



Seed production & distribution whitepaper



Sowing the seeds of progress

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One of the major barriers to agricultural productivity in Africa is the persistent use of inferior seeds by smallholder farmers. Through the recycling of non-resilient varieties that are lacking in drought tolerance, late maturing, low yielding, and with no resistance to pests and diseases, farmers remain locked in a cycle of poverty and hunger.

For centuries, farmers in Africa have skilfully operated their own informal seed systems. They have saved seeds from one year's crop for planting in the next, and distributed these seeds through community networks. Many have worked like plant breeders and researchers, combining different varieties to obtain desirable traits, and collaborating with other farmers to expand their knowledge. Despite this impressive ingenuity, the performance of local varieties of maize, cassava, millet, and other African food staples have lagged far behind the rest of the world. Harvests per hectare for major crops like maize can be as much as 80% below their potential.

Yield gaps on this scale mean that Africa does not produce nearly enough food to sustain the continent's rapidly growing population. And despite being home to 65% of the world's uncultivated land, Africa remains dependent on foreign imports. Currently, Africa spends \$35 billion in foreign currency annually on imported food – a figure which, according to the World Bank, could rise to over \$100 billion per year by 2030.

However, in recent years, the work of the Alliance for a Green Revolution in Africa (AGRA) has demonstrated that Africa's smallholders are not bound by tradition or preference to subsistence farming. On the contrary, our work has shown that Africa's farmers are in fact eager adopters of new technologies. Provided they are relevant to local needs and available at affordable prices, these

technologies have enormous uptake potential among farming communities. The advancement of improved seed production and distribution therefore points the way to a brighter and more sustainable future. As such, it is a core component of AGRA's efforts to drive an inclusive agricultural transformation in Africa.

AGRA'S FOUNDING FOCUS

At its founding in 2006, AGRA began to investigate, as a matter of urgency, the major shortfalls, stumbling blocks and bottlenecks within Africa agriculture, with a core focus on seeds. Indeed, although our work has come to encompass a range of thematic programs, seeds was where it all began.

From our initial analysis, it became clear that farmers continue to use low-quality seed due to a lack of available improved varieties. Across east and west Africa, we saw that national and private sector capacity for improved seed production was low, with major gaps in knowledge, expertise and resources, as well as non-enabling policy environments.

To address this problem, in 2007 AGRA launched the Program for Africa's Seed Systems (PASS). Running until 2016, PASS focused on the education of breeders, the breeding of new varieties, and the production and delivery mechanisms required to create viable systems for the dispensation of high-quality, high-yielding seeds. Through the PASS model, AGRA has retained an unwavering focus on seeds, and driven major improvements and progress in all four areas of PASS activity.

But before we look at the individual components of this work and the impact it has delivered, let us consider the very subject of this paper: the seed itself.



SEED OF IMPROVED VARIETIES

When we talk about ‘improved seeds’, we mean both hybrids and non-hybrid varieties. However, there is a tendency to focus on the latter because of their added advantages. Hybrid seeds are seeds from plants and crops – such as maize, sorghum and certain vegetables – that are created through breeding. During this process, scientists carefully control pollination from males to females until they produce a crop variety with ‘improved’ traits, such as higher yields, disease resistance and accelerated growth. This enhancement, through which the hybrid progeny exhibits superior performance characteristics to its parents, is known as ‘heterosis’, or ‘hybrid vigor’; it enables the production of seed of varieties that provide consistent, uniform-quality crops, offering farmers a greater chance of increased productivity. Typically, hybrid seed can provide a three-to-fourfold yearly increase over non-hybrids, and a tenfold increase over non-improved seeds.

Crucially, hybrids are not genetically modified, although they are often mistaken as such. At AGRA, we do not support the development of genetically modified (GM) crops, and since our inception we have adopted a neutral position on GM crop varieties. We aim to maximize the

use of advanced, conventional crops, like hybrids, and we remain a strong proponent of farmer-participatory breeding. To date, we have funded the development of more than 630 new crop varieties of 14 species of food crops, namely: beans, cowpea, soy beans, pigeon peas, ground nuts, finger millet, pearl millet, sorghum, tef, maize, rice, cassava, bananas, and sweet potato.

