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On 07 April 2015 the African Centre for Biosafety officially changed its name to the African Centre for Biodiversity (ACB). This name change was agreed by consultation within the ACB to reflect the expanded scope of our work over the past few years. All ACB publications prior to this date will remain under our old name of African Centre for Biosafety and should continue to be referenced as such.

We remain committed to dismantling inequalities in the food and agriculture system in Africa and in our belief in peoples’ right to healthy and culturally appropriate food, produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.

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<tr>
<td>ACB</td>
<td>African Centre for Biodiversity</td>
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<tr>
<td>ACIAR</td>
<td>Australian Centre for International Agricultural Research</td>
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<tr>
<td>ADEM</td>
<td>Agência de Desenvolvimento Económico da Provincia de Manica / Manica Economic Development Agency</td>
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<tr>
<td>ADP</td>
<td>Agro-Dealer Programme (within AGRA)</td>
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<tr>
<td>AECF</td>
<td>Africa Enterprise Challenge Fund</td>
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<tr>
<td>AFAP</td>
<td>African Fertiliser and Agribusiness Partnership</td>
</tr>
<tr>
<td>AfDB</td>
<td>African Development Bank</td>
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<tr>
<td>AFSA</td>
<td>Alliance for Food Sovereignty in Africa</td>
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<tr>
<td>AGRA</td>
<td>Alliance for a Green Revolution in Africa</td>
</tr>
<tr>
<td>AIMS</td>
<td>Agricultural Input Market Strengthening Programme</td>
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<tr>
<td>AMODEA</td>
<td>Association of Disadvantaged Women</td>
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<tr>
<td>ARIPO</td>
<td>African Regional Intellectual Property Organisation</td>
</tr>
<tr>
<td>ASBP</td>
<td>African Seed and Biotechnology Programme</td>
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<tr>
<td>BAGC</td>
<td>Beira Agricultural Growth Corridor</td>
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<tr>
<td>CA</td>
<td>Conservation Agriculture</td>
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<tr>
<td>CAADP</td>
<td>Comprehensive African Agricultural Development Plan</td>
</tr>
<tr>
<td>CAN</td>
<td>Calcium ammonium nitrate</td>
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<tr>
<td>CARD</td>
<td>Coalition for African Rice Development</td>
</tr>
<tr>
<td>CATERF</td>
<td>Comité de Avaliação Tecnica do Registo de Fertilizantes / Committee for the Technical Evaluation and Registration of Fertilisers</td>
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<tr>
<td>CEPAGRI</td>
<td>Centre for the Promotion of Agriculture (within MINAG)</td>
</tr>
<tr>
<td>CGIAR</td>
<td>Consultative Group for International Agricultural Research</td>
</tr>
<tr>
<td>CIAT</td>
<td>International Centre for Tropical Agriculture</td>
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<tr>
<td>CIMMYT</td>
<td>International Maize and Wheat Improvement Centre</td>
</tr>
<tr>
<td>CNS</td>
<td>National Seed Committee</td>
</tr>
<tr>
<td>DAP</td>
<td>Diammonium phosphate</td>
</tr>
<tr>
<td>DCA</td>
<td>Development Credit Authority (within USAID)</td>
</tr>
<tr>
<td>DFID</td>
<td>Department for International Development (United Kingdom)</td>
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<tr>
<td>DINA</td>
<td>National Directorate on Agriculture</td>
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<tr>
<td>DNER</td>
<td>National Directorate of Rural Extension</td>
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<tr>
<td>DTMSS</td>
<td>Drought Tolerant Maize Seed Scaling Up</td>
</tr>
<tr>
<td>DUS</td>
<td>Distinct, Uniform and Stable</td>
</tr>
<tr>
<td>E&amp;T</td>
<td>Education and Training</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organisation (United Nations)</td>
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<td>FIPS</td>
<td>Farm Inputs Promotions Africa Ltd</td>
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<tr>
<td>FtF</td>
<td>Feed the Future (within USAID)</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GIZ</td>
<td>German International Cooperation</td>
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<tr>
<td>GM</td>
<td>Genetically-modified</td>
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GPS  Geographical Positioning System
Ha  Hectare
IARC  International Agricultural Research Centre
ICRISAT  International Crop Research Institute for the Semi-Arid Tropics
ICT  Information and Communications Technology
IDA  International Development Association
IFDC  International Fertiliser Development Centre
IIAM  Instituto de Investigação Agrária de Moçambique / National Agricultural Research Institute
IITA  International Institute of Tropical Agriculture
IMF  International Monetary Fund
INIA  National Institute of Agronomic Research
INOVAGRO  Innovation for Agribusiness
IP  Intellectual Property
IRRI  International Rice Research Institute
ISFM  Integrated Soil Fertility Management
ISSD  Integrated Seed Sector Development
ISTA  International Seed Testing Association
ITC-F  Iniciativa para Terras Comunitarias / Community Land Initiative
IWMI  International Water Management Institute
MASA  Ministério da Agricultura e Segurança Alimentar / Ministry of Agriculture and Food Security
MINAG  Ministry of Agriculture
MLT  Mozambique Leaf Tobacco
MNCs  Multinational Corporations
MOP  Muriate of potash
NAFSN  New Alliance for Food Security and Nutrition
NDUS  New, distinct, uniform and stable
NGO  Non-government organisation
(NH₄)₂SO₄ Ammonium sulphate
NPK  Nitrogen-phosphorospotassium
O&M  Operations and Maintenance
OPV  Open-pollinated Variety
PARTI  Platform for Agricultural Research and Technology (within USAID)
PASS  Programme for Africa’s Seed Systems (AGRA)
PBRs  Plant Breeders’ Rights
PEDSA  Plano Estratégico para o Desenvolvimento do Sector Agrário / Strategic Plan for the Development of the Agricultural Sector
PENF  Fertiliser Strategic Program
PNISA  Plano Nacional de Investimento do Sector Agrário / National Agriculture Investment Plan
PPP  Public-Private Partnership
PVP  Plant Variety Protection
QDS  Quality Declared Seed
Agricultural investment activities in the Beira Corridor, Mozambique

R&D  Research and Development
SADC  Southern Africa Development Community
SAFRA  Strengthening Agribusiness and Fostering Rural Alimentation (within USAID)
SAGCOT  Southern Agricultural Growth Corridor of Tanzania
SATH  Southern Africa Trade Hub (within USAID)
SDC  Swiss Agency for Development Cooperation
SDR  Standard Drawing Right
Semoc  Sementes de Mocambique Lda / Mozambique Seeds Ltd
SEPA  Seed Production for Africa (within AGRA)
SHP  Soil Health Programme (within AGRA)
SIMLESA  Sustainable Intensification of Maize-Legume cropping systems for food security in Eastern and Southern Africa
SMEs  Small and Medium Enterprises
SNV  Netherlands Development Organisation
SSTP  Scaling Seeds and Technologies Partnership (within NAFSN)
SUN  Scaling Up Nutrition
ToT  Transfer-of-technology
UCAMA  União Provincial de Camponeses de Manica / Manica Provincial Farmers’ Union
UDAC  District Farmer Association
UGC  General Union of Cooperatives
UK  United Kingdom
UN  United Nations
UNAC  União Nacional de Camponeses / National Farmers’ Union
UPC Sofala  União Provincial de Camponeses de Sofala / Sofala Provincial Farmers’ Union
UPOV  International Union for the Protection of New Varieties of Plants
US  United States of America
USAID  United States Agency for International Development
USEBA  Unidade de Semente Básica / Basic Seed Unit
VCU  Value for Cultivation and Use
WASH  Water, Sanitation and Hygiene
WEF  World Economic Forum
WUAs  Water User Associations
EXECUTIVE SUMMARY

Introduction

The research is part of a three year multi-country programme looking at the impacts of the Green Revolution on small-scale farmers in southern Africa with a particular focus on seed and soil fertility. The research focuses on the Beira Corridor, in particular Manica and Sofala provinces. This was selected as a key focus area for Green Revolution interventions in Mozambique where limited civil society research has been conducted to date.

ACB conducted the research in partnership with the national farmers’ union União Nacional de Camponeses (UNAC) and its provincial unions União Provincial de Camponeses de Manica (UCAMA) and União Provincial de Camponeses de Sofala (UPC Sofala), and Kaleidosopio, an independent research organisation based in Maputo.

The research consisted of interviews with key stakeholders in Maputo, Chimoio and Beira and focus group discussions with local farmer associations affiliated to UNAC in Manica and Barue (Manica province) and Dondo (Sofala province).

Background to agriculture and land in Mozambique

Mozambique’s economy was severely disrupted during the internal war, which erupted in 1977 and ended in 1992. At the end of the war, donor money was contingent on structural adjustment and agricultural liberalisation. Today agriculture accounts for around 24% of GDP, with average real annual growth of nearly 8% from 2002 to 2011. Around 77% of the total population rely on agriculture for their livelihoods.

Mozambique can be broadly categorised into three agro-ecological zones: arid and semi-arid in the south and south-west; sub-humid mostly in the centre and North; and humid highlands mostly in the central provinces. Most agricultural production takes place in the North, which is the most fertile region.

Potential arable land and pasture is around 40% of the total area, although only around 10% of this is currently under productive use.

There are approximately 3.7m farms, with the vast majority (98%) being small farms. The average size of family holdings is around 1.2 ha divided into two or more plots. It is estimated that 97% of the area occupied by these farms is not covered by a DUAT (legal title for the use and enjoyment of land). The land is owned by the state, with 50 year leases available for commercial production which can be renewed for another 49 years (Article 17 of the Mozambique Land Law). Given that the land is the property of the state, the proof of use and enjoyment of land can be made by: presentation of title (DUAT); testimonial evidence presented by members, men and women from local communities, experts and other means (Article 15 of the Mozambique Land Law).

Maize, cassava and beans occupy about 60% of the area under cultivation. Rice is an important food crop in some parts of the country, including Sofala. National production of maize is insufficient to cover domestic demand, and maize is imported to meet the shortfalls. The main cash crops for export are cotton, tobacco, cashew nuts and sugar cane.

The Green Revolution in Mozambique

Mozambique has adopted a Green Revolution approach to agricultural development. The method for realising food security and improved farmer livelihoods is explicitly understood to be agricultural modernisation and commercialisation, including the expansion of Green Revolution technologies (certified seed, synthetic fertiliser, irrigation, credit).

The government of Mozambique has signed on to the G8 New Alliance for Food Security and Nutrition (NAFSN). NAFSN advances a private sector, corporate agenda in implementing the African Union’s Comprehensive African Agricultural Development Programme (CAADP) and Mozambique government agricultural plans. Policy commitments include promoting competitive private sector input markets; reforming land use rights to promote private
sector investment; liberalising agricultural marketing and trade; increasing farmer access to credit; and nutrition. The main NAFSN funders in Mozambique are the US and Japan with the UK, EU and Italy also providing funds.

The United States Agency for International Development (USAID) has for long been involved in constructing the agricultural sector in Mozambique to favour private, commercial interests. One channel is the Feed the Future (FtF) programme, which focuses on the Beira and Nacala corridors. Priority value chains are oilseeds (groundnut, sesame, soya); pulses (beans, cowpeas, pigeon peas); cashews; and fruit (banana, mango and pineapple).

More recently USAID launched the Strengthening Agribusiness and Fostering Rural Alimentation (SAFRA) programme as its primary implementing mechanism for FtF. Contractors are currently being finalised. SAFRA emphasises a private sector driven approach, promotion of profitability and farming as a business, with the aim of increasing productivity and competitiveness of farmers and agro-enterprises.

As in other countries, the Alliance for a Green Revolution in Africa (AGRA) interventions in Mozambique are not stand-alone but are integrated with broader Green Revolution initiatives. Total AGRA grants in Mozambique came to US$12.6m in the period 2007-2012 for which grant information is available. The biggest allocations during that period were to the Programme for Africa’s Seed Systems (PASS) with 40.5% of total value of grants, and the Soil Health Programme (SHP) with 33.3%. Additional funds were directed towards institutional support for the Beira Corridor initiative as part of AGRA’s breadbasket strategy. Forty-five percent of AGRA grants in this period went to three recipients: Instituto de Investigação Agrária de Moçambique (IIAM, the national agricultural research institute) with US$2.68m; International Fertiliser Development Centre (IFDC) with US$1.51m and Agência de Desenvolvimento Econômico da Província de Manica (ADEM, the Manica Economic Development Agency) with US$1.5m.

AGRA is contracted to manage NAFSN’s Scaling Seeds and Technologies Partnership (SSTP), which is also operating in Tanzania, Malawi, Ghana and Senegal. The objective of SSTP is to improve public and private sector capacity to deliver improved seeds and related technologies (e.g. synthetic fertiliser) and increasing take-up by small-scale farmers. SSTP in Mozambique operates in the Beira, Nacala and Limpopo Corridors and in the Zambeze Valley, focusing on improved seed, extension services and agro-processing.

The Beira Agricultural Growth Corridor (BAGC) initiative

The Beira Corridor is one of six development corridors highlighted in Mozambique’s strategic investment plan. The corridor is one of Southern Africa’s main transport routes; a road and rail network linking large parts of Zambia, Malawi, Zimbabwe and Mozambique to the port of Beira on the Indian Ocean. The corridor incorporates the three central Mozambique provinces of Tete, Manica and Sofala, with links into Zambezia to the North.

The corridor has a mainly tropical savannah climate with a rainy season from November to April, and average annual rainfall of 1,200mm (moderate to good). Total land area is 23m ha, of which 10m ha is arable land, with 300,000 ha suitable for irrigation. 15% of the arable land (1.47m ha) is under smallholder farming, with 25,000 ha of commercial farming, of which 88% is sugar. 80% of sugar is irrigated. Main crops currently produced in the Beira Corridor are maize, sweet potato, sorghum, rice (only in Sofala), groundnuts, cowpeas, sesame, cassava, beans and soya.

The BAGC initiative is a partnership between the government of Mozambique, private investors, farmer organisations and international agencies. It was launched in 2010 with the aim of promoting increased investments in commercial agriculture and agribusiness in the Beira Corridor. Membership includes MASA, Centre for the Promotion of Agriculture (CEPAGRI); AGRA, DFID, SNV, World Bank; Standard Bank, Tongaat Hulett, Yara as well as a number of banks and mining multinationals; UNAC and its provincial union in Manica, UCAMA, and the General Union of Cooperatives (UGC).
The growth corridor as a whole is driven by mining investments, especially coal in Tete. Commercial agriculture typically follows mining and energy investments. Transport infrastructure anchors investments in the corridor. At the moment there is a stuttering in energy investment in light of uncertainty about the future of the global economy and demand, and hence in investments throughout the corridor. At the same time, these investments take a long time to mature, and there will no doubt be investors who see a lucrative market beyond the next ten years.

The overall objective is to ‘catalyse’ private sector investment, integrate smallholder farmers into commercial value chains and increase economies of scale. The initiative is based on a PPP mechanism to co-ordinate activities, with a secretariat. The BAGC initially targeted 190,000 ha for commercial production. Just over a third of this targeted smallholder farmers on irrigated plots (5-50 ha), with the rest for large estates (over 10,000 ha) and medium-sized farms (300-3,000 ha). In practice it does not look like there has been much development on these projects, and it appears that commercial investment is fairly limited to date.

The BAGC essentially coordinates agricultural and agriculture-related investments in the corridor, while also operating a revolving fund to make some of its own investments. The BAGC Catalytic Fund (an investment company registered in Mozambique) was established to invest in early-stage farming and agro-processing businesses which incorporate smallholder and emergent farmers. UK-based AgDevCo is the fund manager “on a cost recovery basis”. The Catalytic Fund was initially set up as a revolving loan facility providing loans of US$50,000-500,000 with the aim of making a financial return of 5-10% overall. The total value of the fund is US$17m mainly sponsored by DFID, Norway and the Dutch. In practice the fund operates as an equity investor, taking a share of the enterprise’s ownership in exchange for investment. This is finance capital at work, and it is surprising that public funds can be channelled into equity investments in the name of a private enterprise, which is what is happening here. AgDevCo currently has 14 active investments in agriculture in Mozambique, valued between US$200,000 and US$1.5m.

There are some apparent tensions between BAGC and AgDevCo. AgDevCo was meant to set up the institution and then hand the fund over to BAGC. Some respondents argued that AgDevCo prioritises medium-scale commercial farmers, who also tend to be foreign farmers. Respondents went on to say that while such an approach may be justified from an economic and rational point of view, it is more problematic from a development and political point of view. The suggestion is that donor money could more usefully be targeted at the commercial development of small-scale farmers.

**USAID, AGRA and World Bank investments in the Beira Corridor**

USAID has 23 recent and current projects operating in Sofala and Manica provinces, of which five deal with agriculture and food security. AGRA has provided direct support to establishing the institutional architecture for the Beira corridor, and had granted around US$4m to projects in the corridor from 2007 to 2012. The major World Bank activity in the corridor is the large PROIRRI Sustainable Irrigation Development Project which focuses on supporting the growth of small-scale irrigation in Manica, Sofala and Zambezia, linked to commercial markets. The project was approved in 2011 with funding from the International Development Association (IDA), part of the World Bank, and the Government of Japan under the Coalition for African Rice Development (CARD) initiative, with a combined total of around US$90m. Currently around 700 ha is being supported through PROIRRI, out of a planned total of 5,500 ha. BAGC operates as a service provider. It designs an irrigation scheme, government finds a builder, and BAGC monitors construction. A requirement for participation is that farmers pay about 10% on inputs. Government pays 85% of ploughing costs, and irrigation is provided for free. Farmers are trained on management and irrigation, including the formation of irrigation committees with support from extension workers.
Investments in agriculture will have contradictory outcomes. Plans and investments are oriented to favour small-scale farming households over large commercial producers. However, at the same time as such investments can open up opportunities for small-scale farming households, they also allow corporate penetration into previously inaccessible areas, including the extraction of value and wealth created locally. The best route is to work with farmer associations to identify spaces to negotiate about what kinds of investments favour their members and are in line with their principles as democratic organisations.

**Seed: Domination, co-existence or some other alternative?**

Mozambique’s seed sector can be divided roughly into three categories: i) the predominant farmer-managed system that produces and circulates mainly local varieties of food crops; ii) an ‘intermediate’ system which covers mainly food crops but also some vegetative crops and emerging cash crops, and incorporates community-based, NGO, emergency relief and some public activity; and iii) the commercial system which mainly looks at cash crops and incorporates private companies, public sector and closed value chains for specific crops (e.g. sugar cane, cashew, tobacco and cotton).

By far most seed in Mozambique is produced and distributed through **farmer-managed systems**. All the processes from selection, through testing, multiplication and storage are carried out, mostly by individual farmers sometimes in interaction with neighbours and others. Farmer-saved seed currently constitutes an estimated 70% of total seed used, with 20% from informal exchange and no more than 10% of seed through the commercial sector (public and private).

Farmers we spoke to have come with a verdict on the next steps for enhancing the varieties to suit their local needs, looking for increased yields and hardness traits already present in different varieties they use. They want to conduct this research on their own land, under their control with advice and resources from outside. Overall, farmers have got some capacity to do local experimentation and are interested in working on participatory *in situ* seed enhancement. They are also interested in increasing their knowledge about techniques to improve the preservation of seed.

The commercial seed sector only began with the initiation of a national seed programme in 1978, resulting in the establishment of the government-owned *Sementes de Moçambique Lda* (Semoc) to produce and disseminate improved seed. Seed laws and regulations were put in place in the early 1990s following the end of the internal war. The main law was the Seed Act (Decree 41/1994), which regulated the approval and registration of new varieties and defined the rules for seed production, inspection and commercialisation. The Act did not mention the informal or farmer-managed seed system despite the overwhelming importance of this system in Mozambique. Regulations in 2001 created an exclusive seed market for certified, improved, commercial varieties of seed, excluded farmers’ varieties from the market, and made it impossible for these varieties to be officially recognised and registered.

The National Directorate on Agriculture and Silviculture at Ministério da Agricultura e Segurança Alimentar (MASA)³ is responsible for general coordination of the seed sector in Mozambique. A Seed Platform was established in 2013 to bring stakeholders together, including government, private sector and civil society. UNAC is represented on the Platform, though it feels the agenda and composition of the Platform is heavily biased towards commercial interests.

For most of the time that a commercial seed sector has existed, the public sector was responsible for **plant breeding**, in collaboration

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1. Seed is taken to incorporate germplasm for vegetable crops (e.g. sweet potatoes).
2. Following the formation of a new government in 2015, the Ministry of Agriculture has a new designation: *Ministério da Agricultura e Segurança Alimentar (MASA) / Ministry of Agriculture and Food Security*
with the international agricultural research centres (IARCs). Otherwise private companies imported seed varieties bred outside Mozambique. Germplasm inside Mozambique is mostly held by the state in collaboration with the IARCs. More recently, efforts are being oriented towards opening up breeding to the private sector. Since 2000, seed companies also became involved in breeding, mainly in maize. A draft Decree from 2013 lays out regulations on the protection of new plant varieties, which is seen as a key private sector requirement for investment. The Decree is based on the protection of private ownership through intellectual property (IP) protection for breeders. Plant breeders’ rights (PBRs) are granted on the basis of a technical assessment of new, distinct, uniform and stable (NDUS) varieties, with NDUS criteria defined in Articles 8-11 of the regulations. The scope of protection includes production, multiplication or packaging of a protected variety - or any ‘essentially derived’ variety - without the consent of the rights holder. Anyone producing or multiplying protected varieties without a valid licence may be warned, fined, material may be seized and they may be open to being sued by the rights holder.

PBRs do not extend to the use of a protected variety in a programme of improvement of new varieties, unless it is repeatedly used in experiments or research activities; any private and non-commercial activities; and activities carried out by small-scale farmers for purposes of propagation and planting in their own fields (up to a certain extent which has to be defined by the government). This provides for farmers’ privilege and limits farmers’ rights. It allows small-scale farmers to recycle and adapt even protected varieties in their own fields and for any private and non-commercial activity. On the other hand, it prohibits farmers from multiplying seeds to be shared with other farmers or sold and selling seed from a protected variety without the consent of the rights holder.

