growing AFRICA

A PUBLICATION OF THE AFRICAN PLANT NUTRITION INSTITUTE (APNI)

A GUIDE FOR AUTHORS

Growing Africa:

A GUIDE FOR AUTHORS

Growing Africa is a semi-annual, open access digital publication initiated by the African Plant Nutrition Institute (APNI) to provide a forum serving stakeholders interested in Africa-centric plant nutrition science. The publication seeks to strengthen connections within the research community in Africa, and promote impactful solutions, programs and activities. Growing Africa fills a major gap in the current knowledge base by providing scientific information in an actionable manner that supports, promotes and enables Agricultural Research for Development (AR4D).

Prospective authors interested in submitting articles to *Growing Africa* are encouraged to review the following guidelines.

Background

Growing Africa is not a peer-reviewed academic journal, nor is it intended as a popularized consumer magazine for the general public. As a provider of practical information, the publication serves a target audience of agricultural practitioners (agronomists, extension workers, agri-business) as well as advanced farmers, university students, researchers, academics, supply and value chain stakeholders (including fertilizer industry), and policy makers.

Areas of Focus

Growing Africa is designed to be a source for interpreted information on integrating improved nutrient management practices into African food systems. Content will be balanced and presented within APNI's three Strategic Themes.

1. Climate & Weather-smart Plant Nutrition
2. Precision Nutrient Management
3. Soil Health for Improved Livelihoods

The publication intends to focus on field crops, tree and horticultural crops, and cropping and crop-livestock systems important for Africa. Topics of interest include:

- Site-specific nutrient management (SSNM), Integrated soil fertility management (ISFM),

  4R Nutrient Stewardship
- Nutrient and yield gap assessment and reduction
- Best management practice development and implementation
- Best agronomic practices and their influence on nutrient use
- Nutrient-driven cropping system diversification
- Nutrients as a catalyst for value chains
- Nutrient catalyzed improvement in Soil-Plant-Animal-Human Health outcomes
- Economic, and Socioeconomic performance of nutrient management practices
- New analytics/tools for dissemination and scaling of nutrient best management practices (BMPs)
- Nutrient use efficiencies, nutrient balances, and nutrient cycling in agricultural systems

Article Types

Growing Africa is designed to be full of learning opportunities ranging from interpretive research stories from the field, review articles explaining agronomic concepts, and illustrative examples built around published research, or even a single figure, table, or photo. The publication seeks a range of articles including:

- Interpretive summaries of field research focused on take home messages for the practitioner
- Mini reviews and illustrative examples of plant nutrition and nutrient management topics and issues
- Case studies and impact stories from the African R&D community on improved plant nutrition
- Concept notes exploring new ideas or research processes
- News related to programs and activities
- Discussion forums/letters from the plant nutrition R&D community.
- Crowd shared images and digital media focused on connecting subscribers and stakeholders.

Article Submissions

Articles can be submitted at any time. However, articles should generally be submitted within 3 to 4 months of the expected publication date. Final manuscripts should be submitted in English. It is recommended that the development of articles originate through communication between the author and APNI Scientific Staff. Our staff directory is available at https://www.apni.net/apni-staff.

Specific enquiries about article submissions can be sent to the managing editor at g.sulewski@apni.net.

Note that this publication does not accept advertising and does not encourage or accept articles offered by public relations agencies or freelance authors.

Article Review

Drafted articles submissions will be subjected to an internal review process after which comments will be sent back for the author's information and consideration. Editorial work begins once an author is able to respond to any review comments. Prior to publication, authors will be given opportunity to review a proof of the article to verify the content and request additional changes.

Publication calendar (as of August, 2022).

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2022	Article collection				ISSUE 1							
				Article collection & development							ISSUE 2	
2023										Article collection		
	Article collection & development				ISSUE 1							
				Article collection & development							ISSUE 2	

Article Format and Styles

The purpose of *Growing Africa* articles is to present information originating from agronomic research in a condensed, interpretive style. Readers with a range of educational backgrounds should be able to quickly comprehend the highlights and understand the significance of the subject matter.

LENGTH: In general, 1,200 words plus accompanying tables, figures, photographs, or other illustrations should be adequate for most topics.

SYNOPSIS: Each article submitted will include a brief highlight sentence or two that introduces the key purpose of the article.

WRITING STYLE: A series of short, descriptive paragraphs should lead the reader through an explanation of the work, general discussion of experiments and procedures, and implications of results. Emphasize practical applications and possible future developments. Subheadings can be helpful.

