Challenges underpinning the seed value chain in Mozambique

Benedito Cunguara[1] and André Machava, Delfim Villisa, G Matchaya, S. Nhlengethwa, Duque Wilson, & C. Nhemachena

December 2019

Summary

This policy brief seeks to build up awareness among the policy makers in Mozambique of the key challenges underpinning the seed value chain. It presents the major findings from desk review of current research, official government and NGO reports, and legislation regarding the seed sector in Mozambique. The findings were supported by opinions collected through interviews conducted with key stakeholders in the seed sector. The main findings can be summarized into three points: i) seed availability; ii) regulation; and iii) regional trade. First, the supply of quality seeds in Mozambique is very limited as a result of several constrains encountered throughout the seed value chain. There is a need for a better integration, collaboration and complementarity among seed value chain actors and its segments to ensure timely supply of improved seeds and meet farmers' needs in terms of quality, quantity and prices. A more vibrant public-private partnerships between USEBA and seed companies will be essential to increase seed availability and access by smallholder farmers. Second, the current policy environment is conducive to the entry of private sector in roles previously regarded for the public sector, namely private seed laboratories and private seed inspectors. Additionally, the adoption of SADC seed harmonization protocol means that the process of variety release and registration is simplified, and seed companies can easily source quality seeds from neighboring countries and make it available to farmers. Third, there are a few ongoing projects of introduction and dissemination of improved seeds (certified and quality declared seed) to smallholder farmers, which represent an excellent opportunity for learning while simultaneously providing a good basis to assess the suitability of current seed legislation, and to refine future interventions to create a vibrant and competitive seed value chain in Mozambique.

Introduction and Background

The simple idea that better seeds can improve the lives of poor farmers has proven to be so powerful and enduring that efforts to increase the spread of improved crop varieties have now been at the core of agricultural development for more than 50 years[2]. de Janvry and Sadoulet (2002) estimated that the use of improved seeds among smallholders in Sub-Saharan Africa can increase total factor productivity by 10%, and increase farmers' incomes by almost 8%. Cunguara and Darnhofer (2011) use data from rural Mozambique to show that, despite drought, the use of improved maize seeds significantly increases the income of households who had better market access. In Mozambique the seed sector is predominantly informal, with less than 10% of farmers acquiring seeds from formal systems, according to the statistical yearbook of 2016 published by the Ministry of Agriculture and Food Security (MASA). Issues of seed quality, which translate into lower germination rates, poor genetic purity and plant vigor, continue to undermine agricultural productivity and food security. The comprehensive seed law approved in 2013 by the Government of Mozambique (GoM) seeks to improve competitiveness in the seed value chain by allowing the entry of national and foreign private companies in seed breeding programs, and establishment of privately owned seed laboratories and licensing of private seed inspectors. This decentralization reform is in line with the Malabo Declaration which calls for an

[1] Corresponding author: cunguara@gmail.com
[2] Greg Traxler Foreword's remarks in CGIAR (2016)

enabling environment for private sector investment in agriculture, and the commitment to increase agricultural productivity. This will likely contribute to increase the use of quality and affordable inputs by smallholder farmers, and therefore accelerate the agricultural growth and contribute to poverty eradication. Nevertheless, the evidence indicates that the agriculture sector in Mozambique is still characterized by low use of improved seeds, as shown in the agricultural statistical yearbook published by MASA in 2016.

Seed value chain in Mozambique

The seed value chain in Mozambique is characterized by a combination of formal and informal seed systems which operate complementarily (Figure 1).

The formal seed system can be grouped into five categories (Mabaya et al., 2017). The first is research and breeding, and the key players are IIAM (National Agricultural Research Institute), CIMMYT (International Center for Maize and Wheat Improvement), CIAT (International Center for Tropical Agriculture), ICRISAT (International Crops Research for the Semi-Arid Tropics), IITA (International Institute of Tropical Agriculture), IRRI (International Rice Research Institute), CIP (International Potato Center) and UEM (University Eduardo Mondlane). IIAM focuses its research and breeding programs mainly on three groups of crops: cereals, legumes, and roots and tubers. CGIARs are the main partners of IIAM, and both work in collaboration in breeding programs. For example, IRRI leads rice programs, CIMMTY focus on maize, CIAT on common beans, IITA on soybean and cowpea, ICRISAT on groundnut, sesame and pigeonpea, while CIP specializers on potato and sweet potatoes.