The recently-concluded Arusha Protocol for the Protection of New Varieties of Plants (Arusha PVP Protocol) of the African Regional Intellectual Property Organisation (ARIPO) has imposed a regional PVP policy and framework onto all countries signing on to the agreement, based on UPOV 1991, in which PBRs take precedence over farmers’ rights. Mozambique was one of four member countries that signed the Protocol on adoption in July 2015.

IIAM has the primary responsibility for the production of breeder and pre-basic seed, but also produces basic seed through Unidade de Semente Básica (USEBA). USEBA supplies seed to private companies and others mainly involved in producing certified seed. IIAM Central Region works with Dengo, Nzara, Yapera, Semente Perfeita and other companies for certified maize, beans and soya. IIAM also multiplies certified seed through outgrowers to raise income. IIAM is also open to work with private companies to produce basic seed, but few have taken the opportunity so far.

IIAM does work with small farmers, mostly on OPVs. Improved varieties are mostly OPVs but IIAM is trying to promote hybrid. Farmers we spoke to are interested in trying out new varieties on their own terms, bringing them in slowly and experimenting to see how well they perform. Farmers are doing their own value for cultivation and use (VCU) testing here, in field conditions, not on demo plots with all the inputs that the formal VCU test is based on.

Once breeders have registered seed, it is tested before certification for purity (properly cleaned), humidity and germination. The Department of Seeds carries out certification and quality control. Typically, certified seed should be seed of a consistently high and known quality (genetically and physically), produced according to the rules and regulations of an official Seed Certification Scheme (Programa Nacional de Fortalecimiento da Cadeia de Sementes) and for which proof of certification is available. In practice, farmers we spoke to did use certified seed but it is by no means their first choice.

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3. The International Union for the Protection of New Varieties of Plants (UPOV) is an inter-governmental organisation established by the International Convention for the Protection of New Varieties of Plants. The Convention was adopted in Paris in 1961 and was last revised in 1991.
even when available. We repeatedly heard that certified seed often did not perform well, and suspicion is cast on agro-dealers and other seed traders who are said to repackage seed or otherwise hoodwink buyers. The certification process thus does not necessarily meet its objectives of ensuring good quality seed that buyers can trust to perform as specified.

Once the seed is certified, it can be multiplied for branding and sale. Seed laws and regulations establish the requirements for labelling, storage and sale of certified seed. Historically Semoc was responsible for multiplying seed it got from IIAM which was then provided to government for subsidised or free distribution. The regulatory system is undergoing changes. Decree 12/2013 repealed all previous seed decisions, and aims at guaranteeing the production and commercialisation of quality seeds and planting material.

From a commercial point of view, irregularity of demand is a major obstacle to planning and implementation of seed production. Actual production of bean, rice and maize certified seed was between 3% and 13% of planned production in 2013/14. Producers themselves do not necessarily know what their demand for the next year will be, even just for commercial varieties. This makes it very difficult for companies to know how much seed to multiply, and in turn for IIAM to plan two years in advance to allow for the certification process.

The usual obstacles stand in the way of increasing demand for certified seed: high price, with grain seed up to 30 times more expensive than grain retained by farmers; lack of complementary inputs such as fertiliser, irrigation and pesticides which means farmers cannot realise the genetic potential of the seed; lack of timely availability of certified seed; and lack of credit to purchase seed.

Seed companies are not yet meeting demand for certified seed in Mozambique, and the country still imports most certified seed. Regional seed harmonisation processes aim to construct a regional list where varieties listed in two or more countries can be freely imported into any country in the region who has agreed to the regional protocols.

Semoc was the only seed company to operate in Mozambique until 1999 after which the sector was liberalised. Demand was driven by government and NGOs working on emergency distribution during the internal war. Maize seed constituted 70% of seed production. Semoc relied on the free distribution services during this era and struggled to establish its own distribution networks after the relief programmes were phased out.

With liberalisation in the 2000s, Semoc’s monopoly came to an end and there was an expansion of seed traders importing seed into the country for distribution. In mid-2013 there were 41 registered seed companies in Mozambique. Pannar and Semoc are the two main companies at the moment, but there are a number of other regional and multinational corporations as well as domestic seed enterprises, including farmer collectives.

Establishing domestic commercial seed enterprises is an objective of AGRA’s Seed Production for Africa (SEPA) sub-programme within PASS. Key concerns for the seed industry identified by AGRA were shortage of foundation seed simultaneous with surpluses at IIAM stations that are not distributed; lack of financing for seed enterprises; rudimentary processing facilities; and lack of technical and business skills. Semente Perfeita, Insumos Agricultura, Ikuru Seeds and Lozane Farms all received sponsorship from AGRA, as has Nzara Yapera. One of the biggest domestic companies is Phoenix Seeds, and Nzara Yapera is a rising star. Nzara Yapera contracts small-scale farmers as outgrowers for certified seed. Its founder, Peter Waziweyi, represents small-scale farmers in the Central Region on the Seed Platform.

Over the past 15 years there have been some efforts by government, ICRISAT and NGOs (e.g. CARE, Concern) to support ‘semi-formal’ local seed production. Seed legislation accommodates ‘guaranteed’ seed for both improved and local varieties. Guaranteed seed is defined as any seed which was tested for good germination, purity and moisture content in the laboratory (quality declared) but which was not field inspected during the growing period. The Integrated Seed Sector Development (ISSD) programme, established by the Gates Foundation and the Dutch
government, operates in Zambezia province to support small-scale farmer production of certified seed.

**Extension services, agro-dealers and transfer of technology**

Distribution of seed and related inputs is a major challenge for the expansion of a commercial seed sector. Distribution channels are very similar for both seed and soil fertility from the point of view of the commercial sector. In contrast, in existing farming systems seed and soil fertility inputs are accessed from different places and therefore the access and distribution methodologies will vary.

Extension services and agro-dealers have distinct but somewhat overlapping functions, and there are interventions by Green Revolution practitioners to replace public sector extension services with private enterprise agro-dealers. This limits the role of extension workers to conduits for commercial products and services. Essentially they are both about transferring technical knowledge and resources. Extension workers are meant to offer technical knowledge and support to farmers. There is a long history of top-down extension methodologies, like transfer-of-technology (ToT), where ‘experts’ from outside develop the technologies under controlled conditions and then bring them to farmers and teach farmers how to use it.

Agro-dealer networks fall very much into this ToT model. Essentially, agro-dealer models are about setting up access points for the delivery of defined technologies, especially improved seed, synthetic fertiliser and pesticides, and to a lesser extent machinery and implements. The agro-dealer model favoured by Green Revolution proponents is also a private enterprise model, where the aim is for the agro-dealer to become a financially self-sustaining business over time.

A related private sector model is the closed extension network, where only users of the commercial product receive support and training in techniques related to the technologies being sold. A similar model applies to participants in donor programmes who adopt the technologies the programmes are designed to support. In both these cases, a popular model is the ‘lead farmer’ model, where outside technicians hired by the company or for the project train a set of lead farmers who then share the information in their farming communities or associations, and provide ongoing support especially related to the introduced technologies.

Demo plots are a key methodology, and these are usually run by farmers with extension support. The demos are provided with the necessary inputs to make the demo a success. The idea is that the technologies will spread when neighbours see how well they produce. However, demo plots provided with the full Green Revolution package (sometimes including irrigation) are not a good reflection of actual field conditions for the majority of farmers, who either will not have irrigation, or will not have access to synthetic fertiliser, or who may face numerous other obstacles to realising a perfect production process. The demos therefore may flatter to deceive. The demo plots can also be driven from outside, not by farmers themselves, but by commercial interests that aim to introduce their products to farmers. So the demos may not really be doing experiments driven by farmers’ own stated priorities. This is not to say that demo plots have no role, but they should be closer to farmers’ democratic associations and driven by the priorities of farmers in their specific localities. Farmers do experiment and are interested in experimentation on their own land, but under their control, since they are the ones who must carry the consequences.

AGRA works both with public sector extension and private agro-dealers. Public sector extension support focuses on production practices, especially on integrated soil fertility management (ISFM) which focuses on grain-legume intercrops. US$1.51m was granted to the IFDC under the Agro-Dealer Programme (ADP) in PASS to construct an agro-dealer network. The networks covers 7 districts in Manica and 6 in Tete, and built on previous work with USAID funding in the Agricultural Input Market Strengthening Programme (AIMS) I and II (2006-2012) to promote private sector investment in modern agro-inputs and
marketing in the Beira and Nacala corridors of Mozambique, and to improve access to these inputs through agro-dealer networks.

A widely recognised problem is that NGOs and donors set up their own agro-dealer networks which are not always adequately trained, and are then left on their own once the project comes to an end. This result is a very unevenly trained set of agro-dealers who are not organised and who are oriented towards looking for paid work.

**Soil fertility and synthetic fertiliser**

In Mozambique, especially in the Central Region, shifting cultivation, where land lies fallow for a time before being cropped again, is still widely practiced and as a result fertiliser use does not feature much in production practices. Green Revolution proponents have two primary arguments for increasing synthetic fertiliser use. The first is that while farmers practice shifting cultivation at the moment, land will become limited in future. While this is not currently a problem, farmers must prepare for the time when they can’t move anymore, and that there is a long-term necessity to use fertiliser. The second is that, in order to increase productivity, certain missing nutrients required for healthy plant production should be supplied. These may not occur naturally in some areas, or otherwise they have been mined out through repeated extraction without replenishment.

Fertiliser use is very low in Mozambique, with an average of only 4.4kg/ha over the period 2002-2009. Currently commercial tobacco (60%) and sugar cane (30%) constitute the bulk of total fertiliser consumption in Mozambique. The standard type of fertiliser used by small-scale farmers is NPK 12:24:12, despite the fact that the blend does not bring much of a yield increase. MASA has recognised the “abusive use of 12:24:12 formulation”. The direction of development at this stage is towards prescription blended fertilisers adapted to more localised requirements.

USAID and NAFSN are pushing a strong free market private sector line, including reducing tariffs and taxes for fertiliser imports, and opening the way for the free flow of fertiliser into the region. The national fertiliser strategy builds on the Abuja Declaration, which set the goal of increasing average fertiliser use across Africa from 8kg/ha to 50kg/ha by 2015. Because use is so low in Mozambique, the strategy is to piggy-back on economies of scale for export into the region with a small amount channelled for use in Mozambique. Otherwise, the private sector is not interested in bringing such small volumes into Mozambique.

Therefore ease of re-export is crucial to the whole plan. The Beira port is recognised as a strategic entry point for fertiliser into the region.

The national fertilizer strategy proposed to develop and implement a fertilizer subsidy programme to stimulate demand, with a goal of reaching 200,000 farmers by 2016. A voucher programme for subsidised fertiliser was piloted in 2009-2011 in the central provinces, targeting medium-scale and commercialising farmers. The scheme is still based on the discredited 12:24:12 standard blend.

Imports mainly go through private companies, with tobacco, especially Mozambique Leaf Tobacco Company (MLT), and sugar companies importing their own fertiliser supplies, and constituting about 75-80% of imports between them. Beira and Nacala ports are entry points for fertiliser imports, which come mainly from Middle East, East Asia, Europe and South Africa. An estimated 70% of the imports that go through Mozambique’s ports are in transit to Malawi, Zambia and Zimbabwe.

There are two domestic blending factories – MozFert in Manica and Greenbelt in Sofala – using imported raw materials. Greenbelt Fertilisers is a Zambian company that started operations in Mozambique with a factory in Beira in 2011. Greenbelt’s initial focus was on commercial farmers (>100 ha) in Mozambique but the large estates import their own fertiliser and there were not enough medium-scale commercial farmers to constitute a market. Greenbelt then decided to turn to demand creation amongst small-scale farmers, starting in the Beira Corridor. Today Greenbelt is part of many large initiatives to provide synthetic fertiliser to small-scale farmers.
across Mozambique, and says the share of its production used in Mozambique has risen from 5% to 15%.

Greenbelt has its own system and approach to synthetic fertiliser. At the core is prescription blending of fertilisers to suit specific soil conditions. The first step is to do soil mapping at a district level across the country. This takes the form of a cross section across an area because plots are small and it is not feasible to do tests on every plot. The idea is to map nutrient lacks and then develop a prescribed blend for each area. Greenbelt says while not perfect, it is better to start with accurate district level information on soils and a prescription blend than a uniform blend across the country. The company is opposed to the standard NPK 12:24:12 application and emphasises the micro-nutrients - especially zinc, boron and sulphur - that are not found in these standard blends. The company recognises the importance of organic content and promotes conservation agriculture (CA), defined as no till, permanent cover and intercropping, to ensure organic content in conjunction with micro-dosing (125-185 kg/ha, placed rather than broadcast).

AGRA’s Soil Health Programme (SHP) is essentially on ISFM, which focuses on grain-legume integration for nitrogen fixing. It also includes micro-dosing of synthetic fertiliser. Top grantees are public and parastatal institutions, with ILIAM, the Netherlands Development Organisation (SNV) and ADEM receiving 80% of SHP grants. In Beira, extension workers were trained on demonstration plots and to train farmers in ISFM techniques. These included fertilizer application rates, correct crop spacing, intercropping and rotation of maize and pigeon pea, incorporation of crop residues, and pest and disease management.

**Conclusion**

Farmers are interested in experimenting with new technologies. Some of the risks and threats as well as any potential benefits of public-farmer partnerships should be raised with farmers. Some basic principles will allow farmer associations to determine whether to adopt a critical engagement or oppositional stance to particular interventions. These may include active farmer participation and informed consent, public and shared genetic resources, no to privatisation, no to criminalisation of production of non-certified seed or reuse of any seed on the farm, regardless of private claims of ownership, but these should be developed together with farmers and their democratic organisations.

On seed, there is a general agreement that variety enhancement or improvement can be of value to farmers, and that it can widen choice. However, at the outset we have to note that the entire orientation of government and Green Revolution interventions in the seed sector is oriented towards the expansion of a commercial seed sector in Mozambique. This is based on the assumption that only private, commercial entities have the capacity and motivation to generate improvements. The farmer-managed system is largely ignored. Within farmer-managed seed systems, the main concern is that public resources are being channelled into supporting Green Revolution improvements and distribution and farmers are being left on the margins to do what they can with the resources available to them.

On plant breeding research and development (R&I), trials and registration there are a number of problems. PVP laws could open the door to the wholesale privatisation of germplasm that is held in the public sphere (CGIAR and public sector institutions) on behalf of society. Privatisation means the transfer of this germplasm that was selected and developed over a long period, mainly through in-field selection and saving by farmers themselves, to private interests who get exclusive rights to use that germplasm or to charge others for its use. It is clear that this is unjust. Once germplasm is put into private hands, it will no longer be available to farmers to use for their own enhancements, thereby diminishing their choices, not expanding them. The orientation to plant breeding focuses on the commercial sector, and breeders’ rights trump farmers’ rights.

DUS tests are onerous and not appropriate for farmers’ needs. These tests are designed specifically to allow private interests to claim a variety as their property. We do not believe the DUS test has any value for the majority
of farmers, for whom the distinctiveness of the variety from other varieties is irrelevant. Uniformity and stability are characteristics of simplified, standardised systems of production and are not appropriate for the complex, dynamic conditions farmers face.

Programmes of technical support, germplasm access and advice driven by farmer priorities and closely linked to democratic farmer organisation should be an explicit and funded part of public sector activities in the seed sector. Farmers do conduct experiments on their own land and the main support required is public access to germplasm they can use to cross with their own varieties, together with technical support from the public sector or other not-for profit ventures. This applies to the many species and varieties that are not of interest to commercial breeders. Farmers may also want to use improvements from protected varieties to bolster their own reserves.

Generally speaking, we should make a distinction between the commercial and the farmer-managed systems. In the commercial system, rules and regulations should apply and be enforced to ensure that farmers receive what is being promised. The aim of regulations governing seed standards should be to ensure farmers are not abused by unscrupulous seed suppliers. At the same time, regulations should not limit the production and distribution of quality seed by farmers even outside this formal framework.

Small-scale farmers can play a role at the level of defining decentralised R&D priorities, breeding and in-situ testing of new varieties, and multiplication and distribution of seed. These activities can apply to both commercial and farmer-managed seed systems.

If farmers want to produce certified seed for commercial sale in the market, they will need to follow procedures for that system. However, several issues can be raised with regard to the applicability of certain of those procedures, in particular restrictions on use of protected varieties and NDUS testing on the breeding and R&D side; and certification costs, and unnecessarily restrictive labelling and packaging requirements on the production and storage side. It may be that good or recommended practice, with technical support to build these practices, could replace inflexible procedures in regard to labelling and packaging. An intermediate system, such as QDS or guaranteed seed, could offer flexibility to farmers who want to produce certified seed for sale on the market.

On soil fertility, is synthetic fertiliser necessary? This is an empirical rather than an ideological question, but we need more information and this is expensive to obtain. What nutrients are missing and what nutrients are required for different crops and to ensure soil health? We also need technical capacity to interpret such data even where it is available? In some places farmers indicate they do not need fertiliser because the soil is fertile and yields are good. The counter is that as farmers have to do continuous rather than shifting cultivation, the soil will be mined of nutrients more quickly and hence will require more inputs.

Nutrient mapping can be beneficial because it potentially makes more information available to farmers. But the information must be in the public sector, otherwise it creates an unequal playing field where private businesses have information they can act on that others do not have. Farmers may be able to identify when plants are not performing well as a result of a lack of nutrients, but their knowledge may not necessarily extend to knowing what the causes are. In some cases it may be that the missing nutrients are not locally available.

There is a question of the negative ecological impact of synthetic fertiliser use. Runoff of excess nitrogen is a major problem for waterways and soil life, but this may also be true for overuse of manure which can also cause a build-up of excess nitrogen. A key weakness of the Green Revolution approach to soil fertility is that soil life is not measured or considered. The main focus is on impacts on crop yield. The result is that soil may become an inert carrier of synthetically produced chemicals to feed the plant from one year to the next, not a living system itself. This is not sustainable in the long term. At the very least, we must ensure moisture content and soil life measures (macro and micro fauna and flora, especially earthworms and mycorrhizal fungi) as a central component of soil testing.
Methodologies to bring testing closer to farmers should also be identified and shared with farmers.

The same set of issues as with seed arise on who will benefit most from public sector channelling of resources to support private sector fertiliser products. This is likely to be a thin layer of farmers who are seeking to expand commercial (mostly mono-cropping) operations, and the companies. Alternatives that can be explored further and supported through public sector programme include farmer experimentation with manure, compost, and CA in its basic form (permanent ground cover, intercropping or crop rotation, no-till, without the addition of synthetic fertilisers or pesticides). This can be based on the same public sector extension working with farmers and their associations, introducing a menu of options but not channelling farmers to accept a single, predetermined path.
INTRODUCTION TO THE RESEARCH

The research is part of a three year multi-country programme looking at the impacts of the Green Revolution on small-scale farmers in southern Africa, with a particular focus on seed and soil fertility. Research started in Malawi and Tanzania in 2014, and parallel research in Zambia and Zimbabwe is being conducted at the same time as the Mozambique research. We began with a focus on the interventions and activities of the Alliance for a Green Revolution in Africa (AGRA), an initiative started by the Bill and Melinda Gates Foundation and the Rockefeller Foundation in 2006.4 In the course of the research in Malawi and Tanzania we noted that AGRA was just one component of a much larger Green Revolution agenda and have consequently widened our scope to try to get a wider picture of coordinated Green Revolution activities in the various countries where the research is being conducted.

The focus of the research was in the Beira Corridor, in particular Manica and Sofala provinces (Figure 1). This was selected as a key focus area for Green Revolution interventions in Mozambique where limited civil society research has been conducted to date. More detailed information about the Corridor is provided below.

The research has two process objectives:

i) To support the formation of country-based research cooperation linked to farmer associations and progressive movements on issues of seed and soil fertility in relation to the content objectives; and

ii) To connect country researchers with one another, across countries, to share and discuss research results and contribute to planning and activities to realise food sovereignty.

We aim to conduct the research in the form of participatory action research. This means involving farmers and their associations directly in the research and then using the findings to identify priorities and develop action plans together with farmers and their associations. In Mozambique we partnered with the national farmers’ union, União Nacional de Camponeses (UNAC), and its provincial affiliates, União Provincial de Camponeses de Manica (UCAMA) and União Provincial de Camponeses de Sofala (UPC Sofala), as well as with Kaleidoscopio, an independent research organisation based in Maputo.

Figure 1: Map of Mozambique with provincial boundaries and centres

Source: http://www.emapsworld.com/mozambique-provinces-map.html

UNAC is a national movement of small-scale farmers represented by individual farmers, associations of small-scale farmers, district and provincial farmer unions. The economic

4. www.agra-alliance.org

Agricultural investment activities in the Beira Corridor, Mozambique
and political changes which occurred in 1987 motivated the emergence of UNAC which was formally constituted in 1994. Its fundamental objective is to defend the interests of small-scale farmers marginalised by the government and international institutions like the World Bank and the International Monetary Fund (IMF). Originally there was no national association, but when government policy shifted in favour of markets, the Maputo district initiated discussions to formulate a peasant response, and provincial unions were developed over time. The movement is divided into political and executive structures: the political structure comprises a body with elected representatives, while the executive structure is mandated by member associations and rests on a base of independent farmer associations. These farmer associations form District Associations (UDACs) who, in turn, form provincial unions. Representatives are elected at each of these levels up to the national level. UNAC has an extended Council which includes provincial representatives and functions as a Board which constitutes the management body. A General Assembly comprising elected representatives at the grassroots level prioritises UNAC’s programmes every five years. Privatisation of seed and land are key issues on the current agenda. UNAC works with government but from an independent, critical angle. Its main focus to date has been Nacala in the north of the country, with a few agro-ecological activities in the Beira Corridor.

The research consisted of interviews with key stakeholders in Maputo, Chimoio and Beira, plus focus group discussions with local farmer associations affiliated to UNAC in Manica and Barue (Manica province) and Dondo ( Sofala province).

