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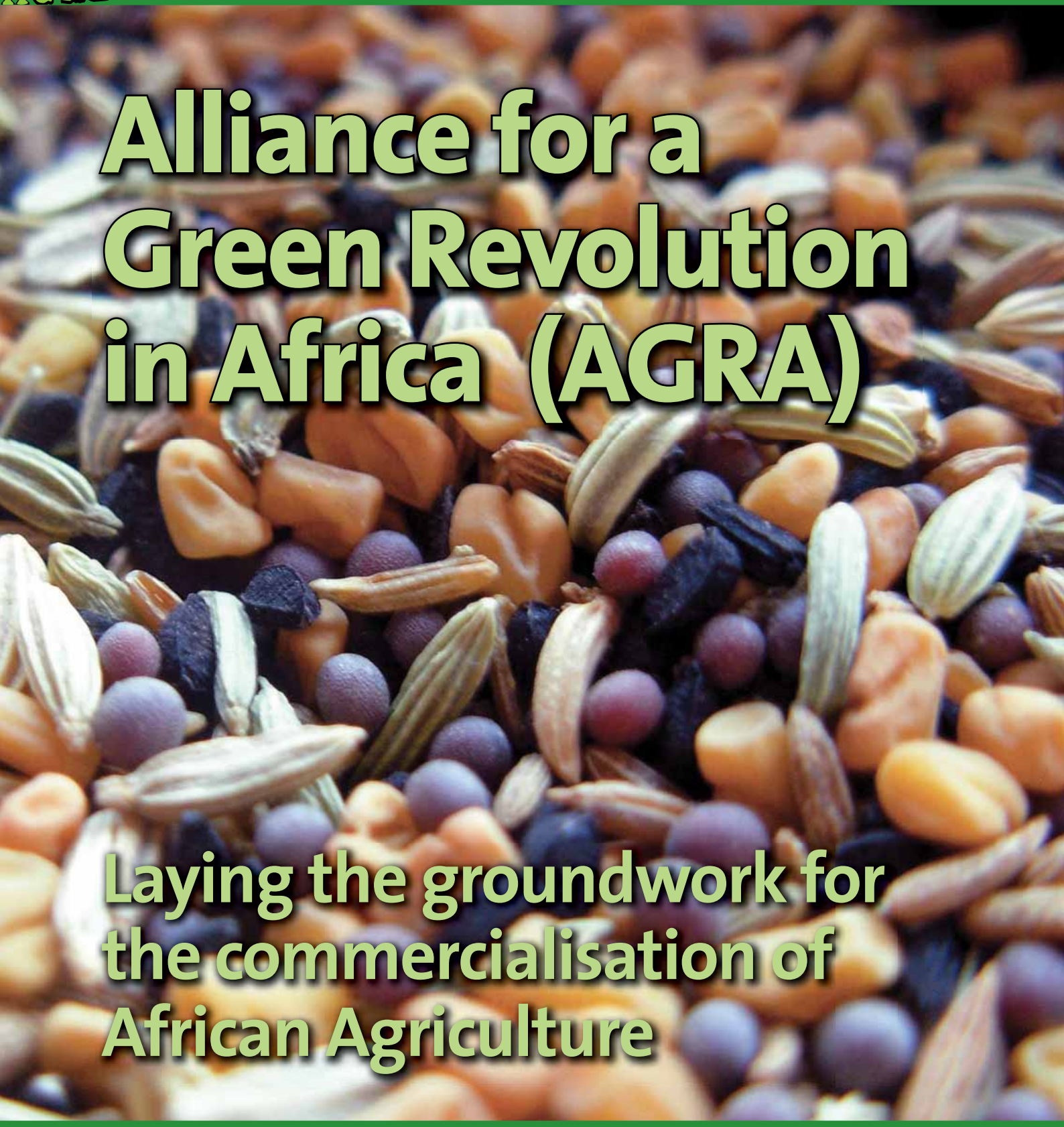

Alliance for a Green Revolution in Africa (AGRA)

Laying the groundwork for the commercialisation of African Agriculture

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The African Centre for Biosafety (ACB) is a non- profit organisation, based in Johannesburg, South Africa. It was established to protect Africa's biodiversity, traditional knowledge, food production systems, culture and diversity, from the threats posed by genetic engineering in food and agriculture. It has in addition to its work in the field of genetic engineering, also opposed biopiracy, agrofuels and the Green Revolution push in Africa, as it strongly supports social justice, equity and ecological sustainability.

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www.acbio.org.za
PO Box 29170, Melville 2109 South Africa
Tel: +27 (0)11 486 1156

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Acronyms

AAC	African Agricultural Capital
ACCI	African Centre for Crop Improvement (UKZN)
ACTESA	Alliance for Commodity Trade in Eastern and Southern Africa
ADP	Agro-dealer Development Programme
AECF	African Enterprise Challenge Fund
AFAP	Africa Fertiliser Agribusiness Partnership
AfDB	African Development Bank
Agmark	Agricultural Market Development Trust
AGRA	Alliance for a Green Revolution in Africa
AU	African Union
Ca	Calcium
CAADP	Comprehensive Africa Agricultural Development Programme
CARD	Coalition for African Rice Development
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Centre
CNFA	Citizen's Network for Foreign Affairs
COMESA	Common Market for Eastern and Southern Africa
DANIDA	Danish International Development Agency
DFID	Department for Foreign International Development (UK)
EACI	Education for African Crop Improvement
FAO	Food and Agriculture Organisation (UN)
FDI	Foreign direct investment
FIAAC	Fund for the Improvement and Adoption of African Crops
FOSCA	Farmer Organisation Support Centre in Africa
GDP	Gross Domestic Product
GM	Genetic modification/genetically modified
IARCs	International agricultural research centres
IDRC	International Development Research Centre (Canada)
IFAD	International Fund for Agricultural Development
IFDC	International Fertiliser Development Centre
IP	Intellectual property
ISFM	Integrated soil fertility management
K	Potassium
Mg	Magnesium
N	Nitrogen
NARS	National agricultural research systems
NEPAD	New Partnership for Africa's Development
NGO	Non-government organisation
OECD	Organisation for Economic Co-operation and Development
OFAB	Open Forum for Agricultural Biotechnology in Africa
P	Phosphorous
PASS	Programme for Africa's Seed Systems
PPP	Public-private partnership
R&D	Research and development
S	Sulphur
SEDF	Soros Economic Development Fund

SEPA	Seed Production for Africa
SHP	Soil Health Programme
SSA	Sub-Saharan Africa
UKZN	University of KwaZulu-Natal
UN	United Nations
UPOV	International Union for the Protection of New Plant Varieties
USDA	United States Department of Agriculture
WACCI	West Africa Centre for Crop Improvement
WRS	Warehouse receipt systems

1. About this paper and why the focus on AGRA

This paper examines the Alliance for a Green Revolution in Africa (AGRA) with a focus on its work around seeds. AGRA's intervention in African agriculture ties together a number of otherwise disparate initiatives by public sector institutions, national and multinational government structures and private companies and investors. AGRA thus provides an organisational and technical nucleus for the expansion of profit-making ventures in African agriculture. It focuses on interventions in seed as one of the central technologies for the commercialisation of agriculture, and as a profit centre.

Appraisals of AGRA from sovereignty movements so far have tended to focus on generic critiques of Green Revolution approaches to agriculture, and on the links between the Bill & Melinda Gates Foundation (Gates Foundation) and multinational biotechnology and seed companies, in particular Monsanto. Most existing critiques emerged soon after AGRA's launch in 2006 before much had happened, based on the historical experience of the Green Revolution and the role of the Rockefeller and USAID programmes amongst others, based on the historical experience of the Green Revolution and the role of the Rockefeller and USAID programmes amongst others.

Enough time has passed now since AGRA's launch to begin interrogating the initiative on the basis of its practical experiences. What we have tried to do in this paper is to dig a bit deeper into AGRA's philosophy and practice to understand in more detail what they are proposing and interrogate this. While there was not an opportunity to go to the sites and speak to participants in AGRA's activities, there has been a chance to work through the growing body of material related to AGRA's philosophy and orientation. These include important books and papers either written by key AGRA proponents or papers commissioned by AGRA to inform their strategic direction.

2. Key findings

We have found a fairly complex array of solutions being proposed by AGRA.

On the face of it, it would appear as if AGRA recognises the limits of trying to replicate the Green Revolution as it unfolded in Asia in the 1960s and 1970s in Latin America, where social and ecological conditions are markedly different. In this regard, AGRA appears to be proposing an approach to the introduction of new technologies based on the Green Revolution model that aims to work around some of these limits. In this regard, it emphasises the importance of local adaptation and the blending of different technological approaches according to context. For example, AGRA appears to be promoting work with resource-poor smallholder farmers and participatory plant breeding and selection.

However, AGRA considers hybrid seed, biotechnology (including genetic modification), synthetic fertilisers, irrigation, credit provision and general commercialisation of agricultural production as long-term goals to strive towards.

What AGRA has done is to set itself the immediate task of putting in place the building blocks to move towards the wider scale adoption of these Green Revolution technologies without trying to impose them all at once or immediately in a context where they will not be satisfactorily supported or taken up.

In this regard, an important focus of AGRA's project is to work on building both institutional and regulatory systems that can support the introduction of these technologies. Working with individuals and organisations with a long history of agricultural development work in Africa, such as USAID and the Citizen's Network for Foreign Affairs (CNFA) – organisations whose key focus historically has been on the expansion of US agribusiness, AGRA has identified specific countries and areas within countries where this work can proceed most effectively.

From a seed point of view, at the top of the policy agenda is the harmonisation of laws and policies to allow for the cross-border flow of technology, regulated as far as possible by private capital but with government support as required, and the securing of intellectual property (IP).

AGRA's emphasis on the profit motive as the driving force of economic development, and its long-term orientation towards the rolling out of Green Revolution technologies based on biotechnology, synthetic fertilisers and debt-driven commercialisation place it on a potential collision course with the agroecological approaches being endorsed by farmer-based sovereignty movements. The directions in which these contradictions might proceed are very much dependent on the strategies and actions taken by farmers and their independent associations and movements in Africa, both in response to AGRA, and in developing their own programmes and practices.

3. Structure of paper

This paper investigates the role of AGRA in Africa's seed systems in the context of the 'Green Revolution' push in Africa and the new frontiers of accumulation. The first section considers AGRA's broad philosophy and structure, focusing on AGRA's own views or those of its consultants, before turning to a more detailed consideration of its specific work in the Programme for Africa's Seed Systems (PASS) and, in slightly less detail, its Soil Health Programme (SHP). These programmes are inseparable because seed and soil fertility technologies are interlinked. Seed and fertiliser are the fundamental technological interventions on which AGRA's strategies hang. The paper concludes with thoughts for ways for the broad agroecological and food and seed sovereignty movements to respond to AGRA.

4. The Green Revolution in Africa and new frontiers of accumulation

In the second decade of the new century, a growing consensus has emerged that we have entered a period of structurally higher food prices (Timmer, 2008:32). These rising prices are driven inter alia, by limited arable land and rising urban populations and the expansion of biofuel production using maize, especially in the US (the historical generator of maize surpluses for food aid to Africa). The United Nations (UN) predicts that food prices as a whole will rise at least 40% in the next decade (Vidal, 2011). The United States Department of Agriculture (USDA) and Organisation for Economic Co-operation and Development/Food and Agriculture Organisation (OECD-FAO) predict that global wheat and grain prices will be 30-60% higher in the coming decade than they were during the period 2002-2007 (Headey, *et al*., 2009:17). There is also an expectation of growing volatility because demand for cereals is highly inelastic (there are no alternatives).

As a result, land and agricultural production have become more important as well as a site for potential profitable investment. Africa is seen as the 'new frontier' of accumulation (Goldman Sachs, 2012). Following decades of neglect, the past few years have thus witnessed growing external investment in African agriculture, including in Africa's seed systems. The possibilities for profitable investment are situated in the context of foreign direct investment (FDI) as the perceived answer to Africa's problems, both from within and outside Africa. The New Partnership for Africa's Development (NEPAD) and its related agricultural programme, the Comprehensive Africa Agricultural Development Programme (CAADP), are explicit in their support of a strategy that attracts FDI on the basis of investor friendly policies and systems. The limits to Africa's development are identified essentially as lack of capital and expertise.

