



Healthy soils for healthy and nutritious crops: combating hidden hunger

M.G. Kangara

Global Symposium on Soils for Nutrition | 26-29 July 2022



“Hidden hunger”



- Zinc

- Iron

- Iodine

- Vitamins

- Selenium

countries

By mid-century efficiency in a

2.0x

bigger problem

50%
Children
(1.1 billion)

25%
Children

27%
Women

15%
Men

Impossible for Africa's future generation to escape the "nutrition" poverty trap





Soil and Crop Surveys

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Farmer management effects on Zn

Plant Soil (2012) 361:57–69
DOI 10.1007/s11104-012-1332-2

REGULAR ARTICLE

Over 40% increase in maize grain Zn concentration
under optimal conditions

Received: 24 January 2012 / Accepted: 6 June 2012 / Published online: 29 June 2012
© Springer Science+Business Media B.V. 2012

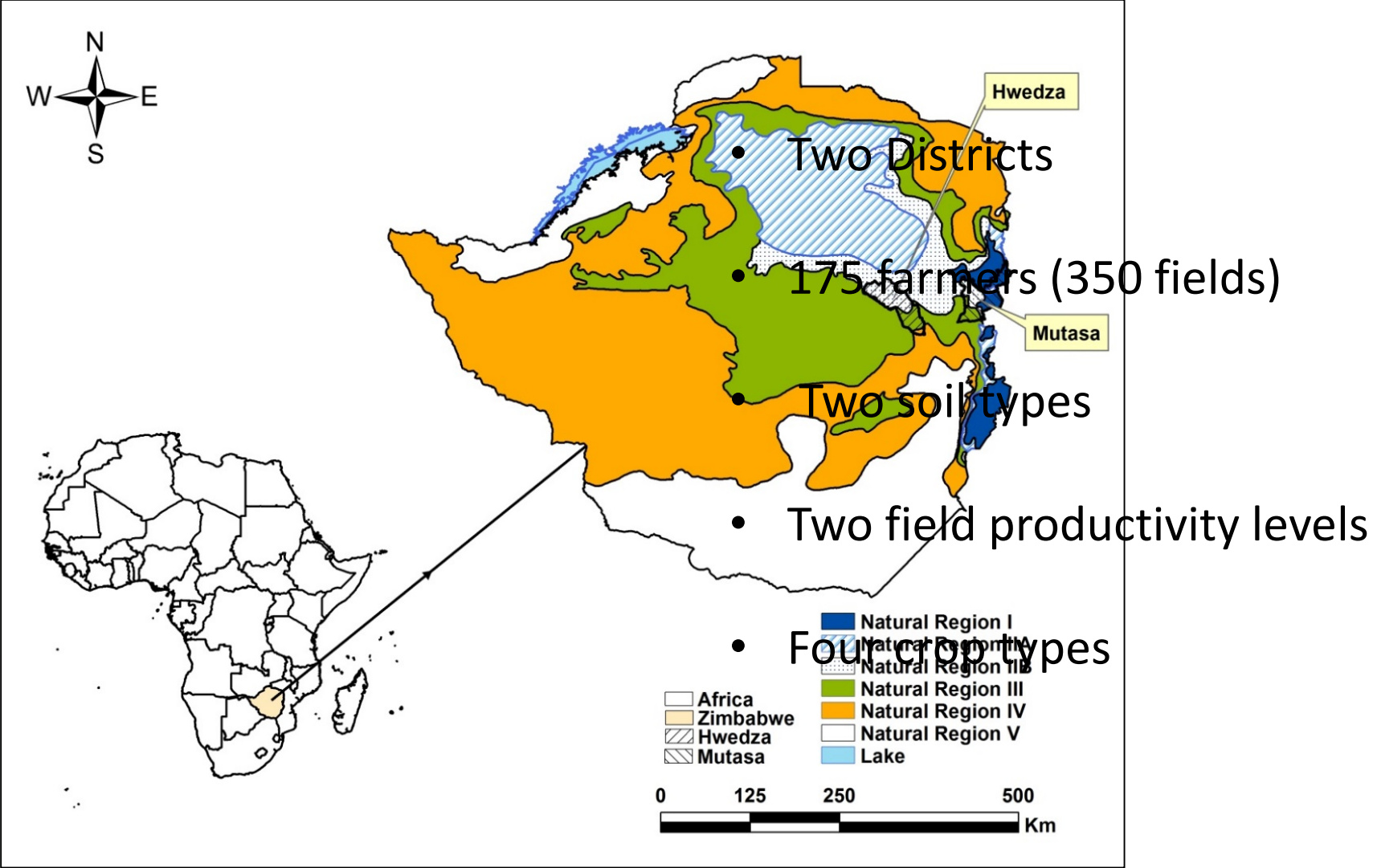
Abstract

influence of farmers' diverse soil fertility management

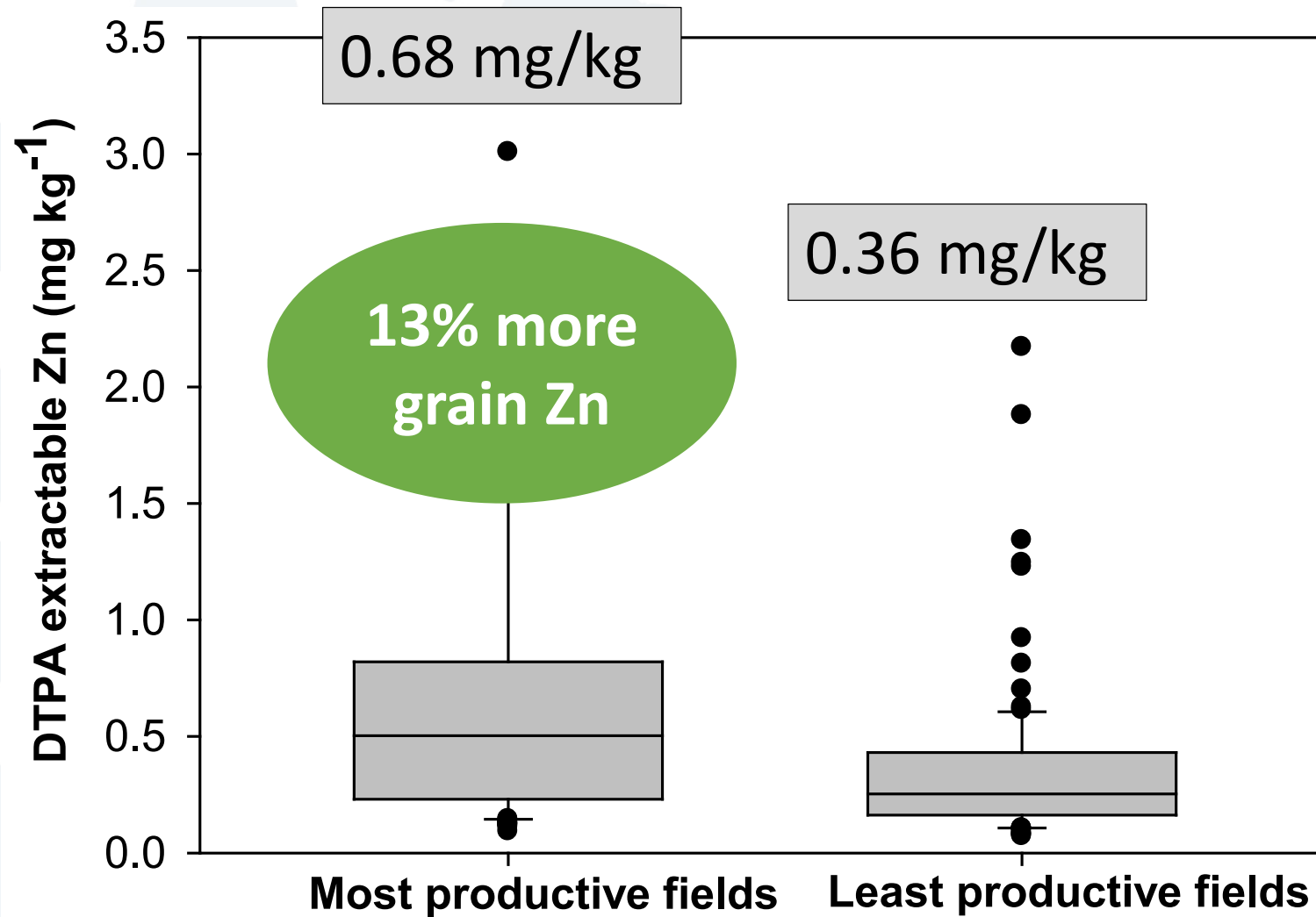
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Zinc and Fe supply in two contrasting regions



