IITA, the lead research partner facilitating agricultural solutions to overcome hunger and poverty in Sub-Saharan Africa

The critical role of appropriate soil fertility and land use management

N. Sanginga, Director General
B. Vanlauwe, many colleagues/partners
International Institute of Tropical Agriculture (IITA)
‘To lift over 11.6 million Africans out of poverty and turn 7.5 million ha of land into sustainable use’
Bukavu, DR Congo
1. Deriving a livelihood from being a smallholder farmer in sub-Saharan Africa is not easy
Old and degraded soils
Degradation getting increasingly complex

Crop yield

Soil fertility status

Time

Nutrient imbalances

Other degradation

Time (or degradation status)
$200-500 /tonne urea world market 2010-2011
$900-1,400 /tonne urea in Bukavu (DRC)
The ‘Coca-cola’ paradox

$2 – 2.5 in Europe
$0.5 in Bukavu (DRC)
2. Intensification is a must!
Densely populated areas

→ No realistic alternatives in densely populated areas

Kenya
Population densities and yield gaps

Yield gaps

Population density

Legend
- Action Sites
- Population density number/km²
  - <= 25
  - 25 - 50
  - 50 - 100
  - 100 - 200
  - > 200

nutrient limited
nutrient + water limited
water limited
yield ceiling limited
Population growth and distributions

Nigeria

2015
Population: 183,523,000

2050
Population: 440,355,000

http://populationpyramid.net/nigeria/2050/
‘The tip of the iceberg’
Intensification for forest conservation

DR Congo
3. We’ve learnt at lot about potential solutions (and failures) to sustainably intensify smallholder agriculture
Who's vision counts?

It's fertilizer, stupid!

Fertilizer - ISFM
Land clearing/tillage
Perennials/alley crop
Herbeceous legumes
Dual purpose grain legumes

Measuring nitrogen fixation in the field

Integrated Soil Fertility Management

FARM LEVEL
+ Local adaptation to within-farm soil fertility gradients
+ Local adaptation to resources available to farmers

Increase in knowledge

Agronomic efficiency

Move towards ‘complete ISFM’

Current practices & fertilizer
Germplasm & fertilizer & + Organic resource mgmt

‘Complete ISFM’

Yield variability (%)

Soil organic C (g/kg)

Without fertilizer
With fertilizer

Control
Leucaena
Senna
4. The enabling environment is changing!
The African Union Ministers of Agriculture convened in Abuja on 12 June 2006 for the Africa Fertilizer Summit:

Given the strategic importance of fertilizer in achieving the African Green Revolution to end hunger, the African Union Member States resolve to increase the level of use of fertilizer from the current average of 8 kilograms per hectare to an average of at least 50 kilograms per hectare by 2015.
Parcs Agro-industriels – DR Congo

Bukanga Lonzo
DR Congo, 2015
Yara’s History in Africa

Yara has a long history of doing business in Africa and engaging with African agro-dealers, farmers and policymakers – delivering its first mineral fertilizer shipment to the continent back in 1929, and now looking back on a permanent presence in Africa since 1985.

Yara is the only global mineral fertilizer company with a direct presence throughout the continent. Continuously developed and expanded through sales offices and production facilities, this presence also includes the consolidated involvement of local businesses and through the knowledge of the continent.
En route to plentiful food production in Africa

Pedro A. Sanchez

Africa south of the Sahara is going through a major agricultural transformation. Low crop productivity, hunger and pessimism are being replaced by a rapid rise in food production, an increasingly vibrant agricultural value chain and convergence towards a common goal.
5. Change is happening!
Abuja 2006: Increase fertilizer use from the current 8 to 50 kg fertilizer nutrients per hectare → LSMS data (Sheahan & Barrett, 2014)

<table>
<thead>
<tr>
<th>Country</th>
<th>Proportion of cultivating households using (%)</th>
<th>Use across all households, including zeros (kg ha⁻¹)</th>
<th>Mean total</th>
<th>Mean nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia</td>
<td>55.5</td>
<td>45.0</td>
<td>25.2</td>
<td></td>
</tr>
<tr>
<td>Malawi</td>
<td>77.3</td>
<td>146.0</td>
<td>56.3</td>
<td></td>
</tr>
<tr>
<td>Niger</td>
<td>17.0</td>
<td>4.5</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>41.4</td>
<td>128.2</td>
<td>64.3</td>
<td></td>
</tr>
<tr>
<td>Tanzania</td>
<td>16.9</td>
<td>16.2</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Uganda</td>
<td>3.2</td>
<td>1.2</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>35.2</td>
<td>56.9</td>
<td>26.0</td>
<td></td>
</tr>
</tbody>
</table>
### Average agronomic efficiency:

