



Strategy for the Development of Sustainable Seed Supply Systems in the Democratic Republic of Congo



**SEED SYSTEMS
GROUP**

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Country Snapshot



Population - 89 million



21.1% Agricultural share to GDP



80 m ha Arable land



1.9 million Children with acute malnutrition



Age group < 15 - 44.4%; 15-65 - 53%; > 64 - 2.6%



68% Agricultural employment



Climate Risk index- 59



Global hunger index- NA

Figure 1: Country Snapshot - DR Congo

Nutrition Profile

- DRC is characterized by high rates of child stunting (45%) and high rates of absolute poverty (80%).
- Rates of overweight/obesity are highest among women living in urban areas (19%) compared to rural areas (9%).
- Figure 2 indicate the key statistics related to nutritional aspects in DRC. Data not available for dietary diversity and average per capita fruits & vegetable intake

Food insecurity	Nutrition
<ul style="list-style-type: none"> • About 70% of population affected by food insecurity • Poverty rate-63.9% 	<ul style="list-style-type: none"> • < 5stunting-42.7% • <5 Wasting-8.1% • Anaemia in women of 15- 49 years age -47.7 %

Figure 2: Nutritional Profile - DR Congo





Crop Profile

Cassava dominates the cropping system of DRC, followed by maize, rice, beans, cowpea, ground- nut, and soybeans (Figure 3). Maize (both yellow and white) is the key staple crop after cassava across the country. Plantains are

the other important crop cultivated commercially and consumed across the country. The major local vegetables produced are egg- plant, cabbage, Chinese cabbage, spring onion, okra, and onion.

The decline in food production in the country can be ascribed to several negative factors, notably disrupted rainfall patterns,

increases in pests and plant diseases, low soil fertility, low quality seeds and poor agricultural practices as well as the negative impact of social and political strife that has characterized the country during recent decades.

The yield trend of the major crops being cultivated in the- country (Figure 4) has been stagnant over the last decade.

The yield of groundnut, which was low (0.8 tons/ha) in 2008, has declined to 0.6 tons/ha in 2017 due to the lack of improved varieties. Similar trends are observed for maize, rice, and beans.

Irrigation potential is estimated at 7 million hectares, which shows great promise to increase productivity. Revenues that could be generated from the agricultural sector and derived products are estimated at US \$10 billion per year. This potential, however, is far from being reached due to on- going struggles in the agriculture sector, such as lack of breeding programs and inadequate

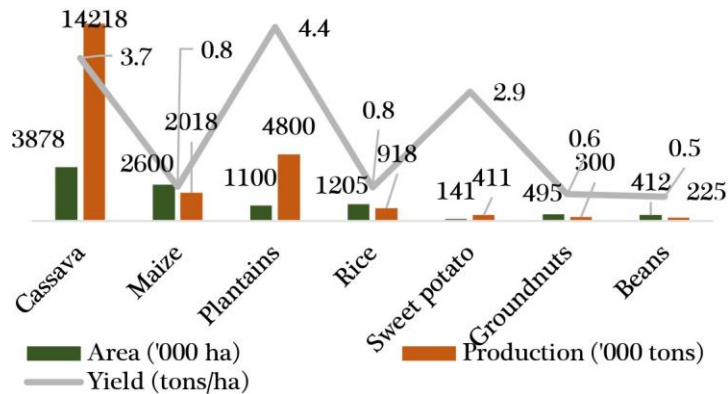


Figure 3: Crop Profile (2017) - DR Congo

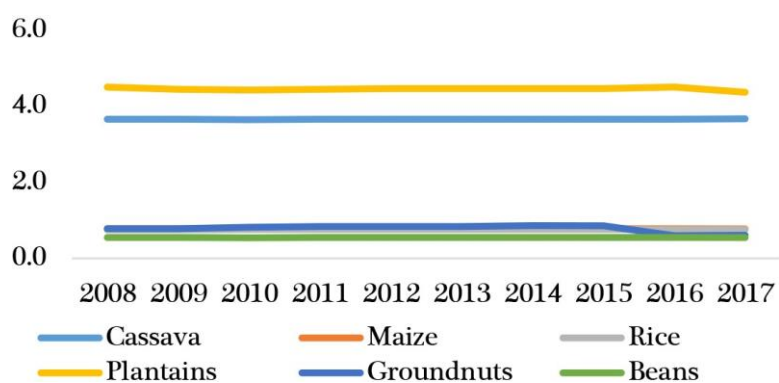


Figure 4: Yield Trends (tons/ha) - DR Congo



seed systems. As a result, DRC is a major food importer. Smallholder farmers are assessed nationally at about 6 million households, covering an area of 6-8 million hectares.

