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BRIEF REVIEW OF MOZAMBIQUE SEED MARKET

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1. INTRODUCTION

Launched in 2012, the New Alliance for Food Security and Nutrition is an invigorated commitment of the international community to enhance food security and nutrition in developing countries through agricultural growth. Among various candidates, the use of improved seeds ranks as one of the fastest mechanisms to improve agricultural productivity for several reasons. Improved seeds can be easily transferred to smallholder farmers as new varieties are widely distributed to large numbers of farmers, and better seed varieties contribute directly to gains in agricultural productivity. In addition, many new seeds can be readily substituted for older varieties without complicated changes in crop management. Moreover, open and self-pollinated seed varieties can be further disseminated through trade between neighboring farm households.

Seeds can also be selected based on their tolerance to droughts and diseases, making them an important tool to cope with climate-induced variability. Well-chosen seed varieties can also increase the efficiency of agro-industrial processing, and the quality of processed products. As a result, farmers, traders, processors and consumers (all the actors along the seed value chain) can have their welfare improved. The recognition of the role of improved seeds in increasing agricultural productivity has led to new reforms, policies, and laws. Also, new regulations are being implemented (and/or considered) in the seed sector.

In 2013, Mozambique approved a new seed law, and this highlights two key points for the development of the seed sector: the accreditation of private agents and the protection of new varieties of plants (allowing the entry of private companies in seed breeding). Also in April 2014 the Ministry of Agriculture and its partners launched the National Platform of Dialogue of Seed Sector in order to establish a good business environment in the seed sector. This platform will gather different actors of the seed value chain including public and private sector and the end users (community) to discuss and share challenges that need to be overcome for a better performance of the sector.

The primary objective of such reforms is to increase the use of improved seed varieties by smallholder farmers. Mozambique's agriculture is predominantly rain-fed with low use of external inputs, including improved seeds. Agriculture is largely of subsistence, and availability and accessibility of quality seed for both smallholder and commercial farmers is a major challenge. The latest agricultural census conducted in 2009 and 2010 shows that smallholder farmer's account for 97% of the total cultivated area, and 99% of all farms (INE, 2010). Only 10% use improved seed varieties, suggesting that the overwhelming majority of Mozambican farmers use uncertified and most likely poor quality seeds.

The use of improved seed varieties is still low in Mozambique because the seed value chain still faces major constraints, such as (Rohrbach et al., 1997): i) lack of excellent quality seed; ii) government intervention in the seed sector, especially substituting the private sector, and; iii) lack of information by producers about the benefits of quality seed; iv) liquidity problems. The objectives of this study are the following:

- Examine how much of breeder seed is produced, and how much of basic seed is multiplied locally and how is it distributed to farmers, with emphasis on maize, soybeans, pigeon peas, and legumes;
- Estimate the seed market size for the target crops and analyze the share of seed market in terms of quantities and suppliers.
- Examine how a typical smallholder accesses seeds.
- Examine what factors affect the smallholders adoption of improved seed and why is adoption in some crops more successful than others.

The remainder is structured as follows. Section 2 describes the methodological approach that includes both the description of data source and the methods used to estimate the seed market size for the target crops. Sections 3, 4, 5, and 6 cover each of the four objectives of the study. Section 7 concludes with a summary and some policy remarks.

2. METHODOLOGICAL APPROACH

This study is based on a combination of tools. Some of the objectives listed above are met through a review of studies conducted in Mozambique and elsewhere in developing countries. Data from MINAG's (Ministry of Agriculture) national agricultural surveys (TIA/IAI) were used to highlight some agricultural indicators. Through qualitative interviews to key informants, we gathered data on the quantity of seeds purchased by MINAG and distributed to smallholder farmers.

While the INOVAGRO study in 2012 provides an estimate of the total amount of seed used and the seed market size, we also used TIA data to estimate the total quantity of seeds that were used in 2012, whether local or an improved seed variety. TIA provides an estimate of cultivated area for each crop, and we used these area estimates and multiplied by an assumed seed rate (kg/ha) by crop to obtain the total amount of seed that was used. The validity of this estimates hinges mostly on the sowing rate that is used, especially on maize because this is such an important crop in terms of area planted. This is open for revision in case we have better and more reliable estimates for the amount of seeds planted for each crop per hectare.

3. PRODUCTION OF BREEDER AND BASIC SEEDS

The importance of breeder seed and basic seed on the seed value chain is widely recognized. Without this seed the subsequent stages of multiplication and distribution of certified seeds would be compromised. This recognition made the Ministry of Agriculture and IIAM (the National Agricultural Research Institute) in particular, to underscore the importance of the production of breeder and basic seeds in its key strategic development documents. The Strategic Plan for the Development of Agrarian Sector (PEDSA) in its Pillar 1 stressed the need to produce

and supply seeds for increased productivity. In turn, the Strategic Plan of IIAM proposes to release a not specified number of new varieties or plant material in five years (PEDSA 2010 and IIAM, 2010). However, the environment for continued and consistent production of breeder and basic seeds and its link with the market are still unfavorable (INOVAGRO, 2012).