There are two sides to this new wave of investment: on the one hand is the production and export of raw or semi-processed materials for consumption outside Africa in a continuation of Africa's colonial role as an exporter of raw materials. On the other hand is an emphasis on building local and regional markets in Africa. That is, Africa is an emerging zone of consumption for the realisation of surplus value in its own right. Much of the consumption based on Western diets currently means imports from other countries, e.g. wheat from the US, and soya from Argentina and Brazil. However soya and other crops are targeted for development in Africa. The first side provides inputs into production and consumption elsewhere; the second side is the expansion of markets. Biofuels, maize, rice and cassava are key focus areas from an agricultural point of view.

The key challenge facing investors in African agriculture is how to increase productivity so that sustainable profits can be made. It is logical that they will turn to the experiences of the Green Revolution in Asia and Latin America in the 1960s and 1970s to see what lessons can be learned for application in Africa. Green Revolution seed work was spearheaded by the Consultative Group on International Agricultural Research (CGIAR), with its roots in research institutes that pioneered technological innovations in plant breeding and seed systems since the 1940s. The first such institute, the International Maize and Wheat Improvement Centre (CIMMYT) was sponsored by the Rockefeller Foundation, which continued its funding as the group of institutes expanded over the decades. Although the Green Revolution did lead to rapid and sustained increases in yields, this came at immense social and ecological cost (Box 1). These costs must be considered an integral part of the Green Revolution package.

Social and ecological costs of the Asian Green Revolution

- Replacement of locally-used crops with cash crops for export, and associated replacement of polycultures (mixed farming) with monocultures;
- Land degradation and soil nutrient depletion through overuse of synthetic fertilisers and pesticides, led to destruction of soil life;
- Negative health impacts for rural communities as a result of pesticide poisonings;
- Water pollution and waste;
- A focus on a few high-yielding varieties resulted in a narrowing of agricultural and wild biodiversity;
- Sharp rises in input costs, resulting in greater indebtedness of small-scale farmers and consequent loss of farmland;
- Concentration of land holdings, and rising social inequality.

In comparison with Asia and Latin America where the Green Revolution took hold, Africa has low grain yields, with stagnating per capita grain production (Minot *et al*., 2007:1). The dominant story until recently was that Africa's low agricultural productivity was caused by the failure of the first Green Revolution to take root. Initially lack of African capacity to adopt new technologies and lack of government will or support was blamed for this failure. More recently, however, the arguments have become more sophisticated, and there is greater recognition that the simple transfer of technology model that allowed for the rapid uptake of new technologies in Asia in particular is not appropriate for Africa's more diverse ecological and social context. The World Bank argues that the wide diversity of agroecological zones in Africa require adaptations in technology and "the 'technological distance' between growing conditions prevailing in Africa and those prevailing in developed countries is unusually large, so technologies travel even less well to Africa than they do to other developing regions" (World Bank, 2009:61). According to this argument, there was not enough emphasis on local adaptation in the first Green Revolution. Numerous other factors played a role in the inability of Green Revolution technologies to gain traction in Africa. For example, Minot *et al*. (2007:152) add that the higher costs of fertiliser, unreliable rainfall, lack of irrigation and low population density "which makes yield-increasing technology less appealing" were also contributing factors.

It is in this context that AGRA, an initiative of the Gates and Rockefeller Foundations, was formed in 2006 as a private sector initiative with links to government institutions globally and in Africa. AGRA is registered as a non-profit institution in the US, but operates out of Nairobi in Kenya where it is registered as a branch of a foreign corporate entity. The Gates Foundation has made large investments in agriculture globally since 2003, to the value of US$2bn up to 2011. Recipients include CGIAR institutes, universities, public sector institutions and non-government organisations (NGOs), and AGRA offers a wide range of support from research into genetic modification (GM) to organic farming support. Up to 2011, AGRA was the recipient of 16% of global agriculture grants from the Foundation.[1]

Funding for AGRA is primarily from the Gates and Rockefeller Foundations and the UK Department for Foreign International Development (DFID). To the end of October 2011 the Rockefeller Foundation had contributed US$72m to AGRA and up to September 2010 the Gates Foundation had contributed US$329m[2], with another US$56m in February 2012 to AGRA's Programme for Africa's Seed Systems (PASS – see below)[3]. Later funding has come from the Danish International Development Agency (DANIDA), the Swedish foreign ministry, the New Venture Fund (which invests in seed work in Liberia and Sierra Leone), and Canada's International Development Research Centre (IDRC).

1. http://www.sourcewatch.org/index.php?title=Gates_Foundation_Global_Agriculture_Grants
2. http://www.sourcewatch.org/index.php?title=AGRA
3. This Day 2012 "Africa: Bill Gates boost Africa's food crops drive with US$56 million", *This Day*, 28 February http://allafrica.com/stories/201202280809.html

AGRA is only one programme the foundations are involved with in Africa. Others include the African Enterprise Challenge Fund (AECF)[4] and the Coalition for African Rice Development (CARD)[5]. The AECF is a US$150m "private sector fund" sponsored by the governments of Sweden, Denmark, Netherlands, Australia and the UK, and the International Fund for Agricultural Development (IFAD) and hosted by AGRA. The focus is on building markets to enable the expansion of agribusiness and, where it is potentially profitable, the commercialisation and incorporation of smallholder farmers into these formal markets. It is currently operating in 16 countries with regional hubs in South Africa, Ghana and Kenya.

CARD is an initiative between AGRA and the Japanese government to increase rice production in Africa using green revolution technologies based on hybrid rice. It builds on existing programmes such as the Africa Rice Centre (AfricaRice) and the African Union's (AU's) CAADP. Partners include the World Bank, African Development Bank (AfDB), the FAO and a number of CGIAR institutes. It currently operates in 23 countries.

5. AGRA's philosophy and structure

AGRA considers the fundamental problem in African agriculture to be low productivity. It identifies a few key areas that contribute to this problem: i) lack of scientific knowledge and capacity, caused by ii) lack of investment in African agriculture, iii) poor soils, iv) limited seed systems that inhibit the introduction of new varieties, and v) weak governance and regulatory systems.

Two key themes can be extracted from the body of work surrounding AGRA: first, local adaptation is critical to improvements in agricultural productivity in Africa; and second, technologies should be blended with one another without ideological hang-ups, so that techniques ranging from organic methods through to biotechnology are incorporated where appropriate.

AGRA adopts a fairly good critique of prior approaches to support for African agriculture, including systematic under-investment, the historical focus on large-scale agriculture and standardised technologies, and efforts to transfer technologies developed elsewhere which were inappropriate to the context (both seed and manufactured fertilisers).

The following discussion draws heavily from an influential book written in 2001 by Joe DeVries and Gary Toenniessen called *Securing the Harvest*. DeVries is the current director of AGRA's Programme for Africa's Seed Systems (PASS), which is at the core of AGRA's seed work. He has worked on agriculture in Africa since the 1980s, and was a director in World Vision International and the Rockefeller Foundation where his work on genetic improvement of African crops laid the foundations for AGRA. Toenniessen has worked with the Rockefeller Foundation since 1971, where he is now Managing Director, leading the Foundation's strategic direction on agricultural development. DeVries and Toenniessen were instrumental in AGRA's formation.

DeVries & Toennissen argue that the wholesale adoption of what they call the Asian Green Revolution cannot work in Africa (2001:7). In particular, in Asia it was possible to immediately target a layer of existing better-off farmers who were able to adopt the technological package and make it

4. http://www.aecfafrica.org/
5. www.riceforafrica.org

work in their interests. In contrast, in Africa rain-fed marginal farming conditions are the norm, not a secondary focus to be targeted once the more favourable areas have been tapped. This means the emphasis at the outset must be on resource-poor small-scale farmers in the context of the actual constraints they face.

AGRA draws from different sources of knowledge in its responses to the core problem of low agricultural productivity. These range from locally-sensitive agroecological practices through to biotechnology, with the idea that there is a right time and place for different types of technology. In the current context, AGRA argues, biotechnology is not appropriate in most places in Africa, although it explicitly views biotechnology (including GM) as part of the longer-term solution. It therefore suggests that conventional Green Revolution technologies can only be introduced over time as systems are put in place and the various components become readily available to farmers. AGRA says that without effective distribution systems, improved seed varieties will just sit on the shelf without being used. Another example it offers is that the effectiveness of fertilisers is reduced by the absence of irrigation. In this regard, it argues that GM crops cannot be introduced without a proper institutional base and regulatory framework that ensure they can be properly developed and controlled in the field. Therefore, according to AGRA, certain key building blocks must be put in place first, before moving forward with these technologies.

AGRA's focus is on seed improvements and soil fertility. A background report written for AGRA (Minot, *et al*., 2007) in preparation for the launch of its seed work recognises some value in informal or farmer-owned seed systems. These systems produce inexpensive seed, farmers are familiar with the performance of the seed, the varietal heterogeneity that comes from these systems may reduce the risk of severe crop losses, and selection is for a range of criteria (Minot, *et al*., 2007:157). However, AGRA considers these systems to be insufficient by themselves to increase productivity in a sustained way. According to AGRA, there are limits to the local sharing of seed. Over time the quality degenerates because the genetic pool is not wide enough, and in particular that local sharing systems are weak at introducing new and 'improved' varieties. A related argument is advanced by AGRA that formal seed systems in most parts of Africa generally lack capacity and therefore little if any work is being done in developing new varieties based on locally-adapted germplasm. As a result, AGRA focuses its efforts on building formal seed systems.

AGRA identifies a number of areas where interventions are required to facilitate the expansion of formal seed systems. First, modern scientific methods must be introduced, built up and supported where they already exist, to enable African institutions to develop higher yielding varieties of crops. Second, systems must be developed to multiply and distribute improved seed. In this context, there is very limited production of foundation seed as this is seen as a primary bottleneck in the expansion of new varieties (DeVries & Toenniessen, 2001:xiv). Local specificity is key to AGRA's approach, and DeVries and Toenniessen argue for country-level programmes where practitioners

can operate in close proximity to the various agroecologies where they can develop "localised 'agro-ecology-based' breeding programmes" (2001:xiii). In their broad philosophy, AGRA's designers strongly promote farmer participation in agricultural research. On the face of it, it seems as if they recognise that farmers best understand the conditions they work in, and breeding programmes will be most effective if they operate in close proximity to farmers and involve farmers especially in variety selection (DeVries & Toenniessen, 2001:xv). Whether these ideas match the way the seed programmes actually materialise in practice is an important issue for further investigation.

Although systems are not currently in place for the effective use of biotechnology, this according to AGRA, can change. Part of AGRA's mission is to induce such change through 'modernisation' of seed systems and the associated R&D. The approach is to support biotechnology capacity where it exists (DeVries & Toennissen, 2001:xiv), starting with tissue culture of clonally propagated crops and marker assisted selection for traits. Once effective biosafety systems and regulations are in place, it will be possible to advance to GM, using the genetic base of already well-adapted varieties (DeVries & Toennissen, 2001:xiv).

Soil fertility is the second strand of AGRA's strategy. According to DeVries and Toenniessen (2001:xv), "in spite of its potential, genetic improvement of crops will always face limitations with regard to what it can offer to farmers in regards to their levels of productivity. No matter what efficiencies genetic enhancement is able to build into crop plants, they will always draw their nutrition from external sources, and this places enormous importance on the investments that can be made in the soils of Africa". The basic argument is that there is need to increase the organic content in soil, and AGRA will support work in this direction. But, as with existing farmer-based seed systems, AGRA argues that in and of itself this is not enough. According to AGRA, there is also need for the judicious use of manufactured fertilisers, e.g. rock phosphate is necessary for plant growth, and this can be manufactured into a form that is easily taken up by plants. Like seed, AGRA says that fertilisers need to be adapted to local conditions. A one-size-fits-all, standardised technology will not work in Africa's diverse agroecological conditions. Again, the notion of blending different technological approaches, at least in the conceptual framework, can be seen here.