The second category is variety release and regulation, and includes IIAM, seed companies, and ANS (National Seed Authority). Research institutions have the mandate to develop new seed varieties, while the ANS is responsible for the release of varieties and regulation of the seed sector. However, the ANS can delegate its competences to third party entities provided that certain requirements are fulfilled.

The third category pertains to seed production and processing, and this includes institutions such as the IIAM, seed companies, seed producers and associations.

The fourth category is education, training, and extension, and this category includes institutions such as the IIAM, seed companies, agro-dealers, NGOs, FAO (United Nations Food and Agriculture Organization), and DINAS (National Directorate of Agriculture and Forestry).

The fifth category comprises distribution and sales, and includes agro-dealers, public extension services, NGOs, and seed companies.

Conversely, the informal seed system has fewer types of stakeholders (although more smallholders, see Figure 1) and is less structured compared to the formal system, although it represents more than 90% of the total share of the seed value chain. In this system, farmers use local seed varieties or cultivars from their own harvest, or access seeds through neighbors, relatives and local seed providers. Additionally, the seed from formal systems can enter into the informal seed system when farmers recycle and use certified seed themselves, without undergoing formal seed inspections and certification processes. In fact, part of the seed used in the informal seed system was once certified seed introduced to farmers through government, NGOs programs, and other seed dissemination schemes.

Policy Review

The seed sector is regulated by two policy documents: i) the Strategic Plan for the Development of the Agricultural Sector (PEDSA), and ii) the Program for Strengthening of the Seed Chain (PFCS); and five key seed legislation documents: i) Decree 12/2013; ii) Decree 26/2014; iii) Ministerial Directive 115/2014; iv) Ministerial Directive 82/2015; and v) Ministerial Directive 58/2017.