This paper is a simple first report intended to provide useful information for ACB and our partners and allies in Mozambique, to facilitate decisions regarding how to advance a shared agenda of socially just and ecologically sustainable agricultural production. It is not a definitive statement of what is happening, nor does it advocate a position in regard to these activities. Rather, it will provide a base from which to start a discussion with UNAC and others about how to proceed, practically, with their members. ACB wants to share the information gathered with government and find possible areas for work that could advance the interests of small-scale farmers and their associations. We recognise differentiation amongst farmers, but before hurrying to a conclusion the first task is to acquire a deeper understanding of this differentiation by engaging with farmers. We anticipate that a strategic orientation will emerge from this understanding, in partnership with farmer associations and other organisations in Mozambique.

BACKGROUND TO AGRICULTURE AND LAND IN MOZAMBIQUE

Mozambique’s economy was severely disturbed during the internal war, which erupted in 1977 and ended in 1992 with the signing of a peace agreement in Rome. The country became almost entirely reliant on external aid for food and inputs. At the end of the war donor money was contingent on structural adjustment and agricultural liberalisation (ACB, 2014). Today agriculture accounts for roughly 24% of GDP, with an average real annual growth of nearly 8% in the years 2002 to 2011. Approximately 77% of the total population is dependent on agriculture for their livelihoods; just 5% of the population lived in urban agglomerations of more than 1 million people in 2011, and commerce and services is the largest component of GDP.

Although Mozambique has six agro-ecological zones, the country can be categorised broadly into three: arid and semi-arid in the south and south-west; sub-humid mostly in the centre and north; and humid highlands mostly in the central provinces. Most agricultural production

takes place in the north, which is the most fertile region (IFDC, 2012:12).

Fifty to sixty per cent of Mozambique’s land is covered by forests, including wildlife reserves and conservation areas. Potential arable land and pasture is around 40% of the total area, although only 10% of this, more or less, is currently being used productively (MINAG, 2012:7–8). It is not clear from these figures, however, whether productive use refers specifically to commercial production. There are approximately 3.7m farms, of which the vast majority (98%) are small farms and ninety-seven per cent of farms are not covered by legal title (MINAG, 2012:9). A current argument is to support titling processes to give smallholder families a chip with which to negotiate. This argument came from BAGC as well as a number of civil society organisations. According to Edgar Jonas of BAGC in Chimoio, customary rights are there, but they need to be converted to official proof. Currently, when an investor arrives, people will be paid off and lose their land. But with title they have space in which to negotiate. However, demarcation and titling may well be a precursor to legalised dispossession (Craib, 2004). The issue is how to secure tenure rights in forms other than private title deed. There is a large body of work on this issue in Africa (for example, see Peters, 2007). A few people mentioned also that government has recently raised the issue of the ability to use land. This could be seen as a veiled threat to continued access to land for people who are considered inefficient farmers, or who are thought not to be using the land productively enough. This must be watched carefully.

The average size of family holdings is around 1.2 ha divided into two or more plots (Wulf and Torp, 2005:13). It is estimated that 97% of the area occupied by these farms is not covered by a DUAT (legal title for the use and enjoyment of land). The land is owned by the state, with 50 year leases available for commercial production which can be renewed for another 49 years (Article 17 of the Mozambique Land Law). Given that the land is the property of the state, the proof of use and enjoyment of land can be made by: presentation of title (DUAT); testimonial evidence presented by members, men and women from local communities, experts and other means (Article 15 of the Mozambique Land Law). Shifting cultivation is the prevalent form of land use and intercropping and/or mixed farming are predominant. An estimated 3–4% of arable land was under large commercial estates in the early 2000s, although there is no accurate data to support this claim (Wulf and Torp, 2005:13).

The main food crops are maize, cassava, pulses, groundnut and sorghum. Cassava provides the highest amount of calories nationally, while maize provides the highest protein and also a fairly high portion of calories (Wulf and Torp, 2005:14). Maize, cassava and beans occupy about 60% of the area under cultivation (IFDC, 2012:15), while rice is an important food crop in some parts of the country, including Sofala. The national production of maize is insufficient to cover domestic demand, and maize and wheat were the biggest agricultural imports by value in the early 2000s (Wulf and Torp, 2005:15). The main cash crops for export are cotton, tobacco, cashew nuts and sugar cane (AGRA 2010:9) with exports also of soya, sesame and tea. In recent years cereal imports have ranged between 30–88% of local production, with cereal food aid between 3–14% of local production. Cereal yields have increased since 2007, climbing from an average 788 kg/ha in 2002–2006 to an average of 1 108 kg/ha in 2007–2011.7

In Manica farmers we spoke to8 were producing a range of crops: maize, peanut, soya beans (in the rainy season), pigeon pea, and fruit and veg (including mango, litchis, citrus, tomato, onions, cabbage, lettuce, garlic, carrots). In Barue, also in Manica province, the main crops were maize,

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beans, sunflower, vegetables (cabbage, onions, tomato) and sugar cane. In Dondo in Sofala, farmers were producing rice, maize and vegetables.

THE GREEN REVOLUTION IN MOZAMBIQUE

Mozambique is identified as a high potential agricultural country, especially given the large amounts of land and the low productivity of the sector as a whole, although the use of improved seed and synthetic fertiliser is well below the regional average (USAID, 2013:2). Mozambique has adopted a Green Revolution approach to agricultural development. The agricultural policy framework is structured on the Strategic Plan for the Development of the Agricultural Sector (Plano Estratégico para o Desenvolvimento do Sector Agrário (PEDSA) for 2011–2020. In turn, this has laid the basis for the Plano Nacional de Investimento do Sector Agrário (PNISA), the National Agriculture Investment Plan 2014–18. These plans are aligned with CAADP (MINAG 2012). The plans are nested more broadly in a number of other government frameworks on national and rural development—poverty, food security and nutrition—and are also meant to relate to a number of parallel policy documents on research, extension, forestry, irrigation, food production and livestock (Marapusse et al., 2014:5–6).

The agricultural investment plan has a large number of priorities, with 5 components, 21 programmes and 61 sub-programmes. The five components are broad categories of intervention: production and productivity; market access; food and nutritional security; natural resources; and institutional reform. Financial requirements for the plan total US$ 4b, with almost 85% allocated to the production and productivity components (Marapusse et al., 2014:3, 8). As with most of these strategic plans, there is a lot of talk about food security and improving the livelihoods of farmers, at the same time as protecting natural resources. But the method for realising this is understood explicitly to be agricultural modernisation and commercialisation, including the expansion of Green Revolution technologies. This is the framework of government interventions in Mozambique and, as such, the strategic framework presents both threats and opportunities for small-scale farmers. We need to move off the paper and into the field to see the actual, material situation facing small-scale farmers on the ground. While we will always be able to draw on strategic documents in support of socially just and ecologically sound interventions, proponents of the Green Revolution will likewise find justifications for their actions within the strategic frameworks.

Government’s strategic frameworks are closely aligned with the Comprehensive African Agricultural Development Programme (CAADP) of the African Union. In turn, CAADP is shaped through interactions with major donor countries who combine development and philanthropic aid with the advancement of the interests of their own private sectors. This story is already well documented and while we need not detain ourselves too much here, it is important to note a few key links to this broader agenda at a national level, before focusing on a more concrete analysis of the situation in the Beira Corridor, which is the focus of this research.

First, the government of Mozambique has signed on to the G8 (G7 for the moment, with Russia in disgrace) New Alliance for Food Security and Nutrition (NAFSN). NAFSN is presented as a private sector support for the implementation of CAADP and Mozambique government agricultural plans, “where the conditions are right” (Marapusse et al., 2014:9). There is plenty of good recent literature on NAFSN and its role in advancing a private, corporate agenda in African agriculture (for recent examples see ACF et al, 2014; FIAN,

10. Farmer focus group discussion, Dondo local associations, 8 May 2015.
in terms of the NAFSN framework agreement in Mozambique, government has committed itself to a set of policy reforms in five areas: inputs, land, trade, credit and nutrition (Table 1). The main NAFSN funders in Mozambique are the US and Japan with the UK, EU and Italy also providing funds. Total commitments from all government donors are around US$ 201m (Marapusse et al., 2014:19), which are less than the initial commitments of US$ 365m at the launch of the programme (G8 NAFSN, 2013:6–7). Roughly 79% of the revised amount was disbursed by mid-2014. A number of domestic and international companies signed letters of intent to partner with government in the initiative, including Cargill, SABMiller


Table 1: Mozambique government NAFSN policy commitments

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<tr>
<td>Promote competitive private sector input markets.</td>
<td>Cease distribution of free and unimproved seed except in predefined staples in emergencies; Promote private ownership of seed and investment in basic and certified seed production; Harmonisation of seed laws and policies with the Southern Africa Development Community (SADC); National fertiliser strategy.</td>
<td>Revised seed policy and legislation passed; 2012 Programme to Strengthen the Seed Value Chain; National Seed Dialogue Platform established; PVP regulations approved; Decree 12/2013 on production, trade, quality control and seed certification; Compliance with SADC seed protocols; Decree 11/2013 approved regulatory framework for fertiliser; Fertiliser Dialogue Platform; Drafting of fertiliser law.</td>
</tr>
<tr>
<td>Reform of land use rights to secure tenure and promote agribusiness investment.</td>
<td>Make processes more efficient; Allow communities to enter into leasing arrangements.</td>
<td>Procedures for under 10ha drafted and piloted; Testing of procedures targeting private sector and communities—but revealed corrupt practices in processes and procedures; Draft legislation on leasing.</td>
</tr>
<tr>
<td>Liberalisation of agricultural trade and marketing.</td>
<td>Deregulate and simplify procedures.</td>
<td>Some activities.</td>
</tr>
<tr>
<td>Increase access to credit for farmers.</td>
<td>Private sector information bureaus; Risk-based mobile finance innovations.</td>
<td>Draft legislation under revision.</td>
</tr>
<tr>
<td>Align nutrition plans with Scaling Up Nutrition (SUN).</td>
<td>Food fortification; Alignment and institutional coherence.</td>
<td>Fortification committee, programme and regulations; Multisectoral Nutritional Action Plan approved.</td>
</tr>
</tbody>
</table>

Source: Marapusse et al., 2014:11–18.
and United Phosphorous. However, the private sector remains cautious about investing, with constraints including infrastructure, bureaucracy, cost of finance, taxes, policy and regulatory issues, and limited technical capacity. Some planned investments were delayed, revised or cancelled (Marapusse et al., 2014:21).

**USAID** has long been involved in constructing the agricultural sector in Mozambique to favour private, commercial interests and a significant level of donor coordination has been evident throughout. Until 2014 USAID had seven projects under its Agriculture, Trade and Business programme, two of which were Feed the Future (FtF) programmes (ME&A, 2013). FtF focuses on the Beira and Nacala corridors, incorporating the provinces of Manica, Zambezia and Nampula. Priority value chains are oilseeds (groundnuts, sesame, soya); pulses (beans, cowpeas, pigeon peas); cashews; and fruit (bananas, mangoes and pineapples) (USAID, 2013:3).

In 2014 USAID launched the SAFRA programme as its primary implementing mechanism for FtF, which targeted 350 000 agricultural beneficiaries until 2018 (USAID, 2014). SAFRA will complement ongoing FtF interventions. It has a total value of US$ 90m, according to Edgar Jonas at the BAGC initiative in Chimoio.12 It is worth looking at this in some detail, since it is in the early stages and there has been a recent call for contractors to lead the project on behalf of USAID. USAID has already received applications although the process has been delayed—for political reasons—according to Jonas. This is related to ongoing clashes between the government and RENAMO which have taken place in the centre of Mozambique, affecting the provinces of Manica, Sofala and Tete.

SAFRA emphasises a private sector driven approach that supports the promotion of profitability and farming as a business, aims to increase the productivity and competitiveness of farmers and agro-enterprises, as well as nutrition interventions, and encourages PPPs. Four focus areas include agricultural productivity, markets, nutritious food, and the adoption of healthier nutrition and hygiene behaviours (USAID, 2014:14). Agricultural interventions will target 23 districts in the Zambezia, Nampula, Tete and Manica provinces including the Beira and Nacala Corridors. Targeted value chains are soya beans, sesame, groundnuts, common beans, cowpeas and pigeon peas, and banana, where opportunities arise. The target is smallholders, defined as having 5 ha or less of agricultural land, or equivalent units of livestock (e.g. 10 beef cattle, 2 dairy cattle, and other livestock types, as specified in the document) (USAID, 2014:19).

SAFRA includes three project components: strengthening agribusiness value chains for food security; promoting agribusiness investments; and improving nutrition and Water, Sanitation and Hygiene (WASH) behaviours. Gender, local capacity building and Information and Communications Technologies (ICTs) are cross-cutting issues (USAID, 2014:17). Component One—agribusiness value chains—emphasises improved technologies, including improved seed, increased use of fertilisers, inoculants and input packages, with the “aggressive scaling up and adoption of technologies” in soya, cowpeas and pigeon peas (USAID, 2014:18). Part of Component One is support to facilitate the development of the technical, organisational and managerial capabilities of farmer organisations to transform them into “well-established, for-profit independent organisations able to advocate for their viable concerns” (USAID, 2014:20). Component One will receive around 70% of the total resources (USAID, 2014:29).

Component Two—promoting agribusiness investment—seeks to create a business-enabling environment through improving capacity and policy dialogue, including building stakeholder constituencies, and encouraging nutrition-focused investment partnerships between the private sector, government and NGOs in the targeted value chains. The focus is on farmer profitability, reducing post-harvest losses, and value-added processing. Contractors

must support the operationalisation of NAFSN private sector commitments, plus other NAFSN commitments such as the voluntary guidelines on responsible land and agricultural investment (USAID, 2014:22).

Component Three addresses nutrition, health and sanitation and includes access to and the consumption of diverse, quality (nutrient-rich) foods; nutritional screening and referral; and improving nutrition and health-related behaviours and services.

As in other countries, interventions by the Alliance for a Green Revolution in Africa (AGRA) in Mozambique are not stand-alone but are integrated with broader Green Revolution initiatives. AGRA was launched in 2006, founded by the Bill and Melinda Gates Foundation and the Rockefeller Foundation. Currently it has multiple donors and partnerships. Total AGRA grants in Mozambique came to US$ 12.6m in the period 2007–2012 for which grant information is available. The biggest allocations during that period were to PASS, with 40.5% of the total value of grants, and SHP, with 33.3% of grants. Markets and the breadbasket strategy which target institutional support for setting up the Beira Corridor received 25.4% of grants (Appendix 1). Forty-five per cent of AGRA grants in this period went to three recipients: IIAM, the national agricultural research institute, with US$ 2.68m; the IFDC, with US$ 1.51m; and ADEM, with US$ 1.5m. More details on specific AGRA grants to the Beira Corridor, seed and soil fertility are provided in the thematic sections below.

Since 2012 AGRA has not published updated figures for grants, although, according to AGRA staff in Maputo, grants are still being made. AGRA is revising its strategy to focus on value chains and identify gaps, and will focus on central and northern Mozambique.13

AGRA is contracted to manage NAFSN’s SSTP, which operates also in Tanzania, Malawi, Ghana and Senegal. The objective of SSTP is to improve public and private sector capacity to deliver improved seeds and related technologies (e.g. synthetic fertiliser) and increase their uptake by small-scale farmers. It plans a US$ 40–50m investment in the supply of private sector technology across the countries of operation. In Mozambique, to date, SSTP has provided three grants: to IIAM in collaboration with the International Maize and Wheat Improvement Centre (CIMMYT) and the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT), to produce breeder and foundation seed; to Oruwer, a private company in Nampula, to multiply maize, pigeon peas, soya, peanuts and cassava; and to the IFDC for extension services, business management for seed production farms, training on cassava, and financing for a cassava processing company. The approach integrates the three grants so the grantees work together. SSTP in Mozambique operates in the Beira, Nacala and Limpopo Corridors and in the Zambezi Valley.14

The value of grants to date is US$ 2.36m, with the IFDC receiving the largest amount. A second call for proposals was released in October 2014 but was still in process at the time of conducting field research in February 2015. According to AGRA staff, the private sector is not yet confident that the government wants it to operate in the seed and input sector in Mozambique, although the G8 Co-operation Framework is improving trust and partnerships are being developed.15

13. Interview, Anabela Manhica and Benvindo Verde, AGRA, Maputo, 26 Feb 2015.
15. Interview, Manhica and Verde, 26 Feb 2015.
THE BEIRA AGRICULTURAL GROWTH CORRIDOR (BAGC) INITIATIVE

Background

The ‘corridor’ approach has gained significance over the past five to ten years as an economic development strategy in Africa. Corridors are largely based on historical transport infrastructure and links, but the concept has moved beyond transport to incorporate development by taking advantage of agglomeration and spillover effects.16 SADC policy frameworks have adopted corridors as a major policy direction, and the SADC Regional Agricultural Policy identifies them as key to achieving its specific objectives (Byiers, 2013). Although corridors may bring infrastructural and investment benefits, a small-scale farmer approach is often lost. A variety of studies indicate that development corridors can benefit only 2–10% of smallholders at best, and to date the corridors have favoured the interests of multinational private sector and domestic elites (Byiers, 2013; Vorley et al., 2012).

The Beira Corridor is one of six development corridors highlighted in PEDSA, Mozambique’s strategic investment plan. The Corridor is one of Southern Africa’s main transport routes, comprising a road and rail network linking large parts of Zambia, Malawi, Zimbabwe and Mozambique to the port of Beira on the Indian Ocean (Figure 2). Within Mozambique the Corridor incorporates the three central Mozambique provinces of Tete, Manica and Sofala, with links into Zambezia to the north, especially to the port at Quelimane.

Figure 2: The Beira Corridor and the Guinea Savannah strategy

The Corridor has a mainly tropical savannah climate with a rainy season from November to April, and average annual rainfall of 1 200 mm (moderate to good). Its total land area is 23m ha, of which 10m ha is arable land and 300 000 ha are suitable for irrigation (BAGC, 2010:14). Fifteen per cent of the area (1.47m ha) is under smallholder farming, while commercial farming covers 25 000 ha, of which 88% is sugar. Eighty per cent of sugar is irrigated (BAGC, 2010:12). Tongaat Hulett operates in the Corridor at the Mafambisse mill in Sofala, with some planned expansion. Surprisingly, the company tends to rely on its own estate production with its own workforce. The company has 8 800 ha under cane, and outsources only 780 ha to medium-size commercial growers. It has only just started a 50 ha project with smallholders occupying 1–2 ha each and the development of small-scale outgrowers is clearly not a central part of its strategy.17 Apart from sugar cane, there is another 1 200 ha of irrigated commercial agriculture in the Corridor (BAGC, 2010:12).

16. Agglomeration—benefits to firms of being located near to one another; spillover effects—economic activities caused by activities in a seemingly unrelated area.
17. Interview, Jose Piwalo, agronomist, Mafambisse mill, 8 May 2015.
The main crops currently produced in the Beira Corridor are maize, sweet potatoes, sorghum, rice (only in Sofala), groundnuts, cowpeas, sesame, cassava, beans and soya. The main livestock types are chickens, goats, cattle and pigs, but these are not farmed on a commercial scale. Smallholder tobacco and cotton are the main cash crops, although there is a shift away from tobacco by smallholders as result of low prices. MLT and Dunavant are the main buyers and MLT has tobacco processing operations in Tete. There are also centralised maize processing facilities in Tete and Chimoio (BAGC, 2010:12).

The Corridor is incorporated into a larger Green Revolution strategy based on occupation of the Guinea Savannah, an agro-ecological zone stretching in an arc from West Africa to Mozambique (World Bank, 2009). The World Bank has conducted comparative research on small-scale agriculture in Thailand and large-scale agriculture in Brazil, in similar ecological contexts. While the Bank proposed that the application of its strategy in Africa should favour the small-scale route, the BAGC initiative explicitly calls for replication of the occupation of the Brazilian cerrado in the 1970s (BAGC, 2010:8–9), which was based on large-scale commercial agriculture. There is evidently some tension amongst partners about the approach (see below).

According to the BAGC initiative, “farmland along the corridor has proven agricultural potential with microclimates suitable for a variety of crops for domestic consumption and export. There are good water resources along the corridor, although a lack of infrastructure means that most agricultural production is rain-fed. Of the over 10 million hectares of arable land available in the Beira Corridor less than 0.3% is presently commercially exploited”.

The BAGC initiative

“We need to accept that commercial farming is the way to go, at all scales. This will produce a healthy demand base for inputs and outputs, and the production of raw materials to feed into other enterprises … Commercial agriculture is the engine for growth. We do not apologise for saying this. But it doesn’t happen on its own, it needs support. Agriculture is a generally uncompetitive sector, so deliberate action is needed to jump-start it. We know what works: extension workers, electricity, varieties that work, trained manpower. It’s just that we don’t want to do it.”

Emerson Zhou, Executive Director, BAGC, Feb 2015.

The BAGC initiative is a partnership between the government of Mozambique, private investors, farmer organisations and international agencies. It was launched in 2010 with the aim of promoting increased investments in commercial agriculture and agribusiness in the Beira Corridor. Membership includes MINAG, CEPAGRI, AGRA, DFID, SNV, the World Bank; Standard Bank, Tongaat Hulett and Yara, as well as a number of banks and mining multinationals, UNAC and its provincial union in Manica, UCAMA, and UGC. (For a full list of initial members see Appendix 2.)