Breeding, Variety Development and Release

The National Institute for Studies and Agricultural Research (INERA), under the Ministry of Scientific Research and Technology, is the national research organization. INERA's current activities are limited to varietal selection and maintenance breeding owing to insufficient budget allocations and lack of equipment and infrastructure, among other deficiencies.

Research projects are generally funded through CGIAR institutes and donor-funded projects, and many research activities and impacts are stalled by project discontinuation.

INERA operates 16 research stations spread across the country's 14 different agro-ecological zones. Key crops include cassava, maize, legumes (beans, groundnut, and soybean), rice, and tubers. Agricultural research is carried out in close collaboration with international research centers, including IITA, CIAT, Biodiversity International, CIMMYT, IRRI, ICRAF, AFRICARICE, CIP, Harvest Plus, and NACCRI (Uganda) for accessing improved lines for adaptability trials.

IITA works collaboratively with INERA for production of basic seeds for the major crops including maize, cowpea, groundnut, common bean, and vegetables. INERA is also actively involved in research networks organized within sub-regional and regional framework (ASARECA, CORAF, SACCAR, FARA, IRAZ, and CIALCA).

INERA comprises five research centers, each located in an agro-ecological zone of the country: M'vuazi in Kongo Central Province; Gandajika in Lomami Province; Yangambi in Tshopo Province; Nioka in Ituri Province, and Mulungu in South Kivu Province. INERA's Mvuazi center has released 22 varieties in the last three years including: beans (4); maize (3); cassava (5); soybean (3); groundnut (4); and cowpea (3). INERA-Mulungu has released 14 varieties of these crop species since 2015.

The current breeding focus is on development of varieties resilient to climatic conditions (drought, pest, and diseases), biofortified grains (with micronutrients such as zinc and iron), and enriched with quality proteins. Key traits under varietal development include high yield and disease tolerance for maize and rice; biofortified varieties for maize (quality protein), rice (vitamins), beans (zinc and iron), and cassava (provitamin A). INERA is currently working on



seven cassava varieties for their registration and release: Vuvu, Ilona, Kansakako, Mugohi, Lito, Nabana, and Sawasawa. A project targeting the selection of beta-carotene-rich, disease resistant and high yielding varieties of cassava is underway at INERA.

The Maize Research Center (CRM) is based in Katanga and has a partnership with CIMMYT for sourcing inbred lines for varietal development. Faculty of Agronomic Sciences of the University of Lubumbashi (UNILU), Haut-Katanga Province, is also involved in research and has developed five maize varieties. The Faculty of Agronomic Sciences of the Université Pédagogique Nationale (UPN), Kinshasais involved in development of improved maize hybrids and released a new hybrid, UPN1, in 2019. UPN are also working on development of five three-way maize hybrids from CIMMYT. ACIDI, an NGO in Kwilu Province, conducts research on legumes and identified three improved varieties of groundnut and two varieties of cowpea.

Approximately five three-way hybrids were created during the 2018-2019 growing season and are scheduled for evaluation during the next season before starting the registration and release process. UNILU and INERA also have the same vision to develop hybrid varieties of maize. The organizations work in collaboration with CIMMYT, which has already granted licenses to produce maize hybrid varieties. In addition, INERA, in collaboration with HarvestPlus, is conducting trials on new varieties rich in pro-vitamin A. INERA's research activities on rice are currently focused on the collection and conservation of rain-fed and lowland varieties, varietal maintenance, and multiplication of pre-basic and basic seeds. The lowland collection was enriched with 26 new accessions from AfricaRice, while the rain-fed collection includes more than 330 varieties/accessions. INERA M'vuazi is working on the following soybean varieties for their registration and release: Buadi, Ntela, and Davi's. No new varieties of groundnuts have been released.

The national varietal catalogue was recently updated in 2019. Over 90 varieties across key crops have been developed in the last 5–6 years, including: maize (17); rice (11); beans (29); groundnut (11); cowpea (5); and cassava (19). These include maize varieties with bio fortification (2) and improved protein content (3); four bean varieties with high iron content; and four bio fortified cassava varieties. Across different crops, several varieties have been removed from the catalogue since INERA was not able to maintain genetic purity of those varieties due to lack of resources.