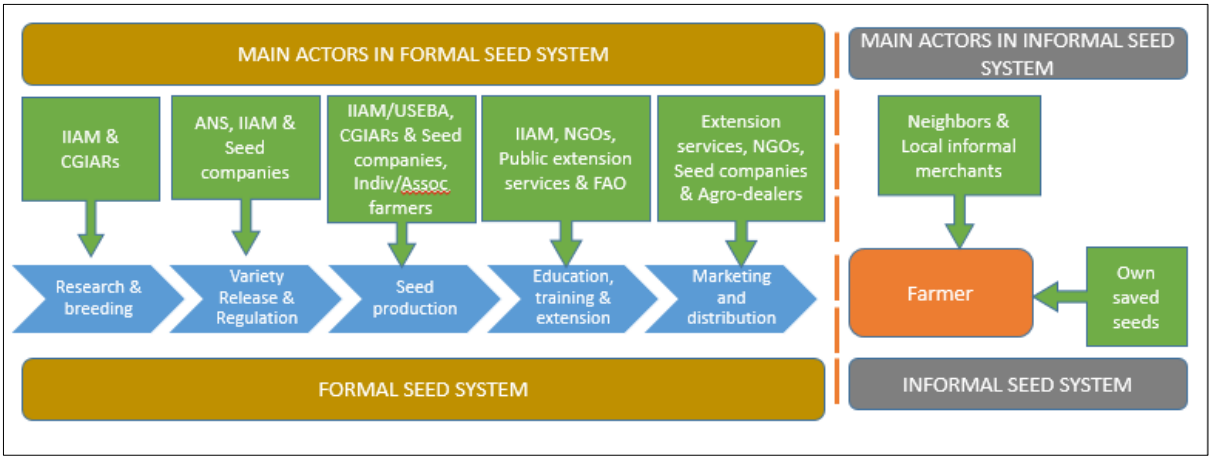

Figure 1: Overview of seed value chain in Mozambique

The Decree 12/2013 of April 10 addresses and regulates issues related to registry, production, processing, transport, commercialization, import, export, quality control and certification of seeds in Mozambique. This decree also simplifies the variety release protocols, which has contributed to an increased number of varieties released between 2011 and 2016. It also operationalizes and harmonizes protocols regarding seed legislation in the region adopted by SADC member countries in 2010. To complement this, the Decree 26/2014 for protection of new plant varieties creates a window of opportunity for entry of national and foreign private seed companies engaged in breeding programs as it protects property rights of owners of seed varieties. The downside is that the Decree 26/2014 is still not yet operational due to lack of regulations, norms and procedures for its implementation. The harmonized seed legislation with SADC protocols, and openness for entry of private seed companies in activities previously and exclusively reserved to the public sector and development partners in Mozambique, are some of the high remarks of current seed legislation.

Additionally, the Ministerial Directives 115/2014 and 85/2015 provide the framework, composition, competences and functioning of the National Seed Committee (CNS) and the Sub-Committee for Registry and Release of Varieties (SCRLV) respectively. These ministerial directives coupled with the Ministerial Directive 58/2017 (which provides complimentary norms for licensing and accreditation of private seed inspectors and laboratories) can contribute further to a well-regulated and dynamic seed sector in Mozambique. As a result, six new private seed inspectors have recently been accredited in central region of Mozambique (Alberto, 2018).

Furthermore, acknowledging weaknesses in linkages among actors in the seed chain, the seed sector has established in 2014 the National Dialogue Platform of the Seed Sector in order to create a good business environment and make the sector more competitive, dynamic and pluralistic. With progress over time, in May 2016, the dialogue platform was converted into APROSE (Association for Promotion of the Seed Sector) as a legal entity with financial and administrative autonomy. The association has representatives from across all 3 regions of Mozambique and different stakeholder groups, namely, public sector, seed companies, farmer organizations, financial institutions and development partners. In its short lifespan, the association has achieved several outcomes in advocacy for licensing of private seed inspectors and their accreditation, seed quality control, capacity building and gathering information about the seed value chain in Mozambique. However, the association still lacks financial resources which somehow undermine its institutional capacity to fulfil its duties and aims.

The current seed legislation in Mozambique allows plurality of actors to participate in the seed value chain, and integration of seed systems, which can be viewed as a milestone towards a more vibrant and dynamic seed sector. This is catalyzed by the

creation of APROSE where multiple stakeholders of the seed value chain can discuss problems and come up with solutions collectively. Another benefit of such organization with good representation is to enable synergism, flow of information and better coordination among stakeholders.

Key Barriers and Opportunities

Key challenges can be summarized as follows: i) lack of incentives to produce breeder seed; ii) insufficient basic seeds; iii) limited capacity to produce certified seed; iv) limited coverage of extension services; vi) market uncertainties.

Lack of incentives to produce breeder seed

The problems in the formal seed sector begin in the early stages of the chain. The existing breeding programs to produce breeder seed do not cover all crops grown in Mozambique. Moreover, the agricultural sector in general is under invested, especially agricultural research, the latter receiving only 0.24% of the agricultural GDP, which is about 12% of the recommended investment rate (Cunguara et al., 2013). This is exacerbated by the absence of appropriate government strategy to attract and retain qualified professionals in the public sector. For instance, currently there are only 18 breeders employed at IIAM distributed across the four Zonal Centers.

Nevertheless, CGIARs play an important role in offsetting the lack of resources from IIAM. Given that research and breeding programs are crucial to develop new improved varieties, Tomo et al. (2017) and Muocha (2018)[3] argue that more incentives are needed to support breeders in their activities. This can be accomplished through a specific legislation to determine incentive package to breeders, for instance by allocating a share of profits from sales of certified seeds. Property rights to breeding tend to be weak in Africa, and this discourages investments. Property rights should be strengthened although this is likely to result in high seed prices for farmers.