STATISTICS: Extensive presentation of statistics is not required; however, any data presented in tables and figures should be supported with appropriate statistics. Whenever statistics are used, the level of significance should be indicated. Limit significant figures in text, tables, and illustrations depending on the units reported and the accuracy of the measuring method or instrument.

REFERENCES: All publications cited in the text should be presented in a list of references following the text of the manuscript. The publication uses an abbreviated style in reference lists (examples provided below), If the citation has more than three authors, only the first author is provided followed by the et al. notation. Please include the reference's digital object identifier (doi) or url if it exists.

Zingore, S., et al. 2007a. Soil type, management history and current resource allocation: Three dimensions regulating variability in crop productivity on African smallholder farms. Field Crop. Res. 101, 296-305. https://doi.org/10.1016/j.fcr.2006.12.006

The publication limits the number of authors to be named in a reference within the text of an article. Refer to the author's name (without initial) and year of publication, for example: "*Since Chapman et al. (2021) has shown that...*" "*This is in agreement with results obtained later (Giller and Zingore, 2021).*"

ACKNOWLEDGMENTS: The publication allows space for a brief acknowledgement at the end of the article.

Supporting Files

It is the author's responsibility to obtain permission for the use of material (text or illustrations) copyrighted by others. Therefore, you are encouraged to identify material that is copyright protected early on in the process.

IMAGES: Provide individual high resolution digital (jpg preferred) files for each image in the article. Images embedded with the drafted article text will be considered as an example for their preferred placement in the article.

GRAPHS AND CHARTS: Provide all figures as separate files in their original forms (Excel, PowerPoint, etc.). You can embed them with the article text as an example of their use. Include the data used to create graphs when possible and practical.

TABLES: Generally, two or three tables should be sufficient. More may be allowed, but avoid large, complex tables. Table heading should be concise and descriptive. Generally, align data at the decimal point. Indicators of statistical significance should be included where deemed appropriate.

Sample Pages

Article Length:

In general, 1,200 to 1,500 words plus accompanying tables, figures, photographs, or other illustrations should be adequate for most topics.

Synopsis:

Each article submitted will include a brief highlight sentence or two that introduces the key purpose of the article.

Writing Style:

A series of short, descriptive paragraphs should lead the reader through an explanation of the work, general discussion of experiments and procedures, and implications of results. Emphasize practical applications and possible future developments. Subheadings can be helpful.

Soil Organic Matter Regulates Maize Productivity and Fertilizer Response in Maize Production

By Shamie Zingore and Samuel Njoroge

Resource-constrained systems need strategies that focus on striking a balance between maintaining SOC above a critical value to ensure high agronomic fertilizer use efficiency and avoiding concentrations of nutrients that prevent viable N use efficiency.

Large agricultural areas in sub-Saharan Africa (SSA) are covered by inherently poor soils that have been subjected to soil fertility depletion and land degradation for many decades due to poor management, including low nutrient and organic matter application (Van der Velde et al., 2014). It is estimated that more than 60% of the arable land in SSA is degraded, with critically low contents of soil organic matter (SOM) (Bationo and Fening, 2018). Under these conditions, increased use and judicious management of fertilizer and organic nutrient resources are essential to optimize crop productivity and fertilizer use efficiency.

The status of SOM varies substantially in cropping fields, driven by differences in management practices, soil types, and landscape position (Tittonell et al., 2013; Zingore et al., 2007). Here we examine the critical role of SOM in regulating maize productivity and fertilizer use efficiency in smallholder farming systems, and provide insights for improved targeting of fertilizer resources to optimize maize productivity, based on two case studies in East and Southern Africa.

Fertilizer response and agronomic N use efficiency patterns

Agronomic fertilizer use efficiency is intricately related to soil quality. Conceptually, the relationship between soil organic carbon (SOC), used as a proxy for soil quality, and crop yields and agronomic nitrogen use efficiency (AEN), creates three categories of response that can form the basis of optimizing fertilizer management (Musingizi et al., 2013):

Category 1. Non-responsive degraded soil: At the lower end of the SOC spectrum, low AEN is associated with very low SOC levels due to complex chemical, physical and biological constraints that severely constrain fertilizer response.

Category 2. Responsive soils: At moderate levels of SOC, high AEN are a result of nutrient deficiencies in the absence of other severe constraints.

