Strategy for the Development of Sustainable Seed Supply Systems in Angola

SEED SYSTEMS GROUP

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Country Snapshot

Population- 28.3 million

10.2% Agricultural share to GDP

4.90 m ha Arable land

25% Undernourished population

Age group < 15 -43.2%; 15-64 -54.1% > 65 – 2.7%

49% Agricultural employment

Climate Risk index- 83.7

Global hunger index- 29.80

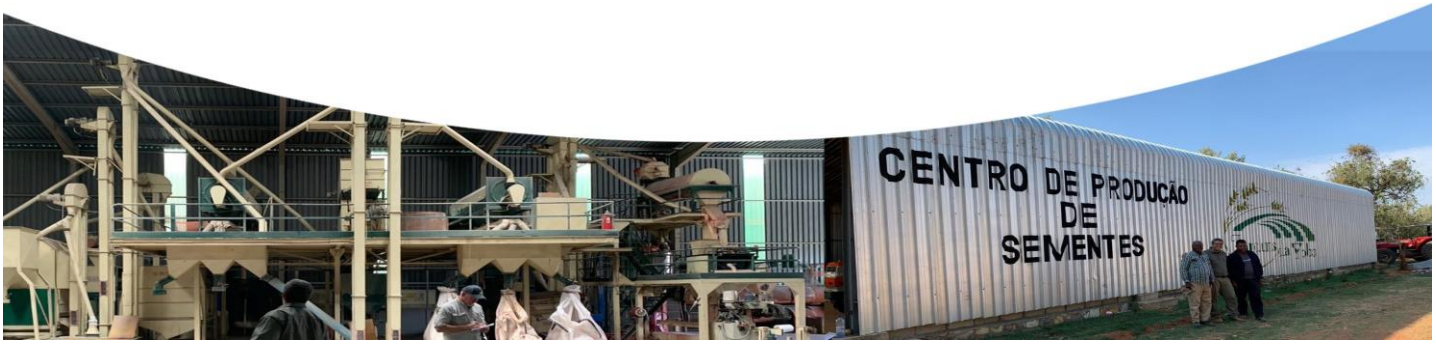
Figure 1: Country Snapshot - Angola

Nutrition Profile

- Angola's food and nutrition situation is classified as "serious" according to the 2019 Global Hunger Index
- The country has one of the highest child mortality rates in the world, and its children suffer from high levels of chronic and acute malnutrition
- The government emphasizes improving the resilience of food and agricultural systems to climatic shocks and threats
- Developing and adopting nutrition sensitive agriculture methods influences food security and contributes to safe, diverse, and nutritious diets

Food insecurity	Nutrition	Dietary diversity	Average per capita Fruits & Vegetable intake
• About 22.2% of population affected by food insecurity • Poverty rate-37 %	• < 5 stunting-37.6% • <5 Wasting- 4.9% • Anemia in women of 15-49 yearsage -47.7 %	• 60% of energy source derived from cereals, roots and tubers representing low dietary diversity	• 247.5 and 185.3 g/ day against recommended guidelines 200-250g/day

Figure 2: Nutritional Profile - Angola



Crop Profile

Data released by the Agribusiness Technologies and Services Cooperation Network (2014) show that the potential area for the agricultural production system in Angola is around 5.821 million hectares. The productive activity of the agrarian sector is carried out through agricultural campaigns, implemented on family farms (EAF) and business farms (EAE). The major food crops cultivated in Angola are cassava, maize, vegetables, beans, and groundnut (Figure 3).