Insufficient basic seed

USEBA is responsible for multiplication of breeder and pre-basic seed to produce basic seed. The basic seed is then supplied to companies, individual seed producers and community based organizations for multiplication to produce certified seed. However, generally, the supply of basic seed lags behind to meet the demand in terms of quantity, quality and variety preferences imposed by markets (Mabaya et al., 2017; Tomo et al., 2017; USEBA, 2018). Figure 2 shows that with the available basic seed produced by IIAM, it would only be possible to sow less than 4% of farmers' total area for all crops presented, thus highlighting the role of regional breeding programs in the SADC and CGIARs in filling the gap. The amounts provided in Figure 2 do not include the basic seed produced by IIAM partners such as CGIARs (or imported seeds from regional networks). The remaining area would have to be sowed with either imported seed or locally available non-certified seeds, which is what is currently happening.

Shortage of basic seed translates into failures in the following stages of the seed chain. Furthermore, larger amounts of basic seed have been planned for the Southern Zonal Center compared to Central, Northeast and Northwest Zonal Centers despite their greater agricultural potential in the latter.

Several contractual arrangements and partnerships are currently being employed to try to increase the supply of basic seeds. For instance, besides producing basic seed in each IIAM Zonal Center, USEBA also oversees and assists the production of basic seed from private companies, individual farmers and community based organizations. USEBA also provides training to extension officers whom in turn provide assistance to seed producers. Furthermore, projects such as Feed the Future Mozambique Improved Seeds for Better Agriculture (SEMEAR) funded by USAID and implemented by the consortium IITA, ICRISAT, CIAT and IIAM produced over 60 tons of basic seed of six

[3] Personal communication

crop type in its first year of implementation (2015), and had targeted to produce 715 tons between 2015 and 2020 (Malita, 2017).

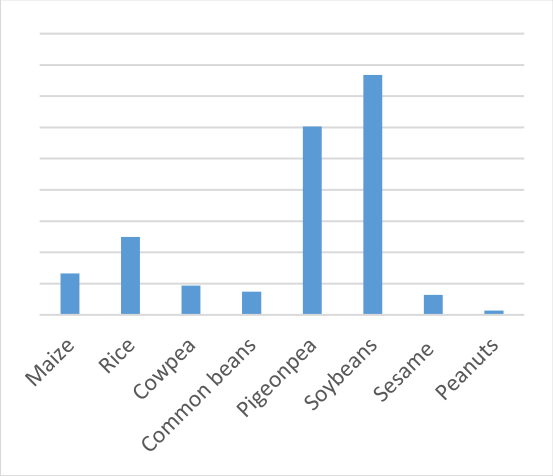

Figure 2 Share of total area nationwide that can potentially be sowed with improved seeds from USEBA

Decentralization, better planning and coordination between actors who produce basic seed and those multiplying it to produce certified seed represent a way forward, and will potentially address the shortages observed at the moment.

Supply of certified seed in quantity and quality at affordable prices

Nationwide, less than 10% of farmers used improved seeds in 2016 (Tomo et al., 2017) (see Figure 3 for maize, 2005 – 2012). There are five key points, and these include, among others i) limited supply of earlier seed classes (breeder, pre-basic and basic seed) which translates into low supply of certified seeds; ii) reduced number and spatial distribution of seed companies, associated to inadequate infrastructure and technical expertise to produce seeds; iii) reduced number of agro-dealers (1 agro-dealer for 20,000 to 25,000 farmers); iv) poor road infrastructure, which result in higher transaction costs and prices, and v) a secured output market, for example, while in case of soybean varieties the estimated adoption rate of improved varieties is 89%, for rice, maize and cowpea is less than 10% (Tomo et al., 2017). Parallel to the aforementioned factors, the limited capacity of ANS to stamp out fake seeds, illegal imports of seeds from neighboring countries, and the subsidized seed prices from government and other NGOs programs contributes further as a disincentive for the private sector to invest in the seed business.