Category 3. Non-responsive fertile soils: Very high SOC levels

Due to its strong influence on soil biological, chemical and physical properties and crucial soil functions, SOM is an essential indicator of soil quality with direct implications for crop productivity, food security, and human livelihood

Images:

Provide an individual high resolution digital (jpg preferred) file for each image. Images embedded with article text are only considered an example for their preferred placement in the article.

Ensure that photos provided are original and permission is confirmed for images from other sources. Photos will be credited to their source.

Tables:

Generally, two or three tables should be sufficient. More may be allowed, but avoid large, complex tables.

Table heading should be concise and descriptive. Generally, align data at the decimal point. Indicators of statistical significance should be included where deemed appropriate.

Figures:

Rather than embedding the Figures within text, provide them as separate files.

The example style for figure axis legends is "Maize grain yield, (t ha^{-1})". Figures should present data in a straighforward manner with statistical analysis to support the validity of the interpretation of the results.

result in high N mineralization rates and sufficient soil N supply to meet the N required to achieve the attainable yields. Soils in the 'non-responsive fertile' category are not common in smallholder farming systems in SSA. They are only found in small hot spots of nutrient accumulation in fields that receive high amounts of organic resources and fertilizer.

For resource-constrained systems, strategies for nutrient management optimization should focus on striking a balance between maintaining SOC above a critical value to ensure high agronomic fertilizer use efficiency while avoiding concentration of nutrient resources to levels that prevent viable N use efficiency. The following case studies illustrate the association of SOC with maize fertilizer response in smallholder farming systems in SSA.

Table 1. Nitrogen and phosphorus agronomic efficiencies as influenced by nutrient management and SOC content, Wedza district, Zimbabwe.

Site	SOC	AEN			AEP		
		NK	NPS	NPKS	NPS	PKS	NPKS
	(g kg^{-1})	kg grain kg^{-1} N applied			kg grain kg^{-1} P applied		
Site 1	3.5	7.0	16.0	17.0	31.5	2.0	35.5
Site 2	5.4	12.1	35.2	31.4	51.8	13.3	51.4
Site 3	8.9	14.1	29.9	36.3	50.5	14.1	52.4

where strategic targeting of scarce nutrient resources by smallholder farmers on different field types becomes crucial to ensure viable fertilizer use efficiencies.

To assess fertilization strategies for optimizing crop productivity and NUE in maize production on heterogeneous sandy soils under rain-fed conditions in Zimbabwe, Kurwakumire et al. (2014) established a nutrient omission study during two cropping seasons, across three on-farm sites with SOC ranging from 0.35–0.89%. N and P fertilizer agronomic efficiencies were influenced by both nutrient management and initial soil fertility (**Table 1**). Overall, this study established that fertilizer application was only agronomically and economically viable for soils with SOC > 0.44%.

In a related study under similar soil and agroecological conditions, Kafesu et al. (2017) showed similar trends of yield responses and fertilizer use efficiency. Baseline yields (< 1 t ha^{-1}) and attainable yields (< 2 t ha^{-1}) were low in fields with less than 0.4% SOC (**Fig. 1a, b**), which translated into very low AEN (**Fig. 1c**). Small increases in SOC between 0.4–0.6% resulted in more then 100% increases in baseline yields, attainable yields, and AEN. These results highlight the vital connection between SOC, land degradation, and crop productivity in granitic sandy soils with critical SOC values between 0.4–0.5%.

> Critically low SOC levels characterize large areas of agricultural soils in SSA due to the predominance of coarse-textured soils and continuous cultivation with little additions of inorganic and organic nutrient resources.

Case Study 1: Sandy soils in Zimbabwe

The Zimbabwean agricultural landscape is dominated by infertile sandy soils derived from granitic parent material. Steep soil fertility gradients on these sandy

Case Study 2: Clayey soils in Kenya

On-farm nutrient omission trials conducted over six consecutive cropping seasons in western Kenya allowed the assessment of initial field SOC status on spatial-temporal patterns in yield response to fertilizer N applications (Njoroge et al., 2017).