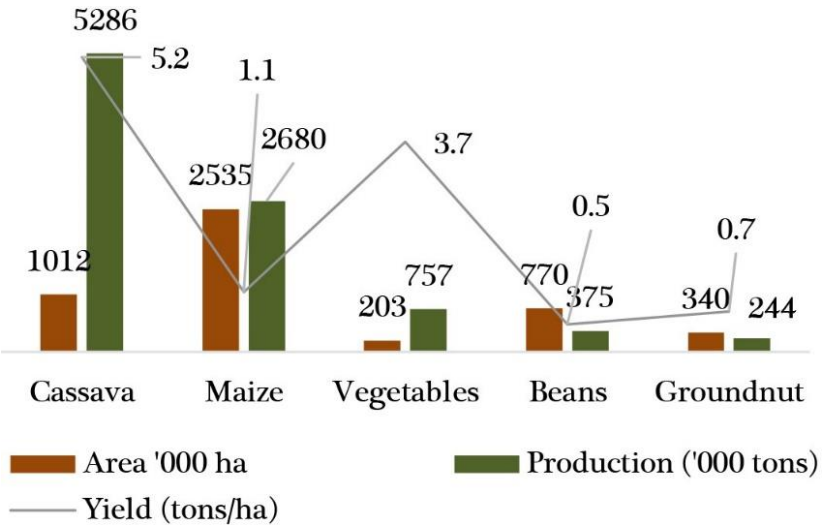


Figure 3: Crop Profile (2017) - Angola

Maize stands out as one of the main food crops in Angola. Its production is concentrated in the provinces of Kwanza Sul, Huambo, Benguela, and Bié, constituting up to 40% of total agricultural production. About 90% of total production in Angola comes from smallholder farmers. In recent years, common bean, macunde bean, groundnut, and soybean crops have been produced not only by traditional farming practices but by some modern market-oriented practices. Yields have been boosted by the fact that prices in the Angolan market are becoming more attractive, which naturally increases production. Angolan agriculture is dominated by subsistence-level farming, with an average farm size of 1.4 ha and average fertilizer utilization rate of only 5 kg/ha. Crop production is characterized by low productivity resulting from the use of old varieties, poor quality seeds and low agri inputs.

In the agricultural year 2018-2019, over 3 million hectares were cultivated with cereals, representing a + 0.1% variation over the previous homologous period. In the year in question, 92% of this sowed area was harvested. In the northern, central, and southern regions, the production of cereals was 2.9 million tons, representing +0.9% growth compared to the 2017- 2018 period. In the cereals sector maize is the dominant crop,

representing 97.1% of all cereals produced; in this segment, the family sector represents 81% of the production volume. It should be noted that the maize crop is dominant in both large scale and smallholder farming systems at the national level. In the agricultural year 2018-2019, over one million hectares were sown, equal to the previous period, with 96% of this land harvested. In the year under review, approximately 575,000 tons of legumes and oilseeds were produced, representing a slight growth of around 0.7% over the homologous period. Beans are dominant in this production with 56%, whereas soy represents only 6%. It should be noted that the large-scale sector favors soybean production. It is noteworthy that in the tuber and roots row, cassava stands out as the dominant crop with 81% of all production, followed by sweet potato with 15% and potato with 4%.

From 1979-2017, Angola experienced a severe decline in agricultural production, leaving the country heavily dependent on imports. Figure 4 depicts the yield trends of the key crops in Angola from 2008 to 2017. The average maize yields in 2017 were only 1.06 tons/ha. Production areas are separated into five major zones, with a coastal plain zone producing a mix of cassava and maize; a humid forest zone bordering DRC where cassava, sweet potato, and oil palm are dominant; a central highland maize belt; a mid-altitude zone bordering Zambia where cassava is dominant in the north and maize in the south; and a semi-arid zone in the south where farmers grow sorghum and millet and raise cattle.

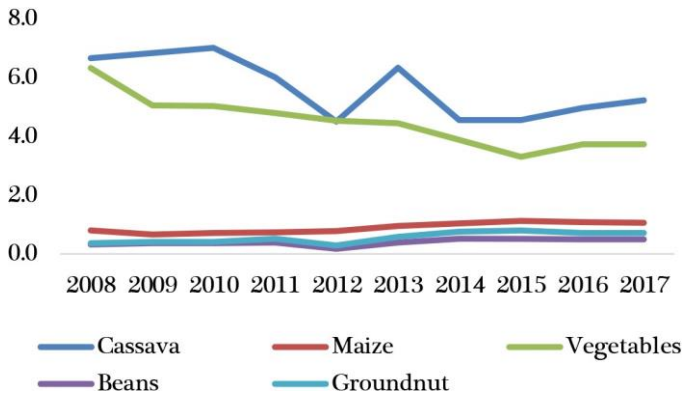


Figure 4: Yield Trends (tons/ha) - Angola

There is a need for improved varieties of soybean and hybrid varieties of maize, sorghum, and millet. New, virus-resistant varieties of cassava can also improve food security in the country's cassava belt, bordering DRC. High rates of inflation have made imported goods more expensive, and the new government is placing a high priority on agricultural development, including public-private models for seed production and supply.

About 94% of maize seed planted by farmers in Angola comes from grain that is saved on the farm or from grain seed that is multiplied by farmers. This percentage is believed to be even higher for other crops such as soybean, millet, sorghum, groundnut, and wheat.

