

Nigeria Agriculture Policy Activity

November 2022

NAPA Highlight #18

First Ever Digitized Soil Nutrient and Soil Productivity Index Maps in Nigeria

Farmer field soil testing and soil mapping can address the important challenges of nutrient depletion, poor soil fertility and inadequate fertilizer use across sub-Saharan Africa. In addition, having information about soil physical and chemical properties can guide fertilizer production (to meet nutrient needs), farmer agronomic practices (to increase yields), and enable transitions to precision agriculture across the region. This nexus of soil health and food security within ongoing conversations about climate change has been elucidated in literature and thus, the paucity of geo-referenced, digitized, and interactive soil nutrients and soil productivity maps necessitated this work. The activity was based on the simple principle that soil testing and nutrient management is essential to healthy food, healthy people, and a healthy planet.



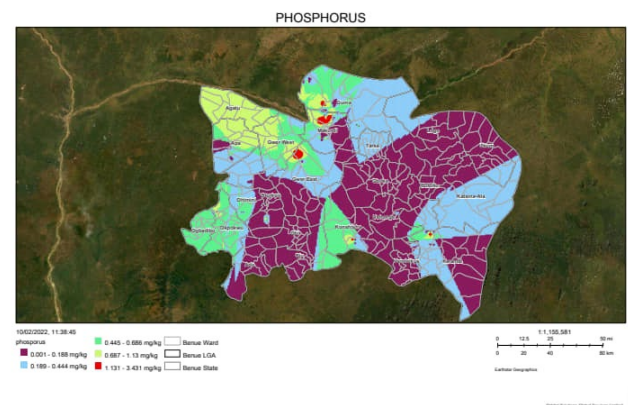
Cross section of Participant at the meeting

Though the goal is to develop and support the use of interactive soil productivity index maps across Nigeria, the study entailed geo-referenced soil testing at the level of farmer fields in three Nigerian states: Benue, Kebbi, and Ebonyi states.

First, purposeful selection of 10 farmers in 3 wards of 10 local government each of 3 states (n= 300) per state. This number was determined to ensure that the

minimum number of samples necessary to generate a digital map were exceeded in each state.

Second, *insitu* soil testing was carried out with a sensor machine. Third, laboratory test of soil samples collected at 3 depths (30, 60, 90 cm). Over 2000 samples from 900 plots were analyzed and soil productivity ratings derived using the Productivity Index rating after Pierce *et al*, 1983. ([Productivity of soils: Assessing long-term changes due to erosion | Journal of Soil and Water Conservation \(jswconline.org\)](#)). Digital interactive maps were generated for use as a free/open source resource. It serves as a soil health management tool in the hands of farmers and extension workers and as data for potential investors for input supply, production, and/or processing in these states. The potential of plots for commercial agriculture can be ascertained with just a click from anywhere in the world. Also, the maps can be used to create agro-belts specific to crops as is currently being proposed for soya bean belts in the draft Benue soya bean policy document.



An insert culled from the interactive map of Benue showing status of Phosphorus in the soil.

The government of Benue State and the private sector have subscribed to the need for farm fields soil testing to cut production cost and increase productivity sustainably. The former Chairman of the Senate Committee on Agriculture, Senator Abdulahi Adamu, has championed this course and used it on one of his farms (https://bit.ly/Shabu_Farm.) We hope this will inform national policy. Also, Prof. Ode Ojuwu (Member, Economic Advisory Council to the President) had his commercial farm tested so nutrients are applied in an appropriate manner following recommendations based on the soil test results.

Soil testing enables better management of resources as the soil nutrient status is taken into account in planning the fertility regime for crop production. It also helps in reclaiming problematic soils and fights “hidden hunger” by supplying micronutrient elements such as zinc and iron. Increasingly, attention has been given to healthy diets and this can be achieved if we critically look at soils where food begins. All the essential/non-essential nutrient elements (nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, boron, copper, zinc, iron etc.) we need as humans to function comes from the soil through the plants we eat (except for hydrogen, oxygen, carbon and fixable nitrogen gotten from air and water). The results of such soil tests will inform the kinds of fertilizer and quantity to be used for a farmer’s field to solve for deficient nutrients and thus, reduce cost while closing yield gaps. It would also help stall overuse which pollutes the environment.

This has been an exciting project; training over 1000 students and extension agents during the process of soil sample collection and testing and then seeing the map actually being used by farmers and extension agents. The plan to use the maps to create an agro-belt for soya bean by the Benue State government is another icing on the cake.

See links for the maps:

Benue state: <https://arcg.is/1yWj4n0>

Kebbi State: https://bit.ly/Kebbi_SoilMap

And that of Ebonyi is planned for completion by December 2022.

By: Agada Iveren Blessing



Dr. Agada presenting the Soil Map

This work is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the Feed the Future initiative through the Nigeria Agricultural Policy Project, Associate Cooperative Agreement Number AJD-620-LA-15-00001. The contents are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government.

Copyright © 2022, Michigan State University, and the International Food Policy Research Institute. All rights reserved. This material may be reproduced for personal and not-for-profit use without permission from but with acknowledgment to MSU, and IFPRI.

Published by the Department of Agricultural, Food, and Resource Economics, Michigan State University, Justin S. Morrill Hall of Agriculture, 446 West Circle Dr., Room 202, East Lansing, Michigan 48824.