Soil organic matter effect on soil and grain Zn



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Ge Nutrition

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LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



The University of
Nottingham



UNIVERSITY OF MALAWI
COLLEGE OF MEDICINE



British
Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL



Ethiopia soil and grain survey (2017/18)



Alem Arega

Wubie Mesfin

Hand-threshing *teff*



Malawi soil and grain survey (2018)



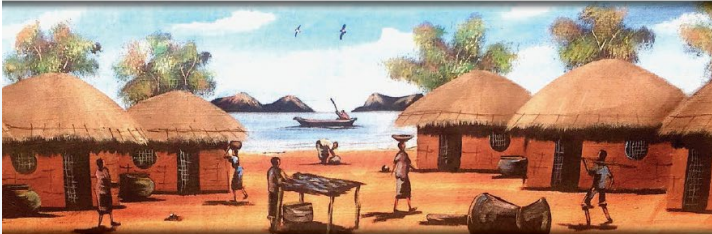
y 2022



Malawi soil and grain survey (2018)

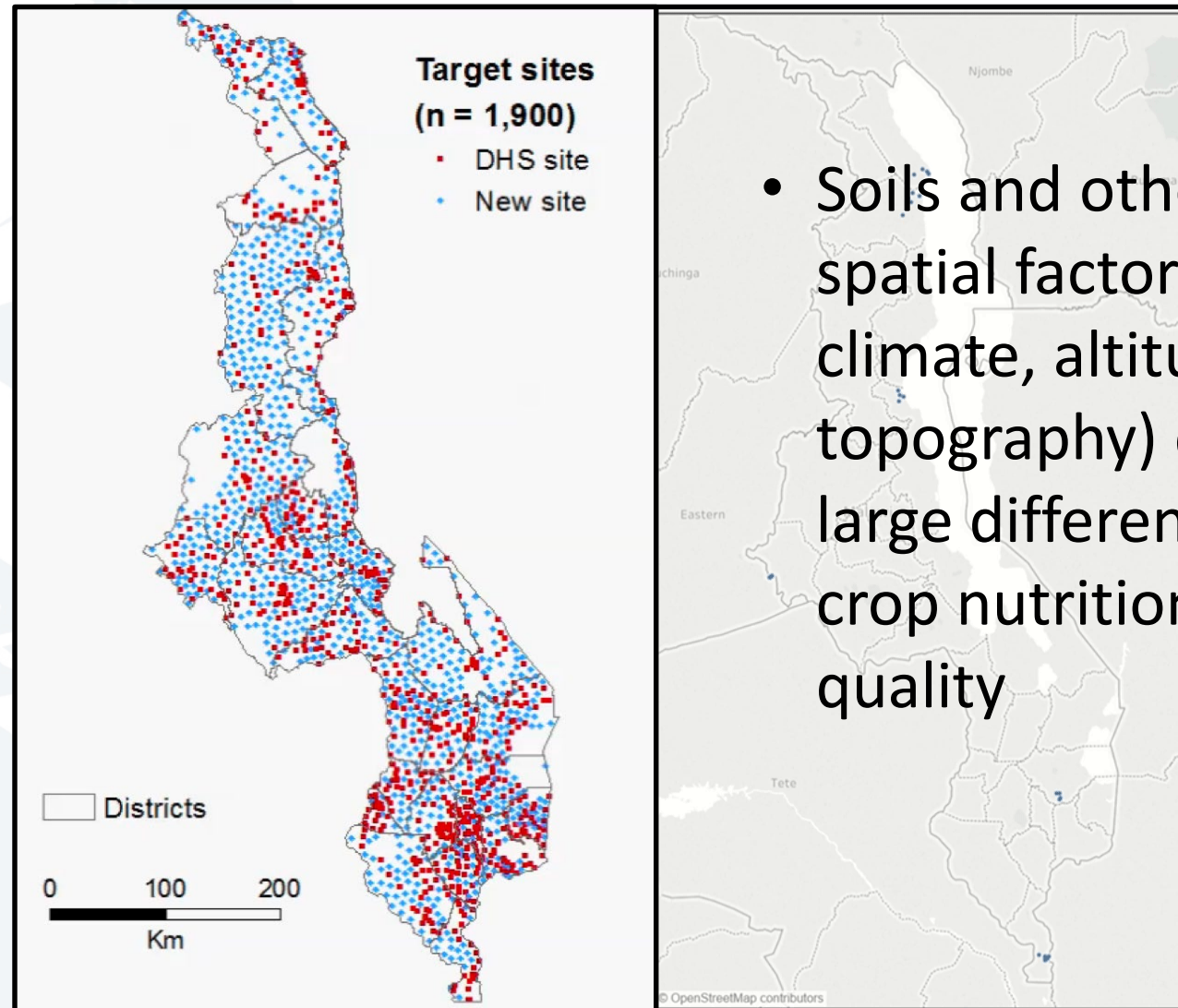


Malawi



Demographic and Health Survey

2015-16



- Soils and other spatial factors (e.g., climate, altitude, topography) cause large differences in crop nutritional quality

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Agronomic biofortification



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1. Interventions: Agronomy (Organic inputs)



2. Soil and foliar application



1. Manzeke et al., 2017.
2. Manzeke et al., 2020.
3. Manzeke-Kangara et al., 2021a.

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3. Nitrogen management



Key findings

- Zinc fertilization increases grain Zn concentration.
- Nitrogen increases grain Zn concentration in cereals, not in legumes.
- Integrated Soil Fertility Management with organic nutrient resources increases grain Zn concentration.
- Grain yield benefit of up to 22% reported from Zn fertilization.

Agronomic biofortification-human nutrition

Manzeke-Kangara *et al. CABI Agric Biosci* (2021) 2:36
<https://doi.org/10.1186/s43170-021-00057-4>


CABI Agriculture
and Bioscience 

RESEARCH

Open Access

Good soil management can reduce dietary zinc deficiency in Zimbabwe