Breeding, Variety Development and Release

Institute for Agricultural Research (IIA) is a public agricultural research institute established in 1961. It is under the Ministry of Agriculture and is devoted to research, technological development, and innovation. It has ten research stations across the country.

IIA works on variety testing and release of seeds but has no breeding activities. Maize OPVs such as 'Round White' and 'SAM3', ZM423', 'ZM521', 'ZM523', 'ZM611', 'ZM621' are currently in production. There is a soybean breeding program in the IIA headquarters in Huambo where improved bean varieties have also been tested, but so far have not reached farmers or seed companies. There are no active crop improvement efforts and limited seed quality control in place. New crop varieties are being introduced in a more or less haphazard fashion.

The Institute of Agrarian Development (IDA), which is a public extension organization, imports maize hybrids for farmer demonstrations and education. The International Higher Polytechnic Institute of Angola (ISIA) located in Lubango, is interested in setting up a center for maize seed linked to IIA. The director of agriculture has also shown a keen interest in bringing True Potato Seed technology into the country. The ISIA also does varietal trials and intends to develop and offer a course on seed technology.

Bean varieties which are commonly used are of the Butter Variety Group and are:

- Round-shaped pea berry (cream color), better known as butter bean;
- Onion (cream colored, elongated shape); very common in the southern region;
- Canary (yellow, round shape), commonly known as butter bean;
- Green, or blue in color, elongated shape, commonly known as calembe beans

Soybean is represented by several varieties, but the well-known is round-shaped and yellow. There are two other versions that are also known and which provide health benefits (edamame and black soy). The predominant varieties are RK8115 IPRO, and RK8317 IPRO.

Existing varieties for cassava are Greenfinch (TMS30162), Taiwan (TMS00326), Vermouth / Early Angola. Two major companies — Jardins da Yoba and Kambondo Seeds — are currently testing CIMMYT hybrids and soon will be testing IITA hybrids. These two companies are the primary source of certified seeds, supplying 30% of all seeds in the country. Jardins da Yoba has excellent infrastructure in place, including pilot irrigation to carry out large-scale seed production. It is also equipped with nurseries for conducting breeding programs including the Chaungo production facility, located at an altitude of 1,370 meters and with 500 hectares of arable land located in the Caculovar River alluvial valley. It has clayey soils, of which 75 hectares are irrigated by rotating pivots and 20 with drip irrigation (mango orchard). Maize seeds and potato seeds are multiplied under license from the National Seed Service (SENSE).

The Chinese Company Winall Hi-tech is in the process of submitting 20 rice varieties and 23 soybean varieties for registration in the country. Other local companies like Novagrolider, Valagro, and Vrelo are focused on potato and maize seed production. There is little activity from multinational seed companies, which are mostly involved in sales (Bayer, Bejo, Corteva, SeedCo, etc.) Capstone Seeds is the only company with at least one processing location in Angola. It has a close partnership with the local company, Jardins da Yoba through which it supplies parent material for maize seed and assists with developing local seed production. Below is shown a list of hybrids that Jardins da Yoba and Kambondo Seeds are trying in the 2019-2020 season.

List of hybrids that Jardins da Yoba and Kambondo Seeds are trying in the 2019-20 season are mentioned in Table 1.

Table 1: Current Popular Varieties Under Evaluation

Base-Genetics	Type of Hybrid	Maturity	Grain colour
TZE-Y DT STR C4 x TZEI 13	Top-cross hybrid	Early	Yellow
TZEI 24 X TZEI 17	Single-cross hybrid	Early	Yellow
TZEI 11 X TZEI 23	Single-cross hybrid	Early	Yellow
TZEIOR 58 x TZEIOR 108	Single-cross PVA hybrid	Early	Orange
TZEQI 82 x TZEIORQ 42	Single-cross PVA-QPM hybrid	Early	Orange
TZEI 124 X TZEI 25	Single-cross PVA hybrid	Early	Orange

Proposed Interventions

- Hybrids of maize with competitive yield levels will be introduced for commercial production
    - *Maize*: Yellow and orange maize hybrids have been sourced from IITA to Jardins da Yoba and Kambondo Seeds with yield gain potential of 7-8 times over current productivity. These will be planted in trials during the 2019-2020 season
    - *Beans*: Varieties will be sourced from regional research centers in neighboring African countries and public and private sources in Asia
    - *True potato seed (TPS)*: Capacity development will be undertaken in the private sector to produce TPS to develop virus-free planting material of local varieties in collabo- ration with Mahindra, PepsiCo (India), and local Angolan companies Novagrolider, Valagro and Vrelo
    - *Cassava*: Portions of Angola are highly dependent on cassava but lack access to new, virus resistant varieties available from IITA or NARS in Ghana and Nigeria
    - *Vegetables*: Hybrids of brassicas, tomatoes and peppers will be introduced in collaboration with mid-sized global vegetable companies like East West, Advanta, Technisem, Sakata and the World Vegetable Centre. These hybrids will be validated with the help of private companies for commercialization