18. Beira Corridor http://www.beiracorridor.com/?__target__=home – accessed 12/01/15. It was a great surprise, when trying to access the website in June 2015, to find that the site no longer exists.
19. Interview, Emerson Zhou, Executive Director, BAGC, Maputo, 26 Feb 2015.
The growth Corridor as a whole is driven by mining investments, especially coal in Tete. Vale has a US$ 1.5 billion open-cast coal mine at Moatize, and Riversdale has a US$ 800 million coal development at Benga, near Tete (BAGC, 2010:10). Commercial agriculture typically follows mining and energy investments (Stefan, et al., 2006). Transport infrastructure anchors investments in the corridor. At the time of the development of the BAGC blueprint there were plans for the African Development Bank (AfDB) and World Bank investments in road and rail facilities, Japanese investment in port facilities in Beira, and Yara investments in a fertiliser terminal at Beira for imports (BAGC, 2010:10). At the moment it seems clear that there is a stuttering in energy investment in light of uncertainty about the future of the global economy and demand, and hence in investments throughout the Corridor. At the same time, these investments take a long time to mature and there will no doubt be investors who see a lucrative market beyond the next ten years. Differences with the state about investments also draws out the process. Short-term investments, for example in seasonal production, will rise on the basis of these long-term infrastructural and institutional investments. Some capitalists are not willing to invest in these kinds of infrastructure because the benefits are shared by their competitors. The state is therefore sometimes left to deal with these investments (Aglietta, 1987) although PPPs are now the favoured route.

Some efforts were made previously to boost commercial agriculture in the Corridor. White commercial farmers with production experience in similar agro-ecological conditions came in from Zimbabwe but faced challenges. For a start, they came in decapitalised and with no assets, according to the BAGC’s Executive Director, Emerson Zhou. In addition, they needed to import seeds but these were not locally adapted; they encountered an unskilled workforce; infrastructure was lacking, especially last mile electricity and roads; and financing was not very friendly, with the main source of finance being the tobacco multinational corporations (MNCs) who provided finance on their own terms, and otherwise only short-term finance was available. According to Edgar Jonas at BAGC’s Chimoio office, many donors came in at the end of the internal war, but there was no coordination so the investments had limited impact. Some small-scale farmers are trying to commercialise but there are too few agribusinesses to create sufficient markets, and anchor investments for small-scale farmers are generally limited, according to Zhou. The purpose of the initiative is thus to ‘crowd in’ agribusiness investment into the Corridor, to create a demand base and reduce the cost of supplying certain services, e.g. electricity.

The BAGC aims to boost agricultural productivity and competitiveness through:

- Ensuring that public and private sector investments along agriculture value chains are properly coordinated;
- Leveraging existing ‘anchor’ investments (e.g. in the mining sector and railways) to benefit agriculture;
- Developing new infrastructure and agriculture projects as commercially-viable business opportunities that drive growth and benefit local communities;
- Supporting the development of sustainable agriculture support services with a special focus on production inputs, financial services and extension services; and
- Supporting investment and help to provide a suitable business environment for agricultural investors who will engage with small- and medium-sized farming interests in the Corridor.

The target in the BAGC blueprint for commercial production was 190 000 ha (BAGC, 2010:14). Just over a third of this was aimed at smallholder farmers on irrigated

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21. Interview, Emerson Zhou, Executive Director, BAGC, Maputo, 26 Feb 2015.
22. Interview, Edgar Jonas, BAGC, Chimoio, 4 May 2015.
23. Interview, Emerson Zhou, Executive Director, BAGC, Maputo, 26 Feb 2015.
25. 100 000 ha sugar cane including biofuel; 55 000 ha wheat, maize and soya; 20 000 ha rice; 16 500 ha bananas, citrus and mangoes (BAGC, 2010:18).
plots (5–50 ha), with the balance reserved for large estates (over 10 000 ha) and medium-sized farms (300–3 000 ha) (BAGC, 2010:18). It should be noted that 5–50 ha is more land than is owned by the majority of smallholder farmers so these might be better characterised as medium-scale farmers. As indicated above, average holdings are 1.2 ha/family, usually on a number of small, fragmented plots. This means that land consolidation underpins even the small-scale farmer orientation in the BAGC initiative.

BAGC essentially has four production models (2010, 25):
• 10 000 ha of irrigated sugar on estates, with 25% to smallholders and 250 ha available for field crops under irrigation, with private capital owning and running the project;
• 3 000 ha under irrigated rice, with 66.6% to smallholders, with infrastructure built by private capital and leased to farmers and their associations;
• 300 ha under mixed horticulture (fruit orchards) and field crops (wheat, soya, maize), on medium-sized farms with 50 ha for smallholders, with infrastructure built by private capital and leased to farmers and their associations; and
• 3 000 ha of mixed farms (1 000 ha to field crops of which 50% is to smallholders; plus 2 000 ha which are for dry land cattle), with the potential addition of poultry and feed stock.

In practice it appears that there has not been much development on these projects, and from what BAGC and other actors say, it looks as though commercial investment has been fairly limited to date. Tongaat Hulett’s 8 800 ha under irrigated sugar qualifies for the first category, but they were already there, having bought the business from the Mozambican government some years before. To date the target of 2 500 ha to small-scale farmers, with 250 ha for field crops, has not been met, at all. There is no compulsion on Tongaat Hulett to meet this goal and therefore the blueprint carries no force. According to Edgar Jonas at BAGC in Chimoio, some districts were identified for medium- to large-scale farms, and he says there is enough space in Manica for both large- and small-scale farmers. Consolidation could become a problem in future and BAGC has called on government to reserve areas for smaller farmers, although Jonas wanted to make it clear that BAGC does not have complete control (to say the least!) on what happens in government.26 New Ministers tend to have different ideas about how to proceed and programmes keep changing every few years as a result. We could investigate some of the other categories if we chose to do so but a better approach may be to work with farmer associations and see what is in their neighbourhoods, rather than chasing mirages or even specific projects. The Green Revolution is a bigger project than these specific instances.

The same entities that are involved in the BAGC initiative are also involved in the Southern Agricultural Growth Corridor of Tanzania (SAGCOT), including the Norwegian Embassy, Yara and Prorustica. The establishment of BAGC was coordinated by Prorustica, a UK-registered company formed in the 1990s to support agriculture-focused PPPs, initially in South-East Asia. SAGCOT and BAGC are part of a broader agricultural growth corridor strategy overseen by Prorustica, which was launched at the World Economic Forum (WEF) in 2009. The overall objective is to ‘catalyse’ private sector investment, integrate smallholder farmers into commercial value chains and increase economies of scale.27 The initiative is based on a PPP mechanism to coordinate activities, with the support of a secretariat. Prorustica assisted with setting up the process and institutional mechanisms, phasing itself out and handing over to the BAGC Secretariat in 2014. According to Roseanne Whalley of AgDevCo in Maputo, “the partnership was based on a fantastic idea but governance and engagement have been limited. There were ten founding members, but four are not open anymore and the others are not really involved”.28

28. Interview, Roseanne Whalley, Country Manager, AgDevCo, Maputo, 26 Feb 2015.
The BAGC essentially coordinates agricultural and agriculture-related investments in the Corridor, while also operating a revolving fund to make some of its own investments. The BAGC Catalytic Fund (an investment company registered in Mozambique) was established to invest in early-stage farming and agro-processing businesses which incorporate smallholder and emergent farmers. AgDevCo is the fund manager "on a cost recovery basis". AgDevCo is a UK-headquartered commercial agricultural development company which works in partnership with Prorustica. It receives financial support from the Rockefeller Foundation and currently operates in Mozambique, Malawi, Tanzania, Zambia and Ghana.

The Catalytic Fund was initially set up as a revolving loan facility providing loans of US$ 50,000–500,000 with the aim of making a financial return of 5–10% overall. The total value of the fund is US$ 17m mainly sponsored by DFID, Norway and the Dutch. It receives financial support from the Rockefeller Foundation and currently operates in Mozambique, Malawi, Tanzania, Zambia and Ghana.

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There are some strategic differences in approach in the Corridor. Some actors indicate that AgDevCo was meant to set up the institution and then transfer the fund to BAGC. AgDevCo prioritises medium-scale commercial farmers, who also tend to be foreign farmers. Some people we spoke to argue that this can be justified from an economic and rational point of view, but from a development and political point of view it is a problem. Investment funds are looking at large-scale investments, but there remains a gap at the lower level. Donor money could be targeted at the commercial development of small-scale farmers, with anchor investments in the private sector providing direct support to small-scale farmers to develop and grow. However, others argue there is a role for small-scale farmers, but small incremental changes are not going to solve poverty.

According to Zhou of BAGC, there is a need for small-scale farmers to become commercial farmers. While farmers are practising shifting cultivation at the moment, the trend is towards continuous agriculture and in order to ensure yields do not decline it will be necessary to intensify inputs. “This is not a danger,” he says, “but an occupational hazard.” All farmers face these rising input costs and the best response to this is to become more competitive. Economies of scale are essential in this process.

30. agdevco.com.
32. Interview, Roseanne Whalley, AgDevCo, Maputo, 26 Feb 2015.
33. Interview, Marlo Machavela, financial analyst, AgDevCo, Chimoio, 6 May 2015.
34. Interview, Roseanne Whalley, AgDevCo, Maputo, 26 Feb 2015.
35. Interview, Emerson Zhou, BAGC, Maputo, 26 Feb 2015.
“We need to accept things that have been accepted elsewhere,” says Zhou. “If farmers are not competitive and cannot stand on their own, they will need funds or grant money that is not there.” Some farmers may grow in size, others will intensify on their existing land, but they will have to feed the land. “The strategy in the first instance is not horizontal expansion but intensification,” says Zhou. When asked about the danger of increasing differentiation and inequality, Zhou responds that it is too early in Mozambique’s development to worry too much about that: “Mozambique is not there yet. We still need to move four or five steps ahead before this [landlessness and the shift of people to wage labour] becomes an issue.”

**USAID, AGRA and World Bank investments in the Beira Corridor**

USAID has 23 recent and current projects operating in Sofala and Manica provinces, of which five deal with agriculture and food security. These are the CGIAR Fund (2011-2015) which channels USAID grants through the International Water Management Institute (IWMI) for FTF activities; the Development Credit Authority (DCA) partnership with Banco Oportunidade (2009–2016) which provides credit to rural entrepreneurs; Agrifuturo (2009–2013) valued at US$ 19.3m, as part of FTF, which builds private agribusiness in oilseeds, cashews, fruit and pulse value chains; the Platform for Agricultural Research and Technology (PARTI) (2009–2014) which works with CGIAR institutions on the development and adoption of improved policies, technologies and practices, with a total programme value of US$ 822m; and the Southern Africa Trade Hub (SATH). As indicated above, a new implementation mechanism, SAFRA, was launched in 2014 and is currently calling for expressions of interest from contractors.

The Beira Corridor was identified as an AGRA priority ‘breadbasket’ area, and AGRA granted US$ 299,000 to MINAG in 2010–11 to refine the breadbasket approach and develop an investment plan in the corridor. In 2012 the BAGC Partnership, jointly with CEPAGRI (within MINAG) received an AGRA grant to coordinate the implementation of the BAGC Breadbasket Strategy and Investment Plan. The plan sets out interventions for government, development partners (including AGRA) and the private sector; it targets smallholder farmers and local communities and specifically addresses productivity and market access constraints. The overall objective of the grant is to enable the BAGC Secretariat/CEPAGRI to facilitate support to and implementation of the Breadbasket Investment Plans in the Beira Corridor.

Standard Bank manages (or managed) an AGRA-sponsored US$ 25m microfinance fund for the whole of Mozambique, with some resources channelled to the BAGC. In 2010 BAGC indicated that, overall, it had received US$ 15m from AGRA, to support agricultural training and research, seed production and dissemination, agro-dealer development, Integrated Soil Fertility Management (ISFM) and agricultural markets (BAGC, 2010, Annex A).

The major World Bank activity in the corridor is the large PROIRRI Sustainable Irrigation Development Project which focuses on supporting the growth of small-scale irrigation in Manica, Sofala and Zambezia, linked to commercial markets. The plan is to improve or develop irrigation schemes on 5 500 ha of land, of which 3 000 ha was for medium-scale rice irrigation, 1 300 ha for horticulture and 1 200 ha on value chain specific outgrower schemes (World Bank, 2014:2). The project was approved in 2011 with funding from the IDA, which is part of the World Bank, and the Government of Japan under an initiative known as CARD, with a combined total of around US$ 90m. Japan’s investments exclusively target rice. The project focuses on institutional capacity development (an enabling environment, and participatory management of irrigation); investment in

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irrigation systems (around 59% of the total value of investments, with beneficiaries making a contribution of around 8% of the investment); plus some administration and a small amount for value chain development (World Bank, 2012).

Implementation has moved fairly slowly, with just 27% of IDA credit and 20% of Japanese credit disbursed by mid-2014. Work was still mainly in the preparatory stage at that time; construction of irrigation schemes had started on 224 ha, and had been completed on 50 ha for outgrowers in Manica. From the planned total of 16 000 beneficiaries, 33.3% of whom were to be women, only 669 beneficiaries were recorded and there are no women beneficiaries to date. The project was also engaging with government on regulations for Water User Associations (WUAs) and on drafting a National Irrigation Plan (World Bank, 2014:2–3).

In 2012 MINAG and the BAGC entered into a strategic partnership to address the implementation of the PROIRRI outgrower business line. The objective is to promote win-win business arrangements between smallholder farmer associations and private sector operators. Private sector operators could be large-scale commercial producers (requiring volumes to meet identified markets) or processing and/or trading companies dealing in a particular commodity. It is envisaged that the project will support the establishment of up to 1 200 ha of outgrower schemes from 2012 to 2016. The BAGC Secretariat is responsible for identification of projects as well as facilitating the implementation of the identified projects.42

According to Edgar Jonas at the BAGC in Chimio, at present around 700 ha is being supported through PROIRRI. Some farmers are outgrowers for Vanduzi (a private company), producing sweetcorn, baby corn, green beans, peppers, chillies and other vegetables. Production finance came from the BAGC’s Smallholder Facility—which we did not hear of from any other source. The farmers have a guaranteed market on contract, with an annual production schedule and extension support. A separate but related project sponsors sugar outgrowers in Mafambisse, with Tongaat Hulett.

Table 2: AGRA grants specifically in the Beira Corridor, 2007–2012

<table>
<thead>
<tr>
<th>Programme</th>
<th>Dates</th>
<th>Amount (US$’000)</th>
<th>Recipient</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASS ADP</td>
<td>2009–12</td>
<td>1 509</td>
<td>IFDC</td>
<td>Agro-dealer support and development.</td>
</tr>
<tr>
<td>BBTE</td>
<td>2010–11</td>
<td>299</td>
<td>MINAG</td>
<td>Test and refine breadbasket approach and develop investment plan in Beira Corridor.</td>
</tr>
<tr>
<td>SHP Extension</td>
<td>2010–13</td>
<td>684</td>
<td>IIAM</td>
<td>Increase fertiliser use and integration of grain legumes in Sofala, Manica and Tete provinces.</td>
</tr>
<tr>
<td>Markets</td>
<td>2012–14</td>
<td>260</td>
<td>Kixiquila Serviços de Pesquisa &amp; Consultoria, Lda</td>
<td>Postharvest handling and linkages to high value markets in Beira Corridor.</td>
</tr>
<tr>
<td>SHP Extension</td>
<td>2012–15</td>
<td>815</td>
<td>ADEM</td>
<td>Soya and maize outgrower schemes in Beira.</td>
</tr>
</tbody>
</table>

Source: AGRA grants database

42 Beria Corridor http://www.beiracorridor.com/?blogviewid=12&__target__
BAGC operates as a service provider. It designs an irrigation scheme, the government finds a builder, and BAGC monitors construction of the scheme. Jonas said the initiative does not work with big farmers; it works with associations of small-scale farmers on schemes of 20–50 farmers with 1 ha each. A requirement for participation is that farmers pay about 10% towards inputs. Jonas remarked that sometimes farmers contribute even though government fails to make its own contribution. The government is paying 85% of the cost of ploughing, while irrigation is provided free of charge. Farmers are trained on management and irrigation, including the formation of irrigation committees, with support from extension workers. The scheme is gravity fed and there are no pumps involved, and while farmers are meant to pay maintenance costs currently the infrastructure is new and no operations and maintenance (O&M) work is required. Land for expansion is an issue in some areas, and in some places, big farmers acquire land but do not farm or otherwise use it.43

Reflections on the BAGC initiative

It is widely agreed that investments in agriculture are necessary to boost small-scale farming. Investments in roads, water, electricity, telecommunications, extension services and better quality seed can benefit large sections of the population. However, this is not a straightforward issue—investments in agriculture will have contradictory outcomes. Although investment can generate opportunities for small-scale farming households, it can also enable corporate penetration into previously inaccessible areas, with the potential to extract locally created value and wealth. Work needs to be done with farming households and farmer associations to identify what kinds of investments they favour, and to monitor closely the impacts of large-scale capital investments. Accordingly, farmer associations may wish to actively seek and motivate for spaces in which to negotiate the kinds of investments that favour their members, and which are in line with their principles as democratic organisations. This means critical engagement, where possible, with the processes of modernisation, including particular Green Revolution initiatives that are a manifestation of modernisation in African agriculture.

The Green Revolution approach in Mozambique promotes plans and investments that clearly favour small-scale farming households over large-scale commercial producers. This is not surprising given that small-scale farming households constitute an extensive base of production. This orientation is quite evident when speaking to actors in the Corridor. Before dismissing the suggestion, farmer associations would do well to explore the possibility of investments being channelled towards activities in which farmers can participate, deliberately and democratically, and that meet the objectives of associations and their members. If this exploration reveals the orientation in support of small-scale farmers as mere rhetoric, farmer associations can then organise to oppose resources being directed away from small-scale farmers towards other interests—especially if these are private and large-scale capitalist concerns. This assessment must be empirically determined. Farmer associations may wish to be supported in order to locate entry points and then jointly monitor, record and reflect on the process with a critical eye.

It will be useful to have clear, simple measures of inequality that will raise a red flag. For example, material instances of land dispossession or the imminent threat thereof, as well as longer-term increasing landlessness through other slower, related processes of consolidation and differentiation among farming households. In such cases, other dynamics of change inherent in these farming communities will have to be taken into account and the impacts of capital inflow into these areas understood-within a fluid social ecology. Researchers and farmer associations together can review these dynamics, driven by issues arising from members of democratic associations.

43. Interview, Edgar Jonas, BAGC, Chimoio, 4 May 2015
We recognise also that investments in small-scale agriculture can be oriented towards developing a layer of emerging commercial producers. Consequently, farmers and their associations need to be cautious, maintain a critical scrutiny of the impacts of investments, and work with farmers to identify cases of growing inequality, or the extraction of wealth, that arise from direct producers. This is not an in-principle opposition to investment but an attempt to ensure that farmers are actively involved in shaping investment decisions—that ‘blueprints’ are not imposed on farmers but rather that their own needs and requirements, as defined by farmers themselves, shape investment plans and actual investment.

The Green Revolution is beginning to look at the wider society, not only farmers and their communities. The food sovereignty movement must be careful of looking too narrowly at farming households alone, to the exclusion of wider societal dynamics. This is especially needed in regard to occupational specialisation, with multiple livelihood strategies as its obverse, and urbanisation and consistent surplus production. However, it is essential that farming households do not carry the costs of modernisation while others benefit at their expense, no matter who the beneficiaries are. If anything, the future must be negotiated by all the parties who will be affected by it. This requires connecting farming households with other constituencies in society, to enable a clearer understanding of broader dynamics at play, and to elicit participation from small-scale farming households that will be recognised when wider processes of planning and action are being considered. It will be crucial also to pose questions such as who determines the relative weight of these different social forces; and who develops plans around them. At present these roles are performed by governments and corporations, operating in tandem with one another. Again, a close monitoring function is required, with farming households exerting a strong influence on the shape and direction of material developments.

Farmer associations can gain broader social weight only by organising and mobilising to develop their members’ interests in the broader society. Unlike Green Revolution proponents, however, we do not automatically attach a ‘free market-oriented’, ‘private-sector’, ‘entrepreneurial’ preference to such forms of organisation. Indeed we explicitly favour independent, critical, collective, democratic organisation and decision-making, including resource allocation and use.

It is questionable whether increasing agricultural productivity is an urgent requirement at present. Producers in the north of Mozambique generate large surpluses but are unable to transport them to the south where they are needed. This is not an issue of low productivity; rather, the key issue at the moment is agro-food waste, especially post-harvest losses due to poor storage and distribution systems. More broadly speaking, the mal-distribution of existing supplies directs a lot of food value to wealthy consumer elites, globally and, increasingly, nationally, thereby routing production away from local food needs. Engagement with markets often means catering for the wants and desires of these elites rather than the immediate food needs of local populations. There is some emphasis in the Green Revolution discourse on food crops and this should be welcomed, but also monitored, to verify where resources are being directed. There is a strong investment emphasis on food crops in the Beira Corridor, where cash crops generally are earmarked for large-scale interests with their own funding sources. As far as we could tell, from our brief trip down part of the Corridor in May 2015, there may be some outgrower involvement in cash crops, but this is not the focus of any interventions. Experience indicates that it is one thing to state that investment resources are available to small-scale farming households, and quite another for those same farming households actually to receive resources that match to their own needs and proposals.

There are also serious questions about how best to achieve increased productivity. This subject addresses a similar but more specific set of issues contained protected by the Green Revolution. The sections below on seed and soil fertility outline some of the opportunities and and risks that may arise from any engagement by small holder farmers with the Green Revolution’s model of agricultural production in Mozambique.
SEED: DOMINATION, CO-EXISTENCE OR SOME OTHER ALTERNATIVE?

Background: the enduring importance of farmer-managed seed systems

Mozambique’s seed sector can be divided roughly into three categories: i) the predominant farmer-managed system that produces and circulates mainly local varieties of food crops; ii) an ‘intermediate’ system which covers mainly food crops but also some vegetable crops and emerging cash crops, and incorporates community-based, NGO, emergency relief and some public activities; and iii) the commercial system which looks mainly at cash crops and incorporates private companies, the public sector and closed value chains for specific crops (e.g. sugar cane, cashews, tobacco and cotton) (adapted from Pereira and Heemskerk, 2012). Currently an estimated 90,000 tons of seed is used in Mozambique, of which around 10% is certified seed (Marulle, 2014).