Muneta G. Manzeke-Kangara^{1*} , Edward J. M. Joy^{2*}, Florence Mtambanengwe³, Prosper Chopera⁴, Michael J. Watts⁵, Martin R. Broadley¹ and Paul Mapfumo³

DALYs lost reduced from 12,000 to <3,000 with good soil fertility management

from non-maize sources from the Global Expanded Nutrient Supply (GENuS) data set were linked to maize grain Zn composition observed under typical current soil fertility management scenarios.





“Regenerative Agriculture” and Crop Nutrition

- Wide scoping review.
- >3000 papers from 2000 to 2021.
- >350 in-depth review.
- Over 7 crop types.
- **Some evidence of regenerative agriculture effect on nutrition of some crops.**
- **Not much research on soil health and crop nutrition.**

“Pushing the envelope”: The need for collaborative research

Research Collaborations
Biofortification of foods



**Breaking discipline-specific
research silos**

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“Pushing the envelope”: The need for collaborative research

Engage private sector

Fertilizer Companies

Research Collaborations

Biofortification of foods



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“Pushing the envelope”: The need for collaborative research

Work with
Funders

Engage private sector
Fertilizer Companies

Research Collaborations
biofortification of foods



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THE
**ROYAL
SOCIETY**

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“Pushing the envelope”: The need for collaborative research

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ANK
RIZE



The “*New-trition*” Revolution¹

Resilience

- Improved Soil Management
- Collaborative Research
- Policy Formulation



¹Personal quote

The “*New-trition*” Revolution

Resilience

50%
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Thank you very much for your attention.

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