- Enhancement of the R&D capacity of the five seed companies, including Jardins da Yoba and Kambondo Seed, on hybrid development and hybrid vegetable production
- Building human resource capacity (breeding and seed production technology) within the country by providing support to 15 MS and three PhD fellowships via exchange programs at universities in Ghana, Kenya, Uganda, and RSA. MS and PhD breeders will be trained to work with breeding programs to introduce, evaluate, and select hybrids for maize, soybean, and vegetables

Seed Systems

There are currently four domestic private seed companies: Jardins da Yoba (annual production 1,000 tons), Kambondo Seed (annual production 1,500 tons), Aquasolo/ Fazenda Vrelo and Fazenda with production capacities of 500 tons each. Matogrosso, operating in Angola, also produces a total of 3,000 to 5,000 MT of seeds of maize, millet, soybean, and potatoes annually (Figure 5).

Most of these seeds are sold to the government for distribution to farmers via a public subsidy program wherein farmers reimburse twice the quantity of seeds received in the form of grain. According to the Office of Studies, Planning and Statistics, in its report on the results of the 2018-2019 agricultural season, the government procured various quantities of inputs, including a total of 6,845 tons seeds: corn, 5,469 tons; beans, 623 tons; and soybean, 5 tons.

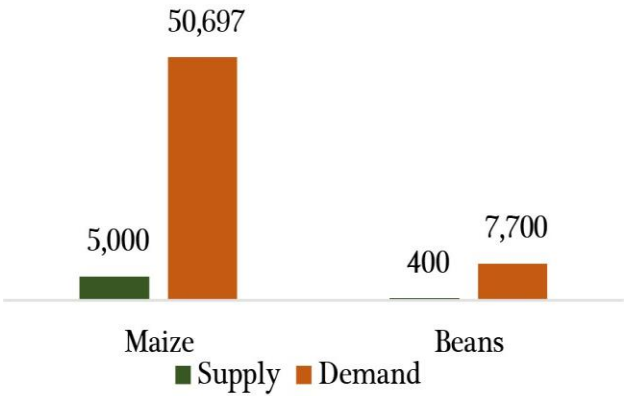


Figure 5: Seed Supply Demand Gap (MT) - Angola

All the cereal seeds produced by the two private companies are currently open-pollinated varieties of maize and millet developed in the 1980s and the 1990s. However,

imports of hybrid maize seed by the government and by private agro-dealers from Zambia are pushing the Angolan companies towards hybrids, and both companies are currently testing CIMMYT and IITA hybrids. There is a public agency for seed certification, but with only three inspectors, it is unlikely that locally produced seeds are being inspected and certified. The farmers' cooperative Cooperativa Faca Tudo Pelo Tempo produces rainfed basic seeds for the OPV maize varieties ZM309, ZM521 and ZM523, with technical support from IIA breeders. The cooperative is an umbrella body for 30 farmer groups and 1,250 members[ix], including 600 women.

Nova Agrolíder, the largest fruit and vegetable producer in Angola, is part of Grupo Lider, with an annual production of 200,000 tons of 50 different fruits and vegetables. Fazenda Girasol is a producer of 52 different types of fruits and vegetables across three farms. Nuviagro, part of Portuguese-Angolan Nuvi Group, produces about 12,000 tons of potatoes, onions, and carrots from a 4,000ha farm in Quibala, of which about 10% is in production. Distribution is handled by Plump, another firm in the group. The company is considering expansion projects, including green houses for tomatoes and peppers. FertiAngola, one of the largest agri-dealers, sells several agricultural products including fertilizers, seeds and agrochemicals and has 12 branches across the country. Novagro deals in seeds, fertilizers, and tractors; has worked with the Institute for Agricultural Development (IDA) in providing inputs and technical assistance to smallholder farmers, and has outlets in the provinces of Huambo, Kwanza Sul, and Benguela.

