

Evans School Policy Analysis and Research (EPAR)

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EPAR’s Political Economy of Fertilizer Policy series provides a history of government intervention in the fertilizer markets of eight Sub-Saharan African countries: Côte d’Ivoire, Ghana, Kenya, Malawi, Mozambique, Nigeria, Senegal, and Tanzania. The briefs focus on details of present and past voucher programs, input subsidies, tariffs in the fertilizer sector, and the political context of these policies. The briefs illustrate these policies’ affect on key domestic crops and focus on the strengths and weaknesses of current market structure. Fertilizer policy in SSA has been extremely dynamic over the last fifty years, swinging from enormous levels of intervention in the 1960s and 70s to liberalization of markets of the 1980s and 1990s. More recently, intervention has become more moderate, focusing on “market smart” subsidies and support. This executive summary highlights key findings and common themes from the series.

**Introduction**

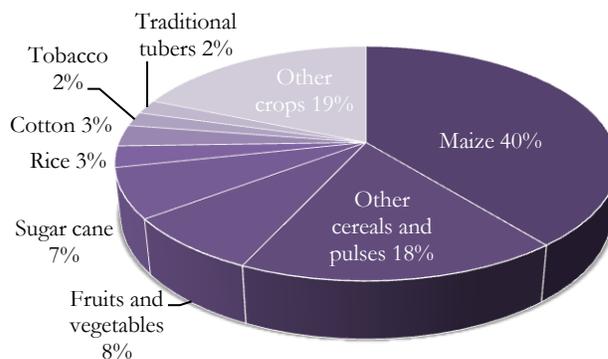
Sub-Saharan Africa (SSA) is heavily dependent on agriculture. Approximately 65 percent of the SSA workforce relies on agriculture for their income, making gains in productivity essential for food security, poverty reduction, and economic growth.<sup>1</sup> Yet yields and per capita production in the region have been relatively stagnant, lagging behind all other regions.<sup>2</sup>

Low fertilizer use is one of the major constraints to increasing agricultural productivity in SSA.<sup>3</sup> Fertilizer consumption in Africa is the lowest in the world, making up only 2 percent of the 2002 world supply and expected to rise to only 3 percent by 2011/12.<sup>4</sup> Developed

countries average 94 kg of nutrients per hectare of arable land; in SSA that number is only 13 kg per hectare.<sup>5</sup> High transportation cost and lack of economies of scale lead to some of the highest fertilizer prices in the world.<sup>6</sup> Understanding how SSA governments can sustainably increase fertilizer consumption will be important if the region hopes to increase agricultural productivity.