INERA has 19 active plant breeders for the staple food crops (cereals, legumes, and root and



tuber crops) including four for maize, three for rice, four for legumes, seven for cassava, and one for tubers. However, not all are active due to lack of adequate infrastructure and financial resources. INERA lacks basic equipment and has no internal facility for early-generation seed production.

IITA has a tissue culture lab for vegetatively propagated crops with a capacity of 50,000 plants per year. A large laboratory has recently been opened at INERA's Kalambo Research Station, Bukavu. Additionally, four breeders are working at UNILU on maize improvement. UNILU has its own laboratories, including a small-scale tissue culture facility and sufficient land for varietal testing.

Proposed Interventions

UPN also has one soybean and three maize breeders.

- Introduction of improved high yielding varieties of maize, rice, beans and varieties of groundnut with a focus on key traits sourced from international and regional research programs. It is proposed to release 20–25 hybrids and/or varieties of the crops over a period of five years. Hybrids with competitive yield and adaption will be released for commercial production. Some of the key sources and yield potential for these crops include:
 - ° *Maize*: Introduction of F1 hybrids from CIMMYT and comparative assessment of UPN1 released in 2019. Introduction of high-yielding hybrids from IITA.
 - ° *Cassava*: Introduction of improved cassava varieties with preferred traits like (a) high yield; (b) high dry matter content; (c) medium branching type (d) resistance to cassava brown streak disease; (e) cassava mosaic disease resistant varieties; and (f) stay green leaves. Support of seed multiplication of planting sticks to private seed companies.
 - ° *Rice*: Test improved hybrids and varieties from AfricaRice
 - ° *Beans*: Varieties can be sourced from national and regional research centers in neighboring countries.
 - ° *Groundnut*: Improved varieties from ICRISAT, Bhabha Atomic Research Center (BARC), India, and Niger
- Capacity building in maintenance of maize parental lines at INERA
- Capacity development of 16 MS and three Ph.D. students (rice hybrids, vegetables) in existing and new crop breeding, including vegetables via exchange programs with



universities in West African countries, including Ghana (WACCI), Kenya and India for

- vegetable breeders. MS breeders will be trained on hybrid vegetable development in addition to the other key crops.

INERA and UNILU are the only sources of basic seed in the DRC. No other entity from the private sector has a license for basic seed production. However, INERA subcontracts some private entities to do additional production of basic seeds to reduce the cost of production. The two institutions work in close collaboration with other agricultural institutions and projects such as the CGIAR institutions (IITA and Harvest Plus). Even though local producers access basic seeds from these institutes, in certain regions the availability is a challenge. In such cases the third party entities produce the basic seed under INERA technical supervision. SENASEM is the national designated agency responsible for certification of seeds.

Table 1: Basic Seed Production Cost and Prices of Selected Food Crops

Crops	Production cost per hectare (US \$)	Crop yield (tons/ha)	Price per kg (in US\$)
Maize	1915	1.5	2,5
Rice	1900	0.8	2,5
Groundnuts	1200	1	3,0
Beans	910	0.8	3,0
Cowpeas	1370	0.6	3,0
Soybeans	1370	0.6	3,0
Cassava	-	20000 LM	0.06 \$/LM

Seed Systems

Approximately 90-95% of INERA’s basic seed production is sourced by international organizations (like AO) and local NGOs, with the rest by private seed producers for production of certified seeds.

Currently, only about 3% (Figure 5) of the seed

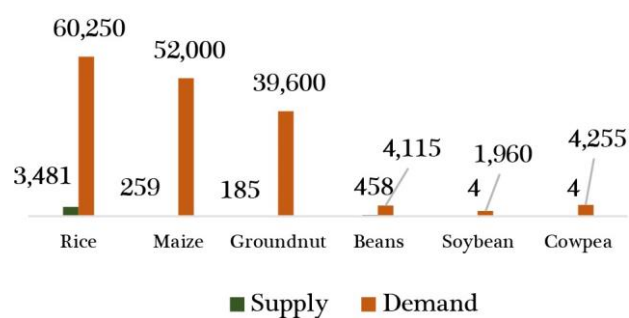


Figure 5: Seed Supply Demand Gap (MT) - DR Congo

requirement is met through certified seeds. Projects like Agricultural Development: Kinshasa Food Supply Centers Support Programme (PAPAKIN), Growth Pole Development



Project in Bas-Congo (PDPC) in the west, and PARRSA in the north also procure seeds from ERA. PAPAKIN procures basic seeds from INERA and supplies to 20 farm unions and three NGOs.