AGRA places a focus on small-scale farmers as the main producers of food in Africa, stating that upwards of 70% of the African population is involved in agriculture, but because of past policies these farmers are caught in a poverty trap. New technologies mean this is no longer necessary, but changes need to be made, in particular in the governance and funding environments. It is thus the view of AGRA that the focus should be on "the very poor, rural people who have been left behind by globalisation and the interests of the private sector" (DeVries & Toenniessen, 2001:xv). That is, AGRA's initial emphasis is on building new markets rather than on supplying export markets. To realise this goal AGRA promotes farmer organisation, noting the importance of organisation in facilitating communication and to provide a market for seed (Minot *et al*., 2007:158). In 2010 AGRA established the Farmer Organisation Support Centre in Africa (FOSCA), which identifies networks of organisations in AGRA's target countries, and links them to service providers to realise AGRA's goals (AGRA, 2010:13).

There is some acknowledgment of the limits of a profit-driven private sector in building African agriculture. "In Africa, multinational seed companies may be motivated to popularise one or even several high-yielding maize varieties among better-off farmers in favourable areas, but it is less likely that they will find it profitable to devote significant resources to developing varieties with the very specific adaptation advantages required by small-scale, low input farmers" (DeVries & Toenniessen, 2001:22). However, despite this recognition, there is an acceptance of the dominance of the private

sector and thus the emphasis is placed on private investment of all kinds in the seed sector (DeVries & Toenniessen, 2001:xv). DeVries's position is carried over into AGRA's design, with emphasis being placed on the private sector and market-led development, based on the understanding that the development of the market economy is incomplete in Sub-Saharan Africa (SSA), requiring interventions to facilitate commodification processes (Morvaridi, 2012:246).

AGRA also recognises the role of the state/public sector. It explicitly recognises that government interventions can legitimately be based on efficiency (market failure) or equity (redistributive) grounds. As a result, AGRA has public-private partnerships (PPPs) at the core of much of its work. This starts with the international agricultural research centres (IARCs) under the CGIAR umbrella, but also seeks to integrate national institutions wherever possible. Part of the reason for this is access to a large pool of free locally-adapted germplasm, infrastructure and expertise, which amounts to subsidisation of the private sector. The state is also necessary to create the 'enabling environment' for effective private sector functioning and to build markets. An important institutional channel for AGRA's work is via NEPAD/CAADP, although CAADP is considered to have limited acceptance in Africa (Action Aid, 2009:18). AGRA aims to leverage additional government resources on the basis of its own funding (Minot, *et al*., 2007:162).

AGRA is embedded in the G8's New Alliance for Food Security and Nutrition initiative, announced in 2012. This is a partnership between G8 countries, the AU and multinational agri-food and input companies, including Monsanto, Syngenta, Du Pont, Cargill, Unilever, Yara International, United Phosphorous, Vodafone, SABMiller and others.[6] One component is the Scaling Seeds and other Technologies Partnership which will be housed in AGRA, with resources promised from G8 countries. This initiative promotes the commercialisation, distribution and adoption of key technologies including improved seed varieties and other unspecified technologies prioritised by the CGIAR-led technology platform.[7] AGRA is therefore an important component of the broad thrust of increasing investment in and commercialisation of African agriculture, and integration of African agriculture into global circuits of accumulation.

Many have been taken by what on the face of it, seems to be a good idea: combining resources and focusing them on a clearly defined set of technological challenges. However, some critics, with good reason, perceive a hidden agenda behind the humanitarian façade. According to Thompson (2012:345-6) the core goal of AGRA is not included in its promotional materials: access to African genetic wealth without benefit sharing, based on free access to genetic materials, with the offspring privatised for corporate profit. The result is free inputs but outputs sold at monopoly prices via patenting, producing soaring corporate profits. Thompson defines this theft not as the sharing

6. http://www.sourcewatch.org/index.php?title=New_Alliance_for_Food_Security_and_Nutrition
7. Government of Canada 2012 "Fact Sheet: G8 Action of Food Security and Nutrition" http://www.canadainternational.gc.ca/g8/summit-sommet/fssa-2012-05-18.aspx?view=d

of the genetic base through free circulation of these resources, but rather the privatisation of new varieties without sharing with farmers who played a major part in developing the genetic base.

There is good reason for suspicion. Although AGRA's public face is linked to 'neutral' UN and government missions, it has less visible links to multinational biotech and seed corporations. For example, AGRA retains two main consultants, David Westphal and Aline Funk. Westphal has worked his 41 year long career for Cargill and Monsanto,[8] including as Monsanto's Area Co-Director for Sub-Saharan Africa, Vice Chairman of Sensako Seeds, and Managing Director of Carnia Seeds.[9] Westphal works on start-up seed businesses with AGRA. Aline Funk was the CEO of Channel Bio Corp. registered in the US in Kentland, Indiana. The company is now named Channel Seed, owned by American Seeds Inc, a Monsanto holding company. It trades in corn, soybean, alfalfa and sorghum – 'row crops' amenable to industrialisation, and also has a focus on GM crops.[10] Funk stepped down as CEO to take up work with AGRA. She has a background in financial markets[11] and risk analysis. Between them the consultants have been paid US$584,000 in three AGRA grants until early 2012. The Gates Foundation has US$23m in stock in Monsanto (Haeder, 2012), thus giving it a material interest in boosting the company's value. Many of the organisations funded by AGRA also receive separate funds from Monsanto (English, 2010).

5.1 What does AGRA do?

AGRA consists of four focal areas: seed, soil health, market access, and policy and partnership programmes, with a cross-cutting theme on "innovative financing".

The first focal area is the breeding, production and distribution of improved seeds through PASS, which has offices in Accra and Nairobi, and was allotted US$100m in AGRA funding from 2006-2011. This programme is the focus of this paper and more detail is provided below.

The second focal area is the extension of locally appropriate soil nutrients, and integrated soil and water management through the SHP, which was allocated US$164.6m in funding from 2007-2013. There is more detail on this programme below. More recently AGRA is considering ways to integrate livestock into their work (AGRA, 2010), which is related to soil fertility.

The third area is improved market access through trade and value chain development. This area has received US$43m for the period 2008-2014. The basic argument is that in some areas surpluses are produced but access to markets is non-existent, leading to local gluts and collapse in local prices in season, which acts against farmers adopting yield-improving technologies (AGRA, 2010:20). The aim is to expand market access for surpluses, built around a commercial orientation of smallholder farmers, farm storage technologies and intermediate processing technologies. One strategy is to adopt and expand warehouse receipt systems (WRS) to enable farmers to store products until the end of the peak harvest season, and borrow against the stored harvest if they require (AGRA, 2010:21). This will operate privately and be at a cost to the farmer of storage and collateral management fees.

8. http://sbc.ucdavis.edu/education/Courses/SB101_focusonFieldCrops.html
9. Sensako and Carnia were two of South Africa's largest grain seed companies, both acquired by Monsanto at the end of the 1990s.
10. http://www.channel.com/Products/Pages/seed_finder.aspx
11. http://www.seedquest.com/forum/roundtable/lessonsfromotherindustries/FunkAline.htm

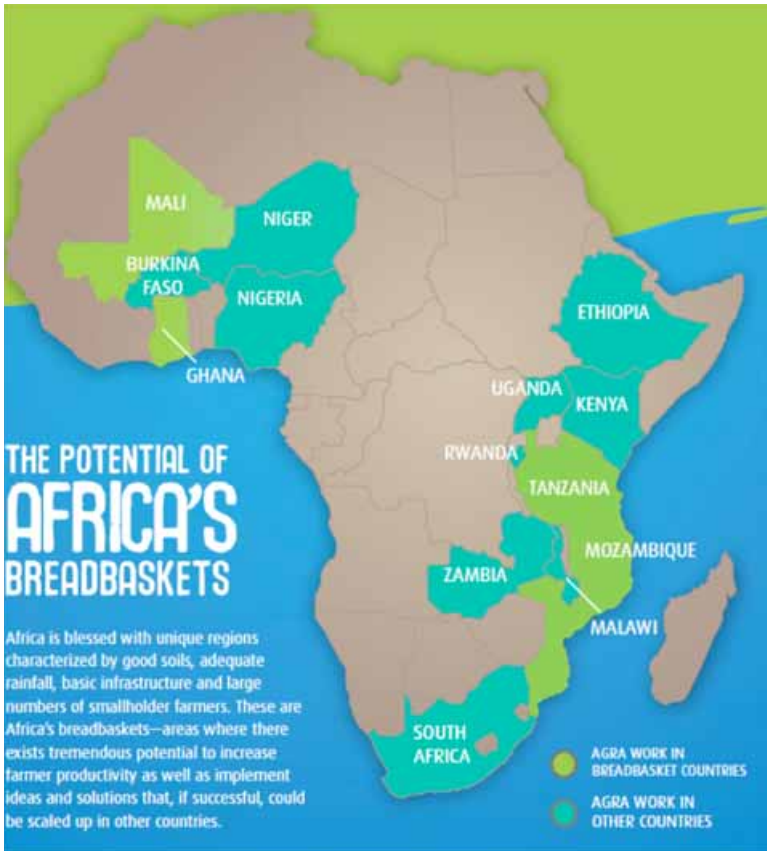
AGRA's approach to wholesaling and processing technologies is based on building greater co-ordination and predictability in government actions in favour of the private sector, and greater investment in 'public goods' (production and marketing infrastructure, including transport networks). An important part of this, which connects closely to the broader agenda of building commodity markets in Africa, is opening regional trade networks through lower barriers (Minot et al., 2007:160). A regional initiative is co-ordinated by the Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA), which was launched in 2008 by the Common Market for Eastern and Southern Africa (COMESA). ACTESA acts as an agency to integrate smallholder farmers in local, regional and international markets. The alliance is funded by the US, UK, EU and Australian governments together with AGRA.[12]

AGRA's fourth focus is financing for agriculture. It states that only 2-3% of commercial bank loans and investments in Africa go to agriculture, even though agriculture's contribution to Gross Domestic Product (GDP) is much higher than this almost everywhere in Africa. This indicates under-investment in African agriculture. Banks see agriculture as a risky investment, especially smallholder farmers. AGRA's Innovative Finance Program aims to provide loans for smallholder farmers and agribusinesses, using loan guarantee funds to leverage larger loans from commercial banks (10 times the guarantee amount) (PWC, 2010:9-11). The banks' risks are lowered through a syndicated risk-sharing pooled facility (PWC, 2010:14) where risks are shared by a number of participants. The guarantees allow the banks to reduce requirements for their own funds. A core objective of the scheme is financial returns for investors, i.e. profit-bearing loans (PWC, 2010:22).

Stanbic (Standard Bank) is leading a consortium of banks and funds, including African-owned banks and funds in Mozambique, Ghana, Tanzania and Uganda to implement AGRA's financial support strategy. Equity Bank in Kenya and Microfinance Bank in Tanzania are participating in micro-financing at reduced interest rates (AGRA, 2010:23). AGRA's loan guarantee facility allows the banks to leverage additional funding.

12. http://www.actesacomesa.org/

Figure 1: AGRA's 'breadbasket' focus areas



Source: AGRA, 2010:11

AGRA has identified a number of geographical focus areas for its work, and has developed an approach based on agricultural corridors with 'bankable projects'. Its core 'breadbasket strategy' focuses on regions with good soil, adequate rainfall, basic infrastructure and large numbers of smallholder farmers (Figure 1). These areas are considered ripe for rapid improvements in agricultural production. Such breadbasket areas have been identified in Mozambique, Tanzania, Ghana and Mali, and AGRA is also working in other countries to "prepare the ground" for expansion: Nigeria, Burkina Faso and Niger in West Africa; Ethiopia, Uganda, Kenya and Rwanda in East Africa; and Zambia and South Africa in southern Africa (AGRA, 2010:11&14).

6. AGRA's Programme for Africa's Seed Systems (PASS)[13]

6.1 Problem statement

According to AGRA, African smallholder farmers have limited access to responsive, high-yielding, locally-adapted varieties of their staple food crops. They primarily have access to low-quality seed that has been saved and reused, degenerating over the course of decades. "For self-pollinated crops,

13. http://www.agra-alliance.org/section/work/seeds

farmer selection is effective in the short run but it cannot efficiently make use of non-local genetic material" (Minot *et al*., 2007:154). Coupled with poor soils, this means reduced yields. According to AGRA, although organic and low-external input methods are part of the solution, these AGRA says, are insufficient on their own, and need to be supplemented with fertiliser and improved seed, which in turn need institutions and systems to be put in place.