IIAM has the primary responsibility for the production of breeder and pre-basic seed. Due to improper operation of the seed chain IIAM has also produced basic seed, through USEBA (*Unidade de Semente Básica*). The basic seed unit (USEBA) within IIAM is dedicated to the production of basic seed to supply private companies and other stakeholders involved in seed production mainly for certified seed. The production of basic seed should be under the sole responsibility of the private sector. USEBA also multiplies certified seed through outgrower scheme by using producers hired from nearby production/ pre-basic seed stations to generate some revenue for the institution.

USEBA establishes the link between the public and private sector. It has also strengthened the collaboration between IIAM and international organizations such as the CGIAR, IITA, ICRISAT, IRRI and CIMMYT through the identification of varieties in other countries that can be adapted to the same agro-ecology conditions found in Mozambique. The amount of seed planned to be produced by USEBA depends on the demand from the private sector which in turn is extremely irregular. In 2011, INOVAGRO reported that the unit had considerable stocks of maize seed due to weak demand by the private sector. With the assistance of USAID (United States Agency for International Development) this unit has expanded and modernized the seed processing machinery and storage facilities, particularly in Chimoio and Nampula. USEBA has the capacity to assist the establishment of small seed processing units in other regions of the country.

Breeders have been working on increasing the availability of improved seed. There are a number of varieties of staple food crops that were released between 1995 and 2011. Maize and common beans have the highest number of released varieties (Table 1). This includes high yield hybrid varieties. More important than the varieties released is the availability of these varieties as breeders' seed to feed the production of pre-basic seed and all the seed chain.

Table 1 Number of seed varieties released between 1995 and 2011

Period	Maize	Groundnuts	Soybeans	Beans
1995-2005	29	6	-	24
2008-2011	9	6	9	16

Source: Compiled from DS/MINAG 2011 and Pitoro, 2007

The planning and implementation of seed production has been a major challenge due to the irregularity of demand. Increased demand is often correlated with emergency situations, for example, when there are floods or droughts. Such irregularities of demand are responsible for the differences observed between the amount of seed that is planned and the actual amount produced (Table 2).

Table 2 Production of certified and basic seed 2013/14 agricultural season (tons)

	Basic Seed		Certified Seed	
	Planned	Production	Planned	Production
Maize	600	440	40,000	5,092
Rice	750	450	18,000	1,092
Beans	216	65	24,660	789
Groundnuts	120	31	1,536	410

Source: DNSA, 2014

4. SEED MARKET SIZE

Market for certified seed in Mozambique is very small. Of 90,000 tons of seed planted of food crops in Mozambique it is estimated that 90% are grain retained by the producers from the previous year, which means that only 10% or about 9,000 tons are certified seed (INOVAGRO, 2012). Of these, 80% or about 7,200 tons are circulated through non-commercial channels such as government and NGOs, leaving only 1,800 tons for the commercial sector. This highlights the existence of a large potential (81,000 tons) for the growth of the seed market to be exploited, under the assumptions on the demand side increasing the incentive for small farmers to use certified seed and supply-side improvements in the capacity of seed supply at competitive prices by firms.

This should happen in a regulatory environment that facilitates the operation of the private seed sector and also the construction or rehabilitation of financing and supporting infrastructure. The small formal seed market is dominated by public sector purchases, mainly for emergency action. At the time of the 2013/14 agricultural season the public sector had bought 3,615 tons of various seeds, with emphasis on maize, potatoes and rice (Table 3).

In the methods section it is discussed a potential approach to estimate the size of the seed market, by looking at the product between total area planted to each crop and the sowing rate. This is still preliminary works and should be updated once there is reliable information on seed rates on which more accurate estimation of the market size depends on (Table 4). For example, some studies suggest that the seed rate for soybeans is between 40 and 120 kg/ha. Using data from the national agricultural survey in 2012, we estimate that the seed market size for soybeans is around 650 tons.