The certified seeds produced are then distributed to farm unions for crop production. PAPAKIN produced about 1,000 tons of seeds of maize, cassava, groundnut, and cowpea in 2018. World Bank funded projects like PARRSA (in Mongala, North and South Ubangi) and PDPC (Kongo Central) use co-financing mechanism for seed production with 50% share by producers and by banks.

There is currently high demand for improved seeds and seedlings by smallholder farmers, which is only marginally met. In general, the Congolese population is not fully aware of the importance and advantage of improved seeds. This is due to the low diffusion of innovations. Approximately 5% of smallholder farmers are aware of the importance and advantage of improved seeds. The seed market is not formally well structured. It remains largely informal and, because of its lack of transparency, is difficult to assess. Small producers do not often have access to quality seed at affordable prices and use improved seeds only in specific cases, especially those assisted by humanitarian organizations (NGOs, FAO, etc.). For seed operators that are able to produce a certain amount of good quality seed, marketing is a bottleneck. Seeds are sometimes sold as food at extremely low prices due to the underdevelopment of the seed value chain. The DRC seed industry, which is at an initial stage, needs substantial improvement.

The Democratic Republic of Congo has a long way to go to achieve a situation where farmers have easy access to seeds of new crop varieties. Access by smallholder farmers to new varieties, developed by Congolese researchers, is limited because of the weakness of the improved seed value chain. The distribution and dissemination of improved seeds remains limited because of the lack of reliable producers, inadequate control of seed quality, and insignificant participation of the private sector. Seed multiplication is largely done by farmers associations or cooperatives with a reduced capacity to set up a real seed production and marketing system.

Starting in 2002, the government developed several programs and projects to improve the seed subsector, including PARSAR, PRESAR, PRAPE, PRAPO, HUP, and PAIDECO, financed by the ADfB and IFAD. This dynamic is maintained in the context of cooperation with FAO, Belgium, and the World Bank. FAO has helped to (a) strengthen the operational capacities of SENASEM,



(b) update the varietal catalogue, (c) upgrade of the equipment at Kinshasa laboratories, and (d) draft the seed law. Since 2014, a new national seed plan has been developed, which aims to support the country with: (i) Seed Sub-Sector Development Strategy, and (ii) Integrated Priority Investment Plan to strengthen the institutional and operational capacities of each segment of the national seed system.

Currently, there are 12 private seed companies operating in the four regions of DRC where seed activities are significant. Seven of the 12 seed companies are locally owned and most are new, having started operation in 2016. The remaining ones are international seed companies, most of which are based in the southern region of DRC. Seven seed companies are located in the east, four in the south, and one in the west.

NASECO, a Uganda-based company, has been producing certified seeds in the DRC. NASECO is the first company with a successful hybrid for the eastern Congo market, and currently sells about 100 tons in three provinces. All the seed sold by NASECO is currently produced in Uganda. Additional regional seed companies like SeedCo and Pannar are selling seed in the DRC mainly to farmers in the area around Lubumbashi. No global MNCs operate in eastern Congo. Seed cooperatives are active in production of certified seeds, however most operate through donor funding. Approximately 20% of the maize producers procure basic seeds from NARS of neighboring nations like Burundi, Kenya, Uganda, and Rwanda at a lower rate than the basic seed seeds from INERA.

Ets Munga is one of the active seed producer partners of ELAN RDC in the eastern region and produces about 300–400 tons of seed annually. ELAN RDC is a DRC market systems development project financed by UKAID and implemented by Adam Smith International. Currently about 12 private seed companies operate in four regions including companies like Mimosa (109 tons), Bon Berger (43 tons), Strategos Plantations, Aidive, and AFME. Most of the seed volume comes from maize.

CEPROSEM is an enterprise engaged in vegetable seed production, initially promoted through donor-funded projects. It has processing equipment, a seed lab, and cold chambers for storage of seeds, and marketing of seeds. Government-owned seed treatment plants and warehouses are old and obsolete and most of the seed producers have no structures, equipment for seed treatment, grading, packaging or storage facilities, which reduce the quality of seeds.