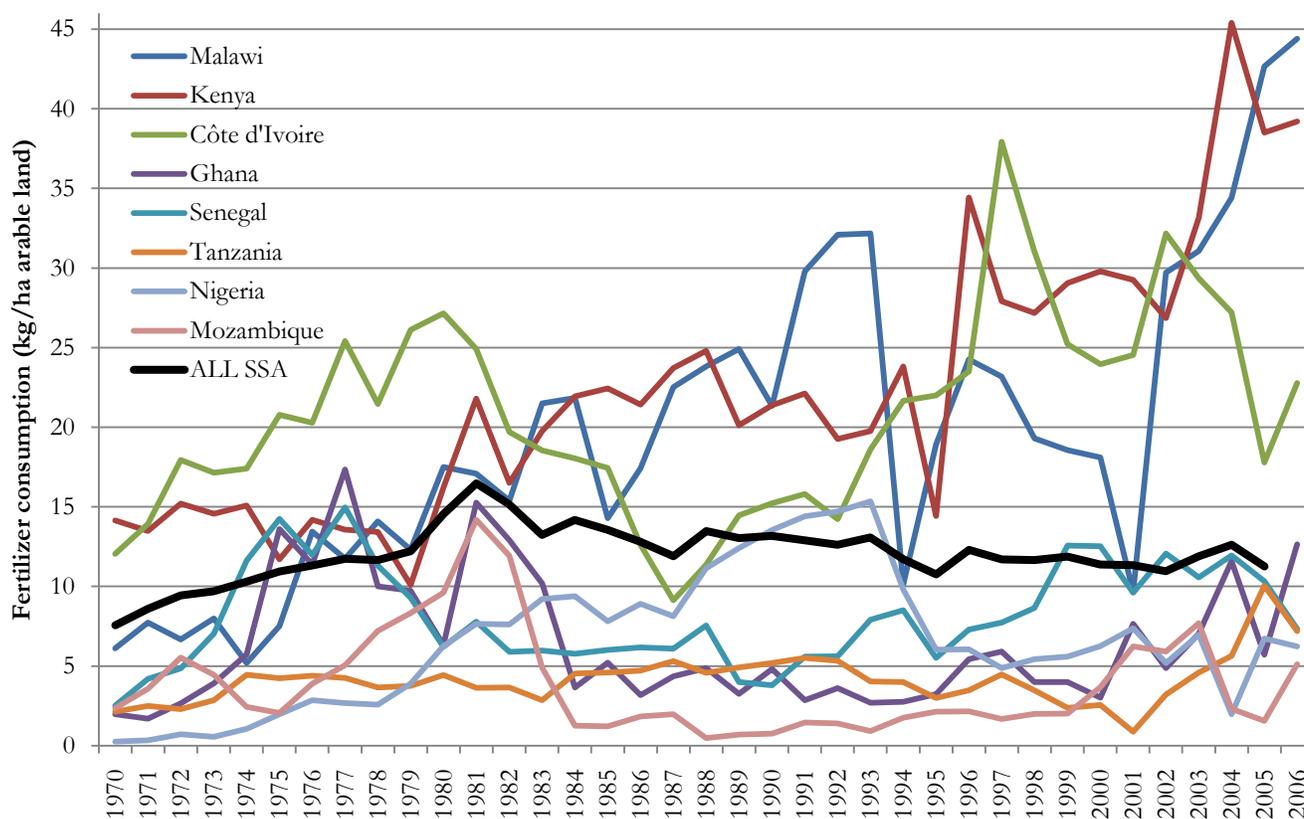
Currently, fertilizer in SSA is most frequently applied on cash crops like tobacco, cotton, coffee, tea, sugarcane, cashews, and irrigated rice.<sup>7</sup> Maize makes up the largest portion of total fertilizer use by weight (see Figure 1), but less than 40 percent of cultivated maize area receives fertilizer.<sup>8</sup> Many subsistence crops like cassava, yams, sweet potatoes, sorghum, and millet are low value crops that are less responsive to fertilizer; these crops, therefore account for little of total fertilizer use.<sup>9</sup> In Tanzania, for instance, 95 percent of tobacco and tea areas receive fertilizer whereas 10 percent or less of maize, millet, pulses, sorghum, and sweet potato areas are fertilized.<sup>10</sup>

Figure 1. Proportion of total SSA fertilizer use by crop (1990s)



Source: Kelly, 2006; data from 12 SSA countries

Figure 2. Fertilizer application rates for all SSA and by country (1970–2006)



Source: Author's construction, country data from FAOStat (1970–2001 fertilizer data from Fertilizers Archive, 2002–2006 from Fertilizers), SSA data from World Development Indicators Online.

During the 1960s and 70s, fertilizer use in SSA grew at an average rate of 9 percent per year, despite the fourfold spike in world prices associated with the oil shocks of 1974 and 1979–80.<sup>11</sup> This illustrates how substantially subsidies insulated farmers from price changes. However, between 1981 and 1995 (the period of macroeconomic reform, subsidy removal, and currency devaluation), fertilizer use declined significantly. Since 1995, use has been relatively stagnant with some recent signs of growth since 2000.<sup>12</sup> While this is an accurate generalization of trends in the region, each country's fertilizer application rate has greatly varied based on unique circumstances and policies (see Figure 2).

### Current Market Structure and Challenges

#### Importation

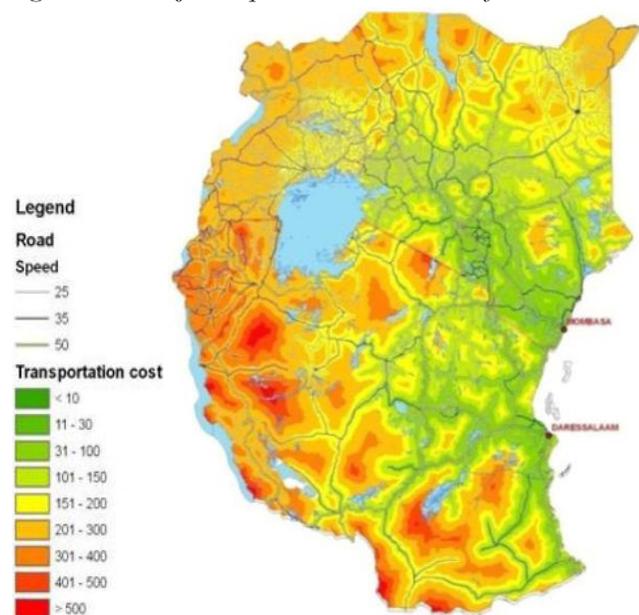
Almost all countries in SSA import the majority of their fertilizer. A mix of private and public sector companies are responsible for this sector of the supply chain, depending on the country. In Malawi and Kenya, public companies are somewhat involved but private companies

import the majority of the fertilizer.<sup>13</sup> In Côte d'Ivoire, Kenya, and Mozambique, the private sector is the exclusive importer of fertilizer.<sup>14</sup>