Table 3 Quantity of seed bought (tons) from companies and distributed by MINAG to producers in 2013/14

Crop	Main season	Short season	Total
Maize OPV	250	0	250
Maize hybrid	1,254	150	1,404
Rice	648	0	648
Sorghum	91	0	91
Beans	70	0	70
Irish Potatoes	0	1,150	1,150
Horticulture	0	2	2
Total	2,313	1,302	3,615

Source: DNSA, 2014

Table 4 Estimation of seed market size for various crops in 2012 (tons)

Crop	Total area (ha)	Assumed sowing rate (kg/ha)	Total seed required (tons)
	A	B	AxB/1000
Maize	1,572,009	25	39,300
Large groundnut	27,716	150	4,157
Small groundnut	131,663	150	19,749
Common beans	41,557	50	2,078
Cowpeas	153,150	50	7,658
Mungbean	19,377	25	484
Pigeon peas	26,878	25	672
Soybeans	8,050	80	644
Pumpkins	91,206	25	2,280
Lettuce	3,053	25	76
Garlic	825	25	21
Onions	4,442	25	111
Carrot	1,398	25	35
Kale	5,709	25	143
Peas	2,302	25	58
Mellon	26,215	25	655
Cucumber	32,961	25	824
Peppers	414	25	10
Chillies	907	25	23
Okra	24,558	25	614
Cabbage	2,572	25	64
Tomatoes	12,648	25	316
Total	2,189,610	-	79,973

Source: Own estimation based on IAI 2012 data

The INOVAGRO study, estimates of the total seed used in 2012 may be underestimated, but more accurate assessment requires more data on sowing rates.

Province	Maize	Rice	Sorghum	Large groundnuts	Small groudnuts	Common beans	Cowpeas
Niassa	4.8	5.5	0.3	1.7	0.0	3.8	0.0
Cabo Delgado	7.0	0.2	1.1	0.4	2.4	2.0	4.8
Nampula	4.3	0.1	0.5	4.8	2.7	7.0	1.3
Zambezia	7.2	0.2	0.0	0.0	1.8	0.0	1.0
Tete	20.8	100.0	16.1	16.4	17.2	25.5	9.2
Manica	11.3	10.3	2.2	8.8	8.6	13.3	5.4
Sofala	11.0	4.3	0.3	6.8	2.9	5.7	3.1
Inhambane	3.5	9.3	5.2	0.0	2.9	0.0	1.3
Gaza	6.6	8.0	1.6	3.2	6.3	11.8	1.8

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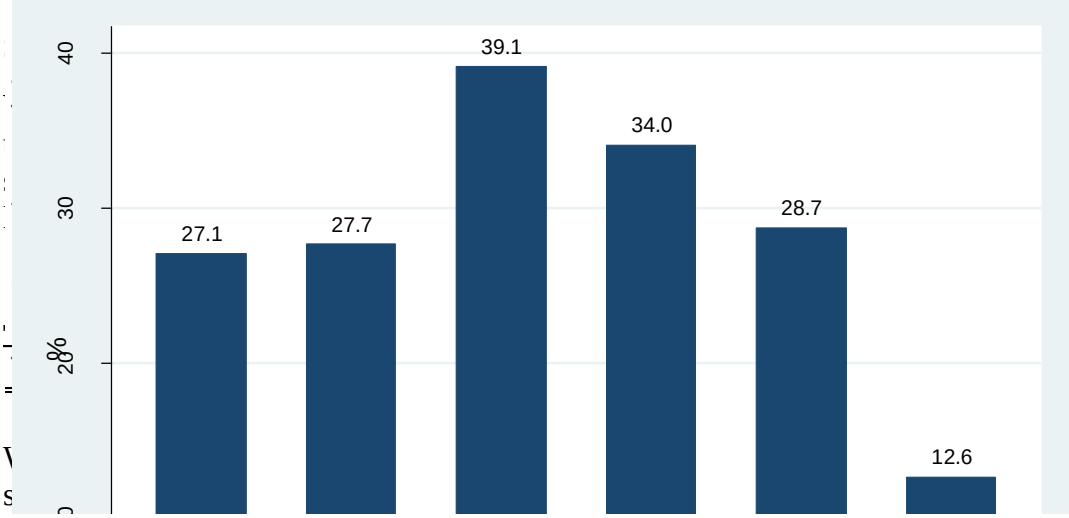
Province	2002	2003	2005	2006	2007	2008	2012
Niassa	2.2	0.0	3.8	5.5	3.0	4.9	3.1
Cabo Delgado	2.3	2.4	1.3	2.7	1.9	1.8	2.3



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	Maize	Large groundnuts	Small groundnuts	Common beans	Cowpeas	Mungbean	Pigeonpea	Total
In the village	61.43	69.71	60.3	53.07	65.83	66.63	71.16	63.63
In te district center	19.68	15.29	22.04	17.6	16.55	20.45	15.28	18.27
Other location within the district	8.09	7	7.08	4.47	6.64	7.5	6.75	7.58
Provincial capital	4.03	3.12	5.67	10.77	5.46	3.83	3.39	4.85
Other location within the province	2.59	2.42	3.32	2.04	2.94	1.02	1.72	2.66
Other province	0.49	0	0.32	1.26	0.08	0.22	0.15	0.31
Other country	3.42	2.22	0.15	10.4	1.15	0.28	1.53	2.09
Maputo city	0.24	0.24	1.11	0.39	1.35	0.07	0.02	0.59
Other	0.03	0	0	0	0	0	0	0.01
Total	100	100	100	100	100	100	100	100

Source: National Agricultural Survey (*Inquérito Agrário Integrado)*, 2012.