Table 2: Annual Productions of Four Individual Seed Producers in DRC (MT) in 2018

Company/region	Maize	Rice	Groundnuts	Beans	Soybeans
STRATEGOS PLANTATIONS /West	4.5	-	-	-	-
MIMOSA/East	101	1	3	3	1
MAIDIVE/South	10	-	4		2
AFME/South	4.8	-	-	1.2	-
BON BERGER/South	35	-	-	4	3.2
Total	155	1	7	8	6

Most of the seed producers concentrate on maize, the leading staple food crop in the country. Seed production is still low and not reflective of the potential demand for seed in DRC. Additionally, approximately 3,800 tons of seeds (3,700 formal imports 150 informal) are formally imported into DRC annually, primarily from Zambia, Rwanda, and Uganda. MNCs, government agencies (including SQAV, DPPV and IPAPPEL), NGOs and agro-dealers are the key importers, and generally imported volumes exceed production by seed companies. With no capacity for hybrid seed production within local seed companies, all of the seed requirements of maize hybrids are imported.

By crop, the volume of imports are as follows: 2,106 tons of maize seed; 180.7 tons of rice seed; 240.5 tons of bean seed; and 1,183.9 tons of soybean seed. Importers include foreign seed companies, the national and provincial government institutions (including SQAV, DPPV and IPAPPEL), and, to a lesser extent, agro dealers. International research institutions usually import seed in collaboration with INERA. The main border entry points for the imports are Kasumbalesa, Bunagana, Kasindi, Ruzizi, and Boma. Most of the informal imports are maize seed (139 tons), with few imports for beans (11 tons) and for rice (less than one ton). However, these statistics are undoubtedly underestimated as some importers are reluctant to disclose the information. The main sources of informal seed are Zambia (by Kasumbalesa and Sakania), Rwanda (by Bukavu and Ruzizi), and Uganda (by Mahagi, Kasindi, and Kabuhanga). All informal imports are in the east and south. No imports have been reported in the western and northern regions.

Seed producers are organized into association at national and provincial levels; however, these associations are not active. Currently, a total of 62 seed producers have focused on at least one of the four crops. Of these, 25 are seed associations while 37 are individual seed producers. Of the



62 seed producers, 37 are in the east, 13 in the west, 6 in the south, and 6 in the north of the country.

SENASA has some seed warehouses and nine seed treatment plants, most of which are obsolete and some of them not yet installed. Our field visit in several provinces showed that most seed producers (INERA, private companies, NGOs, farmers associations, and individual farmers) have no structures, equipment for seed treatment, grading, or packaging facilities. This bottleneck impacts negatively on seed quality.

Seed distribution and delivery is primarily through FAO, WFP, and NGOs such as Caritas, the International Committee of the Red Cross, the Norwegian Refugee Council, and World Vision International. Seed supplied by aid agencies are often inexpensive (less than US \$1/kg for maize) but of low quality, with farmers often preferring to use their own saved seeds. Currently about 5% of smallholder farmers have access to improved seeds. The seed market is not formally well structured. It remains largely informal and, due to its lack of transparency, it is difficult to assess its dimensions.

The government provides some smallholder farmers with seeds which is purchased at the local market (about 93%). Government sources seeds by issuing tenders to private seed suppliers in the area. However, they request a low price to buy the seed (e.g. USD 0.9/Kg of maize seed), which seed producers cannot afford. As a result, seed market opportunists are selected as successful tenders, and subsequently supply the NGOs with the so-called seeds (grains purchased on the local market).

The main volunteer seed aid agencies are UN agencies (e.g. FAO and WFP) and NGOs such as Caritas, the International Committee of the Red Cross, the Norwegian Refugee Council, and World Vision International. According to the seed producers surveyed, seed sales to the emergency market in 2016 accounted for 22% of total maize sales, 40% of total rice sales, 72% of total bean sales, and 41% of total sales of soybean.

Seed marketing is a bottleneck for seed companies/producer groups coupled with limited public intervention in the distribution and promotion of quality seeds and seedlings. The agro-dealer network in eastern DRC, previously promoted through AGRA, sells primarily vegetable seeds without sufficient business or marketing knowledge. According to the TASA report, in 2016



there were 161 agro-dealers in the DRC, of which 42 were hub agro-dealers (serving as wholesalers to supply smaller agro-dealers) and 117 were small rural agro-dealers.

Policy Advocacy

SENASEM coordination offices at national and provincial levels that enjoy financial support from development partners, some are well equipped and carry out the in work efficiently. SENASEM is organized as follows: one national coordination office in Kinshasa, staffed with 29 seed inspectors and 18 laboratory technicians and 25 provincial coordinators of which 10 are financially supported.

