

Distribution of Trace Metals in Urban Garden Soils

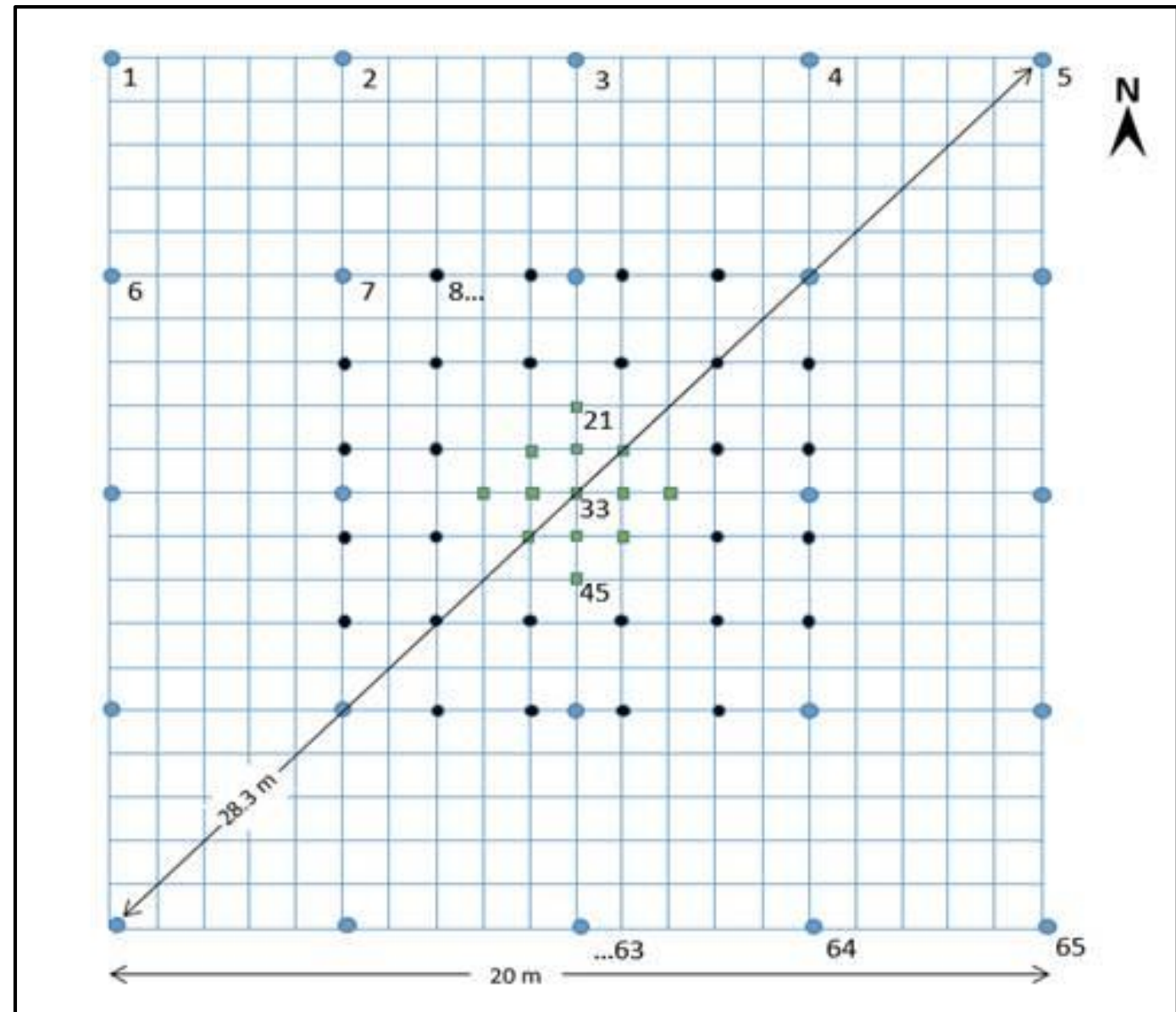
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- Urban agriculture is gaining popularity
 - Large and small cities
 - Repurpose land, support economic growth, improve health and environment
- Soil quality poses health concerns due to Michigan's history
 - Lead-based paints and gasoline
 - Weather



- Nested grid pattern for sample collection
 - Spatial variability
 - Contamination source(s)



Example of nested grid pattern. Each gridline represents one meter. Blue and black dots represent collection points.

(Bugdalski et al., 2014)

Applying pXRF

- X-rays excite electrons in atom's inner shell
- Electrons escape
- Electrons in outer shells move in to fill the vacancy
 - Emit energy
 - K-Alpha 1 line



New! TRACER 5ⁱ

- Portable X-ray Fluorescence Analyzer

(Parsons et al., 2012).

Applying pXRF

- Analyze solids and liquids
- Elements from Na to U
 - Lead
 - Absorbed by plants, tracked in, inhaled
 - Arsenic
 - Infiltrate groundwater

Element	Concentration (mg/kg)	Detection Limit (ppm)
As	18	7
Cr	65	22
Cu	47	13
Fe	48,100	N/A
Mn	1420	50
Pb	22	8
Rb	44	3
Sr	291	3
Th	5.6	4
Ti	5990	4
V	99	25
Zn	98	10
Zr	502	4
Organic matter	6.3%	

Various metals found in Natural Resources Canada Till-1 certified reference materials and their pXRF detection limits (Ravansari et al., 2018).

Project Outline

- Create calibration standards
- Collect samples
- Homogenize, dry, sieve
- Analyze using pXRF
- Geostatistical mapping