**14 kg grain per kg N fertilizer**

<table>
<thead>
<tr>
<th>Year</th>
<th>Farmer-lead fertilizer management</th>
<th>Researcher-lead fertilizer management</th>
<th>Improved varieties + researcher-lead fertilizer management</th>
<th>Organic inputs + researcher-lead fertilizer management</th>
<th>Researcher-lead fertilizer management on infields across soil fertility gradients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nr cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>324</td>
<td>73</td>
<td>272</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>N-AE mean</td>
<td>19</td>
<td>23</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>N-AE st-dev</td>
<td>15</td>
<td>19</td>
<td>23</td>
<td>29</td>
</tr>
</tbody>
</table>

**Mean 2006 (Δ2.5x)**
6. New models for accelerating the impact of research outputs
Placing research within development

African Cassava Agronomy Initiative

Demand for (a) cassava agronomy information

Development of tools and applications for scaling agronomy recommendations (b)

Extension partner with need for agronomic information →

Extension partner facilitating an active dissemination network

(a)

Demand for (c) cassava agronomy information

Extension agents →

Farming households →

A member of CGIAR consortium

www.iita.org
<table>
<thead>
<tr>
<th>Tool/application</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer blending tool</td>
<td>Fertilizer blending industry</td>
</tr>
<tr>
<td>Fertilizer recommendation tool (Nutrient Expert for Cassava)</td>
<td>Cassava farmers with access to agro-inputs and markets</td>
</tr>
<tr>
<td>Optimum planting/harvest for high starch content</td>
<td>Farmers supplying the cassava processing sector</td>
</tr>
<tr>
<td>Staggered planting for continued root supply</td>
<td>Farmers supplying the cassava processing sector</td>
</tr>
<tr>
<td>Best planting practices tool</td>
<td>All cassava farmers</td>
</tr>
<tr>
<td>Cassava intercropping tool</td>
<td>All cassava farmers</td>
</tr>
<tr>
<td>Capacity Building &amp; Dissemination</td>
<td>SNV</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>Input supply</td>
<td>BAF</td>
</tr>
<tr>
<td>Market Access</td>
<td>CRT</td>
</tr>
<tr>
<td>Production – Input &amp; Market Links</td>
<td>CRT</td>
</tr>
</tbody>
</table>

www.N2Africa.org

Sidama Elto Union
Awash Melka
Union

www.iita.org
Business Incubation Platform

Nodumax
NoduMax
legume inoculant

Manufactured and distributed by the IITA Business Incubation Platform

contains 100 g for application to soybean store in cool, dry, shaded conditions avoid direct sunlight, do not freeze

Business Incubation Platform

For more information please contact:
IITA Business Incubation Platform, PMB 5320, Ibadan, Oyo State, Nigeria.
Tel: +234-2-7517472
Email: ita@cgiar.com

User Instructions

Prepare sticker. Dissolve contents of enclosed gum arabic packet into 300 ml of warm water.

Spread seeds. Add 10 to 15 kg of soybean seeds to a large basin.

Apply sticker. Add sticker to seeds and mix until uniformly coated.

Apply inoculant. Add 100 g of NoduMax to seeds and mix until seeds are uniformly covered with the inoculant.

Allow to set. Cover the inoculated seeds with a cloth and allow the sticker to set for 10 minutes. Avoid direct sunlight.

Plant seeds. Plant the inoculated soybean seeds as soon as possible into a moist seed bed.
Agri-preneurs – Youth & agriculture

Abuja, Nigeria, 2014

Nigeria 2050
Population: 440,355,000

Male
Female
Agri-preneurs – Youth & agriculture
2 to 8 December 2015, Ouagadougou, Burkina Faso

Second announcement and call for communications

7th International Conference of the Africa Soil Science Society

Theme:

Critical soil solutions for sustainable development in Africa

A soil health platform for managing sustainable agricultural intensification in Africa

- Data and information management
- Network of laboratory services
- Networking and partnership
- Communication and Information Services
- Etc

Jeroen Huising
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Thank you!
Danke Schön!

Welcome to IITA!
Willkommen im IITA!