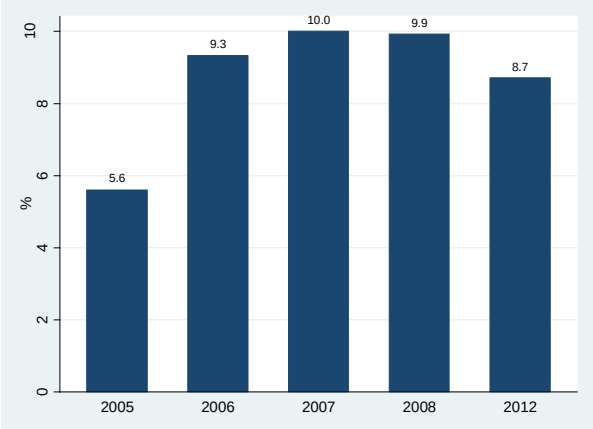

Figure 3 Percentage of smallholder farmers who used improved maize seeds in Mozambique (Source: National Agricultural Surveys)

Alternatives, considered separately or combined to address these issue are: i) Outgrower schemes: several outgrower initiatives aiming at introducing and disseminating improved seed varieties have had positive results (Tomo et al., 2017; Heemskerk et al., 2014). ii) warehouse receipts: the introduction of warehouse receipts where farmers channel their produce could serve to this end; iii) More players in the seed chain: enable private seed companies to carry out breeding programs, and in production and multiplication of all seed classes; iv) Strengthen the capacity of ANS in human, financial and infrastructure resources to enforce the seed legislation, and tackle fake seed and issues of seed quality standards; v) long-term strategy for subsidized seed programs, for instance, the government and other NGOs should gradually withdraw the subsidy as farmers become more aware of the benefits of improved seeds and make profits out of it (Rui Santos[4]).

Limited coverage of extension services

According to the Agricultural Statistical Yearbook 2015, only 4.3% of the 4 million farmer households received some kind of extension advice in

[4] Personal communication

Mozambique (MASA, 2016), although recent data shows an increase to 10% in 2017. Farmers' access to extension services fluctuates considerably over the years, with 15% in 2005 and 8% in 2008 of farmers accessing extension services (Cunguara et al., 2013). Access and exposure to improved pigeonpea seed varieties were the major drivers for rapid adoption in Mozambique, Malawi and Tanzania (Walker et al. 2016). This means that farmers' access to information is critical for adoption and uptake of improved seed varieties. Marrule (2015) and Tomo et al., (2017) propose some approaches to increase farmers' access to extension advice, such as demonstration plots and awareness campaigns on benefits of improved seeds. Mass media communication platforms such as radio and TV programs, coupled with training modules, manuals, leaflets and others, could be used to disseminate knowledge about improved seed varieties and their sources. Furthermore, there is a need for extension officers specialized in seed production to assist community based organization, farmer groups and individual farmers in the production of quality seeds, particularly of locally adapted varieties. Bartolomeu Henriques[5] (2018), in representation of UNAC (National Union of Farmers) highlighted the importance of well-trained extension officers and seed traders capable of passing on relevant advice to farmers on most suitable crop varieties depending on the season and the agro-ecological zone.

Therefore, better linkages, and good flow of information regarding seed varieties between seed companies, agro-dealers and extensions officers is fundamental to ensure adequate assistance to farmers. It is also necessary to expand both the number and the network of extension officers throughout the country.

Other opportunities

As previously stated, the seed sector in Mozambique is predominantly informal whereby farmers rely on their own harvested seed from past agricultural seasons, or obtain their seeds from their neighbors, relatives and local informal seed providers.