6.2 AGRA's plan

The core of AGRA's plan is an "intensive long-term programme of investment in crop improvement which takes advantage of the full range of approaches now available" (DeVries & Toenniessen, 2001:xvi). DeVries and Toenniessen (2001, xvi) lay out the basic plan for spreading high performing crops throughout Africa for the purposes of improving food security:

i) Constructing breeding teams within national agricultural research systems (NARS) supported by IARCs;
ii) Delineating and classifying the agroecologies which merit targeting;
iii) Determining farmer preferences for new varieties;
iv) Employing appropriate parental materials and breeding methods aimed to produce new varieties within an acceptable time frame;
v) Getting seed to farmers via public and private means.

It is clear that this strategy focuses on building formal (commercial) seed systems. AGRA aims to increase African capacity to breed, produce and disseminate quality seed of staple food crops such as maize, rice, cassava, beans, sorghum, millet and other staples. US$150m has been earmarked to develop seed systems that deliver new crop varieties to smallholder farmers efficiently. Up to the end of 2010, 41% of total AGRA grants went to PASS, valued at US$84.5m (AGRA, 2010:43). This is AGRA's biggest programme, followed by the SHP with 22% of grants.

Funds are used for research and policy development too, with a focus on private enterprise. AGRA plans to develop formal seed systems, with the public sector focusing on breeding and regulatory issues and private seed suppliers attending to production and marketing (AGRA, 2010:31). According to AGRA, up to October 2009 the work of PASS across the seed value chain trained over 150 African crop scientists; funded some 60 crop breeding programs; steered 125 new crop varieties into the field; provided start-up capital for 35 African seed enterprises which collectively produced approximately 15,000MT of certified seed; and enlisted 9,200 agro-dealers who have provided smallholder farmers with US$45 million worth of seed and farm inputs.

PASS has four sub-programmes: Education for African Crop Improvement (EACI), Fund for the Improvement and Adoption of African Crops (FIAAC), Seed Production for Africa (SEPA), and the Agro-dealer Development Programme (ADP). EACI and FIAAC focus on developing new locally-adapted varieties through training scientists (EACI) and farmer participatory crop selection (FIAAC) to develop and release new varieties. SEPA aims at the multiplication and distribution of new varieties, including investment funds to fund seed companies. ADP seeks to establish distribution networks for inputs (especially seed, fertiliser and knowledge).

6.3 Education for African Crop Improvement (EACI)

EACI concentrates on building the capacity of NARS in the strategic fields of plant breeding and seed production to develop improved varieties of indigenous and staple crops. The sub-programme's targets are:

- PhD fellowships for 80 African scientists to investigate the traits of important food crops in their home countries;
- MSc fellowships to 170 aspiring African agronomists and strengthening training curricula in crop science disciplines in at least 10 African universities;
- Short-term training on crop improvement and seed topics to technicians in the public and private sector.

EACI is built around core institutions in southern and West Africa. In southern Africa the African Centre for Crop Improvement (ACCI) at the University of KwaZulu-Natal (UKZN) pre-existed AGRA as a unit at the university, and has received US$8.1m from AGRA. The West Africa Centre for Crop Improvement (WACCI) at the University of Ghana was founded by AGRA in 2007 when the programme was launched, and received a grant of US$4.9m. Cornell University in the US received a US$1.7m grant from AGRA to provide academic support to the centres.[14]

AGRA's promotional materials indicate that GM is not a major focus at the moment for 2 reasons: first, according to AGRA, conventional (hybrid) breeding can produce short-term benefits at low cost and have been underfunded in Africa; and second, according to AGRA, a focus on conventional breeding fits into existing regulatory frameworks. Nevertheless, AGRA argues that GM has an important role to play in more developed markets, and aims to get African seed and fertiliser markets to that point through its current work.

In preparation for this, the Gates Foundation has dedicated significant resources for GM research outside AGRA (see Appendix 1). Around 49% of Gates Foundation funding to the R&D sub-programme of its Agricultural Development Programme has gone to projects where there is an explicit GM research component (Gates Foundation, 2011). The Foundation supports a wide range of projects. GM is not the only focus, but is nonetheless very significant, and is obviously seen as part of the longer-term solution to increasing agricultural productivity. In May 2012 AGRA announced a US$3m grant to the Open Forum for Agricultural Biotechnology in Africa (OFAB) in Kenya to advance the cause of GM crops.[15]

14. http://www.sourcewatch.org/index.php?title=AGRA%27s_Programme_for_Africa%27s_Seeds_Systems#Education_for_African_Crop_Improvement_.28EACI.29
15. *The Star* 2012 "Kenya to get Sh249m GMO technology boost", *The Star*, 6 May http://www.the-star.co.ke/national/national/74422-grants-to-boost-gm-technology

Even if AGRA is putting GM based agriculture on the back burner for the time being, it must be recognised that GM is driving competition in the market, and is forcing others into a technological race. Conventional breeding and GM based agriculture can operate from the same technical base. Developing conventional breeding systems simultaneously lays a platform for potential biotechnology investment. The basic infrastructure is the same. However, AGRA propoments do not see an assured return on investment with GM, and the development of GM crops takes longer than generally projected (Minot, *et al*., 2007:155). Therefore, AGRA's current emphasis is on building conventional breeding systems: hybrids, and thus agrichemicals, most of which are imported.

6.4 Fund for the Improvement and Adoption of African Crops (FIAAC)

FIAAC's objective is to develop and release 1,300 new crop varieties over 10 years (AGRA, n.d.:4). The aim is to develop locally-adapted varieties with higher yields than existing varieties in specific agroecological contexts. FIAAC provides support for breeding teams working closely with farmers to develop new varieties. A decentralised approach to crop improvement is adopted that brings breeding work closer to farmers, with testing amongst farmers for selection and an emphasis on agroecological diversity (AGRA, n.d.:4). FIAAC uses breeding stock available through international channels such as CGIAR, and local landraces. Given their strong pro-IP stance, this raises questions around ultimate ownership of products emerging from this research, and farmers' rights to save and exchange seed using a common genetic pool.

One hundred new varieties have been produced through the programme using conventional (non-GM) breeding methods, including vegetative crops. The release of new varieties in 2010 surpassed the target by 50% (60 new varieties released compared with a target of 40) although commercialisation of these varieties lagged behind expectations (30 targeted but only 15 varieties commercialised) (AGRA, 2010:17). Thus instead of 75% of released varieties being commercialised, only 25% were. The annual report provided no reasons for this result. It may suggest unanticipated difficulties in commercialising new varieties. In a press release in July 2012 AGRA indicated it had released 400 new varieties and commercialised 200 of them.[16] However, there is no further detail provided, and AGRA has not released an Annual Report since 2010, so it is hard to get a real sense of progress towards these goals or what difficulties AGRA might be facing in realising them.

The strategy relies on the freely available genetic base of locally-adapted germplasm already existing in Africa either in the NARS or amongst farmers. From the point of view of longer-term corporate strategies, those who can acquire germplasm already adapted to local conditions have an advantage over competitors who will have to adapt their technologies to local conditions first before launching new varieties. Private companies with access to locally-adapted germplasm are therefore the target for acquisitions, such as Pioneer Hi-Bred's recent acquisition of Pannar Seed, a South African company with a large germplasm pool and a big African footprint (Pannar currently operates in 25 African countries).

Alternatively, multinational seed companies may target the national agricultural research institutions. These institutions are ripe for capture by those with sufficient resources in the context

16. AGRA 2012 "Visionary African Plant Breeders tackle issue of better and more available seed for farmers", press release, 31 July http://www.agra-alliance.org/news-events/news/visionary-african-plant-breeders-tackle-issue-of-better-and-more-available-seed-for-farmers/

of privatisation of their functions and the reduction of state expenditure on agricultural R&D over the past decades in Africa, especially as a result of imposed structural adjustment policies in the 1970s and 1980s. These institutions form the backbone of formal seed systems in most African countries. Multinational seed companies have formed 'partnerships' with these institutions over the years, which essentially have enabled the seed companies to use the public resource base for private activities, with free access to germplasm pools and subsidised research infrastructure, while the commercial benefits have been retained by the private sector (outright private ownership or exclusive licence), as Thompson (2012) argues.

6.5 Seed Production for Africa (SEPA)

The SEPA sub-programme focuses on the establishment of local seed enterprises to multiply and distribute seed developed by international and national breeding institutes through private and public channels. SEPA also promotes the production and distribution of non-commercial crop varieties, including vegetatively propagated crops. AGRA aims for the establishment of 40 seed enterprises serving eight million farmers in five years (AGRA, n.d.:6).

SEPA seeks to build seed storage and processing capacity, and to link seed enterprises to public sector crop variety development programmes to access improved seed. The sub-programme provides information to companies and non-commercial seed enterprises on improved varieties, and offers financial support (start-up grants), business development services, and loan and equity fund facilities.

Two funds have been set up through AGRA to support SEPA. The African Seed Investment Fund in Uganda is managed by African Agricultural Capital[17] (AAC) with the Gatsby Charitable Foundation, as founding investors. AAC also makes investments in agribusiness in its own name, beyond acting as a fund for AGRA. Tom Adlam is the managing partner of Pearl Capital Partners Group (registered in Mauritius) who, via wholly-owned subsidiary PCP Uganda, "administers portfolio management on behalf of AAC". The board of AAC has representatives from chemical, financial, European farming and equity investment interests. AGRA contributed US$12m to the fund, which aims to support 30 enterprises over eight years, linked to FIAAC, the crop variety development programme. The focus of the fund is on East Africa, with funding split between micro-financing and commercial financing. Funding is in the form of blended debt and equity investments, with Western Seed Company (Kenya) and Naseco (Uganda) being two beneficiary seed enterprises.

The West Africa Agricultural Investment Fund (domiciled in Mauritius) is managed by Injaro Agricultural Capital Holdings with offices in Accra and Abidjan. Initial investors are AGRA (US$3m), Soros Economic Development Fund (SEDF) and the Lundin Foundation. Amongst investments being made by the two funds are investments in the carbon offset market, which construct ecosystem services as a tradable business.

SEPA has provided grants of around US$13.5m directly to recipients between 2007 and 2012. The grants went to enterprises in East Africa (around half), West Africa and then southern Africa (Figure 2 and Appendix 2). Table 1 shows the individual countries receiving the largest share of SEPA grants.

17. http://www.aac.co.ke/web/

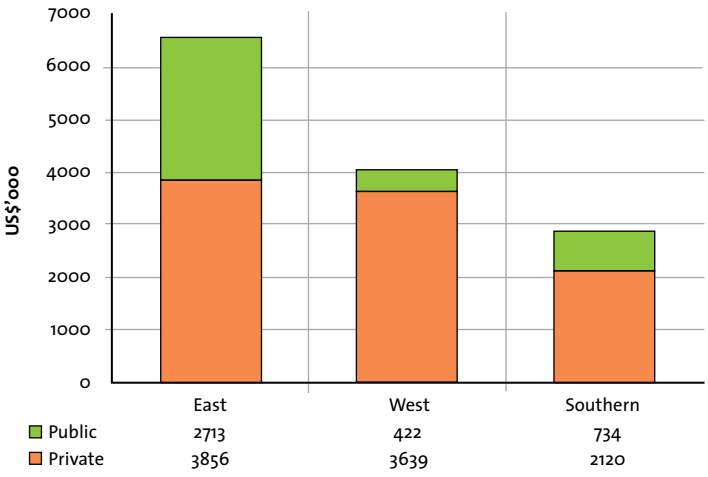
Table 1: Top 5 SEPA grant recipient countries, 2007-2012

Country	Grants received (US$'000)	% of total grants disbursed
Tanzania	2,389	17.7
Uganda	1,567	11.6
Ghana	1,478	11.0
Mozambique	1,211	9.0
Ethiopia	1,054	7.8
Total	7,699	57.1

Source: AGRA

In East Africa, Tanzania has received the most funding, followed by Uganda, Ethiopia and Kenya, with Rwanda a bit smaller. In West Africa, Ghana is followed a bit further back by Nigeria and Mali. Ghana received around the same investment as Uganda, the second largest recipient in East Africa. West Africa has seven recipient countries, compared with five in East Africa, which means expansion will be more rapid in West Africa and deeper in East Africa.