Through our work on seeds of improved varieties, our aim is for African farmers to have more choice and control over the crops they cultivate. And the opportunity, through these crops, to transform their livelihoods and their lives.

AGRA'S APPROACH TO SEED PRODUCTION

Since the launch of PASS in 2007, AGRA has developed a unique approach to seed production and distribution. This approach is aligned to the PASS seed value chain, which ranged from research and development through to production, marketing and commercialization. Of the four key focus areas set out below, only the latter two are still ‘live’ components of AGRA’s strategy since PASS concluded in 2016.

EDUCATION FOR AFRICAN CROP IMPROVEMENT

At the start of the PASS seed value chain, we focused on making links with universities to help to create a new generation of African crop breeders. We supported the training of scientists at MSc and PhD level to develop improved crop varieties. Other key components of this work include:

- Establishment of grant support
- Recruitment of top-level fellows
- Oversight of curricula
- Oversight of thesis research
- Reintegration of students

BREEDING AND PROMOTION OF VARIETIES

The next stage in the research and development phase involved building breeding teams and devising strategies for improved variety development. These strategies included tailoring variety traits and performance characteristics to specific conditions (see below) in order to maximise opportunities for increased farm yields.

Other key components of this work include:

- Establishment of grant support
- Oversight of breeding
- Support for variety release process
- Creation of links between breeders and seed companies
- Support for commercialization

SEED PRODUCTION

As we move into the production and marketing phase, we work to identify and invest in local seed enterprises and build local supply chains. Our priority here was and still is to fund and develop production capacity on the ground, provide all necessary training, and ensure the requisite actors are in place. Other key components of this work include:

- Establishment of product market strategy
- Establishment of grant support
- Support for business development services and training of seed company staff
- Support for production, processing and marketing
- Creation of links to investment funds

- Awareness raising
- Support for governments to establish conducive policy environments

DELIVERY

The final stage of the process involves closing the gap between product and recipient. This process consists of building networks of agro-dealers and village-based advisors (VBAs) to deliver the technologies and knowledge farmers need to increase productivity. Other key components of this work include:

- Identification of service providers to train agro-dealers
- Establishment of grant support
- Oversight of training
- Awareness raising
- Oversight of credit guarantee
- Creation of links between agro-dealers and seed companies
- Creation of links between agro-dealers and farmers

TARGETED AND TAILORED SEED DEVELOPMENT

The ultimate goal of the PASS seed value chain was commercialization; but successful commercialization depends upon the relevance of seed products to local conditions and need. A key guiding principle in our approach to seed system development, therefore, is the tailoring of varieties to specific agro-ecologies. In regions with low rainfall, for example, we support the development of varieties that enable farmers to grow drought-tolerant crops such as sorghum, millet, green grams, pigeon peas and cowpeas. Elsewhere, we focus on seeds of varieties suited to particular soil conditions, for example those that can perform well in acidic or low nitrogen conditions, as well as varieties with increased resistance to pests and disease, such as maize streak, grey leaf spot, Africa cassava mosaic, and cassava brown streak, to mention but a few.