Importation and particularly port costs are an especially significant contributor to high farm-gate fertilizer prices. Old, inadequate port infrastructure prevents economies of scale for bulk shipments.<sup>15</sup> Beira, Mozambique's main port, is one of few African ports large enough to accommodate fertilizer containers.<sup>16</sup> In 2008, Yara International (the world's largest fertilizer company) announced plans to invest \$60 million for the creation of fertilizer terminals at Dar es Salaam and Beira ports.<sup>17</sup>

The sparse and poor quality roads in SSA are another large contributor to high fertilizer prices for farmers. Figure 3, based on a paper using GIS data, shows how fertilizer transport costs vary across East Africa based on distance of transport, road conditions, and slope of the roads.<sup>18</sup> With liberalized markets, this map shows how inland areas or areas with low road density face much higher fertilizer costs than areas close to the port or on the main roads.

Figure 3. Fertilizer transport costs across East Africa



Source: Guo et al., 2009, p. 8, cost in USD/metric ton

### Distribution

Current market structure for fertilizer distribution varies widely across SSA. In Kenya, one of the highest total and per hectare fertilizer users in the region, 7000 to 8000 private agro-dealers (as of 2000) provide farmers good access in a generally competitive market.<sup>19</sup> In Mozambique, distribution is also limited to the private sector, but weak regulatory and quality control contribute to a poorly organized market and limited distribution system.<sup>20</sup> In Côte d'Ivoire, farmer cooperatives play an important role in fertilizer distribution because input dealer density at the village level is low.<sup>21</sup> Overall, private firms are becoming more involved in fertilizer distribution but most SSA countries still lack an efficient market that reaches the more rural areas.

### Domestic Supply & Production

Most SSA countries do not have the natural resources necessary for domestic supply or production of fertilizer, which requires large amounts of energy (usually natural gas). Several countries with phosphate deposits have attempted to increase production in hopes of supplying their own phosphorus fertilizer but with limited success.

Senegal, a significant holder of phosphate deposits, started exporting fertilizer in the 1960s through a parastatal mining company that was privatized in the 1990s.<sup>22</sup> Tanzania's state-run mining company also controlled phosphate mines until privatized. Recently, the

company (with federal support) geared up to vastly increase production of NPK complex fertilizers, but nonpayment by a government agency has stopped production.<sup>23</sup> Nigeria's state-owned Superphosphate Fertilizer Company Ltd. (SFSC) and National Fertilizer Company of Nigeria (NAFCON) had some success in producing nitrogen and phosphorus fertilizers with a capacity of 100,000 and 1,488,000 tons respectively but the country never produced more than 400,000 tons even during its highest production period (1988 to 1993).<sup>24</sup> NAFCON shut down in 1999 and SFSC is in disrepair and at low production levels.<sup>25</sup> Malawi has yet to take advantage of their domestic phosphate deposits, but plans to start mining operations soon.<sup>26</sup>

Countries without phosphate deposits are still trying to increase production domestically. The Mozambique Fertilizer Company is one of many SSA companies importing fertilizer elements and blending locally.<sup>27</sup> Kenya has discussed plans for a fertilizer plant with the African Development Bank.<sup>28</sup> Senegal and Côte d'Ivoire have also blended fertilizer domestically, but to date, few African fertilizer plants have been successful with or without government support.