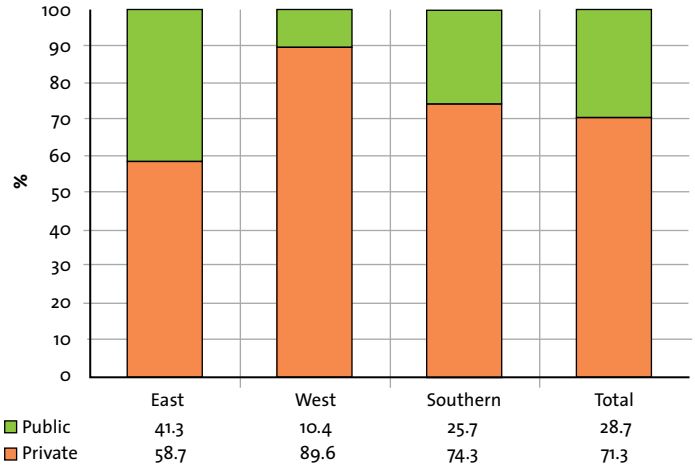
Figure 2: SEPA grants to public and private sector by region (US$), 2007-2012



Source: AGRA

Figures 2 and 3 show the distribution of SEPA grants between public and private entities in each region. 71% of SEPA grants overall went to the private sector, with the highest percentage going to the private sector in West Africa (90% of grants to West Africa by value) (Figure 3). The split was a bit more even in East Africa although 59% of grants still went to the private sector.

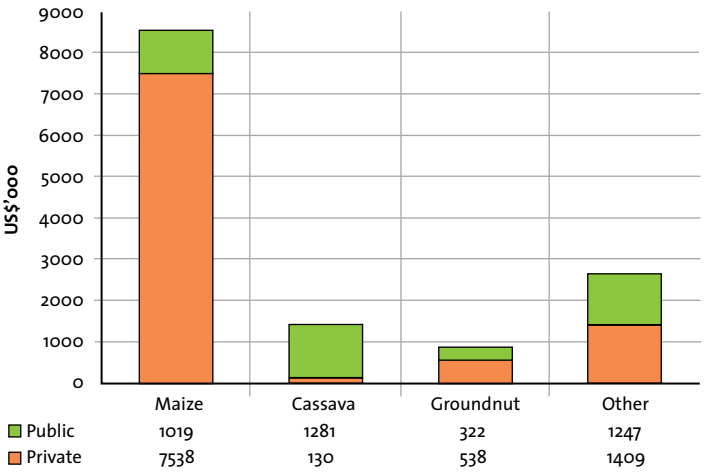
Figure 3: SEPA grants to public and private sector by region (%), 2007-2012



Source: AGRA

The SEPA grants are divided into four categories: private sector, public sector, business training and policy. There are many projects supporting smaller local organisations, especially private seed companies for producing, processing and selling seed to smallholder farmers. SEPA's focus is on hybrid seed, and the method of production is via contracting of smallholder out-growers. Despite statements about supporting a wide range of local crops, the main crops supported through SEPA are maize (64% of funds), followed by cassava and groundnuts (Figure 4 and Appendix 3). These indicate AGRA's priorities.

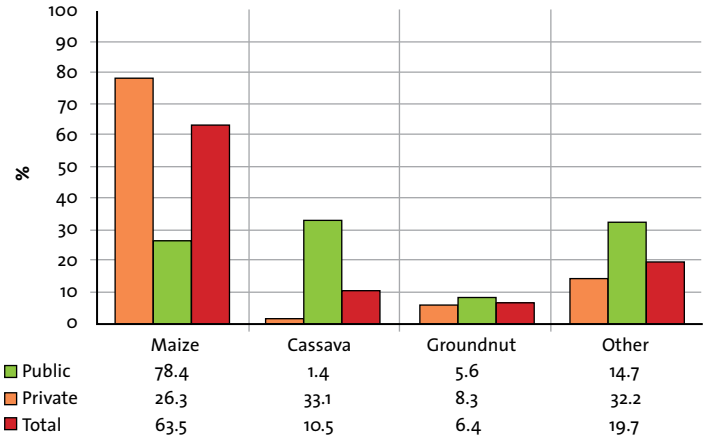
Figure 4: SEPA grants by crop type, 2007-2012



Source: AGRA

Maize received by far the largest proportion of SEPA grants by value, at US$9.6m from 2007 to 2012 (Figure 4). The majority of funding for maize was to the private sector (78%), where for other crops more funding went to the public sector. This was notable for cassava as a vegetatively propagated crop, which means replication and thus profits cannot be captured through seed technologies. A third of all public sector grants went to cassava.

Figure 5: Crop type as percentage of total SEPA grants by value, 2007-2012



Source: AGRA

The business training component of SEPA was granted US$2.18m for 20 projects. These grants were given to service providers to support AGRA-funded seed companies with business management, seed production, processing and storage. Of this, US$1.44m (two-thirds) went to US consultants. South Africa has one project, the Dryland Seed Company, which produces and processes seed. The Seed Management Institute at the University of Nairobi in Kenya was established using a grant of US$4.5m to facilitate business development of seed enterprises.

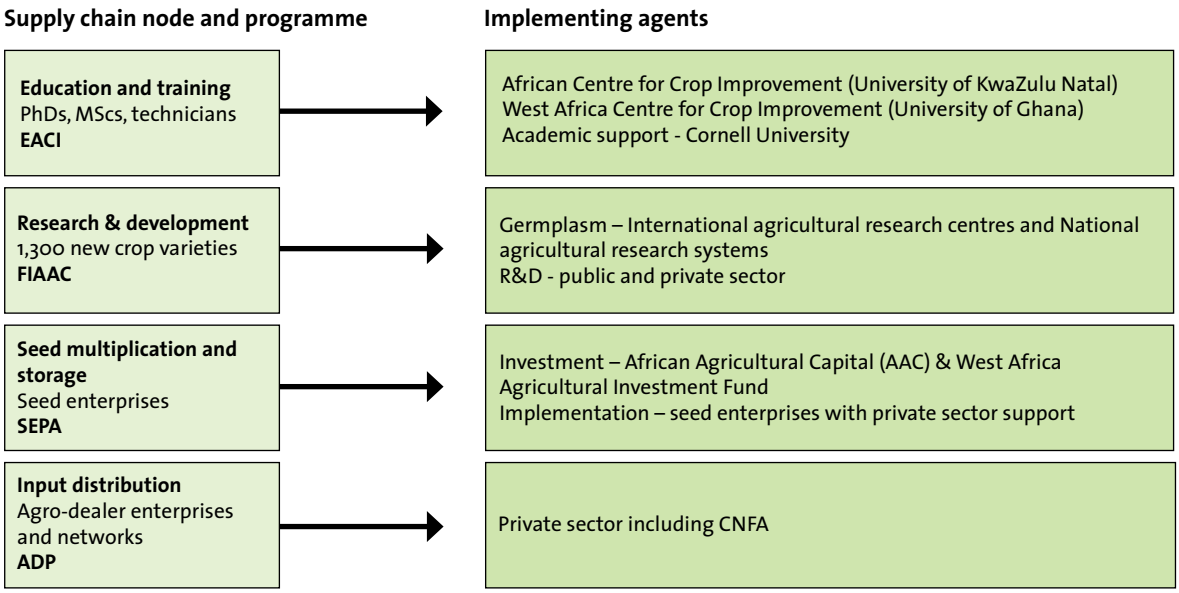
6.6 Agro-dealer Development Program (ADP)

The logic of the ADP is to strengthen networks of village-based agro-dealers to distribute seed developed through AGRA's breeding programmes to remote farmers. It supports the establishment of entrepreneurs who distribute seed and other agricultural inputs to farmers. There is an aspect of extension support, with training of agro-dealers on production methods and knowledge of available products. Business management and technical support on handling, use and storage of inputs is provided to participants. The ADP creates a distribution infrastructure oriented to the market.

The ADP is a key intervention for AGRA; constructing tangible markets for the product being created in the R&D and seed commercialisation work. Through the programme AGRA aims to establish 5,000 agro-dealers by 2017, compared with targets of 300 individuals assisted in the other programmes (scientists and agronomists, seed enterprises). The target of 100,000 tons of certified seed sold through agro-dealers in 2010 was surpassed: actual sales of 373,000 tons were made (AGRA, 2010:17). An early focus was on Malawi, Tanzania, Kenya and Zambia. The US-based NGO CNFA (formerly Citizen's Network for Foreign Affairs)[18] has received most funds for the implementation of the ADP. CNFA has a Kenyan affiliate called Agmark which carries out its work in Kenya. CNFA also receives funds from USAID for similar programmes in other African countries (ActionAid, 2009:8), and has corporate members including Monsanto and Pioneer Hi-Bred (ACB, forthcoming). The NGO is basically a private sector development arm.

18. http://www.cnfa.org/

Figure 6: Schematic representation of PASS



7. Seed policy interventions

AGRA has established policy hubs funded to the tune of US$15m in 2009-2012. Its current focus is on regulatory and legislative change in Mozambique, Tanzania, Ghana, Mali and Ethiopia. Its aim is to promote policies that accelerate the release of proven new varieties, strengthen seed regulatory systems, eliminate seed trade barriers and harmonize regional seed laws.

A background paper commissioned by AGRA on African seed systems proposed the following:

- A regulatory framework with seed laws that at least promote private seed companies;
- Fair competition against subsidised state enterprises;
- Access to germplasm in national and international stores, with an immediate focus on multiplication of existing varieties for seed companies, to "streamline approval of new varieties and to make public germplasm available to private seed companies" (Minot, *et al*., 2007:157);
- Limit the distribution of free or subsidised seed by the public sector or NGOs, with such distribution only in emergencies (Minot *et al*., 2007:156), this is presumably to prevent 'unfair competition';
- Relax restrictions on imported seed and germplasm;
- Seed certification should be either voluntary or based on looser standards to allow a wider range of types of seed in the market place (Minot *et al*., 2007:158);
- Support the independence of contract growers from the public sector or NGOs;
- Training and credit to members of co-ops or farmer associations;
- Capital and technical assistance to private seed companies (Minot *et al*., 2007:157).

It is apparent from this list that the focus is on the development of the private sector and the limitation of public sector involvement with regard to seed production and distribution, although not R&D or regulation. AGRA has identified the production and distribution segments of the supply chain as being conducive to private sector involvement, and it aims to influence policy to promote the private sector in these nodes. Proposals were made for the deregulation of the approval of new

private sector varieties, with 'company reputation' the determinant of quality standards (Minot et al., 2007:158). Initially this would happen for non-staples to learn from the experience, although the size of the market would surely determine some of the practices, and thus the impact of deregulation of the approval process would not be the same from crop to crop. Deregulation of quality standards would include the testing of voluntary certification. AGRA's background paper on seed systems favoured a tender process for allocating public sector germplasm to private companies, although breeding units were not expected to cover their costs with this revenue (Minot et al., 2007:158). According to the authors, plant variety protection may stimulate some investment but mainly in profitable crops (hybrid maize, vegetables and industrial crops) (Minot, et al., 2007:159).

Minot *et al*. (2007) propose permission for trading of seed if approved in the country of origin, but only if the seed comes from a similar agroecological zone. According to AGRA, harmonising seed laws regionally can facilitate the exchange of seed across national boundaries. However, it must be borne in mind that if South Africa and other countries permit the importing and production of GM seed, these harmonised laws can also enable the rapid spread of GM seed regionally, undermining biosafety laws put in place by national governments to exclude the dissemination or planting of GM seed. We are of the view that harmonisation is a strategy to fast-track the implementation of UPOV91[19] in Africa (ACB, forthcoming). This essentially means the tightening of intellectual property rights on seed and the erosion of farmers' rights to save and share seed (ACB, 2012).