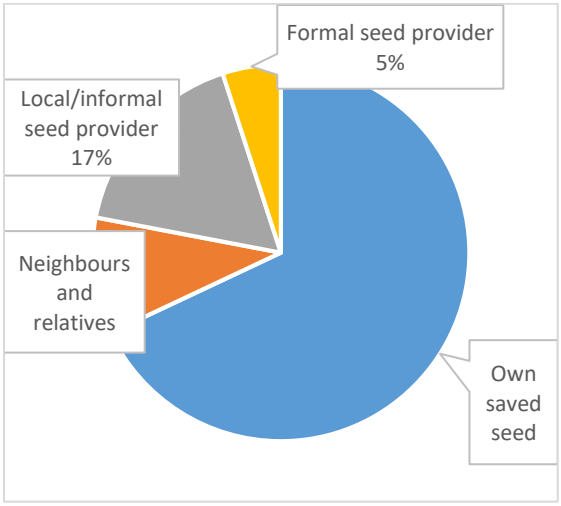

Figure 4: Sources of seed used in Central Region of Mozambique. Heemskerk et al., (2014)

Heemskerk et al. (2014) propose a co-existence and complementarity between the formal and informal seed systems. In fact, scholars argue that around 30% of farmers in Mozambique purchase seeds from their neighbors, relatives and local informal seed provider (see Figure 4**Error! Reference source not found.**). This represents an opportunity to create an special seed market since these farmers are willing to buy seed, although at a relatively lower price compared to formal agro-dealers. Hence, small scale seed production using locally adapted varieties or cultivars can be initiated, which according to FAO is called Quality-Declared Seed[6] (Tomo et al., 2017). This class of seed is likely to be more affordable to farmers and suit their needs and preferences. However, it is important to highlight the need to provide adequate assistance and training to farmers engaged in the business to ensure minimum standards of genetic purity, germination rate and plant vigor (Heemskerk et al., 2014). UNAC is currently carrying out such an initiative in Gurue, Alto Molocue and Manica districts. Another

Another opportunity comes with the prevailing partnership between the Research Centre for Technology Transfer (CITT) in and IIAM for the

[5] Personal communication

[6] Quality declared seed refers to the seed produced locally that meets minimum standards of seed quality, but does not undergo formal seed inspection and certification processes.

production of certified seeds. Although the main purpose of CITT establishing the centers for technology transfer and millennium villages is to demonstrate best crop management practices, CITT is engaged in the production of certified seeds. CITT has 6 centers for technology transfer located in five provinces, all equipped with seed laboratories[7] entitled to certify seeds and conduct all seed quality tests and grading required by ANS. In addition to the 6 centres, CITT also produces certified seed in 2 millennium villages (Molumbo e Toculo). Nevertheless, the involvement of farmers in the production of certified seeds is still highly subsidized by CITT, which may give farmers an unrealistic picture of the costs incurred to produce seeds.

Key Policy and Strategic Implications

Mozambique's seed legislation appears to be conducive to a competitive and dynamic seed sector. The low adoption rates of improved seed varieties actually represents an opportunity for the public sector, private sector, and farmers engaged in the seed value chain to increase agricultural production and productivity.

Evidence from several successful interventions indicate that the adoption rates of improved seed varieties were related to access to markets and good prices. For example, the pigeonpea value chain in Central and Northern Mozambique has developed with little intervention of the public sector, driven mostly by NGOs (introducing and supplying improved seeds to farmers) and traders (aggregation and export of raw and processed pigeonpea to India) (Oppewal & Cruz, 2017; Walker et al. 2016). Likewise, soybean has a high adoption rate because it is used in the production of feed for livestock (Tomo et al., 2017). The key lesson from these experiences is that adoption of improved varieties is intrinsically connected to the possibility of farmers' market their produce and earn back their investment.

Breeding programs, and seed production and multiplication should be market-oriented, and always have farmers at the core of the whole planning process. At the same time, extension services and demonstration of improved seed varieties should also be tailored to meet farmers' needs and expectations. Moreover, the public sector in collaboration with the private sector should create strong institutions capable of ensuring that the seed legislation in place is enforced, and stamp out the practice of fake seed. Simply put, seed value chain actors should identify locally adapted crop varieties that are marketable at good prices while providing returns to farmers.

The above interventions should be accompanied by an increase in the adoption rates of other improved technologies (fertilizers, pesticides, and agricultural machinery), irrigation, and better road infrastructure linking production areas to markets.

