Promoting Fertilizer Use in Africa: Current Issues and Empirical Evidence from the COMESA Region

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Gap between actual and potential maize yields

Actuals from survey data; potential for SG-2000 on-farm demonstrations
Outline

1. Review of factors constraining sustainable fertilizer use
2. Trends in Fertilizer Use
3. Main policy challenges – how to close the gap between potential and actual yields
4. Strategies for raising fertilizer use

I.

Review of factors limiting fertilizer use

Why do farmers not use fertilizer?
Factors limiting fertilizer use:

1. **Lack of profitability**: usually due to
   - Weak physical infrastructure
   - Downside crop price risk → risky
   - Unavailability of improved seed
   - Inefficient farm management, agronomic practices

2. **Lack of credit**: inability to buy fertilizer

3. **Market failure**: Fertilizer may be profitable and there is effective demand, but retailers are not making fertilizer available
II.

Trends in Fertilizer use

Ethiopia
Tanzania

Uganda

Figure 1: Trends in total consumption in Uganda, 1961-2006
Zambia

Zambia: trend in % of smallholders using fertilizer nationwide

metric tons


2002/03 2003/04 2004/05 2005/06 2006/07 2007/08

32.0 33.3 30.9 31.3 34.8 36.0
Yet only modest improvements in maize yields

MACO fertilizer study tour conclusions about FSP

1. Little overall progress in improving productivity on maize, the principal crop targeted in FSP;
2. Poor targeting of farmers/beneficiaries to achieve food security objectives;
3. Delays in input distribution beyond recommended application dates which significantly reduces the effectiveness of both seed and fertilizer use;
4. Poor fertilizer use efficiency due to poor agronomic management practices;
5. Negative FSP impact on achieving a broader private sector participation in input distribution;
III.

Major Policy Challenges of Promoting Fertilizer Use

Gap between actual and potential maize yields

<table>
<thead>
<tr>
<th>Country</th>
<th>Average National Yield</th>
<th>Average Yield in Farm Demonstrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malawi</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Nigeria</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Uganda</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Mali</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Mozambique</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Actuals from survey data; potential for SG-2000 on-farm demonstrations
Reasons for the gap:

1. Many farmers need credit but cannot obtain it
2. Grain prices crash in good season
3. Unavailability of improved seed cultivars

Maize Yields by Seed-Fertilizer Combination Group 1997-2007

Key for Bars: 1=1997 2=2000 3=2004 and 4=2007 Season

Not counting other crops grown on intercropped maize fields
Adoption of improved seed varieties

Reasons for the gap (cont’d):

1. Many farmers need credit but cannot obtain it
2. Grain prices crash in good season
3. Unavailability of improved seed cultivars
4. Sub-optimal farmer management and know-how
5. Limited effective demand for fertilizer in semi-arid areas with weak infrastructure
IV.

Strategies for Promoting Fertilizer Use
How to close the gap between productivity-maximizing yields and existing yields?

1. Profitability
2. Access to credit
3. How to ensure private sector response

Profitability of using fertilizer

\[
\text{Farm-gate Maize Price} \quad \Delta \text{kg maize} \\
\text{------------------------------} \quad * \quad \text{---------------} \\
\text{Farm-gate Fertilizer Price} \quad \Delta \text{kg fert}
\]
Holistic Approach

1. Public investments to raise profitability of fertilizer use:
   - **Infrastructure**: port, road, rail
   - **Crop science**: improved seed and agronomic management
   - **Extension**: know-how to improve efficiency of labor and input use
   - **Crop marketing**: reduce downside price risk
   - **Regional trade**: export bans reduce farm prices, depress incentives to adopt fertilizer

### IFPRI review of rate of return studies:

<table>
<thead>
<tr>
<th>Public Investments in</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input subsidies</td>
<td>&lt; 0 to 12%</td>
</tr>
<tr>
<td>- research &amp; extension</td>
<td>35% to 70%</td>
</tr>
<tr>
<td>- roads</td>
<td>20% to 30%</td>
</tr>
<tr>
<td>- education</td>
<td>15% to 25%</td>
</tr>
<tr>
<td>- communications</td>
<td>10% to 15%</td>
</tr>
<tr>
<td>- irrigation</td>
<td>10% to 15%</td>
</tr>
</tbody>
</table>

