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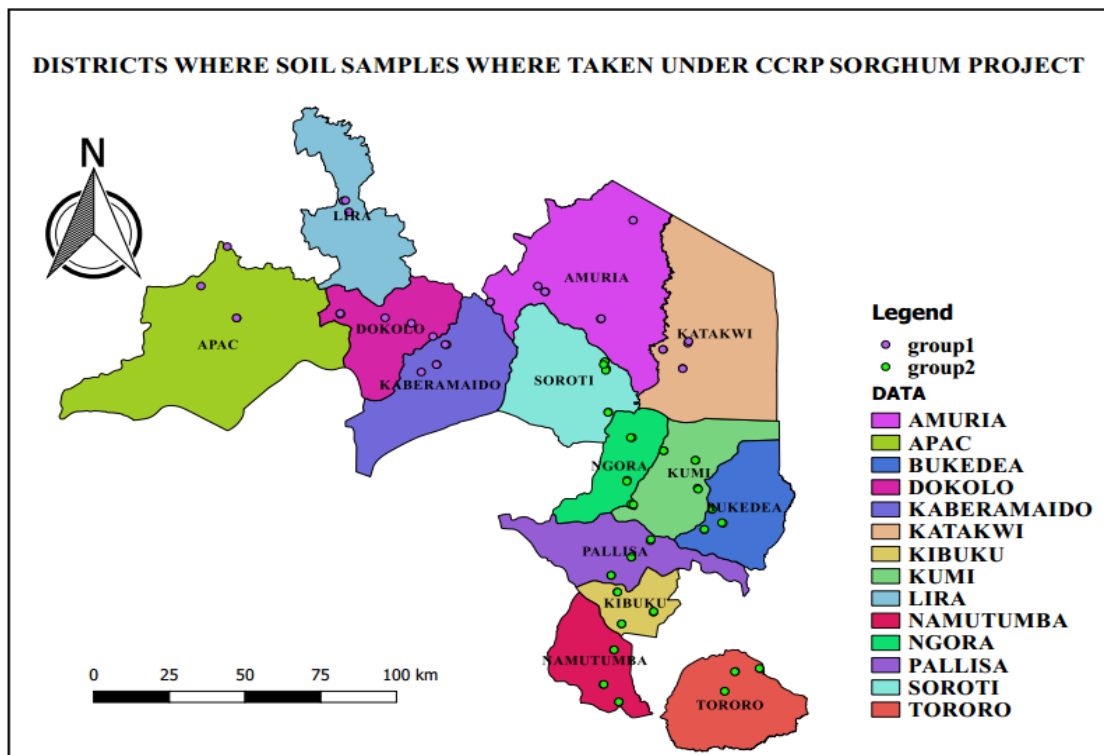
## PARTICIPATORY SOIL ANALYSIS USING THE SOIL TOOLKIT

### Experiences and lessons learned –the case of Sorghum/Legume project of Uganda

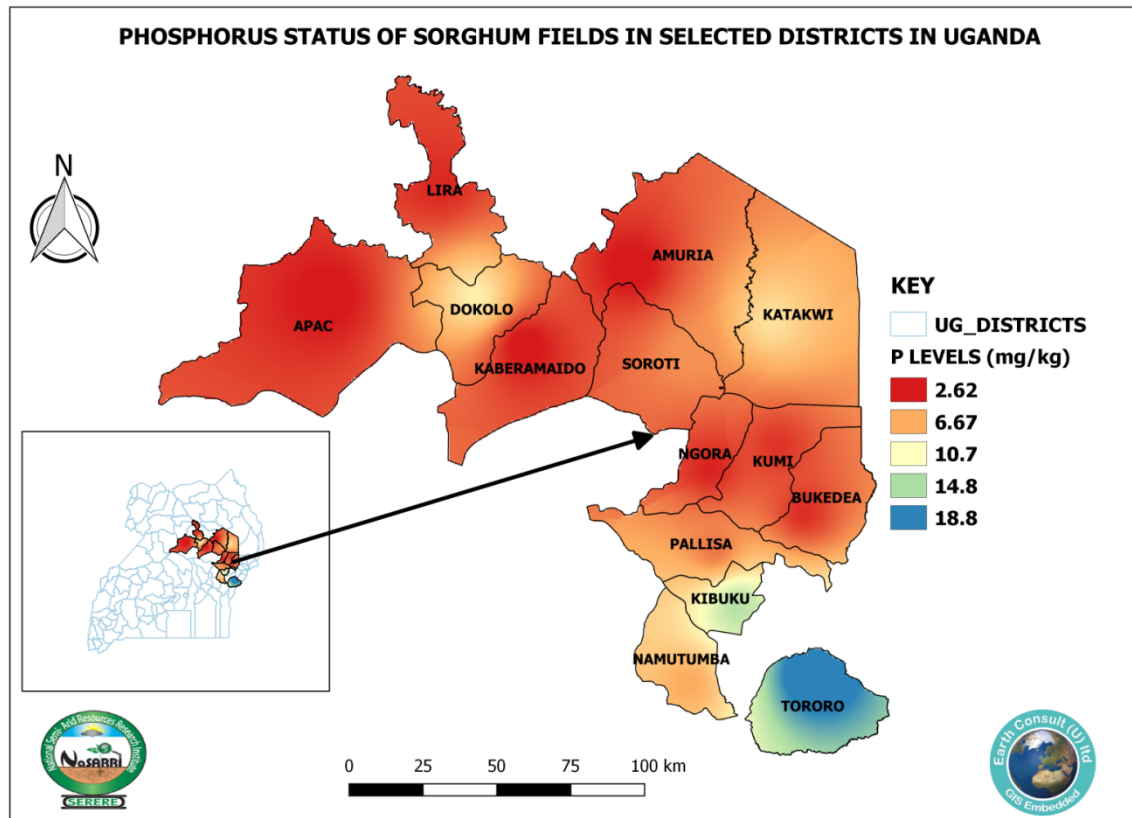
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#### Introduction