6. BRIEF REVIEW OF FACTORS ASSOCIATED WITH ADOPTION OF IMPROVED SEEDS

A combination of factors prevents the effective use of improved seeds by smallholder farmers. These factors can be divided into 2 categories. The first factors are attached to the demand for seed by smallholder farmers. The latter factors are attached to the timely supply of improved seed quality and relative to a real acceptable price for smallholder farmers.

Without demand there is no functional seed system. Demand for seed is closely linked to the incentive that the producer has to change its seed variety selected over the years, according to preferences and resistance to shocks such as drought and pests. Also, the high cost of certified seed, which can reach 30 times the price of grain retained by smallholder farmers, constitutes a real obstacle to the producer to decide to buy certified seed. This also allies with the capacity that the producers acquired over time to produce and keep their own seed. On the other hand, the lack of complementary inputs such as fertilizers, pesticides, and irrigation does not allow smallholder farmers to get the potential income of certified seeds, which can be exacerbated if the prices of agricultural products are not high enough to compensate the value for the production.

In relation to the seed supply it has been the primary constraint a timely availability of accessible seed near the producer. Most seed stores are located in cities and towns, away from the production areas, although nowadays the tendency is to be closer to producers. One study showed that the average distance of the local farmer to store inputs was about 67 kilometers in Mozambique, compared to just 3 kilometers in Kenya (Boughton et al., 2011). The distance associated with the poor state of roads contributes to the rise of the seed cost. However, the experiences with cash crops and contract farming show that even in a high cost environment the possibility of producers using certified seed may increase if there is available credit. But it is known that few producers have access to credit in Mozambique. Only 3% of producers have access to credit in Mozambique against 59% in Kenya (Boughton et al., 2011).

7. CONCLUDING REMARKS AND POLICY IMPLICATIONS

The need to establish an environment conducive to the harmonious development of the agricultural business sector led the government of Mozambique to create the Strategic Plan for Agricultural Development (PEDSA). PEDSA aims to increase agricultural production and productivity, and this can be achieved in part by the timely provision of quality inputs in adequate amounts. It also requires the recognition of the role of both the private and the public sector as partners in the seed value chain.

The impact of improved seeds on agricultural productivity depends on the use of other production factors such as fertilizers and water, making technology packages with different actors' involvement crucial. The potential result of using improved seeds is not achieved if complementary inputs such as water, pesticides and fertilizers are not part of technology

package. To this end, and recognizing the need for formal involvement of more actors in the value chain of seeds and fertilizers, the Government of Mozambique has embarked on reforms in these two subsectors.

The vast majority of certified seed in the market is bought by the public sector for distribution to farmers at subsidized prices, either during normal preparation of agricultural season or in an emergency situation following a natural disaster such as cyclones or floods. The demand for seed from the public sector opens immediate and assured market for seed companies but prevents the development of sustainable market as it does not create an effective and growing demand by smallholder farmers. It could be argued that the share of purchased seeds from companies for further distribution is smaller compared to the great potential that still covered by the use of grain, but the indirect damage to the establishment of a sustainable seed chain may be higher.

Thus, the role of the public sector should focus on regulation and monitoring of the sector in order to provide breeder seed to companies and basic seed production and ensure that the market provide quality seed to farmers through the market. Other activities of the public sector may include but not limited to:

- Improve seed stocks of the breeder and basic, especially non-commercial varieties
- Facilitate the licensing of more production and marketing seed companies
- Ensure the link between extension services, research and seed producers companies
- Design policies that distinguish between seeds that can be commercialized and those likely to require longer term public sector support for their distribution. These may vary for different parts of the country. Monitor the development of the commercial seed sector and periodically reappraise it.
- Ensure the effectiveness of the work of the Seed National Committee
- Ensure that research institutions have a proper mandate and are well financed to maintain breeder seed of all varieties registered for sale, except those subject to private property rights
- Target to the extent possible the distribution of emergency seed trade pursuing it through the retail trade establishments where farmers can obtain commercial seed in the future. Farmers should be encouraged to pay part of the cost of emergency seed

In turn, the private sector should focus on the production of certified seed and the commercialization of the same to producers, including:

- The extent of seed production using associations of producers and private operators
- Provision of technical assistance and training to seed producers
- Promoting credit for seed producers
- Establish contracts with local shops for the distribution of seed
- Provide timely good quality seed in packs that are accessible to farmer (price wise)

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