Most seed in Mozambique is produced and distributed through farmer-managed systems. All the processes from selection, through testing, multiplication and storage are conducted, mostly by individual farmers, sometimes in interaction with neighbours and others. Farmer-saved seed currently constitutes an estimated 70% of total seed used, with 20% from informal exchange and no more than 10% of seed through the commercial sector (public and private) (Pereira and Heemskerk, 2012). In the Central Region, an estimated 70% of maize seed is farmer-saved, 27% is through the local market or neighbours, and just 3% is from agro-dealers (indicating certified seed) (Wageningen et al., 2014:5). On farm homesteads women tend to do the work of separating and storing grain for seed, from that for food.

According to conversations with farmer members of UNAC-affiliated associations in Manica, they select maize seed from the centre of the cob for the next season, avoiding those on the edges that can be contaminated. They also select seed grain from the middle of the plot to avoid cross-fertilisation with other varieties grown by neighbours. A number of maize varieties are grown in the area in close proximity to one another. Farmers in Manica were satisfied with their maize seed quality and available choice, and were interested in experimenting with some enhancements.

In Manica the main maize variety used is the local variety, Chimanica, which is maintained by farmers in their fields (in situ). Farmers in the neighbourhood also use PAN53, PAN67 (Pannar), ZM523 and ZM309 hybrid (K2). There is mixed sourcing of seed and purchased seed is used intermittently to refresh the supply or to introduce new varieties in combination with local varieties. This applies to maize as well as other seed types. Farmers choose to use local maize varieties because the size is larger, it is not eaten by insects, the grains are bigger (for flour), germination is good, and the ears are closed at the top of cob which limits rotting. Some farmers choose hybrid maize because of its short growing time while others indicate discontent because the grains are small and this is not good for business. Some farmers say that they are tending towards using different

44. Seed is taken to incorporate germplasm for vegetable crops (e.g. sweet potatoes).
45. Farmer focus group discussion, UNAC/UCAMA local associations, Manica, 5 May 2015.
46. Participants chose to speak more about maize than other crops. If we want information about other crops we must engage them in further discussions.
varieties. Some of the local seed varieties (which were not specified) do not produce cobs in dry conditions. This year there was almost no rain but even so the hybrid seeds produced cobs.

Farmers in Manica farmers indicated that they always recycle maize, although some said they bought seed when necessary and commented that PAN53 cannot be recycled. Farmers said they experienced pressure from companies to buy seed, particularly drought resistant varieties. They did not indicate what kind of pressure was exerted but seemed to be informed participants in the process. They reported that they had started buying hybrids and had divided their plots, planting local and hybrid varieties in different sections, for purposes of comparison. They say that the choice of seed is mainly a question of timing and local seed takes a long time to produce. This is a good example of an in-field, farmer-controlled process of experimentation with different varieties and these farmer-led investigations should be supported. It is essential that farmers are encouraged to continue their experiments, despite laws which restrict their rights to do so (see below).

Farmers themselves have decided on the next steps for enhancing varieties to suit their local needs, seeking increased yields and hoping to entrench hardiness traits already present in different varieties previously used. They want to conduct this research on their own land, under their own control, with advice and resources from external agencies. They have collective plots where they could do seed production with space to allocate to this process; they want to earn money, and they are willing to share their fields.

Discussion with farmers in Barue revealed that local varieties were ‘disappearing’ and commented that the varieties used by their parents took too long to mature. This is leading to a shift to buying seed. The main maize varieties presently in use are Matuba (another local variety), PAN53, PAN67 and Chimanica/nyanganjere. Farmers buy a small amount of seed and plant it to a small piece of land because the seed is expensive; consequently the largest area is planted to local varieties. Farmers said that purchased seed is used mainly to sell the output, while local seed is used mostly by the household, with some sales as well. They confirmed that if seed from the shop was cheaper to buy, they would shift to it and leave their local varieties. It appears there is more (economic) pressure on this group of farmers than on the Manica farmers, to adopt improved varieties.

Barue farmers said they had recently experienced germination problems with PAN53, purchased from Pannar. They had raised the issue with the company who said they would either return their money or give them new seed, although the issue had not been resolved at the time of our discussion with them. Farmers indicated that a lack of money is their main constraint regarding the purchase of seed, followed by the uneven rains. Accessibility is also a problem, with farmers saying there are no shops nearby from which to buy seed. As a result they purchase from individuals but have no recourse if the seed does not perform. They want seed to be easily accessible and suggest that traders should set up shops nearby.

In Dondo, farmers focused on rice and vegetable seed and only one association provided irrigation. Rice planters use mostly

47 Farmer focus group discussion, UNAC/UCAMA local associations, Barue, 5 May 2015.
48 Farmer focus group, Dondo local associations, Dondo, 8 May 2015.
local varieties (Manda, Supa, Nene, Petrolli, Media, Andipumundo) and sometimes buy other varieties (Ita, C4, Limpopo) from the district agricultural office. Semoc has a local agent. Farmers said the product generated from local varieties sells well but these strains do not have high yields. Conversely, purchased seed has higher yields without good markets—apparently the aroma and taste are key criteria, as are output markets. Seed quality is uneven and farmers tend to shift between varieties. The selection of variety depends on the area and some varieties need a lot of water (Ita); other varieties perform well in both dry and wet conditions (Manda). Farmers said that purchased seed sometimes does not germinate and thus they prefer local varieties; the major difference between local and commercial varieties is the length of time to maturity—commercial varieties succeed within a shorter term.

Farmers in Dondo said they would like technical advice about improving local varieties. In particular, rice grain size reduces over time and they would like to research this to see if improvement is possible. In addition, they said local varieties used with chemicals do not produce well—plants grow large but the grain is poor—and these varieties need to be farmed using traditional techniques. Farmers said they cannot mix local and commercial varieties; the different strains must be kept apart and information is required regarding recommended distances between plots.

In Dondo vegetable seed is sold by agents for Semoc, Munguambe i Filhos and Cadeco. While farmers assessed the seed as generally good, they said it depends on the way the field is prepared. They indicated that sometimes local providers mix old seed with new and the seed does not perform well and their only recourse if the seed fails is to complain to the supplier. South African supermarket chain Shoprite also sells vegetable seed in the town. The quality is good but the price is high—double the price of vegetable seed available elsewhere.

Seed is stored in a range of local containers which are then sealed with dried leaves and/or mud, kept in silos or sometimes buried, until the next season (Wulf and Torp, 2005:28–29). Farmers in Manica indicated they are looking for improvements in processes to safeguard seed against insects. They wanted to improve on traditional processes which use eucalyptus to smoke the seed in order to preserve it; they want simple, modern methods for seed preservation. Dondo farmers raised the issue of technical assistance regarding the conservation of rice seed.

Overall, farmers have some capacity to do local experimentation and are interested in working on participatory in situ seed enhancement. They are also eager to increase their knowledge of techniques to improve the preservation of seed.

Establishment of the commercial seed sector

The advent of a commercial seed sector began in 1978 with the initiation of a national seed programme. This resulted in the establishment of the government-owned Sementes de Moçambique Lda (Semoc) which produces and disseminates improved seed. Seed laws and regulations were put in place in the early 1990s, following the end of the internal war. The main law was the Seed Act (Decree 41/1994), which regulated the approval and
registration of new varieties and defined the rules for seed production, inspection and commercialisation. The Act did not mention the informal or farmer-managed seed system, despite the overwhelming importance of this system in Mozambique. The only official document to recognise the farmer-managed seed system was the 1997–2001 National Seed Strategy (Pereira and Heemskerk, 2012). In 2001 regulations were passed on seed production, marketing, quality control and certification (Wulf and Torp, 2005:18). These regulations created an exclusive seed market for certified, improved, commercial varieties of seed and excluded farmers’ varieties from the market. It became impossible for these varieties to be officially recognised and registered (ACB, 2014). It is apparent that seed laws and regulations tend to focus on the establishment of a commercial sector but there are inevitable spillover effects for farmer-managed systems. According to AGRA staff, the 2013 seed laws were approved by the Minister’s Council and are now awaiting parliamentary approval.49

The Department of Seeds ensures the implementation of legislation and has four sections: seed inspection and certification; laboratory; variety control; and administration. It has four seed testing laboratories, including one in Chimoio for the Central Region. The Department of Plant Protection is responsible for pesticide registration and control and phytosanitary issues.

The National Seed Committee (CNS), established by DINA in 1998, is an advisory group with representation from government and the seed industry (companies, and the Mozambican Association of Seed Producers) (Wulf and Torp, 2005:20–21). A Seed Platform was established in 2013 to bring stakeholders together, including government, the private sector and civil society. UNAC is represented on the Platform, although it feels the agenda and composition of the Platform is heavily biased towards commercial interests. According to AGRA, the Platform currently focuses mainly on policy.51 Carlos Quembo at IIAM Central Region says current discussions concern royalties for breeders and that guidelines already exist.52 Innovation for Agribusiness (INOVAGRO) exerts a strong influence on the Platform, having spearheaded its establishment in 2014. INOVAGRO is a Swiss Agency for Development Cooperation (SDC) project run by DAI, a `global development company’ under contract to USAID and other organisations.54 Phase II of INOVAGRO will continue until 2018.

**Plant breeding research and development and regulation**

For most of the time in which a commercial seed sector has existed the public sector was responsible for breeding, in collaboration with the IARCs. Alternately, private companies imported seed varieties bred outside Mozambique. Germplasm inside Mozambique is held mostly by the state in collaboration with

49. Interview, Manhica and Verde, AGRA, Maputo, 26 Feb 2015.
50. Following the formation of a new government in 2015, the Minister of Agriculture has a new designation: Ministério da Agricultura e Segurança Alimentar (MASA).
51. Interview, Manhica and Verde, AGRA, Maputo, 26 Feb 2015.
52. Interview, Carlos Quembo, IIAM, Chimoio, 4 May 2015.
53. Interview, Peter and Elizabeth Waziweyi, Nzara Yaperia Seed Co, Barue, 5 May 2015.
54. dai.com.
the IARCs. In the mid-2000s the National Plant Genetic Resources Centre, under the National Institute of Agronomic Research (INIA), held 1,122 germplasm accessions. The collection included 660 local landraces and showed good agronomic performances by maize, rice, sorghum, pearl millet, groundnuts and beans. In addition, farmers also maintain landraces (Wulf and Törp, 2005:25).

Recent efforts are being oriented towards opening breeding to the private sector and since 2000 seed companies have become involved in breeding, mainly in maize. A law on Standards on Protection on New Varieties of Plants was passed in 2006 (Pereira and Heemskerk, 2012). A draft Decree from 2011 lays out regulations on the protection of new plant varieties (Republic of Mozambique, 2013), which is seen as a key private sector requirement for investment. The Decree revokes the earlier Decree 58 of 2006, but follows the same logic and is based on the protection of private ownership through IP protection (ACB, 2014). PBRs are granted on the basis of a technical assessment of NDUS varieties; NDUS criteria are defined in Articles 8–11 of the regulations. PBRs will be in force for the UPOV 1991 standard 25 years for tree species and vines, and 20 years for all other genera and species. The appropriate authorities can make a decision to cancel or annul PBRs before the end of their exclusivity period (Articles 26, 35 and 36). The scope of protection includes production, multiplication or packaging of a protected variety—or any ‘essentially derived’ variety—without the consent of the rights holder. Authorisation must be in the form of a licence, and the rights holder may impose limits and conditions (Article 27). Three years after the granting of rights others may request a compulsory licence from the Registration Entity, on the basis that the public interest is not being served or that the rights holder is unreasonably withholding a licence (Article 32). This will also be a licence for use of the plant materials and will be subject to royalty payments. Anyone producing or multiplying protected varieties without a valid licence may be warned, fined, material may be seized and they may be sued by the rights holder (Article 42).

PBRs do not extend to the use of a protected variety in a programme of improvement of new varieties, any private and non-commercial activities; and activities carried out by small-scale farmers for purposes of propagation and planting in their own fields (up to a certain extent which has to be defined by the government). This provides for farmers’ privilege and limits farmers’ rights. It allows small-scale farmers to recycle and adapt even protected varieties in their own fields and for any private and non-commercial activity. On the other hand, it prohibits farmers from multiplying seeds to be shared with other farmers or sold and selling seed from a protected variety without the consent of the rights holder. Expectations are that draft regulations will not be effective in the short- to medium-term because 91% of seed is still produced and traded ‘informally’ (Marapussé et al., 2014:12).

The African Regional Intellectual Property Organisation (ARIPO) has recently concluded the Arusha Protocol for the Protection of New Varieties of Plants (the Arusha PVP Protocol). The Protocol has succeeded in bypassing national legal frameworks and imposing a regional PVP policy and framework on all countries signing the agreement, based on UPOV 1991, in which PBRs take precedence over farmers’ rights. Mozambique is one of four member countries that signed the Protocol on its conclusion in July 2015.55

Farmers’ rights are those rights arising from the past, present and future contributions by farmers to conserving, improving and making available genetic resources, particularly those in the centres of origin/diversity. The concept of Farmers’ Rights is recognised in the International Treaty on Plant Genetic Resources (‘The Seed Treaty’) of the Food and Agriculture Organisation (FAO), part of the United Nations (UN), which entered into

force in 2004. Objectives of the Seed Treaty include the conservation and sustainable use of plant genetic resources for food and agriculture. Its preamble affirms farmers’ rights to save, use, exchange and sell farm-saved seed and other propagating material, and to participate in decision-making. Mozambique’s regulations do not contain any measures to safeguard on-farm diversity and the continued maintenance of heterogeneous crop varieties, which are vital for ensuring food security and resilient food systems for the future (Mayet, 2013). Mozambique ratified the Treaty through Resolution No. 33/2010, empowering the National Jurisdiction of Biodiversity to undertake all acts necessary for its implementation.56

Public institutions involved in seed research are IIAM (including INIA), and the Faculty of Agronomy at the Eduardo Mondlane University. In the mid-2000s IIAM’s breeding activities focused on maize and groundnut varieties (Wulf and Torp, 2005:20). IIAM in the Central Region covers the Beira Corridor and operates in four provinces with a station in each. In Angonia (Tete) IIAM focuses on high altitude crops, including maize, soya, wheat, beans, pigeon peas and Irish potatoes, and also works on animal feed for ruminants. In Sussundenga (Manica) the focus is on maize, sweet potatoes, Irish potatoes, sorghum, legumes and groundnuts, including basic seed production and breeding. This is also the site of a forest station comprising biofuel and indigenous forests, and a regional animal disease laboratory. In Beira (Sofala) there is a training centre (Manga); and in Zambezia IIAM focuses on rice, including seed, and manages a Centre of Excellence for rice, with World Bank funding. IIAM departments in the Central Region are aimed at research and technical transfer, including seed production.57

IIAM has the primary responsibility for the production of breeder and pre-basic seed, but also produces basic seed through Unidade de Semente Básica (USEBA). USEBA supplies seed to private companies and others who are involved mainly in producing certified seed (Wulf and Torp, 2005:20–21). IIAM Central Region works with certified maize, beans and soya together with Dengo, Luzane Farms (less than before), Nzara Yapera and Semente Perfeita companies. IIAM also multiplies certified seed through outgrowers to generate income. It is willing to work with private companies to produce basic seed but few have accepted the opportunity so far. Pannar pursues the breeding of its own seeds in South Africa.58

Carlos Quembo at IIAM Central Region59 says they are working with small farmers, mostly on OPVs. Improved varieties are generally OPVs but IIAM is trying to promote hybrid strains. Most MNCs prefer hybrid varieties while Semoc and others tend to focus more on OPVs. In 2010–11 IIAM released Prístine and other hybrid varieties and is running trials on PAN67 and PAN53. K2 (Kapa Dos, the Mozambican version of the South African company Klein Karoo Saad) works with IIAM hybrids. Quembo says there is a demand for hybrids, especially on farms close to the border (Zimbabwe, Zambia, Malawi). Farmers are interested to try out new varieties on their own terms, introducing them slowly and experimenting to see how

56. FAO Legal Office legislative database, http://faolex.fao.org/cgi-bin/faolex.exe?rec_id=122197&database=faolex&search_type=link&table=result&lang=eng&format_name=@ERALL.
57. Interview, Carlos Quembo, Director, IIAM Central Region, Chimoio, 4 May 2015.
58. Interview, Carlos Quembo, IIAM, Chimoio, 4 May 2015.
59. Interview, Carlos Quembo, IIAM, Chimoio, 4 May 2015.
well they perform. Farmers are doing their own VCU testing here, in field conditions and not on demonstration plots, using all the inputs on which a formal VCU test is based.

IARCs are also involved in crop breeding research in Mozambique, including ICRISAT, the International Institute of Tropical Agriculture (IITA), CIMMYT, CIAT, the International Rice Research Institute (IRRI) and others (Wulf and Torp, 2005:20–21). SIMLESA, funded by ACIAR and managed by CIMMYT, operates in five countries including Mozambique.60 Together with USAID, the McKnight Foundation and AGRA it sponsors IIAM programmes on certified seed. Most projects are based on demonstration plots and farm trials. Quembo suggests visiting the farms to see if farmers are adopting the new varieties. He says that farmers often work on the demonstrations but not on their own farms.61 USAID has provided support to IIAM to expand and modernise seed processing and storage facilities, particularly in Chimoio and Nampula.

At the country level, between 1995 and 2011, 38 maize, 40 bean, 12 groundnut and 9 soya varieties were released (Marulle, 2014:3). In 2013/14, rice (450 tons) and maize (440 tons) constituted the bulk of basic seed produced, followed by 65 tons of bean seed and 31 tons of groundnut seed (Marulle, 2014:4). These totals were between one quarter and three quarters of planned production, which indicates some challenges in the production of basic seed. Regulations proclaimed in 2013 allowed private companies to produce foundation seed and work on this has already begun.

In Mozambique variety approval requires plant breeders to submit agronomic data based on multi-location trials conducted over two to three years, to DIINA. DUS and VCU tests are required. VCU testing must be carried out in four areas and is not required for vegetable varieties (Wulf and Torp, 2005:26). The VCU test looks at differences from the standard variety, and agro-ecological suitability.62 Data from DUS trials in neighbouring countries may also be considered for registration and release (Wulf and Torp, 2005:19).

Varieties that can be legally distributed and sold in Mozambique must be registered, with approval from the CNS, following recommendations from the Sub-Committee of Registration and Release of Varieties. The first official national variety list was approved and published in 1995. It had 152 varieties covering 10 field and 20 vegetable crops. A revised version was published only in 2004, and listed 156 varieties. Maize has the most varieties of any crop on the list. Lack of regular updating is considered an obstacle to commercialisation. Already in the mid-2000s, data from DUS trials in neighbouring countries was being considered for registration and release (Wulf and Torp, 2005:19).

Seed certification and multiplication

Once breeders have registered seed it is tested before certification for purity (properly cleaned), humidity and germination. The Department of Seeds carries out certification and quality control. Testing is done both before and after the seed is put on sale. Certification is valid only for six months, with testing every three months. Tests are requested by companies from government seed laboratories who also conduct tests during the production process. They follow a sampling and testing procedure, including monitoring in the field and analysis in the laboratory.63 In 2012 Mozambique was not yet a member of the International Seed Testing Association (ISTA) (Pereira and Heemskerk, 2012). ISTA establishes standard procedures for testing and sampling seeds to promote uniformity and which are required before many markets will allow seed in.

It is clear that we are talking of the separation between registration—which is when seed has

61. Interview, Carlos Quembo, IIAM, Chimoio, 4 May 2015.
63. Interview, Gibson Uache and Coutinho António, technicians, Regional Seed Lab, Chimoio, 4 May 2015.
passed the DUS test as a way of recognising and evaluating plant varieties, plus some agronomic tests through VCU (adaptation to the agro-ecological context)—and certification, which is essentially monitoring seed quality and varietal purity.

Typically, certified seed should be seed of a consistently high and known quality (genetically and physically), produced according to the rules and regulations of an official Seed Certification Scheme and for which proof of certification is available. In practice, farmers were using certified seed but it is by no means their first choice, even when available, as indicated above. We repeatedly heard that certified seed often did not perform well, and suspicion was cast on agro-dealers and other seed traders who are said to repackage seed or otherwise hoodwink buyers. The certification process thus does not necessarily meet its objectives of ensuring good quality seed that buyers can trust to perform as specified. Individual companies were named although these questionable practices were not widespread.

Once the seed is certified, it can be multiplied for branding and sale. Seed laws and regulations establish the requirements for labelling, storage and the sale of certified seed. Historically Semoc was responsible for multiplying seed received from IIAM which was then provided to government for subsidised or free distribution. The regulatory system is undergoing changes. Decree 12/2013 repealed all previous seed decisions\(^4\) and came into force in 2013. According to an FAO summary,\(^5\) the Regulation, consisting of 10 Chapters and 8 Annexes, aims to guarantee the production and commercialisation of quality seeds and planting material. It applies to formal producers, processing, suppliers and sellers, for both national and international production including imports, and regulates the competencies of the National Authority of Seeds, the registry and variety authorisation requirements, seed and planting material production, quality control and certification, seed processing, trade, the import and export of seeds, inspection, taxes and penalties to be paid for illegal activities.

From a commercial point of view, irregularity of demand is a major obstacle to the planning and implementation of seed production—demand usually spikes in emergency situations such as drought or floods. In 2013–14 the actual production of certified seed was well below its planned production. Actual production of bean, rice and maize certified seed was between 3% and 13% of planned production. A proposed method of estimating demand is to multiply the total area planted to each crop by the sowing rate (Marulle, 2014:4), but this does not capture fluctuations in demand based on decisions by farmers. Producers themselves do not necessarily know what their demand for the next year will be, even for commercial varieties. This makes it difficult for companies to know how much seed to multiply, and for IIAM to plan two years in advance to allow for the certification process.