National Semi Arid Resources Research Institute (NaSARRI) is implementing a project titled “Enhancing food and nutritional security using sorghum-legume interventions for improved livelihood among smallholder farmers in Uganda” in partnership with Facilitation for Innovations and Sustainable Productivity (FINASP) and Popular Knowledge Women’s Initiative (P’KWI). One of the project’s objectives is to integrate appropriate soil and striga. At the start of the project, a baseline survey was conducted that included collecting soil samples for analysis in the lab (Plate: 1).



Lab results indicated that nitrogen and phosphorus were the most limiting nutrients in the soils tested (Plate 2).



The challenges of lab analyses are its prohibitive cost and the length of time before accessing results. In addition, the survey revealed that farmers have knowledge gaps about assessing and using information on soil health themselves. We also knew that researchers' and field workers' understanding of soil health needed upgrading. This is what led to introducing the Soil Toolkit.

### The Soil Toolkit

A project known as **Smallholder Soil Health Assessment** (<https://smallholder-sha.org/>) is part of CCRP (<https://www.ccrp.org/>). The project focuses on developing a global 'toolkit' for agroecological approaches and indices for sustainable soil management. This work includes both methodologies and instrumentation for evaluating soil quality in situ and developing a framework to better understand residue and nutrient management options and limitations across diverse smallholder contexts (including local soils classification and management knowledge). It is built on existing methodological and theoretical efforts around the globe.

We invited Dr. Steve Vanek, coordinator of the project, to come to Uganda and train our project members.

Two trainings were conducted. The first involved training the technical staff (National Agricultural Research Organisation) and the second training was for the Farmer Research Network staff of P'KWI<sup>1</sup>, FINASP, Kujju Agricultural Development Association and Volunteer Efforts for Developmental Concerns in order to train the farmers at the community level.

### **Progress with the use of the soil toolkit**

The training involved characterization of good and bad soils, assessment of diversity of soil organisms in bad and good soils, assessment of soil textural classes, determination of soil organic matter content (particulate organic matter), active carbon (POxC), soil pH, and soil sampling.



Plate 3: Dr. Vanek conducting the POxC test.

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<sup>1</sup> P'KWI (Popular knowledge women's initiative) <sup>2</sup>FINASP (Facilitation for Innovations and Sustainable Productivity)

<sup>3</sup>KADA (Kujju Agricultural Development Association) <sup>4</sup>VEDCO (Volunteer Efforts for Development Concerns)



Plate 4: Farmers brainstorming on good and bad soil qualities at Gweri-Soroti, facilitated by TOTs.





Plate 5: Farmers taking counts of macro fauna, facilitated by one of the TOTs-FINASP.

There was a high abundance and diversity of macro fauna in the fertile soil and it decreased in the citrus and anthill fields (Table:1).

Table 1: Macro fauna abundance and diversity from different fields.

Organism	Fertile soil	Citrus field	Anthill
Termites	150	1	3
Black ants	1	1	2
Beetles	1	1	2
Centipedes	1	0	0
Larvae	5	0	0
Caterpillars	2	1	0
Spiders	1	0	0
Total	161	4	7



Plate 6: Participants taking soil pH readings during the Soil Toolkit training at NaSARRI-Serere.

