Soil Scientists from the Special Projects Assist Connecticut (CT)-NRCS with Urban Soils Investigation

Donald Parizek, Milton Vega, and Braden Fleming, soil scientists with the Special Projects Office (SPO) in Tolland, CT, assisted CT-NRCS with urban soils investigations in Hartford, CT, on February 14, 2023 (fig. 1). The SPO team worked closely with Jacob Isleib, state soil scientist for CT- NRCS, and Morgan McKee, resource soil scientist, for CT-NRCS to conduct trace metal screening on two parcels owned by the Hartford Land Bank, a partner with Urban Agriculture | Natural Resources Conservation Service (usda.gov) (fig. 2).The properties are being redeveloped to improve community and economic vitality of Hartford neighborhoods to ensure long-term sustainability of impacted properties and enhance the quality of life for residents and businesses. Screening for trace metals in the soils helps to identify potential public health hazards and allows planners to make informed designs for urban agriculture, landscaping, and conservation. The University of Connecticut Landscape Architecture students are also partnering on the project to design options for landscaping the properties as part of their course work.

Figure 1.—Donald Parizek, Special Projects Office soil scientist, excavates a soil pit in preparation for pXRF analysis in the field.

Figure 2.—From left to right, Jacob Isleib, CT-NRCS state l soil scientist, Braden Fleming, Special Projects Office soil scientist, Tolland, CT, and Morgan McKee CT-NRCS resource soil scientist collecting physical soil properties data on an urban lot in Hartford, CT.

The team established grid points on the parcels and then described and sampled soils to a depth of 30 cm (12 inches). The heterogeneity of urban soils necessitates a grid approach to soil sampling. The screening analysis was conducted at two depth ranges 0–15 cm (0 to 6 inches) and 15–30 cm (6 to 12 inches), in the field using portable x-ray florescence (pXRF) technology. The technology analyzes florescent signatures from elements after x-ray exposure from the handheld device (fig. 3). The pXRF tool is a great for rapid screening for trace metals in urban environments, allowing for more informed land use decisions. If elevated levels of harmful trace metals are identified, it is often recommended to follow up with thorough lab analysis from a certified lab specializing in soil contamination. The pXRF tool will not pick up on organic contaminates or other non-metallic compounds often associated with trace metals in urban environments, and it is only used as a screening tool to alert land managers of potential levels of concern. Disclaimer, the NRCS does not conduct pXRF testing for the purposes of local, state, or federal regulatory programs and does not assume any liability for these regulatory programs.

Figure 3.—Taking a pXRF measurement in the field on an urban lot on Hartford, CT. The plastic bag protects the sensor during operation.

In addition to pXRF data, soil physical properties were documented, including soil texture, soil color, rock fragments and artifact types (fig. 4). Soil compaction and root limiting M layers were also encountered—the M layer is a subsurface, nearly continuous, horizontal layer of human manufactured materials, such as asphalt or concrete.

Figure 4.—Braden Fleming, Special Projects Office soil scientist, wears nitrile gloves for safety while identifying soil color on an urban lot in Hartford, CT. Hand texturing soils is more challenging while wearing gloves.

Detailed and comprehensive soil information is critical for land mangers working in urban areas, and with the NRCS's commitment to expand conservation programs to serve urban agricultural producers demand for technical soil services will only increase.