gov/app/>)
 - Soil color (Aerial photograph)
 - Topography (uplands, sloping, bottomland)
 - Past inputs (limed vs. unlimed)
- Use judgement on management size
 - One acre in 200 is probably not worth the cost

Conventional Approach

- Sample each area separately
 - Take 15 – 20 subsamples to represent each area
 - Generally no more than 15 to 20 A /sample
 - Collect samples randomly from each area
 - Generally suggest “Zig-Zag” approach

Example



Crouse, K and W. McCarty. 2006. Soil Testing for the Farmer. IS346. MSUCES

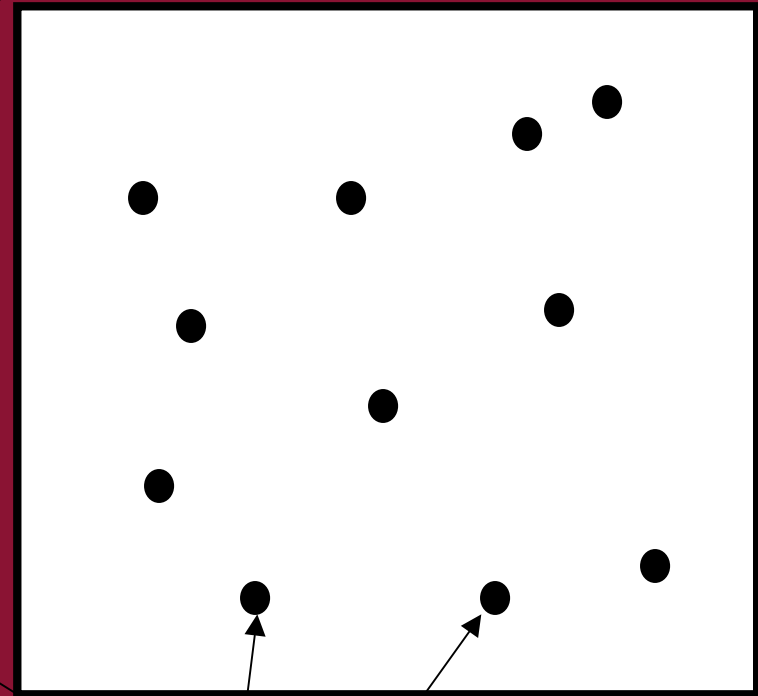
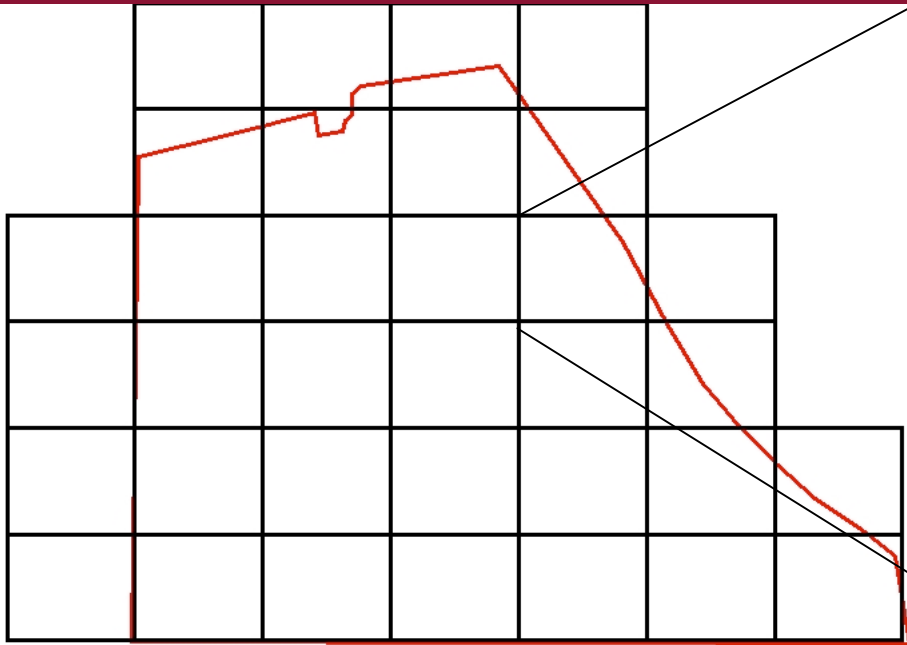
Soil Sampling: Site Specific Crop Management

- Sampling very similar to convention methods only on a smaller scale
- Three main methods of soil sampling
 - Grid cell sampling
 - Grid center sampling
 - Directed soil sampling (management zones)

Grid Cell Sampling

- Computer generated grid is laid over a field to determine sample location.
- A number of subsamples are taken randomly from within each cell and are bulked to form 1 sample
- Soil test value is used to represent fertility across each cell.