According to a 2014 report from the Agribusiness Technologies and Services Cooperation Network, the objective is to ensure that the needs of small farmers are recognized and respected. However, it is clear from the ground that the uncertainty of access to improved seeds by small farmers discourages them from increasing their yield. Although the Angolan government has provided free seed distribution, it has not been sufficient for good coverage. There have been major constraints, especially for remote and hard-to-reach areas, and free seed distribution alone has not solved the problem. In addition to the scarcity facing smallholder farmers, another problem is the near absence of rural input suppliers, which makes it impossible for smallholder farmers to acquire seeds on the market.

Table 3: The 26 Registered Agro-dealers in Angola

S. No.	Agro-dealer	Owner name	Function
1	ACQUASOLO - Sociedade Comercial, Lda	Helena Jardim	Director - Luanda: 923 446 461
2	AGROQUÍMICA DE ANGOLA, S.A	Júlio Correia	Director - Luanda:924 812 85
3	AGROMUNDO - Assessoria Agrícola, Lda	Jesus Vizol	Commercial Director - Luanda: 924 564 009
4	AISHA TRADING - Comércio Geral, Lda	Zahed Isebhai	Director - Luanda: 928 640 182
5	ANGEJA - Comércio e Indústria, Lda	Baltazar Manuel	Store Manager - Luanda: 925 099 415
6	BARLWORLD EQUIPAMENTOS ANGOLA, LDA	Rui Fernandes	Director – Luanda: 923 407 485
7	AGROLÂNDIA Huambo	Sebastião Coelho	Manager – Huambo: 924 002 083
8	AUTO GASOSA	Jorge Manuel Gouveia de Sousa	Owner – Huambo: 923 518 946
9	CAMPOTEC - Assistência Técnica a Equipamentos, Lda	Susantha Silva	Africa Director – Luanda: 00-244-222 395 021
10	CIMERTEX ANGOLA - Sociedade de Máquinas e Equipamentos, Lda	João Aveiro	Director – Luanda: 923 736 786
11	ASCOTECNIA, LDA	Roberto Martin-Delgado Suarez	Manager – Luanda: 00-244-222 441 414
12	BOM PRESENTE - Comércio Geral e Prestação de Serviços	Francisco Guido Alves	Director – Luanda: 924 088 971
13	DRAGO EQUIPAMENTOS DRAGAO SERVICE, SA - Consórcio Financeiro Angola-China	Gentil Viana	Administrator – Luanda: 912 501 623
14	FDCA - FUNDO DE DESENVOLVIMENTO DO CAFÉ DE ANGOLA	Carlos Gurgel	Technical Officer - 935 258 587 (Sede)
15	FERTIANGOLA, SA	Pedro Pimentel	Director - Luanda - 927 907 729
16	FLOPA COMERCIAL & SERVIÇOS, LDA IDENTIFICAÇÃO	Paulo Manuel da Conceição	Director
17	FRICALIS - Comércio e Indústria, Lda	Raul Saraiva de Almeida	Administrator - Luanda:923 408 811
18	GRUPO CALDAS DA RAINHA, LDA	Manuel Bernardino	Manager – Luanda: 930 006 263
19	HUILIS - Sistemas de Rega e Serviços, SARL	António Marques Bicho	Director - Luanda:923 373 856
20	KRASNAIA, LDA IDENTIFICAÇÃO	Krasnaia Miúra	Proprietária - Luanda: 923 622 771
21	LAUSSENA, LDA	Fernando Alexandre de Vasconcelos Costa	Manager - Luanda: 912 504 662
22	MECANAGRO - Empresa de Mecanização Agrícola, EP	Carlos Alberto Jaime Pinto	President – Luanda: 912 502 883
23	NOVAGRO - Comércio de Produtos, Materiais e Equipamentos Agrícolas.	Samuel Jorge	Director: 912 204 696
24	PRIMOR AGRÍCOLA, LDA	António Carlos Dias Fernandes Bairro	Manager - Lubango: Telefone: 00-244-261 228 123
25	SEDIAC, SARL - Sociedade de Estudo e Desenvolvimento Industrial Agrícola e Comercial	Marcelina Campos	Manager – Luanda: +244-222 393 176
26	SIRIUS, SA	Denis Dravet	Director – Luanda - +244-222 355 853