The information provided above indicates the kinds of challenges faced by those advancing a commercial seed agenda. It is very difficult to estimate areas under production for individual crops across millions of small farms with shifting cultivation. Compound this, while it is possible theoretically to


\(^5\) http://faolex.fao.org/cgi-bin/faolex.exe?rec_id=122872&database=faolex&search_type=link&table=result&lang=eng&format_name=@ERALL.
estimate what the sowing should be, based on agronomic knowledge, this does not take into account actual production practices. The usual obstacles stand in the way of increasing demand for certified seed: high prices, with purchased grain seed up to 30 times more expensive than the grain retained by farmers; a lack of complementary inputs such as fertiliser, irrigation and pesticides, which means that farmers cannot realise the genetic potential of the seed; the untimely availability of certified seed; and the lack of credit to purchase seed. Consultants for a USAID review of Mozambique’s seed sector added another constraint: “The capacity that producers acquired over time to produce and keep their own seed.” (Marulle, 2014:7). In other words, farmers’ knowledge is a constraint to expansion of the commercial seed sector. Consequently farmers are encouraged to forget their historical information and to replace this with other knowledge; for example, how to manage chemicals and synthetic fertilisers and how to manage credit and balance the books.

**Commercial seed enterprises**

Seed companies are not yet meeting the demand for certified seed in Mozambique which continues to import most of its certified seed. MINAG (now MASA) authorises imports through the Department of Seeds which must be listed on the official variety list, but there is no requirement that seed varieties for export appear on the national variety list (Wulf and Torp, 2005:20). Regional seed harmonisation processes aim to construct a regional list on which varieties listed in two or more countries can be freely imported into any country in the region that has agreed to the regional protocols.

Semoc was the only seed company operating in Mozambique until 1999, after which the sector was liberalised. When it was first established in 1978, Semoc had a processing capacity of 18 000 tons of seed and was able to produce 2 000 tons of seed annually, during the late 1980s; this figure rose to 9 000 tons in 1994. Demand was driven by the government and NGOs working on emergency distribution during the internal war. In the early days maize seed constituted 70% of seed production and 64% of sales. Semoc relied on the free distribution services during this era and struggled to establish its own distribution networks after the relief programmes were phased out (Wulf and Torp, 2005:18). In the mid-2000s, national production of certified seed reached approximate figures of only 1 000 tons/year (Wulf and Torp, 2005:23), indicating the low uptake of technology.

After Mozambique’s liberation in 1994, Semoc’s monopoly came to an end and during the 2000s there was an increase in the number of seed traders importing seed for distribution. In mid-2013 there were 41 registered seed companies in Mozambique (MINAG, 2013). Pannar and Semoc are the two main companies at the moment with several other regional and multinational corporations, as well as domestic seed enterprises including farmer collectives.

In the year 2000 Pannar, then a South African company, began operating in Mozambique, first as a seed importer, later establishing a production facility in Chimoio. Pannar produces hybrid seeds and its portfolio includes maize, cowpeas, sorghum, beans, sunflowers and vegetables (Wulf and Torp, 2005:23). In 2012 Pannar was acquired by US multinational Pioneer Hi-Bred but still operates under the Pannar brand. As indicated above, Pannar hybrid maize is widely used and generally farmers are satisfied with the seed although a few germination failures have been reported. Farmers appreciate the seed’s contribution to diversity (especially PAN53) as part of their existing stock of varieties, not as a replacement strain.
Semoc has experienced difficulties with its transition from a monopoly, with secure distribution channels, to a corporate entity in a competitive environment. The company was partially privatised in 1997 with a 51% shareholding going to Seed Co, but was repurchased by the state at the beginning of 2014. We have not yet heard the reasons for the repurchase which could be related to Seed Co having been acquired by Monsanto and Groupe Limagrain. According to Goncalves Canivete of Semoc, the company produces according to demand, based on figures from MINAG plus additional local customer requests. Semoc can supply more or less whatever is required, but now there are several companies on the market producing seeds, including ‘fake’ Semoc seed. Canivete reports that Semoc is finding it difficult to continue operating because of this competition. The company could lower its prices but this will negatively affect its production system. In 2012 the government coerced Semoc to produce maize seed and the company complied—but there were no buyers. This resulted in overproduction and Semoc had to destroy two tons of maize seed. Canivete related a further Semoc misfortune: the company had produced seed potatoes on request from the government—who then imported seed potatoes from South Africa, instead of buying the local product.

Semoc multiplies seed on contract with 300 local producers and prices are established at the start of season. Standards in the fields are a problem; there is occasional mixing of varieties but some companies brush this aside and will buy whatever is produced. This leads to poor quality seed.

Semoc currently has a tender to provide seeds to MINAG. Government remains the main buyer of certified seed which it distributes to small-scale farmers through the subsidy programme and in emergency situations. Various companies compete for government business but use dubious tactics, including bribery. Canivete says companies sometimes win tenders without having produced any seed at all and must then scramble to obtain seed from other agencies ... or fail to meet the terms of the contract. This problem can be overcome provided that demand is identified and measured more accurately. Producers would not need to generate seeds on the off chance of winning a tender, thereby risking a failed outcome and having to dump seed or sell it to a competitor, thereby incurring financial loss. At the same time, producers should be prevented from submitting a tender without first having provided proof of their productive capacity.

Besides Semoc and Pannar, a number of other regional or multinational companies operate in Mozambique. Hygrotech, another South African company, started operations in Mozambique in 2000, mainly in the southern provinces. It focuses on vegetable seed and agricultural input supplies. More recently Syngenta has opened offices in Maputo. It is allied to NAFSN, has started registering seeds, and has initiated activities in Nampula (Marapusse et al., 2014:31).

In addition, Mozambique is home to a range of domestic seed enterprises. The establishment of domestic commercial seed enterprises is one of the objectives of AGRA’s Seed Production for Africa (SEPA) project, a sub-programme within PASS. Key concerns for the seed industry identified by AGRA were: a shortage of foundation seed at the same time as surpluses at IIAM stations that are not distributed; the lack of financing for seed enterprises; rudimentary processing facilities; and the lack of technical and business skills (AGRA 2010:11). Semente Perfeita, Insumos Agricultura, Ikuru Seeds and Lozane Farms have all received sponsorship from AGRA (Appendix 1), as has Nzara Yaperia. One of the biggest domestic companies is Phoenix Seeds while Nzara Yaperia is a rising star.

67. Interview, Goncalves Canivete, Human Resources Manager, Semoc, Chimoio, 6 May 2015.
68. Interview, Goncalves Canivete, Semoc, 6 May 2015.
Phoenix Seeds, the largest domestic seed producer in Mozambique, is based in Vanduzi just outside Chimoio. It is managed by Kevin Gifford, a relocated Zimbabwean farmer, and focuses on commercial grain (hybrid and OPV maize) and pulse seed production for distribution to smallholder farmers, in the Beira Corridor and nationally. The varieties are improved and used in Zimbabwe. According to Marlo Machavela of AgDevCo, Phoenix Seeds has signed a US$ 700 000 debt-equity agreement with the organisation. The contract was to have been agreed with the Catalytic Fund, but the fund is registered in the name of the BAGC initiative which is not a legal entity, and therefore the equity is in AgDevCo’s name. Phoenix has also received a US$ 800 000 interest free loan from the Africa Enterprise Challenge Fund (AECF), and is supported by Progene, a US-based plant and seed research company. Gifford is also the head of the Mozambique Seed Producers’ Board. Gifford’s vision is that Phoenix Seeds will eventually engage 700 seed outgrowers, but it has managed to include only three smallholders so far. According to Roseanne Whalley of AgDevCo, “seed multiplication is a non-trivially difficult activity.” Accordingly, Phoenix now concentrates on commercial production, on 200 ha, and is not being pressured to adopt a small-scale outgrower model. In our discussions with farmers they did not mention using Phoenix Seeds products.

**Case study: Nzara Yapera and small-scale farmer seed production**

While working as a farmer, Peter Waziweyi, founder of Nzara Yapera, was trained in seed production by IIAM, Semoc, Moz Seeds, Semente Perfeite and Pannar. At Nzara Yapera he was awarded contracts with quality criteria and supervised all aspects of quality control throughout the production process, including proper training for workers. Nzara Yapera produced certified seed, some of which was exported to Angola. Waziweyi used the proceeds to invest in grinding mills but realised that seed offered greater added value. Grain is traded locally at Mt5/kg, whereas certified seed trades at Mt12/kg. In 2010 Waziweyi bought a seed treater from Zimbabwe, for US$ 6 500, and started constructing a warehouse. He admits to seeking profit from his activities but accepts also that he must look after and help to develop small-scale farmers—who are his customers and who provide the profit. He aims to produce good quality basic seed and reduce its price, hoping to challenge the big seed companies and prove that small-scale farmers can produce better seed.

At some stage Waziweyi decided not to produce certified seed himself and started assisting small-scale farmers to produce seed, selecting ‘trainable’ farmers who showed interest. Small-scale farmers—currently he works with 7 farmers with 15 ha each—produce all Nzara Yapera certified seed. These producers are considered business partners, not outgrowers. Nzara Yapera follows the regulations, accompanies the National Seed Service on field inspections, visits the lands and participates in the harvest. The company contracts with the farmers and Waziweyi says he will revoke agreements if farmers produce seed of poor quality. He has worked with UDAC (the district farmers’ association affiliated to

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69. Interview, Marlo Machavela, financial analyst, AgDevCo, Chimoio, 6 May 2015.  
70. AECF is based in Kenya with development aid funding, hosted by AGRA, with KPMG as the fund manager. It emerged from a UK Commission for Africa recommendation. See www.aecfafrica.org.  
72. Interview, Roseanne Whalley, AgDevCo, Maputo, 26 Feb 2015.  
73. Interview, Peter and Elizabeth Waziweyi, Nzara Yapera Seed Co, Barue, 5 May 2015.
UNAC) in the past but the relationship has since lapsed.

Waziweyi says he is willing to involve new small-scale farmers, especially those who are allied to organisations he can trust. Generally he does not favour advancing credit until a relationship of trust has been established, but there are circumstances in which he may provide credit to encourage new farmers. He advises small-scale farmers to start on at least 1 ha; farmers who have less than 1 ha should develop to at least 1 ha before they can participate as ‘business partners’. Any expansion will first require market research and surveys which should lead to guaranteed markets, together with an assessment of market demand which requires an understanding of the agricultural sector, the industrial demand for maize, and the market price of grain. This should be followed by advertising to stimulate the demand. Waziweyi says he is still establishing market demand.

Nzara Yapera is involved in a wide range of initiatives, including INOVAGRO in Zambezia (Mocuba i Gurre) and more broadly with Farm Inputs Promotions Africa Ltd (FIPS), SNV and BAGC, aiming jointly to build the seed market. The company has received support from AGRA, in the form of four members receiving training in Nairobi on quality assurance, business management, marketing, and seed production and processing. After Waziweyi had established his seed factory, he received an AGRA grant of US$ 152 000 for working capital and used this for salaries for six months, following which his facility was expected to be sustainable. In the first year he received money to buy seed and other inputs. Nzara Yapera has an ongoing relationship with AGRA which includes M&E visits and strategic interactions.

Waziweyi is working also with CIMMYT and USAID on a programme called Drought Tolerant Maize Seed Scaling Up (DTMSS). New varieties are being introduced to respond to changing conditions—decreased rainfall, diseases, and striga (a genus of parasitic plants). The programme operates in seven countries but is country specific in its activities. Seed companies participate in the programme although OPVs are owned by IIAM. Within the programme Nzara Yapera manages two varieties of OPVs produced by a range of companies—ZM523 and ZM309. The enterprise also produces the SP1 hybrid with inbred lines from CIMMYT.

In 2014 Nzara Yapera partnered with Promec to produce a local variety of maize called Chimicana. The seed was planted at Nzara Yapera and then given free of charge to farmers. Nzara Yapera plants Matuba, Chimicana and other local varieties, using the same fertiliser as for different strains, and these show the best results despite being slow to mature. While PAN67 is damaged in the field by weevils, Chimicana survives. Waziweyi says he does not compel farmers to choose a specific variety, but rather offers them a choice.

Small-scale farmers in the Central Region are represented on the Seed Platform by Waziweyi. He recommends that the seed industry tailor-makes seed and that the process must include a role for small-scale farmers. He confirms that CA is part of the protocol and is willing to work with district farmer associations on improved varieties and demonstrations, but stipulates that Nzara Yapera is not a donor and will charge for seed; it will also provide the necessary inputs for demonstrations. They are currently managing 100 demonstration plots in 4 provinces and conducting research on 10 of the sites.

**Small-scale farmers and formal or ‘semi-formal’ seed production**

Over the past 15 years there have been some efforts by government, ICRISAT and NGOs (e.g. CARE, Concern) to support ‘semi-formal’ local seed production. Seed legislation accommodates ‘guaranteed’ seed for both improved and local varieties. Guaranteed seed is defined as any seed that was tested for good germination, purity and moisture content in the laboratory (quality declared) but which was not field inspected during the growing period (Pereira and Heemskerk, 2012:1). According to

74. Interview, Goncalves Canivete, HR Manager, Semoc, Chimoio, 6 May 2015.
Semoc staff, there is no known Quality Declared Seed (QDS) system and farmer-produced seed is not subjected to any certification process.\textsuperscript{74} AGRA staff indicated they had heard about ‘semente garantida’ but did not know much about it.\textsuperscript{75} We did not encounter any evidence of it on the ground but it may well exist in other places. We can investigate further if farmer associations are interested in pursuing this process.

In 2014 the Gates Foundation together with the Dutch government launched an Africa-wide Integrated Seed Sector Development (ISSD) programme, intended to produce a market-oriented, heterogeneous seed sector. The essence of ISSD combines commercial and ‘informal’ seed sectors into an integrated system, recognising that they both have important roles to play. The ISSD programme focuses on entrepreneurship, access to seed varieties in the public domain, and support to AU programmes. A pilot project will run from 2014 to 2016. ISSD works with existing seed programmes in 8–10 countries and work has already started in Ethiopia, Uganda and Burundi, with designs in place for Ghana, Tanzania and Mozambique. The AU has endorsed the programme as part of the African Seed and Biotechnology Programme (ASBP) and CAADP’s seed agenda. It is working with Future Agricultures, Wageningen and KIT, with a secretariat based in Kenya at the Tegemeo Institute of Agricultural Policy and Development, a policy research institute of Egerton University (Falaju, 2014).

In Mozambique the ISSD programme operates in the Beira Corridor and Zambezia to produce quality basic seed as well as new varieties. It works in collaboration with PPPs and the private sector on basic seed production, incentives for breeders, and a role for the public sector in association with CGIAR institutions. It is involved with quality control and inspection (decentralisation, private sector involvement, cost recovery, and QDS/semente garantida); local seed initiatives (community seed management, direct marketing, seed outgrower contracts, including linking seed associations with research and training institutions, and support to medium-scale enterprises to scale up through outgrowing); curriculum development for higher education institutions and practical short courses; and overall coordination and planning (Wageningen et al., 2014).

**Extension services, agro-dealers and transfer of technology**

Distribution of seed and related inputs is another major challenge for the expansion of a commercial seed sector and is related to demand. First, demand for the inputs is what supports the whole edifice; without that demand, the scheme collapses. Secondly, demand can be stimulated only if relevant technologies are available to farmers. From the point of view of the commercial sector distribution channels are very similar for both seed and soil fertility. By contrast, seed and soil fertility inputs in existing farming systems are accessed from different places. Consequently the access and distribution methodologies will vary between the two sectors.

Extension services and agro-dealers have distinct but somewhat overlapping functions, and there are Green Revolution efforts to replace public sector extension services with private enterprise agro-dealers. This will limit the role of extension workers, relegating them to the position of agents for commercial products and, potentially, services. While the purpose of both roles is the transfer of technical knowledge and resources, extension workers are meant to provide technical knowledge and support to farmers. There is a long history of top-down extension methodologies, including the transfer-of-technology (ToT) approach. ToT requires that external ‘experts’ develop technologies under controlled conditions, deliver these to farmers and then teach farmers how to use them. Education and Training (E&T) is hierarchically structured—the teachers know everything and the learners know nothing. Research priorities are determined by government and commercial funders, while

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\textsuperscript{74} Interview, Manhica and Verde, AGRA, Maputo, 26 Feb 2015.
research methodologies focus on simplifying farming complexities and studying only a few variables at a time (Chambers and Jiggins, 1987). Production capabilities are focused on regions well-endowed with natural resources (irrigation, good rainfall, fertile soils) and not on local farmlands with different priorities.

Agro-dealer networks fall within the ToT model. Essentially, agro-dealer models are aimed at establishing access points for the delivery of defined technologies—especially improved seed, synthetic fertiliser and pesticides—and to a lesser extent farming machinery and implements. Dealers also may be trained to teach farmers how best to use the technologies on offer. This is a classic transfer of technology model. The agro-dealer model favoured by advocates of the Green Revolution is also a private enterprise model—it intends that agro-dealers will, in due course, become financially self-sustaining businesses.

A related private sector model is the closed extension network. This model limits the provision of support and training (on techniques related to the technologies being sold) only to users of the commercial product being sold. A similar model applies to participants in donor programmes who are induced to adopt the technologies which the programmes are designed to support. In both these cases, a popular model is the ‘lead farmer’ version: external technicians are hired by the company or project to train selected lead farmers who then share the information with their farming communities or associations, and also provide ongoing support related to the technologies being introduced. There may also be longer term plans to convert lead farmers into private agro-dealer businesses. We encountered a number of private sector extension models in the Beira Corridor, including Nzara Yapera’s demonstration and outreach work in the seed sector, and Greenbelt Fertiliser’s work on extension support for micro-dosing, improved seed and conservation agriculture (see below).

Demonstration plots are a key methodology and are usually run by farmers with extension support. Demonstrations are provided with all the necessary inputs to ensure the success of these trials. As indicated above, Nzara Yapera favours selling seed to farmers but provides them with a package of inputs for the demonstration plots which guarantees the success of the demonstrations. The idea is that the technologies will spread when neighbours see how well they produce. However, provision of the full Green Revolution package (which sometimes includes irrigation) may be disingenuous. The majority of farmers have to contend with field conditions that usually do not have irrigation, they will not have access to synthetic fertiliser, and they may face numerous other obstacles in the path to a perfect production process. The demonstrations therefore may flatter to deceive. Demonstration plots can also be externally driven, promoted not by farmers themselves, but by commercial interests that aim to introduce their products to farmers. An obvious consequence is that demonstrations frequently do not engage with experiments that address the stated priorities of local farmers.

This is not to say that demonstration plots have no role—but they should be more closely aligned with democratic farmer associations and driven by the priorities of farmers in their specific localities. Farmers conduct their own experiments and are eager to test new products and methods on their own land but—given that they will have to carry the consequences—they prefer to oversee any new endeavours themselves. While demonstration plots may be run by farmers, they are introduced by outsiders, and lead farmers are trained externally on specific technologies that have already been developed elsewhere. It is self-evident that, as Peter Waziweyi of Nzara Yapera said, input enterprises should address the needs of the farmers; without this focus their farms will not survive as businesses. Seed improvements may be based on general priorities determined by farmers themselves (e.g. increased yields, pest resistance and drought tolerance), but development of these improvements could be achieved by farmers doing the work themselves, in their own fields, together with external technical support and access to resources (especially germplasm).

AGRA works with both public sector extension and private agro-dealers. Public sector extension support focuses on production
practices, especially on ISFM (Appendix 1). Facilitated by the Extension sub-programme within SHP, AGRA provided grants of US$ 1.93m to IIAM and ADEM, plus a further US$ 399 000 to Manica Polytechnic for the training of extension workers on ISFM. An additional US$ 1.51m was granted to the IFDC under the Agro-Dealer Programme (ADP) in PASS, for the creation of an agro-dealer network. The networks covers 7 districts in Manica and 6 in Tete, and augmented previous work (supported by USAID funding) in the Agricultural Input Market Strengthening Programme (AIMS) I and II (2006–2012). The Programme promoted private sector investment in modern agro-inputs and marketing in the Beira and Nacala Corridors and aimed to improve access to these inputs through agro-dealer networks.\(^7\) In 2012 an estimated 250 agro-dealers were trained in the handling and sale of fertilisers. This was seen as complementing the role of public sector extension workers (MINAG, 2012:4). In addition the IFDC has partnered with ICRISAT, IIITA, and MINAG on a project with agro-dealers in Sofala, Nampula and Zambézia, focusing on improved OPV maize and synthetic fertiliser demonstrations. A National Agro-dealer Association was established but by 2010 this was not fully functional. Some agro-dealers participate in subsidy programmes while others do not and must compete against the subsidised dealers (AGRA 2010).

A generally recognised problem is that NGOs and donors set up their own agro-dealer networks within which personnel may not be adequately trained, and who are then left on their own when the project comes to an end. This leads to an unevenly trained group of agro-dealers who are not organised and who are oriented towards looking for paid work. This is a double-edged sword—one on the one hand donors can use agro-dealers to promote whatever product they are selling or distributing; on the other hand, a circulating mass of semi-skilled agro-dealers can play donors off against one another and pick and choose with whom they work, often with little concern for their customers.\(^7\) AGRA has been criticised for saturating the market with seed licences for agro-dealers and some incidences of dealers repackaging and selling seed.\(^7\)

A similar problem with fragmented short-term networks may apply also to extension services. According to Emerson Zhou of BAGC, "A sustained effort on public sector extension is needed. The problem is that NGOs providing extension support are only in it for the short-term. The NGOs design their exit strategies for the public sector to take over, but the public sector cannot. The money that went to NGOs could rather have gone to public sector extension. Small-scale farmers cannot pay for services and need the public sector to provide support. For small-scale farmers to at least make a contribution to services requires commercialisation, and this means they must be able to sell something."\(^7\)

In some quarters participatory extension methods have found greater favour. Participating farmers are involved in processes to identify priorities for R&D, planning, and technology development, with sharing and learning between farmer associations and links to technical knowledge in public sector institutions. The formal extension service can form a conduit between farmers in the field and R&D in the laboratory. At a deeper

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\(^7\) Interview, Munyaradzi Usore, agronomist, and John Christie-Smith, general manager, Greenbelt Fertilisers, Beira, 8 May 2015.