These provincial coordinations have 158 seed inspectors, 72 laboratory technicians, 1149 seed producers and 100 seedling producers. The ratio is estimated at 7 seed producers for one seed inspector and 16 seed producers for 1 laboratory technician. The distribution of seed inspector and laboratory technicians shows regional disparities in favor of provinces that are financially supported by donors. SENASEM follows two approaches:

- Support to seed producers using its own resources. Ninety percent of the output is sold to government, FAO, and NGOs, and the remaining 10% is partly used by the seed producers and sold to other farmers;
- Support to seed producers who have signed contracts with projects/programs that are supported by technical and financial partners (PTF). SENASEM has signed several contracts with technical and financial partners. These partners provide assistance in terms of seed control, certification, and development of tools for the management of seed systems (varietal catalog and technical manuals relating to seed production, control and certification, guidelines for seed inspections, and analysis), and contribution to the establishment of seed provincial councils (COPROSEM).

Proposed Interventions

- Provide seed grant funding to eight seed companies and/or cooperatives as seed company startup (including NASECO, Ets RDC, CEPROSEM) for:
 - ° Capacity development of quality seed production including hybrid vegetable crops aim to increase the quality seed production of existing varieties/hybrids and newly introduced varieties by 28% of the current quality seed production



- Expand the seed distribution network to reach farmers through extension activities
- Strengthen business entrepreneurship skills of 120 personnel through professional training courses over a period of 5 years
 - Business management and administrative practices
 - Technical skill improvement such as seed standards and quality, seed treatment, controlled storage, and marketing
- Support INERA for providing oversight to trait validation trials of private enterprises in order to expedite their registration process
- Strengthening of seed processing infrastructure: installation of additional capacity of 2 tons/ day in the country at 2-3 centers in private sector premises with versatile processing equipment for production of small batches of large and small seeds
- Build an agro-dealer network through promotion of dealer enterprises across regions
 - Provide grant to 1,000 agro-dealers in DRC to open new outlets, refurbish 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 1,000 agro-dealers will be trained on these modules over a period of five years.
- Extension and knowledge dissemination and 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 100 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 and oversight of the seed delivery by national and international players, and harmonization of regional policy
 - Professional trainings will be provided to more than 240 seed inspectors on proper seed quality assessment and seed certification aspects.



Facilitate an increase in quality seed production for the key crops to 18,030 tons covering an area of 11% under quality seeds (Figure 67) at the end of five year period, and 45,657 tons covering 29% area at the end of 10 years.

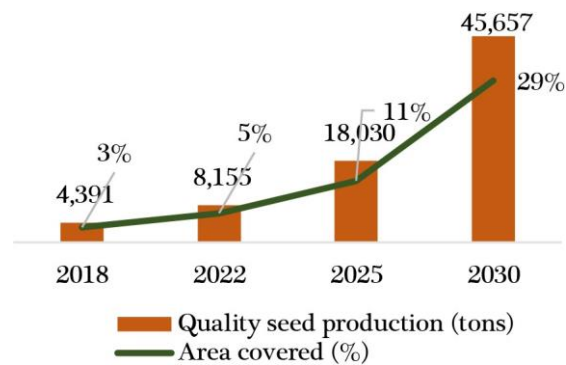


Figure 6: Projected Seed Quantity (MT) - DR Congo

Budget

Table 3: DR Congo Budget

Components	Amount (USD million)					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Component 1: Crop Variety Improvement						
NARS varietal Trials	0.31	0.25	0.13	0.00	0.00	0.69
Early generation seed production	0.08	0.11	0.05	0.00	0.00	0.23
MSc fellowships	0.11	0.21	0.25	0.00	0.00	0.56
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	0.20	0.20	0.00	0.00	0.00	0.40
Hybrid seed production training	0.15	0.30	0.18	0.00	0.00	0.65
Professional trainings	0.06	0.09	0.08	0.00	0.00	0.23
Component 3: Agro-dealer Development						
Grants to agro-dealer development agencies	0.15	0.45	0.53	0.38	0.00	1.50
Capacity Development (Book keeping, 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.	0.56	0.56	0.00	0.00	0.00	1.12
ICT infrastructure and training support	0.38	0.00	0.00	0.00	0.00	0.38
Professional trainings	0.06	0.08	0.08	0.00	0.00	0.21
Component 5: Seed Policy and Advocacy						
Seed Policy and Advocacy (grantee and stakeholder meetings)	0.08	0.08	0.00	0.00	0.00	0.15
Professional trainings	0.03	0.05	0.03	0.00	0.00	0.11
Total	2.54	2.91	1.49	0.53	0.00	7.47