Fields in this study differed in past manure application history and initial SOC status (**Fig. 2**). SOC contents were generally between 1.5–2.5%, except for one field without past manure application that had SOC

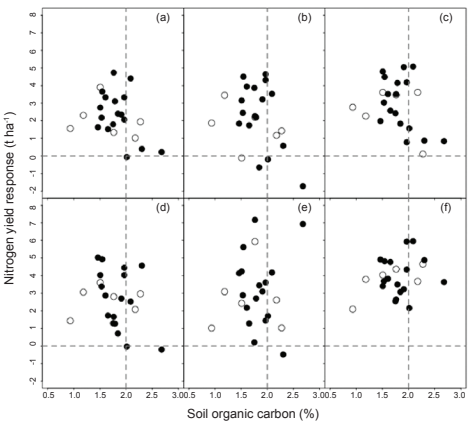

Figure 2. Temporal and spatial patterns in maize grain yield response to fertilizer N (t ha^{-1}) in on-farm trials (n=24) conducted across six consecutive seasons (long rainy season 2013 to short rainy season 2015), in fields differing in past manure applications in western Kenya. White circles represent fields without any farmer applying manure in the three seasons preceding the experiment. Black circles represent fields with some farmers applying manure within the three seasons preceding the experiment.

from 1–3%, with clear patterns of degraded non-responsive soils with < 1.2% SOC, variable responses in mid-range SOC categories, and non-responsive fertile soils with high SOC soils (> 2%). ■

Dr. Zingore is the Director for Research and Development at the African Plant Nutrition Institute, Benguérir, Morocco. e-mail: s.zingore@apni.net. Dr. Njoroge is a Scientist at the African Plant Nutrition Institute, Nairobi, Kenya. e-mail: s.njoroge@apni.net.

Acknowledgement

The article is adapted from Zingore et al. 2021. The Effects of Soil Organic Matter and Organic Resource Management on Maize Productivity and Fertilizer Use Efficiencies in Africa. In: Lal, R. (Ed). Soil Organic Matter and Feeding the Future: Environmental and Agronomic Impacts (1st ed.). CRC Press. https://doi.org/10.1201/9781003102762.

Cite this article

Zingore, S., Njoroge, S. 2022. Soil Organic Matter Regulates Maize Productivity and Fertilizer Response in Maize Production. Growing Africa 1(1), xx–xx. doi:XX.XXXX/GA-11-XX

REFERENCES

Bationo, A., Fening, J.O. 2018. Soil Organic Carbon and Proper Fertilizer Recommendation, In: Bationo, A., Ngaradoum, D., Youl, S., Lompo, F., Fening, Joseph Opoku (Eds.), Improving the Profitability, Sustainability and Efficiency of Nutrients Through Site Specific Fertilizer Recommendations in West Africa Agro-Ecosystems: Volume 1. Springer International Publishing, Cham, pp. 1–10. https://doi.org/10.1007/978-3-319-58789-9_1

Kafesu, N., et al. 2018. Comparative fertilization effects on maize productivity under conservation and conventional tillage on sandy soils in a smallholder cropping system in Zimbabwe. Field Crop. Res. 218, 106–114.

Kurwakumire, N., et al. 2014. Maize productivity and nutrient and water use efficiencies across soil fertility domains on smallholder farms in Zimbabwe. Field Crop. Res. 164, 136–147.

Musinguzi, P., et al. 2013. Soil organic carbon thresholds and nitrogen management in tropical agroecosystems: concepts and prospects. Sustain. Dev. 6, 31-43.

Njoroge, S., et al. 2017. Strong spatial-temporal patterns in maize yield response to nutrient additions in African smallholder farms. Field Crop. Res. 214, 321–330.

Tittonell, P., et al. 2008. Yield gaps, nutrient use efficiencies and response to fertilisers by maize across heterogeneous smallholder farms of western Kenya. Plant Soil 313, 19–37.

Van der Velde, M., et al. 2014. African crop yield reductions due to increasingly unbalanced nitrogen and phosphorus consumption. Glob. Chang. Biol. 20, 1278–1288. https://doi.org/10.1111/gcb.12481

Zingore, S., et al. 2007a. Soil type, management history and current resource allocation: Three dimensions regulating variability in crop productivity on African smallholder farms. Field Crop. Res. 101, 296–305. https://doi.org/10.1016/j.fcr.2006.12.006

Acknowledgment:

The publication allows space for a brief acknowledgement at the end of the article.

Author Information:

Author information should include affiliation, location, and e-mail address.

References:

If three of more names are included in a reference, we will condense it to show the first author name only.

growing AFRICA

https://growingafrica.pub

AFRICAN PLANT NUTRITION INSTITUTE

www.apni.net

APNI Offices:

Headquarters - Benguérir, Morocco
North Africa - Settat, Morocco
West Africa - Yamoussoukro, Côte d'Ivoire
East & Southern Africa - Nairobi, Kenya