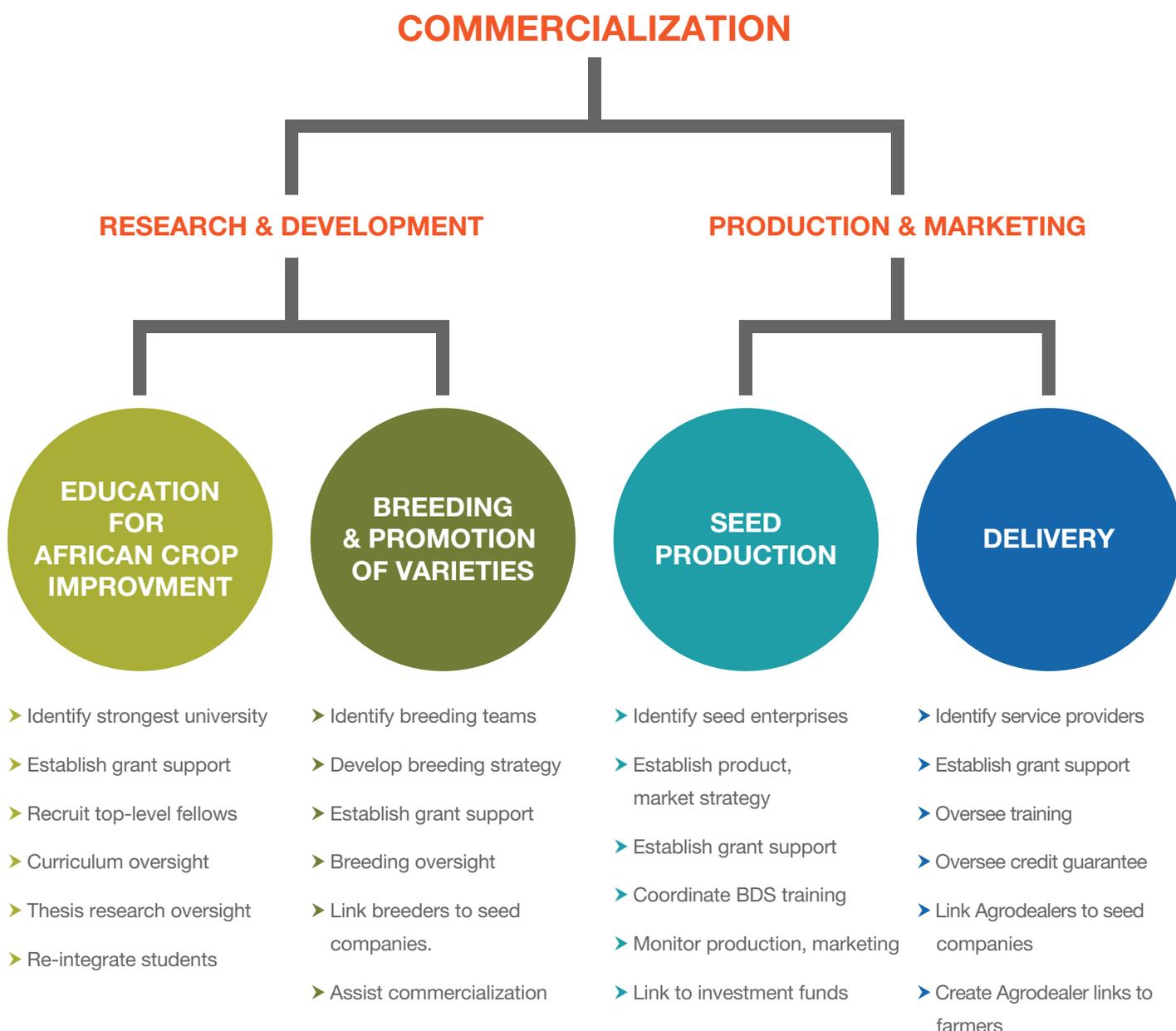
Through targeted seed production, our aim is to encourage smallholder farmers to adopt crops that will perform well in the ecologies and climates in which they work – helping them transition from subsistence farming to profitable commercial enterprise.

We also tailor seed production to local market requirements. For example, we focus on sorghum

and sugar bean in Tanzania, sorghum in Uganda, and cassava in Mozambique to meet demand from local breweries, where these crops are used to produce malt for beer. Indeed, AGRA has blazed a trail in generating awareness and demand for improved crop varieties, both at farm and market level. And by steadily growing local networks and supply chains, we have helped to stimulate interest and involvement from multinationals. In Ghana, for example, until 2018 there were no regional

or multinational companies operating in the seed sector. Since then, however, thanks to the networks we have built, companies such as SeedCo, Corteva and UPL have all entered the Ghanaian seed market.