### History of Government Intervention

#### Post-Independence: 1960s and 1970s

Most SSA countries were heavily involved in the fertilizer market post-independence. Many governments heavily subsidized fertilizer (up to 85 percent) and controlled importation and distribution.<sup>29</sup> The government of Ghana was the sole importer, marketer, and distributor of inorganic fertilizers during this period.<sup>30</sup> In Côte d'Ivoire, cotton farmers received free fertilizer, seeds, and pesticides from the parastatal supporting cotton production and the rice marketing board provided free fertilizer to irrigated rice farmers participating in extension services.<sup>31</sup>

Some of these initial subsidies eliminated regional cost disparities in countries like Ghana and Tanzania, where farmers received the same retail price regardless of location. Pan-territorial subsidies such as these had differential effects depending on the characteristics of the more remote areas. In Ghana, the subsidies greatly benefited the isolated, drier, poorer, northern region. In Tanzania, the pan-territorial subsidies resulted in higher maize production because the Southern Highlands, while

endowed with a climate well-suited for hybrid maize, also have low road density and are far from port, making the full market price for fertilizer generally unprofitable.<sup>32</sup>

Traditional fertilizer subsidies suffered from numerous problems, most obviously their unsustainable cost as oil prices increased. In Nigeria, the subsidy cost over \$240 million USD in 1982, up from \$150 million in 1976 despite a reduction in the subsidy rate from 85 to 28 percent. Fertilizer was also often delivered late and in limited quantities hampering the effectiveness of fertilizer application.<sup>33</sup>

Additionally, while most subsidy programs aimed to benefit smallholders, this proved administratively challenging. In Nigeria, where the goal was to improve yields for smallholders, fertilizer often ended up in the hands of elites who resold it to smallholder farmers for profit or smuggled and resold it in neighboring countries.<sup>34</sup> Leakage was also a problem in Malawi, where 25–30 percent of subsidized fertilizer was estimated to have gone to the estate sector.<sup>35</sup>

#### *Structural Adjustment Period 1980–1995*

During the 1980s and early 1990s, many SSA countries phased out their fertilizer subsidies and reduced or eliminated controls on fertilizer markets, generally resulting in a rise in domestic fertilizer prices.<sup>36</sup> The liberalization of fertilizer and other markets was due to a combination of pressure from donors (The World Bank, the International Monetary Fund (IMF), and other donors) and macroeconomic instability including rising inflation, balance-of-payment imbalances, and fiscal deficits.<sup>37</sup>

Senegal was the first country in the world to undergo an IMF structural adjustment in 1980.<sup>38</sup> Input distribution and output marketing were privatized and the fertilizer subsidy was completely phased out by 1990.<sup>39</sup> This led to a dramatic increase in fertilizer prices and a 21 percent drop in fertilizer consumption from 1981 to 1996.<sup>40</sup> Other SSA countries had similar experiences. In Tanzania, the real price of fertilizer increased by a factor of 2.5–3.9 from 1991 to 1997 after subsidies were phased out.<sup>41</sup> Nigeria experienced input price increases of 300 percent following structural adjustment.<sup>42</sup> Increased prices in West Africa were exasperated by France's move to devalue the CFA Franc, the regional currency, in 1994. While this made export crops more profitable for many

West African countries, it also effectively doubled the price of fertilizer imports.<sup>43</sup>

#### **Recent Policies**

Recently, SSA governments and donors have given renewed attention to involvement in the fertilizer market. However, the new focus is on avoiding mistakes of past programs by using “market-smart” subsidies. These programs target and ration subsidies to keep costs under control and ensure that interventions are targeted at farmers whose main barrier to fertilizer consumption is a market failure.<sup>44</sup> Voucher programs, fertilizer market development, producer organizations, and geospatial policy mapping are other new components of recent policies.

#### *Smart Subsidies & Voucher Programs*

Voucher programs provide farmers with government-subsidized vouchers they can redeem at local agro-input dealers to acquire inputs such as fertilizer, seed, and pesticides.<sup>45</sup> Dealers then get vouchers reimbursed at a local bank. By offering vouchers to only those farmers with the greatest need, governments are able to minimize efficiency losses. Supporters say targeted vouchers can help create demand and support the private input sector whereas non-targeted subsidies are more likely to support farmers who were already going to purchase fertilizer.

Malawi is credited with the oldest and most successful of the major fertilizer voucher programs. In 1998/99, the Starter Pack program gave 3 million smallholder farmers fertilizer, hybrid maize seed, and legumes with the goal of increasing maize production.<sup>46</sup> From 1998–2000, the program was credited with raising between 280,000–420,000 additional tons of maize annually.<sup>47</sup> Some have suggested that these record surpluses resulting from the subsidies played a role in President Mutharika's 2009 reelections in Malawi.<sup>48</sup> Nigeria, Tanzania, Ghana, and Kenya are now implementing similar programs.