If we believe these findings, they have major implications
Budget allocation to Agricultural Sector in Zambia: ZMK465 million in 2005

- Personnel Emoluments: 20%
- Operational funds: 11%
- Irrigation Development: 3%
- Infrastructure: 2%
- Food Security Pack & EDRP: 12%
- Food Reserve Agency Maize Marketing: 15%
- Fertilizer Support Program: 37%

Holistic Approach

2. Address credit issues:
   - Implement targeted subsidy programs in which credit or fertilizer is targeted to the poor, who lack ability to purchase inputs
   - But can the poor really use fertilizer as productively as bigger farmers?
Maize-fertilizer response rates in Zambia by farm size

Source: Crop Forecast Surveys, CSO

<table>
<thead>
<tr>
<th>Landholding size</th>
<th>Total Income</th>
<th>Assets</th>
<th>Landholding size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'000 kwacha per capita</td>
<td>hectares</td>
<td></td>
</tr>
<tr>
<td>Households not acquiring fertilizer:</td>
<td>266</td>
<td>173</td>
<td>.86</td>
</tr>
</tbody>
</table>

Source: Govereh et al, 2006
### Zambia

<table>
<thead>
<tr>
<th>Fertilizer source:</th>
<th>Total Income</th>
<th>Assets</th>
<th>Landholding size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households not acquiring fertilizer:</td>
<td>266</td>
<td>173</td>
<td>.86</td>
</tr>
<tr>
<td>Cash purchases from private retailers:</td>
<td>774</td>
<td>342</td>
<td>1.30</td>
</tr>
<tr>
<td>Government Fertilizer Support Program (50% subsidy)</td>
<td>804</td>
<td>425</td>
<td>2.03</td>
</tr>
</tbody>
</table>

Source: Govereh et al, 2006
Holistic Approach

3. Address marketing issues:
   - Target the poor who lack ability to purchase in order to minimize crowding out of private sector

Malawi

![Graph showing purchases in Malawi from 1997/98 to 2006/07. The graph indicates an increase in purchases over time, with a notable rise in the final years.]
Holistic Approach

Summary:
1. Increase agricultural expenditures on:
   1. Infrastructure
   2. Crop science: hybrid seed research, agronomic trials
   3. Extension services: to help farmers use fertilizer more efficiently
   4. Promote regional trade: to stabilize crop prices
2. Modify input subsidy programs so that they address the credit constraints of the poor
   - Target the poor who lack ability to purchase in order to minimize crowding out of private sector

Thank you

http://www.aec.msu.edu/fs2/
<table>
<thead>
<tr>
<th>Year</th>
<th># Small-holders</th>
<th>Metric Tons Fertilizer</th>
<th># Small-holders</th>
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<th># Small-holders</th>
<th>Metric Tons Fertilizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>02/03 SS</td>
<td>120,000</td>
<td>48,000</td>
<td>102,450</td>
<td>28,956</td>
<td>207,080</td>
<td>50,476</td>
</tr>
<tr>
<td>03/04 SS</td>
<td>150,000</td>
<td>60,000</td>
<td>101,139</td>
<td>33,034</td>
<td>171,274</td>
<td>41,507</td>
</tr>
<tr>
<td>06/07 SS</td>
<td>210,000</td>
<td>84,000</td>
<td>164,229</td>
<td>61,248</td>
<td>303,697</td>
<td>95,169</td>
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<tr>
<td>07/08 SS</td>
<td>125,000</td>
<td>50,000</td>
<td>140,612</td>
<td>43,596</td>
<td>286,514</td>
<td>89,951</td>
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<tr>
<td>07/08 CFS</td>
<td>125,000</td>
<td>50,000</td>
<td>85,666</td>
<td>22,218</td>
<td>337,122</td>
<td>77,471</td>
</tr>
<tr>
<td>08/09 CFS</td>
<td>200,000</td>
<td>80,000</td>
<td>192,897</td>
<td>55,114</td>
<td>247,546</td>
<td>57,124</td>
</tr>
</tbody>
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