PASS SEED VALUE CHAIN



Case Study

BUILDING CLIMATE RESILIENCE IN KENYA

In Kenya, Urbanus Mutua, a local farmer and Project Manager at Anglican Development Services Eastern (ADSE), is working with AGRA to encourage local farmers to adopt more drought tolerant crops. Since 2013, ADSE has been promoting the use of sorghum, green grams, cowpeas and pigeon peas as part of an AGRA-funded project designed to increase food security and incomes for the smallholders of Makueni County.

“Maize has been a staple food crop for decades and farmers will never abandon it entirely,” explains Asseta Diallo, Acting Head of Soil Fertility and Fertilizer Systems at AGRA. “But by introducing these new crops, the hope is that farmers will see how they can increase productivity through climate resilience.”

Aiming to reach 20,000 smallholder farmers, the project is also focused on improving the lives of women and young people through the introduction of Integrated Soil Fertility Management (ISFM). Based on intercropping and seasonal rotation, ISFM can further enhance productivity and offer viable routes to market.

“Previously,” says Mutua, “farmers might produce three-to-four 1,000 kg bags of crop per acre per season. But now they can optimise production and get five bags or more, sometimes as many as 10 or 15.”

And there is clear evidence to support these claims. In Kathonzweni, members of the Kasau ka Kyunyu Hope farmer group have embraced the new varieties and methods and are enjoying a plentiful harvest. As host farmer Elizabeth Muthiyani explains, up until 2014 the local smallholders planted only maize. But through the training and support of ADSE and AGRA, and thanks to subsidized, high-quality products from Kenya’s Dryland Seed Company, they have achieved significant improvements.

With a healthy surplus of produce, Muthiyani says she is now not only food secure but in profit, as she is able to sell the sorghum and green grams her family does not consume. The impact has been transformational:

“I am very happy. Now I can feed my family and pay my children’s school fees. We have also been able to buy solar panels, which means no more kerosene. And we have access to external credit, so we can purchase the inputs we need for next season. It gives us hope for the future.”

SEED DISTRIBUTION: BRINGING ‘THE SHELF’ TO FARMERS

Twelve years ago, it was common for smallholder farmers in Africa to walk long distances to acquire agricultural inputs: seeds, fertilizers, and other vital planting materials. Such distances, over 20km in some cases, deterred and prevented farmers from accessing the technologies they needed. Faced with the choice of a long journey, often on foot, or recycling old seed at home, many would choose the latter option, perpetuating the cycle of low productivity and poverty.

Therefore, while producing seed of improved varieties is a vital component of agricultural transformation, getting these products to the farmer is equally essential. In the words of Kehinde Makinde, previously in charge of agro-dealer work in West Africa, and Fred Muhhuku, AGRA Senior Program Officer for agro-dealer development and input distribution in Eastern and Southern Africa:

“Technology on its own cannot bring about sustained growth...Technology generation must go hand-in-hand with efficient and effective distribution systems... Clearly, the solution is not just to put good things on the shelf, but to bring the shelf...to the farmers.”

By working to bring services closer to the farmer through local distribution networks, AGRA is addressing one of the major gaps and disconnects in African agriculture.

AGRO-DEALER DEVELOPMENT

Agro-dealer development is one of the key pillars of the PASS seed value chain and AGRA distribution model. Agro-dealers are individuals or SMEs dealing in agricultural inputs. They are essential frontline extension agents, often operating out of small village shops with nearby demonstration plots. As such, they are purveyors and disseminators of both products and knowledge. And their reach is considerable: on average, one agro-dealer can reach over 1,000 smallholder farmers in a big town, and between 100 and 200 farmers in a village. Furthermore, farmers can often sell surplus produce back to agro-dealers to generate additional income. Speaking in 2010, Mr Akinwumi Adesina, President of the African Development Bank, described the agro-dealer model as “the single most important rural market revolution in Africa in decades”.