8. Soil Health Progamme (SHP)

The SHP operates parallel to PASS. The problem is defined as degraded soils in SSA. Farmers use 10 times less fertiliser than elsewhere, with the result that crop yields are 2-5 times lower than the global average. Three main macro-nutrients are required in the soil for food crops to grow: nitrogen (N), phosphorous (P) and potassium (K). Other secondary macro-nutrients are also needed, *viz*. calcium (Ca), magnesium (Mg) and sulphur (S) as well as a number of micro-nutrients. These can be found in a combination of organic sources (manure and plant residues), minerals (P and K) and N fixed from the atmosphere. In synthetic fertilisers, these are combined using industrial manufacturing techniques.

AGRA's solution is that greater fertiliser application is a key to increasing yields, stating that 40-60% of crop yields in the Green Revolution are attributable to commercial fertilisers. AGRA has adopted Integrated Soil Fertility Management (ISFM) as its core approach. This involves the application of water and nutrients as efficiently as possible to the plant's roots, maximising soil organic matter and mulching, and minimising soil disruption. In the latter, SHP promotes a no-till or conservation farming approach. Organic matter is left on the surface rather than ploughing and discing the soil. However, it is combined with significant use of manufactured fertilisers. Such techniques are not in contradiction with the use of GM seed. In fact proponents of GM seed claim increased no-till from the use of Roundup Ready seed as one of the benefits of the technology (Givens et al., 2009). No weeds mean no need to till and thus no disturbance of the soil structure.

19. International Union for the Protection of New Plant Varieties, 1991 version, which reduces farmer's rights and intensifies intellectual property protection compared with the 1976 version, to which most developing countries are signatories.

AGRA proposes that cover crops, legumes and manure are part of improving fertility. According to AGRA, 'improved' fallows are also important, entailing the planting of fast-growing legume trees to fix nitrogen and provide water and soil retention. However, these practices are not sponsored by AGRA because of the lengthy time required for results and the need for additional fertiliser inputs. According to AGRA "purely organic approaches to African soil fertility are not sufficient... and are not appropriate for poor farmers" (AGRA SHP proposal, 2007:8). Alley & Vanlauwe (2009:27), writing on ISFM, argue that such approaches require too much land and labour and farmers thus do not adopt them fully. AGRA argues that "most 'low input' methods are also characterised as 'low-output' systems", resulting in low quantity and quality of nutrient provision, producing poor outputs.

Here are some challenges with the use of organic fertilisers at scale: Organic fertilisers are said to prevent precision in distribution of nutrients or timing of release, leading to inherent variability in production and yields. This is related to a focus on precision farming, treating each different part of the farm differently with regard to inputs based on varying physiological conditions. Organic fertilisers are also said to be very bulky and thus difficult to move around, and may contain pathogens if not properly produced, including heavy metals in manures that may accumulate in the food chain (Alley & Vanlauwe, 2009:30). Organic N sources must decompose prior to nutrient release and therefore must be applied further in advance of the crop's need (Alley & Vanlauwe, 2009:15). It is our virew that the issues raised here concern farmer knowledge rather than an inherent limit of organic N sources. We also acknowledge the importance of improving and sharing knowledge amongst and between farmers about soil fertility techniques.

AGRA argues that organic soil fertility techniques have been tried in Africa but have proven inadequate on their own in increasing yields sustainably. AGRA says that even if all available organic matter was efficiently converted into fertiliser, mineral fertilisers and synthetic nitrogen are still required as a supplement to compensate for leaching, and atmospheric and runoff losses. Some proponents of organic farming agree on the need for mineral additions to the soil. According to Nancy Bubel (1973:37), writing for the Rodale Institute (one of the oldest organic farming institutes in the US), "no plant can grow successfully, attain a ripe maturity, or reproduce its own kind without the phosphorous and potash found in rock minerals". Others support this view by stating that balanced nutrient supply requires supplements depending on the specific nutrient content of the soil (Alley & Vanlauwe, 2009:22). At the same time, it is conceded that the application of fertiliser alone on poor soils is not enough to improve agronomic efficiency, and fertiliser is best applied in combination with organic sources (Alley & Vanlauwe, 2009:25).

AGRA proposes increasing the use of synthetic fertilisers in association with hybrid seeds which have greater yield potential built into the seed. Alley & Vanlauwe (2009:25) indicate that integrated plant nutrient management (based on a combination of organic and synthetic fertiliser sources) is

combined with improved germplasm to fully realise ISFM. Rather than broadcasting fertiliser, the approach aims at "targeting of fertiliser in space and time" (Alley & Vanlauwe, 2009:25).

The SHP is based on this idea of supplementary inputs. It identifies access to fertilisers as a constraint and therefore endeavours to build fertiliser supply chains to increase the use of fertilisers by smallholder farmers in SSA. The aim is to reduce the cost and increase the availability of fertiliser for smallholder farmers, and develop supply chains for more efficient import and wholesale and retail distribution of fertilisers based on principles of private sector investment and competition (Scarpone, 2011:10). The emphasis is on the efficiency of value chains (retail networks, tariffs, logistics, local blending), and building the efficiency of port operations in particular to facilitate the import of fertilisers. Some effort may be put into local production of some inputs (e.g. phosphates, which are in abundance in Africa) and local blending and granulation of imported materials. But the emphasis is clearly fixed on adapting imported fertilisers away from "niche, over-engineered blends" for new fertiliser markets in SSA (Scarpone, 2011).

To this end, AGRA established the Africa Fertiliser Agribusiness Partnership (AFAP), initially focusing on Mozambique, Tanzania and Ghana (AGRA, 2010:19). All these countries have access to the sea and are gateways to other countries: Ghana is a gateway to Mali, Niger and Burkina Faso; Mozambique is a gateway to Botswana, Swaziland, Zimbabwe and Malawi; and Tanzania is a gateway to Zambia, Uganda, Malawi, Burundi, Rwanda and the DRC (Scarpone, 2011:3). Soil Health Consortia have been established in AGRA focus countries, and were operational in 10 countries by end of 2010. These build capacity amongst soil specialists and agronomists, and include private seed and fertiliser companies (AGRA, 2010:19).

Given the reticence of African farmers to purchase fertilisers, AGRA argues that subsidies may be required to incentivise fertiliser use. AGRA identifies a key role for credit and finance to develop fertiliser supply chains, and is working with NEPAD, the International Fertiliser Development Centre (IFDC) and the Agricultural Market Development Trust – Africa (Agmark), the latter which is registered in South Africa. Part of this is to provide micro-financing for farmers to help them to access fertilisers.

The SHP aims to assist 4.1 million farm households to increase yields by 50-100% by 2012.[20] According to AGRA, in its implementation so far, micro-dosing (at one third of recommended fertiliser application rates) has increased yields in AGRA sites (AGRA, 2010:19). The programme was assigned US$164.5m from 2007-2014.[21] This can be compared with allocations for the seed work of about US$150m (not only on grants). Therefore the SHP is actually more significant in terms of resources than the seed programme. SHP has four sub-programmes: extension, research, training and education, fertiliser supply, and soil health policy. Slightly more than half of grants had gone to the extension sub-programme (technical support for the adoption of ISFM by farmers) by the end of 2010 (AGRA, 2010:19).

20. Bill & Melinda Gates Foundation 2012 "Grant: Soil Health Program for Farm Households in Africa" http://www.gatesfoundation.org/learning/Pages/grantee-agra-soil-health-program-farms-africa.aspx
21. Bill & Melinda Gates Foundation 2012 "Grant: Soil Health Program for Farm Households in Africa" http://www.gatesfoundation.org/learning/Pages/grantee-agra-soil-health-program-farms-africa.aspx

AGRA has battled to realise its goals in the SHP. Its progress report indicates a slow start but no indications why this was the case. The 2010 goal was to deliver 112,200 tons of fertiliser to small farmers, but the programme actually only realised 8,000 tons. AGRA also fell short of the 2010 goal of assisting 2.5 million farmers to adopt ISFM techniques, and the programme only realised assistance to 120,000 farmers.[22]

9. Responding to AGRA

9.1 Technological pathways

How can food and seed sovereignty movements respond to AGRA's initiatives? AGRA's interventions have technical as well as social dimensions, which are interlinked. AGRA tends to separate the technical and social aspects, or rather sees social benefit flowing from technological process in a one way stream. It advances a technical response to issues of agriculture and food production in Africa. According to Sam Moyo, AGRA seeks to contribute to the 'modernisation' of African agriculture, essentially through transfer of technology as the overarching solution to Africa's agrarian question (ActionAid, 2009:4). There is an echo of the first Green Revolution, where increasing productivity through capital inputs (e.g. seed, fertiliser and irrigation) was regarded as an alternative to land reform (Morvaridi, 2012:244). The Green Revolution was (and is) capital's response to the combined challenges of food supply and social upheaval.

Technically, AGRA presents what appears to be a contradictory process. Aspects of its interventions may find appeal to some, for example, the development of scientific capacity, building farmer participation in plant breeding and variety selection, local adaptation for specific agroecologies, enhancing soil fertility, and building distribution networks for inputs to reach more remote small-scale farmers. While it is our view that there is a role for science and for appropriate technologies, but if these are separated from direct producer control over their development and use, they are open to appropriation for sectional benefit. The ways technologies are developed and how they are channelled into societies can create a 'path dependence', reshaping society through technology in the interests of those who control the process. The technologies and distribution mechanisms being pursued by AGRA are undoubtedly open to capture by corporate interests to introduce GM and other technologies designed to ensure private profit; and to open the conduits to flood Africa with inappropriate technologies that can tie farmers into unsustainable high-input systems, while simultaneously destroying existing systems. Even if existing systems are weak, at least control over seed, production and distribution technologies reside with the producers themselves. Creating dependence on powerful, debt-driven external input providers is a very bad idea.

These are some of the important questions: can the introduction of technology designed to facilitate the appropriation of private profit also facilitate the introduction of useful new varieties? In the long run, would these displace existing varieties? Can improved access to manufactured fertilisers offer farmers greater choice without them necessarily having to buy into the hybrid seed paradigm?

22. Bill & Melinda Gates Foundation 2011 "2011 Progress Report: Soil Health Program for Farm Households in Africa", http://www.gatesfoundation.org/learning/pages/2011-progress-report-agra-soil-health-program-farms-africa.aspx

There are some saving graces: people do not merely passively absorb dominant cultural products, but reinterpret and adapt them for their own use, thereby changing their meaning and the way they influence social life (de Certeau, 1984). Once practitioners have access to new knowledge and farmers have a wider choice of technologies for production, it is not always easy for corporations to determine precisely how these technologies will be used. In this we should not see the corporations as all-powerful, even while we must be extremely wary of the concentration of power they do have.

9.2 Farmer organisation

A key struggle will be over ownership and control of technologies, and consequently the direction of their use. Issues of power loom large here. AGRA's work on building farmer associations will necessarily be a top-down process with farmer associations umbilically linked to AGRA programmes and products. These kinds of top-down, dependent civil society associations are structured to serve as conduits for corporate interest, and it is not always easy to work from inside such structures to create an independent voice and activity for producers. The clear counter to this is to engage on the basis of independent organisation, which ideally combines farmers with broader constituencies around food and seed sovereignty. Part of the struggle around technology is to bring scientists and academics into the sphere of influence of independent sovereignty movements, serving the interests of farmers and food consumers rather than corporations.

An associated question is the need for nascent food and seed sovereignty movements on the continent to more clearly define their constituencies. AGRA does emphasise smallholder producers, which is not such a big deal, given that the majority of farmers in Africa can be defined as smallholders. However, AGRA's focus is on adoption of Green Revolution technologies and commercialisation which will inevitably lead to concentration and centralisation. The majority of Africa's farmers will not fit into commercial agricultural production, including the integration into formal supply chains. There is need for a diverse production base, easy access to locally-adapted genetic resources, and maintenance of biodiversity; as well as to protect access to land and water for local and household production.

Not all those who distribute seeds can, or will want to, form a company in order to make private profits from these activities. By far the majority of farmers will need to continue saving and exchanging seed outside of formal markets as the basis of robust seed systems. How can this base be supported, deepened and extended without 'cherry picking' a small layer and condemning the rest to become passive consumers of seed, other inputs and, ultimately, food? AGRA does not refer to or recognise traditional ecological knowledge (Thompson, 2012:348), including seed saving and exchange, which forms the foundation of Africa's seed systems.