\(^7\) Interview, Roseanne Whalley, AgDevCo, Maputo, 26 Feb 2015.

\(^7\) Interview, Emerson Zhou, BAGC, Maputo, 26 Feb 2015.
level participatory extension is closely linked to farmer organisations, with farmer association extension workers operating under the umbrella of a democratic organisation. Relationships are based on farmer-to-farmer exchanges with technical linkages to R&D in the public sector.

In the mid-2000s DNER (within MINAG) employed approximately 600 frontline extension workers who were located in 66 of Mozambique’s 128 districts (Wulf and Torp, 2005:22–23). Emerson Zhou of BAGC has commented on the lack of public extension. He said that currently there are 60 extension officers in Tete, which is about four officers per district. While farmers in Dondo in Sofala indicated they had received extension support from district agriculture, there is only one person for a large area and more extension officers are needed. Farmers confirmed that extension workers provide good advice but have limited time to spend with them. UPC Sofala prioritises training for farmers on agricultural techniques, specifically CA, and provides access to inexpensive technologies including seed production, manure and animal traction.

**Threats and opportunities—paths to follow and further investigation**

There is general agreement that variety enhancement or improvement can be of value to farmers and that it can increase choice. However, at the outset we must note that the positioning of government and Green Revolution interventions in the seed sector in Mozambique is oriented towards the expansion of a commercial seed sector. This bias is based on the assumption that only private, commercial entities have the capacity and motivation to generate improvements and the farmer-managed system is largely ignored. This could mean that the rules and regulations apply to the commercial seed sector only, and that farmers can proceed as they have done in the past, saving and sharing many varieties of seed. However, there will be encroachments on farmers’ rights to save, exchange and sell any seed in their possession. This will start with protected varieties once PVP laws come into operation, and will expand with the privatisation of germplasm and the inevitable increase in private investment for improvements to other varieties.

Within farmer-managed seed systems the main concern is that public resources are being channelled into supporting Green Revolution improvements and distribution, and farmers are being left on the margins to do what they can with the resources available to them. While governments are willing to support the formation of a commercial seed sector, this does not mean they should completely ignore farmers, who are the vast majority of seed producers, and will continue in this role for the foreseeable future. Information and funding for agricultural business projects are not easy accessible by small-scale farmers. Programmes that offer technical support, germplasm access and advice, that are driven by farmer priorities and closely linked to democratic farmer organisations, should be an explicit and funded part of public sector activities in the seed sector.

Trials and registration for plant breeding R&D reveal a number of problems. Once germplasm is placed in private hands it will no longer be available to farmers for their own enhancements, thereby diminishing their choices rather than expanding them. The existing orientation in favour of plant breeding focuses on the commercial sector where breeders’ rights trump farmers’ rights. It may be that the intention is to explore protection for registered varieties from the unauthorised use and sale by other commercial competitors. However, current wording of laws and policies governing plant breeding leads to the criminalisation of farmers who sell seed that is recycled from protected varieties, or in some other way is derived from these varieties (for example, through crossing in the field). Again, this restricts rather than expands their rights and choices.

Presently, in predominantly farmer-managed seed systems, farmers select, store and reuse seed from the same crops that they use for

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80. Interview, Domingo Buramo, President, UPC Sofala, Beira, 7 May 2015.
food. This is a highly skilled activity which requires substantial contextual experience, much of which is passed down through generations. Farmers have always conducted experiments on their own land and now need public access to germplasm which they can cross with their own varieties, together with technical support from the public sector or other not-for-profit ventures. This applies also to the many species and varieties that are not of interest to commercial breeders. Farmers may also want to use improvements from protected varieties to bolster their own reserves. While this is permitted by the 2013 Decree, provided that farmers do not share the seed with others, it is not clear whether the Arusha PVP Protocol will criminalise the recycling of protected varieties if used by farmers. However, currently the Arusha Protocol severely restricts farmers’ rights to save, exchange and sell farm-saved-seed and/or the propagating material of protected varieties in their possession. DUS tests are onerous and inappropriate for the seeds used by local farmers. These tests are designed specifically for genetic uniformity and favours commercial seed companies. We do not believe the DUS test has any value for the majority of farmers, for whom the distinctions between one variety and another is irrelevant. Uniformity and stability are characteristics of simplified, standardised systems of production and these traits are unsuitable for the complex, dynamic conditions faced by farmers. Conversely, a lack of uniformity and standardised performance may benefit farmers by spreading risk; for example, enabling seeds to mature at different times in the season which allows continuous harvesting rather than a single large harvest (which, in turn, results in overproduction, decreased market prices and large-scale post-harvest losses). These uneven traits may be present in existing adapted varieties or variety mixes developed by farmers themselves to meet their local conditions. However, VCU testing could be applicable in that it determines whether new varieties perform in specific agro-ecological contexts, and the tests can be done in situ by farmers—not as in-field trials managed by external researchers on farmers’ lands, but by the farmers themselves.

Generally speaking, we should draw distinctions between commercial and farmer-managed systems. Within the commercial system rules and regulations should apply and be enforced to ensure that farmers receive what is being promised. This applies more to certification than registration, as well as the crossover from plant breeding to seed multiplication. Any variety of seed that bears a government seal of approval should abide by a set of standards, especially germination rates and moisture content. Ideally, one of the aims of regulations governing seed standards should be to protect farmers from exploitation by unscrupulous seed suppliers, which would give farmers some security. At the same time, regulations should not limit the production and distribution of quality seed by farmers operating outside the formal framework.

Small-scale farmers can play a role at the level of defining decentralised R&D priorities, breeding and in-situ testing of new varieties, and multiplication and distribution of seed. While these activities can apply to both commercial and farmer-managed seed systems, ISSD tries to restrict these efforts to the commercial system. If farmers wish to produce certified seed for commercial sale in the market, they will need to follow procedures for that system, but even so we can raise issues about the applicability of certain of those procedures, in particular restrictions on the use of protected varieties and NDUS testing on the breeding and R&D side; certification costs; and needlessly restrictive labelling and packaging requirements on the production and storage side. It may be that good or recommended practice, with technical support to build these practices, could replace inflexible procedures
Farmers in Manica

institutions) on behalf of society. Privatisation means the transfer of this germplasm—which has been selected and developed over a long period, mainly through in-field selection and saving and use by farmers themselves—to private interests who attain exclusive rights to use that germplasm or to charge others for its use. Quite clearly this is an unjust practice. At present the wholesale privatisation of germplasm banks does not appear to be on the immediate agenda. However, there will be encroachment over time as the public sector cedes exclusive rights to improvements on germplasm to the private sector, once the latter has developed new varieties that fall within the NDUS criteria.

This situation should be defended on two counts. First, all germplasm in the CGIAR and public sector institutions should remain in the public sphere and be available to anyone choosing to use it, whether for purposes of R&D and/or improvement. This includes farmers individually or in association with one another. Secondly, any improvements which have utilised germplasm from this common pool should be returned to the common pool for further public use. This is the basis of a General Public Licence that functions well in the open source computer software industry. Elsewhere we have already made the argument that anyone should be permitted to multiply and brand improvements for sale (subject to agreed regulations and quality controls). Also, it is accepted that developers are likely to be ahead of others through ‘first mover’ advantage and because of the difficulties of reverse engineering improvements. Ultimately, a brand should be a stamp of quality and users will return to the brand if the product is worthy. If we find that laws and policies do not permit this approach, at the very least farmer organisations should be able to interrogate projects and activities to see where final ownership of the improved varieties will lie. If possession moves from the public sector into private hands, organisations can then decide not to work with that project and to oppose the redirection of public resources to such projects.

What is the logic behind government adopting the Green Revolution approach to seed improvement? First, there is recognition that combining germplasm from different parts of the world, with different traits, promotes the production of seed that is better able to meet farmers’ needs than germplasm from an isolated pool. Secondly, governments will have access to imported germplasm—especially through the CGIAR institutions—whereas other agencies and individual farmers will not. We should acknowledge that CGIAR institutions have received a new lease of life through grants and donations from some of the major sponsors of the Green Revolution, such as USAID, AGRA, the Rockefeller Foundation and many others. There is something to be said for resources flowing into support for R&D in the CGIAR institutions, in collaboration with national agricultural research institutions, rather than to the private sector.

There is a general perception that African governments, by and large, do not have sufficient resources to carry the seed improvement and production process to its end point. It follows that these governments will support the private sector becoming involved in multiplying and branding seed and selling it for their own account, with the payment of royalties or a fee to the public sector (as the rights holder) for access to the foundation seed. This makes sense only if private enterprises are not granted exclusive rights to the public improved varieties. Rights granted to any group should not be at the expense of the rights of other groups. Farmers’ rights in this instance are to reproduce and reuse in any way they choose (including selling) the genetic material in their possession which they have been reproducing and keeping alive, year after year.
From a biodiversity and sustainability point of view these rights are also critically necessary. This is a sticking point for private sector enterprises; they argue that without exclusive rights to produce a particular variety, too many people will produce the variety and the market is not big enough to justify the investment. The counter to this is that their lack of success in a competitive market is no reason for the public sector to protect them—at its own expense and the expense of others. Governments may argue that farmers need access to this seed in order to increase productivity, but access can be provided only through a commercial enterprise producing the seed on the basis of strict quality control. In fact, this runs counter to experience on the ground—farmers appear distrustful of packaged seed because its quality is so variable. This may be a distribution issue, i.e. agro-dealers repackaging seed, and many people say this is commonplace; but it may be, also, a result of a monopoly on seed production (with proprietary or exclusive rights) with private enterprise being unconcerned about quality. In this respect competition will force the private sector to maintain quality or lose market share.

Commercial rights to make a profit from production and sale of seed should not impinge on the rights of others to do the same, or to produce and distribute other varieties. Farmers’ rights should not be restricted; equally, the varieties available to them should not be constrained.

SOIL FERTILITY AND

SYNTHETIC FERTILISER

Background

In Mozambique, especially in the Central Region, shifting cultivation (i.e. land lying fallow for a time before being cropped again) is still widely practised. As a result fertiliser use does not feature much in production practices. Green Revolution proponents have two primary arguments for increasing synthetic fertiliser use. The first is well-articulated by Greenbelt Fertilisers: farmers practise shifting cultivation at the moment but land will become limited in future. While this is not a problem at the moment, farmers must prepare for the time when they cannot move from field to field anymore, so already there is a long-term necessity to use fertiliser. The second assertion is, in order to increase productivity, certain missing nutrients required for healthy plant production should be supplied. These may not occur naturally in some areas, or they have been depleted from the soil through repeated extraction without replenishment. MINAG identifies nutrient mining caused by “traditional low yield production methods” as being the cause of low productivity in Mozambican agriculture (MINAG 2012:iii). A study conducted in the 1990s estimated soil nutrient losses of 122 kg/ha of nitrogen, 60 kg/ha of phosphorous, and 116 kg/ha of potassium through nutrient mining from cultivation without replenishment, coupled with soil erosion and nutrient leaching (cited in IFDC, 2012:4). Based on the extent of crop production and the amount of nutrients removed, maize and cowpeas are the two crops with by far the largest nutrient removal ‘footprint’. Sorghum, rice and cassava have a far less detrimental effect (IFDC, 2012:40).

Fertiliser use is very low in Mozambique, with an average of only 4.4 kg/ha over the period 2002–2009. Currently commercial tobacco (60%) and sugar cane (30%) constitute the bulk of total fertiliser consumption in Mozambique.

81. Interview, Munyaradzi Usore, agronomist, and John Christie-Smith, general manager, Greenbelt Fertilisers, Beira, 8 May 2015.
Apart from applications for tobacco and sugar cane, Mozambique’s farmers do not use much synthetic fertiliser. Also, there is limited use of organic fertiliser such as manure because of low animal ownership, which is partly a consequence of the apartheid-sponsored internal war when agricultural production was severely disrupted. In 2008 in Manica less than 5% of small- and medium-sized farms used fertiliser, and in Sofala the figure was less than 1%. In the same year Tete showed the highest percentage of fertiliser use in the country, at around 15% of small- and medium-sized farms (IFDC, 2012:23). In 2012 the IFDC estimated that for Mozambique to meet the growth targets in the country’s strategic agricultural plan (PEDSA), fertiliser use will have to increase from 51 600 tons to 225 000 tons (IFDC, 2012:vi).

Prior to structural adjustment in the 1990s, fertiliser for small-scale farmers was procured and distributed mainly through public sector institutions, with a few private concessionary holders. Japan was a major supporter of procurement (MINAG 2012:3). Following deregulation in 1996 a vacuum was created in the supply of fertiliser, because the private sector claimed that importing fertiliser for use by small-scale farmers was not profitable. The public sector was later tasked with providing support to encourage private sector involvement in the supply of fertiliser (MINAG 2012:6).

The standard type of fertiliser used by small-scale farmers is NPK 12:24:12, despite the fact that the blend does not provide a substantial increase in yield, according to AGRA staff in Maputo. MINAG itself (2012:18) recognises the “abusive use of 12:24:12 formulation”. The direction of development at this stage is towards prescription blended fertilisers adapted to more localised requirements (see below). Urea (N) is used as a top dressing for food crops, tobacco uses calcium ammonium nitrate (CAN), and sugar uses CAN, diammonium phosphate (DAP), muriate of potash (MOP) and ammonium sulphate ((NH4)2SO4) (MINAG, 2012:8).

Policy terrain

As indicated earlier, part of the government’s NAFSN commitment is to produce a Fertiliser Strategy, although there is no discussion on content in the NAFSN framework document. It is obvious that USAID and NAFSN are pushing a strong free market private sector line, including reducing tariffs and taxes for fertiliser imports and opening routes for the free flow of fertiliser into the region. The Abuja Declaration declared fertiliser, from both inorganic and organic sources, as a “strategic commodity without borders” (MINAG, 2012:iv), and MINAG has accepted the Declaration as its departure point for a national strategy.

PEDSA identifies a few priority actions for increasing fertiliser use: consolidate agricultural research and link with extension; develop a network of agro-dealers to transfer seed and fertiliser technologies; develop product value chains and markets; and encourage PPPs for agricultural investment (IFDC, 2012:4). In 2014 a Fertiliser Platform was established which aims to increase the local production and use of fertiliser. There is a national strategy in place and Decree 11/2013 approved a regulatory framework for fertiliser but so far no law has been drafted.

The national fertiliser strategy extends the Abuja Declaration which set the goal of increasing average fertiliser use across Africa from 8 kg/ha to 50 kg/ha by 2015—obviously this will not be achieved. This presages trade liberalisation and regional harmonisation, which are explicitly mentioned as objectives in the Declaration (MINAG, 2012:iv). The Beira port is recognised as a strategic entry point for fertiliser into the region (MINAG, 2012:11).

According to MINAG, a policy constraint to increasing fertiliser use in Mozambique is a 2.5% tax on importation, and restrictions on the re-export of fertilisers (MINAG, 2012:13). According to Greenbelt Fertilisers import costs

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83. Interview, Emerson Zhou, BAGC, Maputo, 26 Feb 2015.
84. Interview, Manhica and Verde, AGRA, Maputo, 26 Feb 2015.
are very high. The direct port charge is US$ 400, but the figure is almost double (US$ 700) by the time it arrives at the factory, with the addition of customs, scanning, wharfage, shipping lines and a dredging fee, and the 2.5% duty to government, although this last item may be rescinded. Exchange rates increase costs and customs charges higher than the official rate.\textsuperscript{85}

Because fertiliser use is so low in Mozambique, the strategy is to piggyback on economies of scale for export into the region with a small amount reserved for use in Mozambique. Without this tactic the private sector is not interested in bringing such small volumes into Mozambique so ease of re-export is crucial to the plan. The lack of regulations for quality control is a further constraint. MINAG indicates that an “efficient market-oriented system” is required. This should take into account the creation of a favourable policy environment; improve importation mechanisms; establish retail networks; produce updated recommendations on fertiliser use; create demand amongst small-scale farmers; and develop credit schemes, amongst others (MINAG, 2012:13). Demand-related constraints identified by MINAG (2012:15) include the high price of fertiliser, low prices for agricultural products, the poor quality of fertiliser, a lack of farmer knowledge; inappropriate package sizes; and inadequate procurement and transportation systems.

A Fertiliser Strategic Programme (PENF) was detailed in the fertiliser strategy document and proposes to stimulate supply and demand to increase productivity, while taking into account environmental considerations (MINAG, 2012:19). Key issues included in the programme are: the establishment of an agro-dealer network, an input subsidy programme, stimulating national production, mapping soil fertility and updating crop recommendations, and developing regulations. Decree 11/2013 on fertiliser management regulations requires registration for the production, distribution, import, export and use of fertiliser, and stipulates that these activities are conducted only by companies registered in Mozambique. A new institution called Comité de Avaliação Técnica do Registo de Fertilizantes (CATERF) is responsible for the oversight of all fertiliser-related activities in the country (Davies, 2014:10). USAID consultants appear concerned at the slow pace of movement and also complain that the regulations on imports and distribution are too onerous for the private sector (Davies, 2014).

The national fertiliser strategy recommended the development and implementation of a fertiliser subsidy programme to stimulate demand, and suggested the goal of reaching 200 000 farmers by 2016 (MINAG 2012:20, 22). A voucher programme for subsidised fertiliser was piloted in 2009–2011; it targeted medium-scale and commercialising farmers in the central provinces (Manica, Sofala, Tete, Zambezia, Nampula) and was supported by FAO, IFDC, EU and USAID (MINAG 2012:25). The pilot targeted 25 000 farmers and beneficiary farmers each received one bag of NPK 12:24:12, and urea, plus maize or rice seed. Farmers contributed 30% of the cost (IFDC, 2012:26). Agro-dealers received the fertiliser on credit from the Mozambique Fertiliser Company (MozFert); they then supplied it to rural stockists who gave it to farmers in exchange for vouchers. The stockists submitted the vouchers to the agro-dealers who passed them on to the FAO for reimbursement. The FAO paid the dealers and informed MozFert who then requested their payment from the dealers. This was a cumbersome process and revisions include the involvement of commercial banks, supposedly to make the process more efficient (IFDC, 2012:27). The 2012 government budget estimate for fertiliser work was US$ 1.1b over 5 years, with 93% to the subsidy scheme (MINAG 2012:27).

From commencement to the present, the scheme has been based on the discredited 12:24:12 standard blend, according to AGRA staff in Maputo.\textsuperscript{86} Greenbelt Fertiliser refused to participate in the subsidy pilot because it was based on the standard NPK package, and

\textsuperscript{85} Interview, Usore and Christie-Smith, Greenbelt, Beira, 8 May 2015.
\textsuperscript{86} Interview, Manhica and Verde, AGRA, Maputo, 26 Feb 2015.
Greenbelt is working on specific blends for different areas and conditions (see below). IFDC is working on new fertiliser blends, while Greenbelt, the African Fertiliser and Agribusiness Partnership (AFAP) and IIAM are working on soil mapping, soil tests and experimental blends.\(^{87}\)

**Imports and the production of synthetic fertiliser**

Imports are administered by private companies, mostly, with MLT and several sugar companies importing their own fertiliser supplies, constituting about 75–80% of imports between them (MINAG, 2012:5). Agrifocus, Tecap, Hygrotech, Agroquimicos, Savon, Greenbelt and MozFert had a combined total of roughly 20–25% of imports. The ports at Beira and Nacala are the entry points for fertiliser imports, which originate mainly in the Middle East, East Asia, Europe and South Africa (MINAG 2012:10). An estimated 70% of the imports that pass through Mozambique’s ports are in transit to Malawi, Zambia and Zimbabwe (IFDC, 2012:21).

Fertiliser for smallholder use in Mozambique arrives mostly from South Africa via road (IFDC, 2012:25). The BAGC mentioned plans to upgrade the Beira terminal and other facilities, including rail into the interior to serve Zambia and Malawi, as well as Yara’s investments. Local production of fertiliser is very limited. There are two domestic blending factories, MozFert in Manica and Greenbelt in Sofala, using imported raw materials. MINAG proposes four new factories by 2016 (MINAG 2012:22). Sumitomo, with Toyo Engineering, was seeking finance for a fertiliser plant in Beira as part of its NAFSN intentions (Marapusse et al., 2014:31). Gas fields and phosphate deposits indicate potential for local production, and Yara and Mitsui have plans to develop a nitrogen plant which could drastically reduce the cost of nitrogen, even though internal production costs are very high.

Greenbelt Fertilisers is a Zambian company that started operations in Mozambique in 2011 with a factory in Beira.\(^{88}\) It employs 57 permanent and 350 casual staff members. In the early days about 95% of Greenbelt’s production in Mozambique was exported to Zambia, Zimbabwe and Malawi. Greenbelt’s initial focus in Mozambique was on commercial farmers, i.e. those with farms >100 ha—but the large estates imported their own fertiliser and there were not enough medium-scale commercial farmers to constitute a market. Greenbelt then decided to turn to demand creation amongst small-scale farmers, starting in the Beira Corridor. The company used cabbage in demonstration plots because cabbage is much more responsive to fertiliser than maize and they could easily prove their product’s efficacy to farmers. They provided extension services with the product and offered small package sizes (5–10 kg) to make the fertiliser more affordable. The focus is not only on commercial production but also on households—to intensify their food production and achieve greater productivity on smaller acreages. Today Greenbelt is part of many large initiatives to provide synthetic fertiliser to small-scale farmers across Mozambique, and claims that the share of its production used in Mozambique has risen to 15%. The company works closely with MINAG, IFDC, AFAP, German International Cooperation (GIZ), USAID and Concern, amongst others.