Example of Grid Cell Sampling



Subsample locations

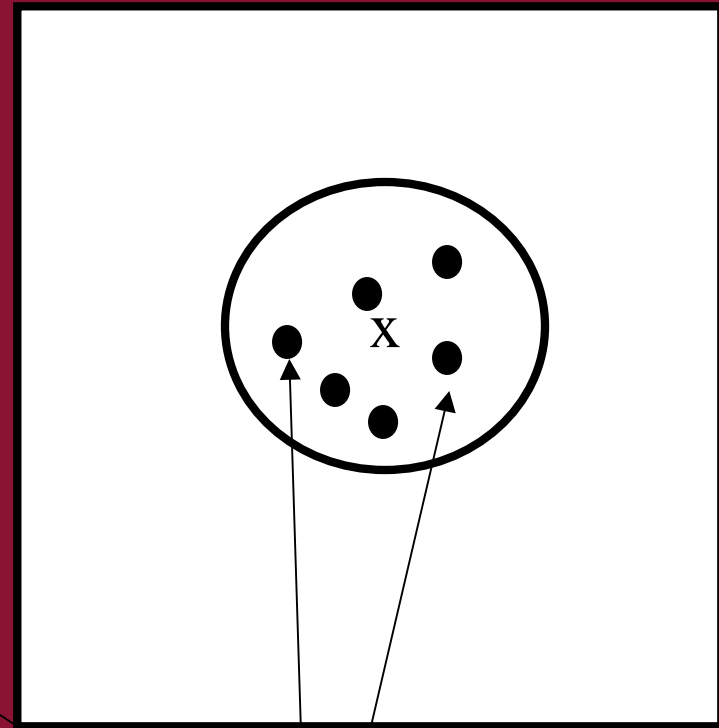
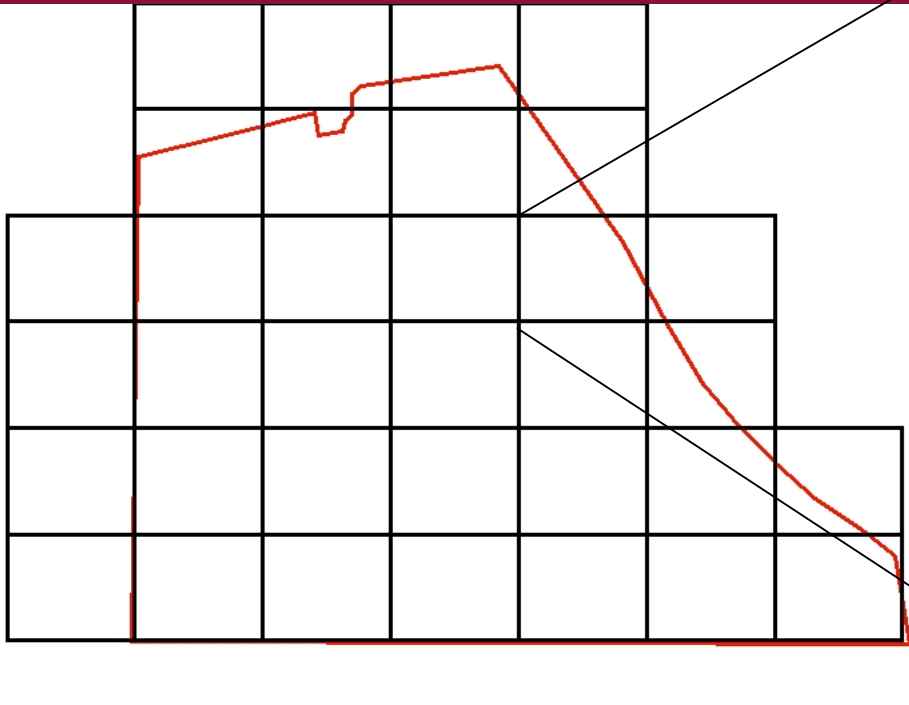
Grid Cell Sampling

- Method assigns an average fertility value across the whole cell.
- There is no fertility estimation.
- Essentially the same method as tradition soil sampling. Difference is the field is now divided into many smaller “fields”.
- Can be very time consuming.

Grid Center Method

- Process is similar to grid cell sampling
- Computer generated grid is laid over a field
- DGPS is used to pinpoint and navigate to the center point of the grid.
- Soil cores are then taken from a 30 ft radius around the center point to form that cell's sample