Are the two agendas of integration of smallholders into commercial value chains and localised production primarily for local use compatible? If we look at Africa's main Green Revolution

'success' (South Africa) we can see that a condition of the expansion of commercial agriculture, and the adoption of Green Revolution technologies, was the concentration of land holdings and the marginalisation or complete exclusion of smallholder farmers, and a concentration and centralisation of agricultural marketing systems. We cannot detach the technological basis of South African commercial agriculture from the accompanying processes of dispossession. They emerged hand-in-hand with one another.

AGRA and associated corporate initiatives in African agriculture threaten to split nascent food and seed sovereignty movements and farmer associations, dividing farmers between those who can participate in initiatives for commercialisation (not only by AGRA, but also by a range of other state and private sector actors from CAADP to hedge funds) and those who cannot. Movements in Africa must acknowledge the accelerated processes of class differentiation that capitalist interventions will necessarily produce amongst farmers. Movements must quickly sharpen their analysis, together with farmer associations, on their orientation towards commercial farming and core constituencies. Are movements geared towards being multi-class alliances, and what does this mean in the context of some farmers being able to take up the opportunities on offer by these well-resourced interventions, and some not being able to do so? The history of rural movements is the splitting off of segments of farmers once they have gained access to land or services for themselves. Do movements condemn this, do they embrace it, or do they accept that their membership will forever be unstable in conditions of capitalist competition? The answers to such questions will have a fundamental impact on strategies and ways of engaging with AGRA and similar initiatives across the continent and globally. So how might smallholder farmers and their organisations respond to AGRA's initiatives? Let us take these one by one, in the order of improved seed varieties, input distribution, soil fertility, and financing.

9.3 Improved seed

AGRA is proposing sustained investment in R&D to develop improved seed varieties, in close collaboration with farmers to breed and select varieties, and with privately contracted small-scale farmers to bulk up the seed for sale. It proposes to use the freely available genetic base residing in the IARCs and NARS, but to privatise the results.

This privatisation must be the first point of contention. If public resources are being used as the genetic base, the products must also remain freely available to the public. AGRA argues that private ownership of the resulting improved varieties is the only way of 'crowding in' private sector investment. According to AGRA, states do not have enough resources or expertise to do this themselves, there is no other option. This logic needs to be pushed back. Movements need to think about ways to bring scientists and public sector R&D institutions closer to independent farmer associations and movements to work on R&D in the public rather than private interest. Public sector institutions may be under pressure to engage in PPPs where the benefits ultimately flow to private companies. However, there are units and individuals within these institutions that can be worked with to develop a counter strategy for the retention of improved genetic resources in the public sphere. The immediate task is to explore these possibilities and build practical links, however small, between public sector R&D and independent farmer movements and associations.

The second point of contention in the arena of improved seed is to demand greater R&D work on crops outside the core 'commercial' crops (maize, cassava) in conjunction with producers. There are thousands of other crops and varieties that are locally important, even if they do not reach an economic threshold that is interesting to multinational corporations. These crops have a consumer

base, and a market, even if it is small. This base cannot be reached using centralised methods of production and distribution. By drawing on the "distributed intelligence" of millions of farmers through decentralising and democratising the tools of production and distribution, and connecting supply and demand (rather than imposing standardised products) these markets can be built (Anderson, 2009). But this will necessarily be outside the control of the corporations that focus on the small number of big selling 'hits' (e.g. GM maize varieties).

Food sovereignty movements should decide whether biotechnology (excluding GM) in the broad sense, has a possible role to play in improving genetic resources and increasing farmer choice. If so, then this must be accompanied by a clear orientation towards agroecological production and opposition to GM technologies, which threaten to obliterate alternatives on introduction. The key point, as above, is control over the technology and its development. A good rule of thumb is whether any development process increases the direct control and understanding of producers over a wider array of technologies, or whether the process results in greater passivity of producers in the face of technological change. Ultimately, technological development should be rooted in farmers' practices in farmer-based breeding, selection and sharing.

9.4 Seed markets/distribution

For seed distribution, AGRA focuses on agro-dealer networks based on private enterprises where farmers can buy inputs including seed and fertiliser, and where the owners can inform the farmers of the best choices for their conditions. Almekinders and Louwaars (2002:25) have shown how on-farm seed saving and exchange with neighbours are very good sources of planting material, but have weaknesses when it comes to the introduction of new varieties. It is always useful to widen the genetic pool wherever possible. Informal distribution systems do extend beyond the boundaries of immediate neighbours, but access may sometimes be an issue as distance increases and there are distribution delays.

In theory, an 'agro-dealer' network can bring new varieties closer to farmers, but such a distribution system is reliant on cash and some travel is also usually involved. An additional limitation of agro-dealer networks is their dependence on the sale of the 'hit' seeds for them to remain profitable as enterprises. The result is a reduction in the range of varieties made available and an inevitable narrowing of seed diversity. The role of seed laws in preventing the sale or distribution of non-registered varieties, the cost of registration, and outlawing of the use of germplasm already developed by rights holders works against locally-developed varieties generated by local farmers.

Strengthening seed distribution infrastructure has a place in improving Africa's seed systems, although a key issue is how open the network is, and whether it enables the distribution of any seed or only that seed produced through AGRA's programmes. Further on the ground research is required to see in practice what role AGRA-supported seed enterprises are playing, how they affect existing seed production systems, and the undoubtedly differential effects they may have on farmers' choice in selecting seed.

23. Bill Gates has an in-principle belief that private ownership of 'intellectual property' and the payment of royalties to property owners is the only path to innovation, stretching back to his early days as a software programmer (see Markoff, 2005).

We must also note the power context, and that training of the agro-dealers will be done by Green Revolution boosters, producing an orientation towards promoting AGRA's Green Revolution technologies. In this way the private sector replaces high quality public sector extension services which offer a range of choices beyond those profiting private seed and agri-chemical companies. This mirrors the private sector capture, not only of R&D but also of extension services, where private companies train public sector extension officers on the details of their products and the extension officers become *de facto* agents for those products. The priority here must therefore be on strengthening of public sector extension services, based on farmer-to-farmer participatory approaches with extension officers playing a supportive and process facilitation role.

Almekinders and Louwaars' (2002) discussion of seed systems suggests the most appropriate seed distribution systems would be rooted in a combination of on-farm seed saving; with exchange between neighbours, friends and family both within and outside communities. Rather than building an entirely separate private agro-dealer network, the question is how existing distribution systems may be strengthened. This might include the promotion of seed fairs and other organised forms of seed exchange for variety, local saving and exchange for access to locally-adapted planting material; and on-farm and community seed banks. Distribution systems of this sort are built on farmer organisation rather than as separate, profit-driven distribution systems.

9.5 Soil fertility

AGRA recognises that organic and agroecological techniques (e.g. use of legumes for nitrogen fixing, increasing organic content of soil, mulching, conservation agriculture/minimum or no-till) are an important component of increasing soil fertility. But AGRA argues this is not enough and judicious supplementary application of synthetic fertilisers is necessary to increase yields sustainably.

We need to consider what the use of synthetic fertilisers entails.

- First, synthetic fertilisers emphasise macro-nutrients (N,P, K) and may underestimate micro-nutrients, with negative ecological effects. The overuse of nitrogen throws off the chemical balance of the soil and causes over-acidification. Phosphates lead to the accumulation of poisonous heavy metals in the soil such as uranium and cadmium, resulting over time in the sterilisation of the soil. Farmers thus become dependent on feeding nutrients into the soil from season to season and the soil becomes a dead, inert carrier of these external nutrients rather than a living system that is able to support plants through its natural fertility.
- Second, synthetic fertilisers require cash. AGRA's expectation is that increased yields will generate sufficient cash to allow producers to buy these inputs. Whether this is borne out in fact must be investigated, but we know that the results are uneven in other parts of the world where Green Revolution technologies have been adopted. The result over time is increasing concentration of resources and an associated widening of the wealth gap. Cash for inputs may be sourced from micro-financing schemes that open producers to indebtedness should the technology not work as planned.
- Third, synthetic fertilisers necessitate imports because not all raw materials are found in Africa. This approach increases farmer dependency on external agents who have concentrated resources and power.

A priority focus might rather be on improving organic soil fertility practices, including supporting integrated farming systems (livestock and cropping) to generate on-farm resources to improve fertility. This agroecological practice ultimately requires support and farmer-to-farmer sharing. If

external mineral inputs are required, the first step might be to look for local ways of producing the necessary inputs, rather than immediately building dependency on manufactured imports. This might be done by building domestic, organic fertiliser production units and making investments in integrated pest and disease management systems, limiting imported materials. This in turn may require tariff protection, which runs counter to AGRA's philosophy of lowering tariff barriers and opening African markets.

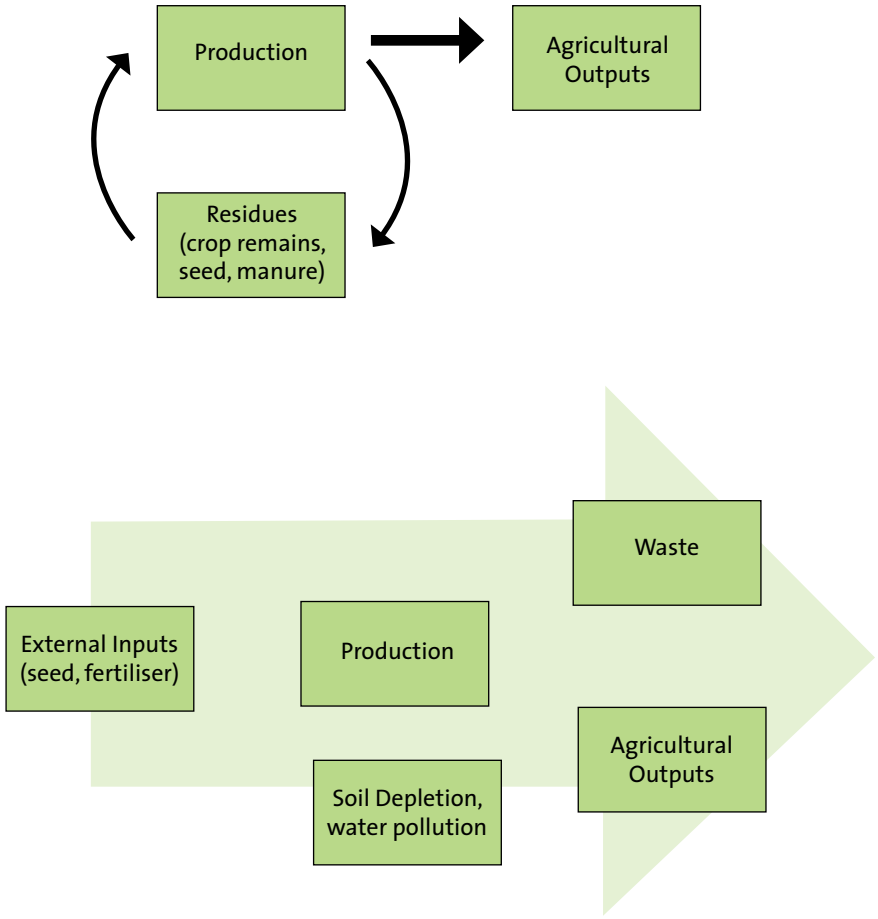
Pretty *et al*. (2006), coming from the food sovereignty angle, have reviewed case studies of agroecological practice in Africa that show an increase in yields compared with previous practices. These increases are on a scale that matches Green Revolution technologies, but with longer-term beneficial social and ecological effects. There is an urgent need to do further work on this question to look at the possibilities of low-external input agriculture in comparison with Green Revolution agriculture in practice. This must be looked at holistically, not only focusing on yield, but also on social, financial and ecological sustainability.

9.6 Holistic approach to agricultural production

Agricultural production might better be conceptualised in terms of cycles instead of chains. A chain is a linear approach where there is a complete disconnection between input supply and outputs. In contrast, a cycle is a closed system approach where outputs feed back into inputs. Rhetorically speaking, AGRA recognises aspects of such ecologically sustainable closed cycles in the form of increasing organic content in the soil using crop residues and legumes for nitrogen fixing. This links inputs and outputs. But AGRA combines this with aspects of a linear, chain mentality in the supplementary use of synthetic fertilisers, which it recognises will continue being imported because of a lack of raw materials in Africa. Such a system is not a closed cycle because inputs constantly flow from elsewhere and their negative imprints remain behind after outputs have left the production system.