Greenbelt has its own unique approach to synthetic fertiliser. At its core is prescription

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87. Interview, Manhica and Verde, AGRA, Maputo, 26 Feb 2015.
88. Interview, Usore and Christie-Smith, Greenbelt, Beira, 8 May 2015.
blending of fertilisers to suit specific soil conditions. The first step requires soil mapping at a district level across the country, modelled on the example of Rwanda.\(^9\) Kenya had also conducted a similar mapping process. This is accompanied by an annual soil sampling exercise. According to John Christie-Smith, Greenbelt’s General Manager, soil mapping is an expensive process but must be done. Using funds from USAID and IFDC and the Geographical Positioning System (GPS) samples are taken from different areas and variations are checked. The process is performed over a cross section of the selected area, because plots are small and it is not feasible to do tests on every plot. The idea is to map nutrient lacks and then develop a prescribed blend for each area. According to Christie-Smith, this is where the market is, and while the process is not perfect, it is better to start with accurate district level information on soils and a prescription blend, rather than a uniform blend across the country. Christie-Smith is opposed to the standard NPK application and emphasises the need for micro-nutrients that are not found in these standard blends, especially zinc, boron and sulphur. Greenbelt’s facility in Beira is equipped with machinery that permits the production of prescription blends based on orders from the field.

Greenbelt recognises that overuse of fertiliser can burn plants but this can be prevented if organic content is also applied. The company therefore promotes CA—defined as no till, permanent cover and intercropping—to ensure organic content in conjunction with micro-dosing (125–185 kg/ha, placed rather than broadcast). The emphasis on CA is not a gimmick and it appears that Greenbelt is serious about spreading the idea of CA as much as the idea of prescription blended micro-dosing with synthetic fertiliser. CA can accommodate micro-dosing with synthetic fertiliser and this creates a market amongst small-scale farmers for the company. At the same time it indicates an awareness of the importance of organic content. There seems to be general acceptance that synthetic fertiliser on its own is insufficient and its effectiveness is determined by interactions with other inputs, including organic fertilisers, improved seed, water, traction equipment and management practices (e.g. ISFM or CA) (IFDC, 2012:6).

AGRA’s Soil Health Programme (SHP) is essentially on ISFM, which focuses on grain-legume integration for nitrogen fixing. It also includes micro-dosing of synthetic fertiliser. Total grants for SHP in Mozambique came to US$ 4.2m in 2007–2012, split mainly between extension and research and training (Appendix 1, Table 1B), although all grants dealt with one or other aspect of ISFM. Top grantees are public and parastatal institutions: IIAM received US$ 1.7m (40.5% of total SHP grant value) in three tranches; ADEM was awarded US$ 815 000 for outgrower schemes in Beira; and the Netherlands Development Organisation (SNV) received US$ 800 000 for input and output markets for pigeon pea and maize (19% each of SHP grant value). Thus 80% of SHP grants in Mozambique up to 2012 went to these three institutions. Another US$ 441 000 was granted to the Directorate of National Agrarian Services to improve access to fertiliser.

AGRA sponsored an ISFM (pigeon pea and fertiliser) project with IIAM, from 2010 to 2013, in the Gorongosa district in Sofala, as well as the Manica, Vanduzi and Barue districts in Manica. Extension workers received training on demonstration plots and how to train farmers in ISFM techniques. These included fertiliser

application rates, correct crop spacing, intercropping and the rotation of maize and pigeon pea, the incorporation of crop residues, and pest and disease management. There were 354 demonstrations over the three years (AGRA and IIRR, 2011:65).

Since 1996 CA has been promoted in Mozambique: 27 development organisations, 10 research organisations and 5 private sector organisations were actively involved in CA in 84 districts in 2012, with a concentration of projects in Manica province (Grabowski, et al., 2013:1–2). There is some evidence of yield gains from CA, and a gradual improvement in soil quality although this is a slow process—it can take up to five years before yield-increasing soil improvements are evident. However, in the early years there are other advantages including reduction in erosion, fuel, labour and equipment costs (Grabowski, et al., 2013). Generally speaking, farmers were doing one or two of the components of CA but not the whole package. Residues must be spread thickly and this is not always possible because of a lack of biomass and because of competing uses for the residues (e.g. animal feed). Farmers are interested in CA and provincial unions provide support to farmers but this is not always systematic or thorough.

**Threats and opportunities**

It is necessary that we understand the logic of the argument supporting the use of synthetic fertilisers. The first step in the logical flow is that soils may be lacking in some macro and micro nutrients and these must be replaced, otherwise soil quality and yields will decline over time. It is self-evident that if nutrients are extracted through harvesting plants, those nutrients must be replaced in the soil. In Mozambique it appears that nitrogen and pH levels are affected (hence the need for lime) as well as micronutrients—which are the most critical factors—although this will also be context specific. The argument is that in some places the soils have never had these micro-nutrients, and it will improve yields and farmers’ livelihoods if these nutrients are added to the soil.

The second step in the logical flow is that organic matter is an essential part of maintaining soil fertility, hence the use of permanent ground cover which feeds the soil. But the argument continues that organic matter is often insufficient on its own, because if the soil is missing some nutrients (especially micro-nutrients, some of which are required to enable plants to take up the macro-nutrients), the organic matter arising from that soil will also be missing these micro-nutrients and therefore cannot logically increase their availability in the soil.

The third step in the logical flow is that there is a problem with existing fertiliser practices based on the application of a standard macro-nutrient mix uniformly to all soils (e.g. NPK 12:24:12). First a soil test needs to be done to see what is missing (depending on the crops to be grown), and then a specific blend for that soil can be made. Micro-dosing is used to reduce the negative ecological impacts.

The fourth step in the logical flow is that it is expensive to produce prescription blended fertilisers and farmers generally cannot afford it, hence subsidies are required. Since the private sector will produce the blends only if it is profitable to do so, subsidies must come from the public sector. Once farmers have improved the soil fertility, yields will increase and they will be able to pay for these inputs.
This is the same story as for the modernisation of seed (above).

There are a few issues to address. First, is synthetic fertiliser necessary? This is an empirical rather than an ideological question, but at this stage we do not have enough information to answer it. In some places farmers indicate they do not need fertiliser because the soil is fertile and yields are good. The counter is that as farmers have to do continuous rather than shifting cultivation, the soil will be mined of nutrients more quickly and hence will require more inputs. Some farmers have indicated they want to use synthetic fertilisers but these are not readily available and/or are expensive. Synthetic fertiliser is far more expensive an input than seed. Farmers need to be supported to identify their soil fertility needs and also to look at possible practices and alternative inputs that are more readily available and less costly.

We are at a disadvantage regarding an informed response to the prescription blended micro-dosing argument because we do not have data on the nutrient content of the soil, and acquiring such data is an expensive undertaking. What nutrients are missing, what nutrients are required for different crops, and to ensure soil health? We also need technical capacity to interpret such data if/when it becomes available. The first thing we can say is that nutrient mapping would be beneficial because it potentially makes more information available to farmers. But the information must be in the public domain, otherwise it creates an unequal playing field where private businesses have information that is not available to other interested parties. Farmers may be able to identify when plants are not performing well, as a result of a lack of nutrients, but their knowledge may not necessarily extend to knowing what the causes are. In some cases it may be that the missing nutrients are not locally available.

There is also the question of the negative ecological impact of synthetic fertiliser use. This needs further exploration. Runoff of excess nitrogen is a major problem for waterways and soil life, but this may also be true for the overuse of manure which can also cause a build-up of excess nitrogen. A key weakness within the Green Revolution approach to soil fertility is that soil life is not measured or considered; rather, its approach is to focus on the impacts on crop yield. The result is that soil may become an inert carrier of synthetically produced chemicals to feed the plant from one year to the next, not a living system itself. This is not sustainable in the long term. At the very least, we must ensure measures of moisture content and soil life (macro and micro fauna and flora, especially earthworms and mycorrhizal fungi) are incorporated as a central component of soil testing (Bot and Benites, 2005). Methodologies to bring testing closer to farmers should also be identified and shared with farmers.

The same set of issues that apply to seed apply also to fertiliser. Who will benefit most from public sector resources being re-directed to support private sector fertiliser products? This is likely to be a thin layer of farmers who are seeking to expand commercial (mostly monocropping) operations, and private enterprise. Alternatives that can be explored further, with support from a public sector programme, include farmer experimentation with manure, compost, and CA in its basic form—permanent ground cover, intercropping or crop rotation, no till, without the addition of synthetic fertilisers or pesticides. This should be based on the same public sector extension working with farmers and their associations, introducing a menu of options but not compelling farmers to accept a single, predetermined path.

CA is a technical methodology, but it can be hijacked by private interests on two scores. The first is the insertion of synthetic fertiliser and pesticides into the package, and the second is the longer-term danger of the private capture of legume varieties as an alternative to synthetic fertilisers over time. There is a particular danger of the introduction of genetically-modified (GM) soya beans and even cowpeas over time, especially as PVP laws and regulations favouring private interests come into play.
CONCLUSIONS AND THE WAY FORWARD

The Green Revolution in Africa is couched in the language of support to small-scale farmers for food security. This is based on the idea that food insecurity in Africa is caused by inefficient farming practices, and the solution is that these farmers need technologies that have already been developed and adopted elsewhere. The proof that these technologies work is offered by the yield increases and surpluses being produced. However, there is a hidden underbelly to this argument—primarily, that modernisation relies on the consolidation of land and farming units, with fewer, larger producers generating surpluses. In advanced capitalist countries this was possible because the huge social dislocation caused by enclosure of the land and dispossession was absorbed by rising industrial enterprises and wage labour in the towns and eventually cities. But we live in a different age today. Industry and manufacturing are globalised, with Africa a net importer of manufactured goods and an exporter of raw materials. Private and corporate control over R&D and cutting edge technologies make it ever more difficult to compete on that field. More recently, the private ownership of intellectual output tightens the multinational corporate grip on technological development. Powerful states back private interests and share in the wealth, to the exclusion of others.

The logic of modernisation is that there is a need for specialisation, meaning surplus-producing farmers on consolidated land, while the majority of farmers will need to find some other means of survival such as wage labour on other peoples’ farms, or will be economically driven to migrate to urban areas where their existing skills are not required in the job market. In these conditions the Green Revolution may realise one half of its agenda, which is to create a commercial surplus-producing layer of farmers. But never mentioned in the boosterist propaganda of AGRA and USAID et al is the downside: for every large farmer occupying consolidated land, there are many households who lose their land and farming livelihoods and are forced to turn to other activities to survive, including low paid wage labour on commercial farms and in mines. When pressed, those pushing modernisation will say this is an inevitable and necessary transition to a more efficient and productive economy, with higher levels of consumption generating an endless virtuous circle of supply and demand. However, potential employment in urban areas and even on the mines and farms will not be able to absorb the numbers of families pushed off the land and out of agriculture. The Green Revolution will always hold up as proof of success the 5–10% of farmers who have been able to take advantage of the large amounts of money being invested in African agriculture. But no-one will look at or mention the multitude of other farmers who have been pushed aside.

The Green Revolution can talk of support to small-scale farmers since these farmers constitute the vast majority of the farmers on the continent. But among these small-scale farmers not all will benefit equally, and a class of larger surplus producers will arise. Even so, it will take a long time before it becomes apparent that investments have consistently been oriented towards building precisely such an elite stratum. First comes the provision of blanket support to see who rises to the top, then dedicated support to those individuals who show promise for commercialising. And all the while, any criticism on the investment strategy can be staved off because these farmers have, after all, risen from the ranks of the mass of small-scale farmers, and relatively few investments (especially by the country donors, philanthropists and multilateral donors) will be oriented towards what we understand to be large-scale producers, such as the vast sugar estates or timber plantations.

The Green Revolution is based on an argument that fewer, larger farms producing larger surpluses are the way forward for food security as a whole. Here the Green Revolution is looking not only at farmers, but at the broader society. It may or may not be true that a concentrated core of large commercial farms can produce enough food. The example of South Africa on the continent suggests that it may be possible, but the social inequalities it engenders also means that the cornucopia of
food that is produced is out of reach of many people simply because they cannot afford to buy it. Ultimately, despite the rhetoric, the Green Revolution sees the necessary sacrifice of many small, ‘inefficient’ farmers at the altar of food surpluses—as such it can be considered anti-farmer.

Part of the problem for the Green Revolution is that it cannot yet find buy-in for its products in Mozambique. The argument is that farmers don’t know or don’t have access to the technologies, and they would adopt them if they knew about them, had access to them and tried them. It may be true that some of the technologies could be useful to farmers, and farmers definitely expressed an interest in trying out improved seeds and, to a lesser extent, synthetic fertiliser, and were also interested in mechanisation. But these technologies are too expensive, and so the cycle starts again, with trying to create output markets that can provide farmers with income to buy the inputs. The logic is that this will increase productivity and expand the economy, both in production and consumption, with more money and assets circulating among farmer and other localities.

There is a question here about output markets and the extent to which farmers in Manica or Sofala can compete on the market. One of the main problems is that many people are producing the same thing at the same time of year, which depresses prices. Standardised technologies that result in all farmers harvesting at the same time reinforce this. When the product is perishable (e.g. fresh fruit and vegetables), this situation is worse, so niche markets are not necessarily the answer. The emphasis is on finding buyers for produce before it is produced. This may help with value chain financing, although this path often leads to a different kind of exploitation as farming households carry the production risk and all other costs are recouped by the buyer at the end of the season, leaving the farming household with limited gain and potentially high loss. This is true especially if the farming household has invested in inputs, although this does not apply to everybody. The larger, better-resourced farming households will rise to the top, and receive further support which will enable them to consolidate and expand their operations. This may be beneficial in an individualistic way for these households, as they can make a living from agricultural production. But hidden away are the impacts on the surrounding households and community.

So how could small-scale farmer associations approach the Green Revolution thrust in Mozambique and the Beira Corridor? Farmers are interested in experimenting with new technologies. Potential threats should be raised with farmers. Arguments should be made to support public-farmer partnerships. Some basic principles will allow farmer associations to determine whether to adopt a critical engagement or an oppositional stance to particular interventions. These may include active farmer participation and informed consent, public and shared genetic resources, no to privatisation, no to criminalisation of the production of non-certified seed or the reuse of any seed on the farm, regardless of private claims of ownership, but these should be developed together with farmers and their democratic organisations.
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## APPENDIX 1: AGRA grants in Mozambique, 2007–2012

### Table 1A: Programme for Africa’s Seed Systems (PASS) grants, 2007–2012

<table>
<thead>
<tr>
<th>Sub-programme</th>
<th>Dates</th>
<th>Amount (US$’000)</th>
<th>Recipient</th>
<th>Description</th>
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<td>2007–08</td>
<td>199</td>
<td>Semente Perfeita Limitada</td>
<td>High yielding seed in southern Africa</td>
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<tr>
<td>SEPA</td>
<td>2007–09</td>
<td>129</td>
<td>Insumos Agricultura e Pecuaria</td>
<td>Produce, promote and disseminate improved seed</td>
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<tr>
<td>SEPA</td>
<td>2009–11</td>
<td>157</td>
<td>IKURU, SARL</td>
<td>Improved maize, cowpeas, soybean, groundnuts and sesame in Northern Province</td>
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<tr>
<td>SEPA</td>
<td>2009–11</td>
<td>150</td>
<td>Lozane Farms Lda</td>
<td>Support production and supply of improved seed in central and southern regions</td>
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<td></td>
<td>2010</td>
<td>34</td>
<td>Enock Kuziwa Maereka</td>
<td>Support to Lozane Farms</td>
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<tr>
<td>SEPA</td>
<td>2010–13</td>
<td>227</td>
<td>Instituto de Investigacao Agraria de Moçambique (IIAM)</td>
<td>Improved cassava in Nampula, Zambezia and Niassa</td>
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<tr>
<td>SEPA</td>
<td>2011–14</td>
<td>199</td>
<td>Sementes de Nampula</td>
<td>Improved maize, cowpeas, sorghum, groundnuts and sesame in Nampula</td>
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<tr>
<td>SEPA</td>
<td>2011–13</td>
<td>150</td>
<td>MC – Morais Comercial</td>
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<td>FIAAC</td>
<td>2008–09</td>
<td>414</td>
<td>International Potato Centre (Peru)</td>
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<td>Downy mildew and MSV resistant maize varieties</td>
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<td>FIAAC</td>
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<td>IIAM</td>
<td>Improved sorghum</td>
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<td>FIAAC</td>
<td>2008–11</td>
<td>185</td>
<td>IIAM</td>
<td>Rice yellow mottle virus, bacterial blight, grain shattering and lodging resistance in southern Mozambique</td>
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<tr>
<td>FIAAC</td>
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<td>IIAM</td>
<td>Improved rice varieties in lowlands in northern and central regions</td>
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<td>FIAAC</td>
<td>2011–14</td>
<td>185</td>
<td>IIAM</td>
<td>Improved maize in tropical lowlands</td>
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<td><strong>Sub-total FIAAC</strong></td>
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Table 1B: Soil Health Programme (SHP) grants, 2007–2012

<table>
<thead>
<tr>
<th>Sub-programme</th>
<th>Dates</th>
<th>Amount (US$’000)</th>
<th>Recipient</th>
<th>Description</th>
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<tbody>
<tr>
<td>Extension</td>
<td>2009–12</td>
<td>435</td>
<td>IIAM</td>
<td>ISFM in Zambezia and Nampula</td>
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<tr>
<td>Extension</td>
<td>2010–13</td>
<td>684</td>
<td>IIAM</td>
<td>Increasing fertiliser use and integration of grain legumes in Sofala, Manica and Tete</td>
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<tr>
<td>Extension</td>
<td>2012–15</td>
<td>815</td>
<td>Agência de Desenvolvimento Económico da Provincia de Manica (ADEM)</td>
<td>Soya and maize outgrower schemes in Beira</td>
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<td>Sub-total Ext</td>
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<tr>
<td>Research</td>
<td>2010</td>
<td>58</td>
<td>Kenyatta University (Kenya)</td>
<td>Report writing training to ARI and Dept of Agricultural Extension</td>
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<tr>
<td>Research</td>
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<td>IIAM</td>
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<td>2011–14</td>
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<td>Manica Higher Polytechnic Institute</td>
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<td>Research</td>
<td>2012–15</td>
<td>800</td>
<td>SNV – Netherlands Development Organisation</td>
<td>ISFM and input and output market support for pigeon pea and maize</td>
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<tr>
<td>Sub-total Res</td>
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<td></td>
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<td>Fertiliser Supply</td>
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<td>441</td>
<td>Directorate of National Agrarian Services</td>
<td>Improving access to quality fertiliser</td>
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<td>Total SHP</td>
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<tr>
<td>Sub-programme</td>
<td>Dates</td>
<td>Amount (US$ 000)</td>
<td>Recipient</td>
<td>Description</td>
</tr>
<tr>
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<td>-----------</td>
<td>------------------</td>
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<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BBTE</td>
<td>2010–11</td>
<td>299</td>
<td>Ministry of Agriculture and Fisheries</td>
<td>Test and refine breadbasket approach and develop investment plan in Beira Corridor</td>
</tr>
<tr>
<td>Markets</td>
<td>2011–12</td>
<td>750</td>
<td>Agribusiness Systems International (US)</td>
<td>Market training, storage and market linkages in Beira Corridor</td>
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<tr>
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<td>2011–14</td>
<td>812</td>
<td>MICAIA Foundation</td>
<td>Smallholder farmer support</td>
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<tr>
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<td>Agência de Desenvolvimento Económico da Provincia de Manica (ADEM)</td>
<td>Market support in Tete</td>
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<tr>
<td>Markets</td>
<td>2012–15</td>
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<td>IKURU, SARL</td>
<td>Market support in Nampula</td>
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<tr>
<td>Markets</td>
<td>2012–14</td>
<td>260</td>
<td>Kixiquila Serviços de Pesquisa &amp; Consultoria, Lda</td>
<td>Postharvest handling and linkages to high value markets in Beira Corridor</td>
</tr>
<tr>
<td><strong>Total other</strong></td>
<td></td>
<td><strong>3 258</strong></td>
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</table>
APPENDIX 2: Membership of Beira Corridor Partnership

<table>
<thead>
<tr>
<th>Government of Mozambique</th>
<th>Farmers Organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Instituto Superior Politécnico de Manica</td>
<td>• UCAMA</td>
</tr>
<tr>
<td>• Ministry of Agriculture, Centre for the Promotion of</td>
<td>• UGC</td>
</tr>
<tr>
<td>Agriculture (CEPAGRI)</td>
<td>• UNAC</td>
</tr>
<tr>
<td>• Ministry of Industry and Commerce</td>
<td>• UPC Tete</td>
</tr>
<tr>
<td>• Ministry of Plan and Development, Centre for the</td>
<td></td>
</tr>
<tr>
<td>Promotion of Investment (CPI)</td>
<td></td>
</tr>
<tr>
<td>• Ministry of Transport and Communication</td>
<td></td>
</tr>
<tr>
<td>• Vale do Zambezi</td>
<td></td>
</tr>
<tr>
<td>Donors/DFIs</td>
<td></td>
</tr>
<tr>
<td>• Alliance for a Green Revolution in Africa (AGRA)</td>
<td></td>
</tr>
<tr>
<td>• Department for International Development, UK (DFID)</td>
<td></td>
</tr>
<tr>
<td>• International Finance Corporation (IFC)</td>
<td></td>
</tr>
<tr>
<td>• Hewlett Foundation</td>
<td></td>
</tr>
<tr>
<td>• Norfund</td>
<td></td>
</tr>
<tr>
<td>• Norwegian Embassy – Mozambique</td>
<td></td>
</tr>
<tr>
<td>• SNV</td>
<td></td>
</tr>
<tr>
<td>• World Bank</td>
<td></td>
</tr>
<tr>
<td>• Young Africa</td>
<td></td>
</tr>
</tbody>
</table>

Private Sector

• AgDevCo
• Banco Oportunidade de Moçambique
• BCI Bank
• Banco Terra
• CETA
• Clean Star
• Gapi
• Grown Energy Zambeze
• InfraCo
• Marketlink
• Mozfoods
• Prorustica
• Rio Tinto
• Riversdale
• Sal & Caldeira
• Sena Sugar
• Standard Bank
• SEMOC
• Sun Biofuels
• Tongaat Hulett ( Açucareira de Mafambisse )
• Vale
• V&M Trading
• Yara International

Source: http://www.beiracorridor.com/?__target__=partnerships-membership