Example of Grid Center Sampling



Sample locations

Grid Cell\Center Sampling

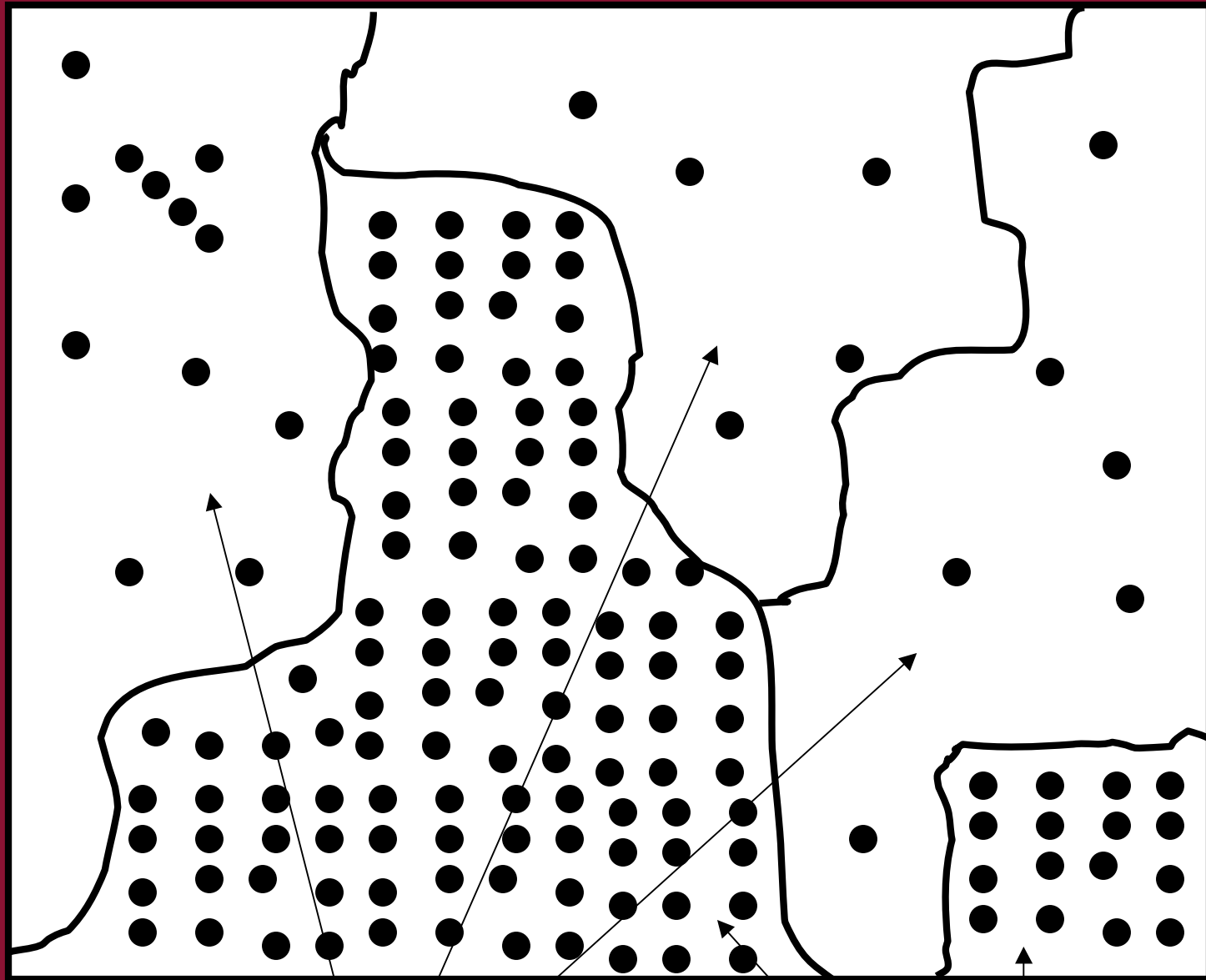
- Maps must be interpolated (Fertility values between sample locations are estimated)
- Grids must be small (2.5 Acres common)
- Grid size should be based on field variability and determined by someone familiar with the field.
 - Large amounts of variability should call for smaller grid sizes.
 - Small amounts of variability should call for larger grid sizes

Directed Soil Sampling (Management Zones)

- Where the next generation of soil sampling is going.
- Method is not based on grids
- Based on spatial patterns defined by prior knowledge of field variability.
- Field is divided into homogeneous soil units of various sizes. Each soil unit is sampled independently.

Directed Soil Sampling (Management Zones)

- Management zones can be based on:
 - management history
 - soil types
 - soil color
 - yield maps
 - topography
 - soil imagery
 - past soil tests
 - etc.



Low variability

High variability

Soil Sampling

- Remember that the sampling method is only as good as the soil sample.
 - Use clean equipment
 - Auger
 - Soil probe
 - Plastic bucket (using a galvanized bucket has led to Zn errors)
 - Sample to consistent depth (plow layer, 6 inches)
 - Mix subsamples thoroughly to composite
 - Be sure to keep track of samples (which sample came from which area)

Soil Sampling Depth

- Match sampling depth to tillage system
 - Conventional tillage - sample plow layer*
 - Conservation tillage – sample plow layer*
 - No till – sample 0 - 2” and 2 – 6”
- Be sure to remove residue from soil before sampling

* Generally 6 – 8”

Soil Sampling

- Do not sample unusual spots
 - Old roads
 - Fence rows
 - Dead furrows
 - Turnrows
 - Fertilizer/lime spills
 - Etc.

Soil Sampling Time

- Generally once every three years
 - If soil has low CEC or fertility, sample more often.
 - If soil has high CEC or fertility, sample less often
- Fall planting
 - May, June, July, Early August
- Spring planting
 - Late October, November, December, January

Soil Sampling Time

- Timing is not critical
 - Can be adjusted to farm schedule
- Keep a constant soil sampling time.
 - Sampling in the fall one year and spring the next will result in different soil test results.