Although voucher programs represent a substantial improvement to traditional fertilizer subsidies, there are still serious challenges. The costs are still very high and will likely be unsustainable if fertilizer prices rise again. Tanzania, Nigeria, and Malawi spent 28, 42, and 45 percent of their respective 2008 agricultural budgets on these subsidy programs.<sup>49</sup> Leakage and a lack of

administrative capacity are other common challenges for governments trying to target the vouchers.

#### *Fertilizer Market Development Programs*

Improving the policy environment, strengthening the network of agro-input dealers with training and credit, and providing farmers with information about fertilizer use are all components of this strategy, which has become common over the past 10–15 years.<sup>50</sup> This is a particularly effective strategy if farmers already have access to cash or credit, as in Kenya where focusing on this tactic has led to substantial increases in the number of agro-input dealers and reduced transaction costs.<sup>51</sup> Tanzania is also investing in an agro-input dealer strengthening program where local suppliers go through business and management training and can then access credit to stock fertilizer.<sup>52</sup>

#### *Producer Organizations*

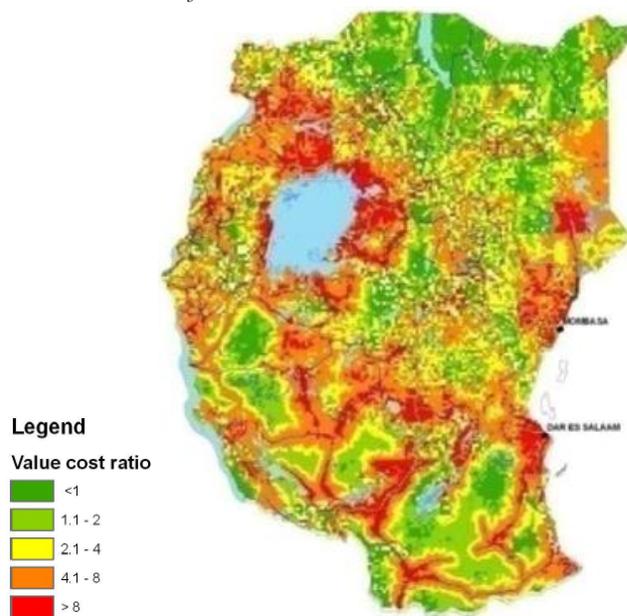
Producer organizations (POs) or other forms of collective action by farmers are also growing in importance. In Senegal, 69 percent of rural households are members of a PO and a lobby group made up of POs has been successful in influencing the government to incorporate smallholder concerns into the country's new agricultural vision.<sup>53</sup> As previously mentioned, Côte d'Ivoire farmer cooperatives play an important role in fertilizer distribution. Ghana has also recognized the potential of collective action by providing smallholder farmer associations with loans to purchase agricultural inputs, extension services, and has designed marketing campaigns to increase awareness about fertilizer use among smallholder farmers.<sup>54</sup>

#### *Geospatial Policy Mapping*

A recently developed technique is to use GIS technology to model how agricultural policies will affect different areas. A recent paper using this technique used transport costs, FOB fertilizer prices, port costs, optimal nitrogen application rates, and net maize farm-gate prices to create geospatial models of different policy options across East Africa.<sup>55</sup> The model simulates the effects of policies including reducing fertilizer, transport, and port costs and could be useful in tailoring policies to different areas or understanding equity implications of policies. Figure 4 for instance, maps the value cost ratio of applying 35 kg of nitrogen per hectare of maize, comparing urea farm-gate

prices against maize farm-gate prices and maize's yield response to 35 kg Nitrogen application.

Figure 4. Value Cost Ratios of 35 kg/ha N application to maize land across East Africa



Source: Guo et al., 2009, p. 17

#### **Conclusion**

Despite numerous strategies over the last fifty years, from heavy government involvement to liberalization, major weaknesses in SSA's fertilizer market hinder economically optimal application rates. Market development is constrained by farmer and agro-input dealers' low knowledge about fertilizer, limited distribution channels, high transportation costs, unavailability of improved seed to respond to fertilizer, and low access to credit. New "market-smart" fertilizer subsidies and policies appear to be a promising approach to address these constraints, offering the potential to increase fertilizer access for targeted farmers while supporting the development of private markets.