AGRA works to promote and expand agro-dealership as the backbone of our seed distribution network. By helping to build links between agro-dealers and seed companies, by training agro-dealers in product

knowledge, record keeping, advisory services and awareness-raising, we are helping to expand vital services. Crucially, we are also helping to reduce the distances farmers travel to access the inputs and advice they need. To date, AGRA has built a network of around 40,000 agro-dealers across our 11 focus countries, closing the gap from 20km in Burkina Faso and Mozambique to between five and eight km in Kenya and Uganda, and under five in Rwanda.

VILLAGE-BASED ADVISORS

Our approach to seed distribution also involves identifying and training self-employed village-based advisors (VBAs). VBAs are 'lead farmers' who are selected to share technologies and knowledge locally with fellow farmers. With connections to input companies, they help to promote quality seeds and fertilizers, together with good agricultural practices – for example, crop management, fertilizer use, weeding and pest control.

VBAs create a robust input delivery and distribution mechanism, supporting agro-dealer network expansion. Through demonstrations and field days, they help to stimulate awareness and demand, performing a key role in triggering the adoption of improved varieties. They also operate as aggregators and commission agents, supporting the trading of grain. In recent years, we have therefore focused on developing VBAs as a key delivery channel, and training and integrating VBAs into our agro-dealer networks. We are also engaging VBAs in trials of pipeline crop varieties to ensure the preferences and needs of farmers are being met.

POLICY ENGAGEMENT

Policy engagement is another key area of activity in our efforts to improve seed systems in Africa.

While innovations on the ground are driving uptake and progress, at national and regional level policy constraints still hamper the development of seed systems. Historically, government policy in Africa discouraged companies from producing and marketing staple crop seed, until liberalization in the 1990s through the IMF and the World Bank opened up market activity. Since that time, we have seen the emergence of more progressive policy environments, but there is still much work to be done.

In the last ten years, AGRA has been helping African governments to address seed policy issues. With strong support from USAID, The Rockefeller Foundation, and the Bill and Melinda Gates Foundation (BMGF), we have successfully advocated for reforms, working with the governments of Mali, Ghana, Tanzania, Burkina Faso, and Mozambique to liberalize foundation seed supply policies, among others. Our other focus areas include:

- Seed inspection and certification
- Royalty charges for public varieties
- Restricted seed marketing by private seed companies, in-country and across borders
- Variety testing and release processes
- Plant variety protection

One key example is our work in Nigeria, where we have enabled the National Agriculture Seed Council (NASC)



to launch the electronic seed verification and authentication system – Seedcodex. We have also supported NASC to validate a five-year strategic investment plan for the regulation of the seed sector. In turn, these developments are helping to raise awareness of seed quality among Nigerian farmers, leading to increased willingness to adopt seed of improved varieties.

Through such work in Nigeria and elsewhere, AGRA aims to strengthen national seed regulatory agencies and remove policy constraints, further opening up markets and enabling the development of viable seed systems.

IMPACT AND EVIDENCE

When AGRA started out, only three sub-Saharan African countries were exporting hybrid seeds, producing a total of 2,000 MT a year. Today, there are over 110 companies producing 110,000 MT tons a year. Indeed, through the work of PASS, and through collaboration with our partners, we have delivered tangible results, driving progress and innovation in the development of seed technologies and systems. Key highlights include:

- Over **600 varieties** of improved seed developed and released, at least half of which have been commercialized
- **15 million farmers** now accessing seeds of improved crop varieties
- **800,000 MT of certified seed** produced to date by AGRA-supported seed companies
- **\$200 million of private investment** catalyzed in the seed sector across the continent
- **600 PhD and MSc graduates** trained with AGRA's support
- Nearly **40,000 agro-dealers trained**
- **142 enterprises** (public, private and cooperatives) supported by PASS

Looking ahead, our aim is to ensure seed companies focus on accelerating climate smart varieties – that is, varieties that are early maturing, drought tolerant, and pest and disease resistant. Only in this way will we help farmers develop the resilience required to farm productively, finally breaking the cycle of low yields and poverty, and helping to drive agricultural transformation.

For more information

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