Conclusions and Recommendations

The supply of quality seeds in Mozambique is very limited due to several constraints encountered throughout the seed value chain. These include: limited supply of early generation seeds; breeding programs targeting only few main crops; reduced number of private companies specialized in seed production; limited coverage of agro-dealers and extension services; limited capacity of institutions to regulate and control the seed sector allied with issues of fake seeds; free distribution of seeds; weak IIAM capacity to forecast seed demand at the beginning of the cropping season; and unaffordable prices of improved seeds. There is a need for a better integration, collaboration and complementarity among seed value chain actors and its segments to ensure timely supply of improved seeds and meet farmers' needs in terms of quality, quantity and prices. A more vibrant public-private partnerships between USEBA and seed companies will be essential to increase seed availability and access by smallholder farmers.

The current policy environment is conducive to the entry of private sector in roles previously regarded for the public sector, namely private seed laboratories and private seed inspectors. Additionally, the adoption of SADC seed

[7] Some of the laboratories have yet to be certified, hence they are not operational.

harmonization protocol means that the process of variety release and registration is simplified, and seed companies can easily source quality seeds from neighboring countries and make it available to farmers. A study by Magaya et al. (2017) also found that private companies were satisfied with the length of the seed importation. Thus, there is an indication that a more dynamic and pluralistic seed sector can be achieved in Mozambique. Nevertheless, more awareness and training regarding seed legislation to all stakeholders is required, especially with involvement of smallholder farmers in seed production and multiplication, and to take advantage of free movement of seeds across SADC member countries.

There are a few ongoing projects working on the introduction and dissemination of improved seeds (certified and quality declared seed) to smallholder farmers, and they represent an excellent opportunity for learning while simultaneously providing a good basis to assess the suitability of current seed legislation, and to refine future interventions to create a vibrant and competitive seed value chain in Mozambique.

References

Cunguara, B., Garrett, J., Donovan, C. & Cássimo, C. (2013). *Análise situacional, constrangimentos e oportunidades para o crescimento agrário em Moçambique*. Ministério da Agricultura, Governo de Moçambique, Maputo.

Cunguara, B., and I. Darnhofer. 2011. Assessing the impact of improved agricultural technologies on household income in rural Mozambique. Food Policy, 36(3): 378-390.

Heemskerk, W., Borman, G., Muocha, I., Manjate, A. & Kleijn, W. (2014). *Programa regional e integrado de desenvolvimento de sementes (PRIDES)*. Agência de Desenvolvimento do Vale do Zambeze e Cooperação Holandesa.

de Janvry, A., Sadoulet, E., 2002. World poverty and the role of agricultural technology: direct and indirect effects. Journal of Development Studies 38 (4), 1–26.

Mabaya, E., Alberto, M., Tomo, A. & Mugoya, M. (2017). *Mozambique brief 2017 - The African Seed Access Index*. Available at: tasai.org/reports

Malita, C. (2017). *One year of implementation*. Bulletin 2, USAID – Feed the Future Mozambique Improved Seeds for Better Agriculture (SEMEAR) Project

Marrule, H. (2015). *Plataforma nacional de diálogo sobre o sector de sementes. Plano estratégico/operacional 2015-2017*.

Oppewal, J. & Cruz, A. (2017). *Análise da cadeia de valor do feijão boer em Moçambique. Políticas públicas e plano de acção*. Ministério da Agricultura e Segurança Alimentar, Governo de Moçambique, Maputo

Tomo, A., Alberto, M.E. & Nagarajan, L. (2017). *Mozambique early generation seed study.* Alliance for Green Revolution in Africa

Walker, T., Said, S., Cunguara, B., Donavan, C., Rao, P.P., Amana, M. & Siambi, M. (2016). *A expansão do feijão boer na agricultura familiar em Moçambique: Uma história de sucesso*. Ministério da Agricultura e Segurança Alimentar, Governo de Moçambique, Maputo