Proposed Interventions

- Provide seed grant funding to five private seed companies such as Jardins da Yoba, Kambondo, Aquasolo, Fazenda Vrelo, and Fazenda in order to:
  - Increase the capacity of quality seed production: aim to increase the quality seed production of existing varieties/hybrids and newly introduced ones by 39% of the current quality seed production
  - Expand the seed distribution network: expand network reach to farmers,
  - Increase production of hybrids seeds and capacity development
  - Strengthen business entrepreneurship skills of 96 personnel through professional training courses over a period of five years
  - Eventually link Jardins da Yoba and Kambondo to Quali-Basic Seed Company for supply of inbred lines
- Capacity building of IIA to produce basic/foundation seeds and build a public-private partnership to strengthen basic and foundation seed production
- Upgrade and establish seed processing infrastructure: installation of additional capacity of 2 tons/day in the country at private sector premises
- Agro-dealer development
  - Provide grants to 1,000 agro dealers in Angola to open new outlets, renovate or relocate shops, procure inventory supplies, and build cost-effective storage units
  - Capacity building of the agro-dealers on aspects related to storage, quality control, and safe handling of products, and how to better manage micro-enterprises through courses on bookkeeping, cash management, inventory management, quality standards, customer relations, and compliance. All the 1,000 agro-dealers will be trained on these modules over a period of five years
  - Strengthening of agro-dealer network and association building
- Extension and knowledge dissemination
  - Enabling wider adoption of improved varieties through grants to NGOs for demos, small packs, etc

- Promotion and introduction of ICT enabled infrastructure through various stakeholders to accelerate adoption of quality seeds
- Professional trainings will be provided to over 125 extension professionals over a period of five years. Trainings will be provided on aspects related to farm demonstrations, farmer training through deployment of ICT tools

- Seed Policy and advocacy
  - Continued dialogue with public sector stakeholders for sensitization on national seed laws implementation and outreach methods to stakeholders, seed standards and regulations refinement, oversight of the seed delivery by national and international players, and harmonization of regional policy
  - Professional trainings will be provided to more than 100 seed inspectors on proper seed quality assessment and seed certification aspects

Facilitate quality seed production for the key crops to reach 11,047 tons covering an area of 18% under quality seeds (Figure 6) at the end of five-year period, and 22,496 tons covering 37% area at the end of 10 years.

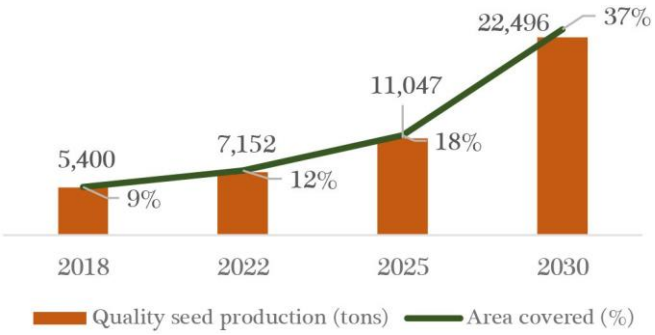


Figure 6: Projected Seed Quantity (MT) - Angola

Budget

Table 4: Angola Budget

Components	Amount (USD million)					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Component 1: Crop Variety Improvement						
NARS varietal Trials	0.38	0.38	0.25	0.25	0.00	**1.25**
Early generation seed production	0.12	0.09	0.00	0.00	0.00	**0.21**
MSc fellowships	0.11	0.21	0.21	0.00	0.00	**0.53**
PhD fellowships	0.15	0.30	0.00	0.00	0.00	**0.45**
Component 2: Seed Enterprise Development						
Grants for start-up seed companies	0.23	0.23	0.15	0.15	0.00	**0.75**
Multiplication support for vegetative crops	0.00	0.00	0.00	0.00	0.00	**0.00**
Hybrid seed production training	0.25	0.38	0.25	0.00	0.00	**0.93**
Professional trainings	0.03	0.08	0.08	0.00	0.00	**0.18**
Component 3: Agro-dealer Development						
Grants to agro-dealer development agencies	0.30	0.60	0.60	0.00	0.00	**1.50**
Capacity Development (Bookkeeping, information dissemination, inventory management etc.)	0.02	0.03	0.03	0.00	0.00	**0.07**
Component 4: Seed extension						
Grants to NGOs for demos, small packs, etc.	0.63	0.60	0.00	0.00	0.00	**1.23**
ICT, infrastructure and training support	0.25	0.00	0.00	0.00	0.00	**0.25**
Professional trainings	0.03	0.06	0.05	0.00	0.00	**0.14**
Component 5: Seed Policy and Advocacy						
Seed Policy and Advocacy (grantee and stakeholder meetings)	0.05	0.10	0.00	0.00	0.00	**0.15**
Professional trainings	0.02	0.03	0.03	0.00	0.00	**0.08**
Total	**2.55**	**3.06**	**1.68**	**0.40**	**0.00**	7.69