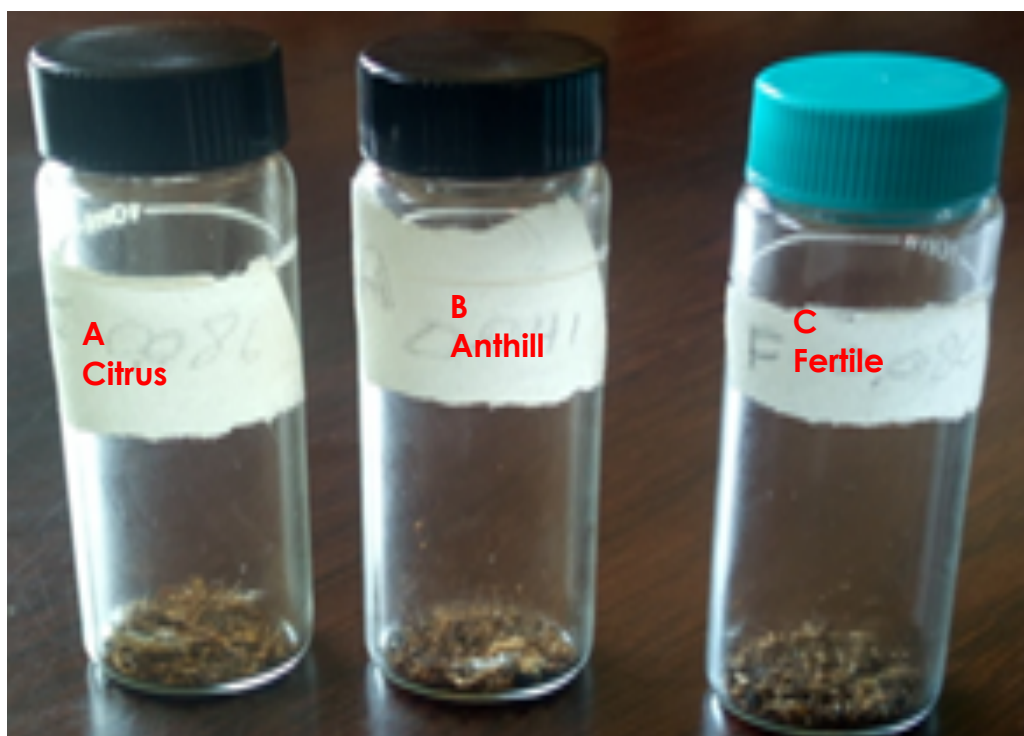


Plate 7: Particulate organic matter levels from different field: (A) from a citrus field, (B) from an anthill and (C ) from a fertile field at Gweri-Soroti.

Table 2: Physiochemical soil qualities of project sites in eastern Uganda

Districts	Soil pH	POM	POxC (Active carbon)	Avail P	Texture
	(1:2H <sub>2</sub> O)	%	mg/kg	mg/kg	
<b>Amuria (n=02)</b>	6.2-6.50	0.1-5.4	457-533	0.6-1.9	clay loam-sandy loam
<b>Bukedea (n=07)</b>	5.9-6.50	0.02-3.0	166-724	0.4-5.0	Sandy clay-Sandy loam
<b>Kumi (n=05)</b>	5.9-6.70	0.003-0.35	50.576	0.4-3.9	Sandy clay
<b>Soroti (n=09)</b>	5.8-6.76	0.5-9.0	454-695	0.7-7.10	Sandy clay-Sandy loam

Note: The composite soil samples were collected during the survey and re-analyzed using the soil toolkit



<b>critical values</b>	<b>&lt;5.5</b>	<b>&lt;3%</b>	<b>&lt;400mg/kg</b>	<b>&lt;15mg/kg</b>	Not available
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### **Feedback from the farmers during the participatory soil testing**

- “We gained understanding on the status of our soils and can now differentiate the healthy soil from the unhealthy soil.”
- “The garden with a high number of macro fauna is healthy and fertile. So, in order to improve on other soils, you have to add manure to them as well.”
- “We are happy to know that even soil has got salts in it (pH) and that you can see manure (organic matter) in the soil.
- “I have learned how soil sampling is done, the basic measurements involved (macro fauna), and I have confidence that I can try it out in my field.”

### **General lessons learned**

The Soil Toolkit is a breakthrough because it is user-friendly for the farmers, especially for testing basic soil parameters of soil pH, macrofauna, soil texture and particulate organic matter at the field. This can guide farmers on the fertility status of their fields and the type of crop to be cultivated in a given field type. In addition, researchers will be able to generate quantitative results that can be published since lab-based results and toolkit results are similar, particularly for available P, soil organic matter/particulate organic matter, and soil pH.

The main challenge for toolkit use is accessing the necessary testing reagents, which need to be brought from Nairobi.