AGRA entirely fails to recognise cycles in the circulation of seed. In AGRA's view, seed is a once-off input that must be purchased anew each season. Its emphasis on private ownership of new varieties via patents[23] ignores centuries of collective improvements of genetic resources by farmers on the land. It also breaks the natural cycle of on-farm saving and exchange that connects seed outputs with inputs. Thus on the one end of the chain, seed companies provide inputs, and on the other end agricultural products emerge with no further connection to agricultural production.

Figures 7a&b: Simple representation of closed nutrient cycles vs. linear input-output systems



Technology is important, but must be developed in conjunction with secure access to natural resources, water, production infrastructure and appropriate technical support. This requires a "holistic supply response strategy" (ActionAid, 2009:18). AGRA does not touch on these broader issues of imbalances in access to natural and other resources, preferring to treat agriculture as a stand-alone technical system. In contrast, the connection between land access and agricultural production is very tight in the understanding of most independent farmer associations and movements on the continent.

Current thinking in AGRA does seem to be shifting in the direction of integrated cropping and livestock systems. This is a key component of agroecological production, pointing to mixed farming rather than specialised monocropping. Integrated farming systems, with agroecological techniques, increase the availability of sources for on-farm fertiliser production (manure, cover crops, crop rotation etc) that can result in increased yields without reliance on synthetic fertilisers. The quality of livestock feed has a direct impact on nutrient content of manure, thus affecting both livestock and plant production (Alley & Vanlauwe, 2009:30). The possibility of AGRA embracing mixed cropping may produce contradictions in its own logic, since GM based agriculture is suited for large-scale monocropped farms.

9.7 Finance and credit

Access to finance is important for farmers to increase production, especially if they are producing commercially. Different types of financing are required: working capital to cover the gap between production costs and receipt of income; production credit for expansion; and reserves to hedge against adverse weather and economic conditions. However, it should be recognised that the provision of financing can result in rapid indebtedness of farmers, especially where not all elements of a high-output system are in place to ensure adequate income to pay off debts. It is a risky strategy for most farmers to enter into debt unless they are going to engage in sustained commercial production with clearly identified markets, and even pre-existing contracts for their products. Despite AGRA's claims to be targeting the poorest of Africa's farmers, a commercial financing strategy will always only target a small elite.

AGRA is offering financing in the form of grants, loans and equity. Grants for production and capital expansion at least do not tie farmers into debt. Loans are far riskier for farmers. Loans are extractive, with financiers taking a portion of the surplus for themselves. Africa's experience with World Bank loans and subsequent structural adjustment, and continuing repayment of loans more than 30 years after they were originally made should give great pause for thought about accepting loans at the individual farmer level. Equity does provide an injection of capital but at the cost of loss of ownership to external agents. When these are hedge funds, the investor's interest is in short-term gains rather than long-term commitment to building infrastructure and resources, or the equitable distribution of these resources. Equity investments can also result in foreign ownership of enterprises. If we consider the way multinational biotechnology and seed companies have consolidated ownership in the global commercial seed sector over the past two decades, there is reason to be extremely cautious about opening the doors to foreign investment that makes it much easier for multinationals to snap up successful seed enterprises when the timing suits them. With Monsanto lurking in the wings, and equity funds investing in seed enterprises, this is not an unlikely scenario for the future. The logic is to build markets, allowing local entrepreneurs to take the risk, and then buy them up once they prove to be successful. It has the potential to be a strategy for recolonisation.

10. Conclusion

AGRA is undoubtedly laying the groundwork for the commercialisation of African agriculture and its selective integration into global circuits of accumulation. Benefits will be unevenly spread and we should expect accelerated divergences in farmer interests. This will lead to greater class differentiation and a deepening commodification of African agriculture (subordinating agricultural products to the imperatives of exchange for the realisation of surplus value, rather than as use values in their own right).

The shadow of Monsanto, DuPont, Syngenta and other seed and agrichemical multinationals, and equity funds lie just behind the scenes of AGRA's show. Building new markets and market infrastructure for commercial seed in Africa opens the door for future occupation by multinationals, as they have done with all the major seed companies in South Africa over the past decade and a half (Sensako, Carnia and now Pannar). The focus on private company development (seed companies, agro-dealers) for the production and dissemination of proprietary (and even public sector) seed is a precursor to potential acquisition at a later stage. Dupont-Pioneer has been in a decades-long relationship with Pannar to the benefit of both, until Dupont decided it was strategically the right

time to take over. Small enterprises are a breeding ground for the potential extension of circuits of accumulation. Capitalism is known for ongoing absorption of 'organically' developed innovation, initiative and profitability by larger entities. AGRA and other capitalist interests have identified a profitable ('bankable') investment opportunity in smallholder agriculture in Africa, linked to Green Revolution technologies. They are now acting on that.

Food and seed sovereignty movements and small-scale farmer associations need not, however, be passive bystanders or recipients of the results of these strategies. There is room to contest and even engage, and in doing so to strengthen their own principles and clarity of purpose; possibly to look beyond a profit-driven, competitive economic system towards an economic and social system based on co-operation and mutuality.

Appendix 1: Gates Foundation sponsorship of agricultural R&D with a GM component and an African focus

Grant recipient	Project	Amount	GM research
African Agricultural Technology Foundation (AATF)	Water Efficient Maize for Africa (WEMA) – drought tolerance	US$37.8m	Monsanto subcontracted to carry out GM research
International Maize and Wheat Improvement Centre (CIMMYT)	Improved Maize for African Soils (IMAS) – nitrogen efficient maize adapted to nitrogen-deficient soils	US$17.3m	Pioneer subcontracted to carry out GM research
Cornell University	Durable Rust Resistance in Wheat (DRRW) – East Africa	US$51.8m	Includes GM research component
Donald Danforth Plant Science Centre	BioCassava Plus – enhanced levels of beta-carotene, iron and protein	US$5.2m	Includes GM research component. The Danforth Centre is Monsanto's 'in-house' research foundation
International Food Policy Research Institute (IFPRI)	HarvestPlus II and HarvestPlus Bridge – biofortified staple crops (developing countries as a whole)	US$53.9m	Includes GM research component
International Institute of Tropical Agriculture (IITA)	Cassava Brown Streak Disease Resistance – national research institutes in Uganda and Tanzania	US$2.4m	Includes GM research component
Mikocheni Agricultural Research Institute	Cassava Diagnostics Research Program – mosaic and brown streak diseases - eastern and southern African research institutions	US$1.2m	Includes GM research component
National Science Foundation	Basic Research to Enable Agricultural Development – SSA	US$24m	Includes GM research component
Regents of the University of California, Davis	Generation of Wheat Resistant to Multiple Rust Diseases using RNAi (developing countries as a whole)	US$0.3m	Includes GM research component
International Potato Centre	Sweet potato Action for Security and Health in Africa (SASHA) – weevil resistance and increased levels of Vitamin A	US$21.3m	Includes GM research component

Source: Gates Foundation, 2011

Appendix 2: AGRA SEPA grants by country and crop type, 2007-2011

Region/ country	Crop type	# projects	value (US$'000)	# projects	value (US$'000)	# projects	value (US$'000)
		Private seed companies		Public seed distribution		Total	
East Africa	**Total**	**22**	**3,856**	**15**	**2,713**	**37**	**6,569**
Tanzania	***Total***	***11***	***2,001***	***2***	***388***	***13***	***2,389***
	Maize	9	1,634	-	-	9	1,634
	Cassava	-	-	2	388	2	388
	Soybean	1	170	-	-	1	170
	Pigeon pea	1	197	-	-	1	197
Uganda	***Total***	***2***	***359***	***6***	***1,208***	***8***	***1,567***
	Maize	2	359	1	154	3	513
	Cassava	-	-	1	173	1	173
	Groundnut	-	-	1	152	1	152
	Beans	-	-	1	156	1	156
	Banana	-	-	1	263	1	263
	Seed certification	-	-	1	310	1	310
Ethiopia	***Total***	***4***	***711***	***2***	***343***	***6***	***1,054***
	Maize	4	711	2	343	6	1,054
Kenya	***Total***	***2***	***313***	***4***	***672***	***6***	***985***
	Cassava	-	-	2	356	2	356
	Maize	1	150	-	-	1	150
	Groundnut	1	163	-	-	1	163
	Beans	-	-	1	164	1	164
	Sweet potato	-	-	1	152	1	152
Rwanda	***Total***	***3***	***472***	***1***	***102***	***4***	***574***
	Maize	2	350	1	102	3	452
	Beans	1	122	-	-	1	122

Region/ country	Crop type	# projects	value (US$'000)	# projects	value (US$'000)	# projects	value (US$'000)
		Private seed companies		Public seed distribution		Total	
West Africa	**Total**	**26**	**3,639**	**4**	**422**	**30**	**4,061**
Ghana	***Total***	***10***	***1,478***	**-**	**-**	***10***	***1,478***
	Maize	8	1,198	-	-	8	1,198
	Groundnut	1	150	-	-	1	150
	Cassava	1	130	-	-	1	130
Nigeria	***Total***	***5***	***770***	***1***	***150***	***6***	***920***
	Maize	4	620	1	150	5	770
	Sesame	1	150	-	-	1	150
Mali	***Total***	***3***	***498***	***1***	***126***	***4***	***624***
	Maize	2	348	-	-	2	348
	Groundnut	1	150	-	-	1	150
	Sorghum	-	-	1	126	1	126
Niger	***Total***	***3***	***392***	**-**	**-**	***3***	***392***
	Millet	2	262	-	-	2	262
	Rice	1	130	-	-	1	130
Burkina Faso	***Total***	***2***	***281***	**-**	**-**	***2***	***281***
	Maize	2	281	-	-	2	281
Sierra Leone	***Total***	***2***	***150***	***1***	***76***	***3***	***226***
	Maize	1	75	-	-	1	75
	Groundnut	1	75	-	-	1	75
	Rice	-	-	1	76	1	76
Liberia	***Total***	***1***	***70***	***1***	***70***	***2***	***140***
	Maize	-	-	1	70	1	70
	Rice	1	70	-	-	1	70

Region/ country	Crop type	# projects	value (US$'000)	# projects	value (US$'000)	# projects	value (US$'000)
		Private seed companies		Public seed distribution		Total	
Southern Africa	**Total**	**13**	**2,120**	**4**	**734**	**17**	**2,854**
Mozambique	***Total***	***6***	***984***	***1***	***227***	***6***	***1,211***
	Maize	6	984	-	-	6	984
	Cassava	-	-	1	227	1	227
Zambia	***Total***	***3***	***535***	***2***	***200***	***6***	***735***
	Maize	2	377	1	200	3	577
	Cow pea	1	158	-	-	1	158
Malawi	***Total***	***4***	***601***	***1***	***307***	***5***	***908***
	Maize	3	451	-	-	3	451
	Soybean	1	150	-	-	1	150
	Cassava	-	-	1	137	1	137
	Groundnut	-	-	1	170	1	170

Source: AGRA

Appendix 3: AGRA SEPA grants by crop type

Crop type	Region	# projects	value (US$)	# projects	value (US$)	# projects	value (US$)
		Private seed companies		Public seed distribution		Total	
Maize	***Total***	***46***	***7,538***	***7***	***1,019***	***53***	***8,557***
	West Africa	17	2,522	2	220	19	2,742
	East Africa	18	3,204	4	599	22	3,803
	Southern Africa	11	1,812	1	200	12	2,012
Cassava	***Total***	***1***	***130***	***7***	***1,281***	***8***	***1,411***
	West Africa	1	130	-	-	1	130
	East Africa	-	-	5	917	5	917
	Southern Africa	-	-	2	364	2	364
Groundnut	***Total***	***4***	***538***	***2***	***322***	***6***	***860***
	West Africa	3	375	-	-	3	375
	East Africa	1	163	1	152	2	315
	Southern Africa	-	-	1	170	1	170
Other	***Total***	***10***	***1,409***	***7***	***1,247***	***17***	***2,656***
	West Africa	5	612	2	202	7	814
	East Africa	3	489	5	1,045	8	1,534
	Southern Africa	2	308	-	-	2	308

Source: AGRA

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