*Please direct comments or questions about this research to Leigh Anderson at [eparx@u.washington.edu](mailto:eparx@u.washington.edu).*

#### **Endnotes**

- <sup>1</sup> ILO, 2008, Table 3.2
- <sup>2</sup> ILO, 2008, p. 13
- <sup>3</sup> IBRD/World Bank, 2007, p. 12–13
- <sup>4</sup> Camara & Heinemann, 2006, p. 5; FAO, 2008, p. 17
- <sup>5</sup> Minot & Benson, 2009, p. 2. (originally from FAOStat data)
- <sup>6</sup> Kherallah et al., 2002, p. 28
- <sup>7</sup> Kherallah et al., 2002, p. 34

<sup>8</sup> Heisey & Mwangi, 1997, as cited in Kherallah et al., 2002, p. 33

<sup>9</sup> Kherallah et al., 2002, p. 33

<sup>10</sup> FertiStat, [www.fao.org/ag/agl/fertistat/](http://www.fao.org/ag/agl/fertistat/)

<sup>11</sup> Minot & Benson, 2009, p. 3; Kherallah et al., 2002, p. 52

<sup>12</sup> Minot & Benson, 2009, p. 3

<sup>13</sup> Chirwa, Mwale, Saka, & Kumwenda, 2008, p. 10; Ikerra & Semoka, 2008, p. 3

<sup>14</sup> Kouassi Bredoumy & Ayemou, 2008, p. 8; Jayne, Govereh, Wanzala, & Demeke, 2003, p. 297; Maria & Nhancale 2008, p. 13

<sup>15</sup> Agricultural Council of Tanzania, 2007, p. 5

<sup>16</sup> Gregory & Bumb, 2006, pp. 35, 37, 44

<sup>17</sup> Boudreaux, 2008

<sup>18</sup> Guo et al., 2009

<sup>19</sup> Jayne et al., 2003, p. 297

<sup>20</sup> Maria & Nhancale 2008, p. 13

<sup>21</sup> Kouassi Bredoumy & Ayemou, 2008

<sup>22</sup> AGRA. (2008). Country Report: Senegal, 4. *Unpublished*.

<sup>23</sup> Arusha Times, 2009

<sup>24</sup> Nagy, J.G., & Edun, O. (2002). Assessment of Nigerian Government Fertilizer Policy and Suggested Alternative Market-Friendly Policies. IFDC: Confidential Draft, 10.

<sup>25</sup> Ibid.

<sup>26</sup> Chirwa et al., 2008, p. 10

<sup>27</sup> Maria & Nhancale 2008, p. 4

<sup>28</sup> Kenya Broadcasting Corporation. 2008. Kenya promises farmers subsidized fertilizer. Sept 25, 2008.

<sup>29</sup> Kherallah et al., 2002, p. 26

<sup>30</sup> Jubuni & Seini, 1992, p. 10

<sup>31</sup> Watts & Bassett, 1985; Becker & Youbué, 2009

<sup>32</sup> Kouassi Bredoumy & Ayemou, 2008, p. 26; Skarstein, 2005, p. 352

<sup>33</sup> Minot, N., & Benson, 2009, p. 3

<sup>34</sup> Moguees et al., 2008, p. 47; Akande, 2005, p. 170

<sup>35</sup> Larson, 1996, p. 509

<sup>36</sup> Kherallah et al., 2002, p. 26; Morris, Valerie, Kopicki, & Byerlee, 2007, p. 51.

<sup>37</sup> Kherallah et al., 2002, p. 44

<sup>38</sup> Anderson & Masters, 2009, p. 471

<sup>39</sup> Kelly et al., 1996

<sup>40</sup> Delgado & Jammeh, 1991, p. 111; Kherallah et al., 2002, p. 64

<sup>41</sup> The World Bank and the Government of the United Republic of Tanzania, 2001, p. 51

<sup>42</sup> Akande, 2005, p. 171

<sup>43</sup> Kherallah et al., 2002, p. 57

<sup>44</sup> Dorward, 2009, p. ii

<sup>45</sup> Minot & Benson, 2009, p. 3

<sup>46</sup> Levy, 2005, p. 4–5; Øygard et al., 2003, p. 22

<sup>47</sup> Levy, 2005, p. 105

<sup>48</sup> Therkildsen, 2009, p. 16; BBC News, 2009

<sup>49</sup> Therkildsen, 2009, p. 16; Moguees et al., p. 49; Minot & Benson, 2009, p. 6

<sup>50</sup> Minot & Benson, 2009, p. 6

<sup>51</sup> Minot & Benson, 2009, p. 6

<sup>52</sup> FSRP Fertiliser Review Team, 2009, p.10

<sup>53</sup> IBRD/World Bank, p. 88, 250

<sup>54</sup> Kouassi Bredoumy & Ayemou, 2008

<sup>55</sup> Guo et al., 2009

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