



Strategy for the Development of Sustainable Seed Supply Systems in Guinea



Seed Systems Group, Nairobi, Info@seedssystemsgroup.org,
Tel.: +254 20 525 8042, www.seedssystemsgroup.org



Country Snapshot



Population- 13 million



19.5%
Agricultural share to GDP



3.1 m ha
Arable land



16.5%
Undernourished population



Age group < 15 - 42.5%; 15-65 -54% > 64- 3.5%



66%
Agricultural employment



Climate Risk index- 116



Global hunger index- 27

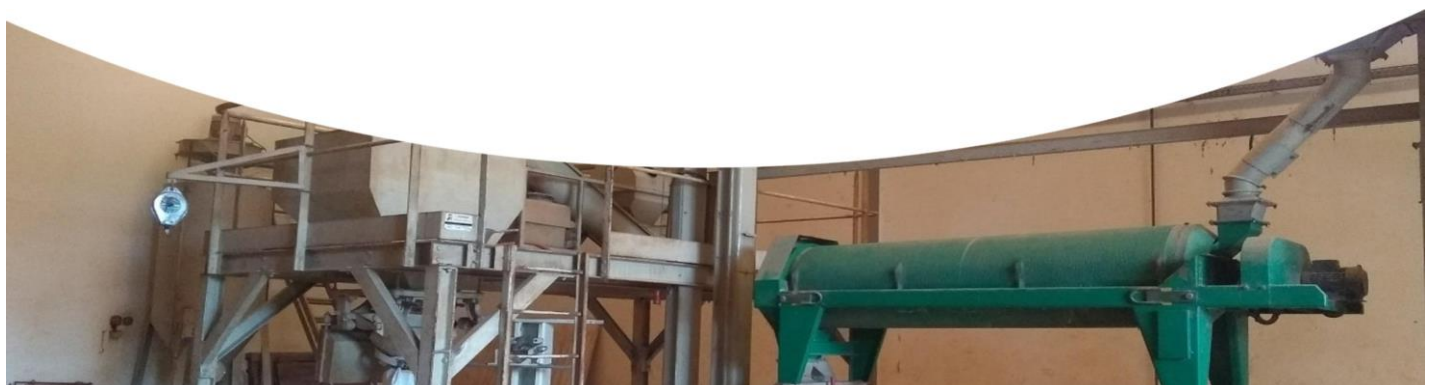
Figure 1: Country Snapshot - Guinea

Nutrition Profile

- Chronic malnutrition is as high as 30% everywhere in the country except Conakry
- The nutritional status of adults shows a great disparity between rural and urban areas
- Endemic goiter in Guinea is one of the most widespread in sub-Saharan Africa, representing a major problem for the country's public health

Food insecurity	Nutrition	Dietary diversity	Average per capita Fruits & Vegetable intake
<ul style="list-style-type: none"> • About 46.5% of population affected by food insecurity • Poverty rate-55% 	<ul style="list-style-type: none"> • < 5stunting-30.3% • <5 wasting-9.2% • Anaemia in women of 15-49 years age -50.6 % 	<ul style="list-style-type: none"> • 62% of energy-source derived from cereals, roots and tubers representing low dietary diversity 	<ul style="list-style-type: none"> • 237.4 and 135.2 g/day against recommended guidelines 200-250g/day

Figure 2: Nutritional Profile - Guinea





Crop Profile

Rice is the staple crop of Guinea, followed by maize and cassava. Other important food crops are groundnut, fonio, and millet (Figure 3), with coffee, rubber, palm, and cocoa being the main cash crops. The yield is low for all crops due to low seed replacement ratio and extensive use of old varieties (15-20 years). Owing to Guinea's fertile soil and abundant rainfall the potential for rice and maize production is high.

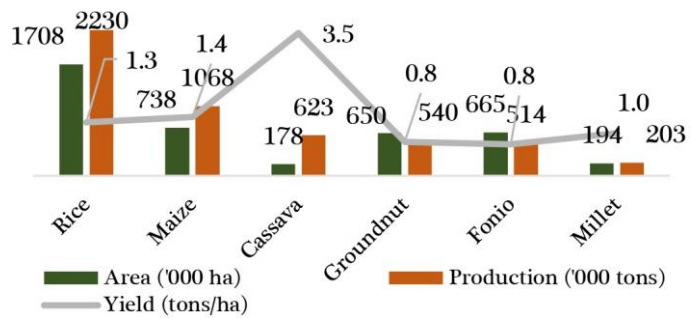


Figure 3: Crop Profile (2017) - Guinea

The yield trend graph (Figure 4) shows a decline in the productivity of all key crops, with only cassava showing fluctuating trends in the last decade. The yield of major crops is low: maize (1.4 tons/ha); rice (1.3 tons/ha); millet (1 ton/ha); and groundnut (0.8 tons/ha).

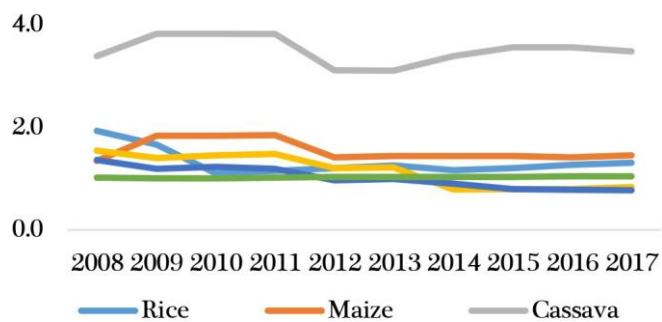


Figure 4: Yield Trends (tons/ha) - Guinea

Agriculture is the mainstay of the economy of Guinea, employing 80% of the Guinean population and is the main source of income for 57% of the rural population. The number of farms is high. Each farm supports 8 people on an average. Smallholding dominates: 64% of farms are smaller than two hectares and only 4% stretch over seven hectares. In general, work is performed mainly by family labor using rudimentary instruments. The proportion of women working in the agricultural sector is slightly higher than that of men: 50.7% against 49.3%.

Yields have changed very little in recent years and remain well below their potential to make this sector the main engine of development of Guinea. Indeed, weak agricultural growth is mainly attributed to low productivity at farmer level. Despite development efforts in the rural sector practices remain relatively unchanged. The promotion of new technologies, control of water, and land surfaces remain localized. Only 2.3% of the plots benefit from phytosanitary treatments, less than 8% of sown areas receive improved seeds, and an average of 7 kg of



fertilizer is used per hectare per year. The absence of functional rural credit system prevents the modernization of equipment and the use of inputs.

Breeding, Variety Development and Release

The Agronomic Research Institute of Guinea (IRAG) is involved in the development, testing and release of varieties, and the supply of pre-basic and basic seeds to NGOs, seed cooperatives, private entities, and gene bank maintenance. Its major focus is rice research followed by maize, vegetables, cassava, soybean, and groundnut.

There is no research ongoing on maize hybrids, and the major focus is on OPVs. There is an ongoing program with China for hybrid rice. IRAG has collaborations with AfricaRice and IITA. Forty percent of the vegetable varieties are from within the country and the remaining are imported from India, Vietnam, China, France, Netherlands, and Burkina Faso. The predominant rice and maize varieties in Guinea are old (20-50 years). There are about 3,000 accessions of rice with IRAG. IRAG has a Plant Genetic Resources Program (PRPG) based at the Foulaya Agricultural Research Center. Its mission is to collect, characterize, and conserve germplasm of existing food crops.

The Higher Agronomic and Veterinary Institute “ Valery Giscard D’Estaing ” Faranah (ISAV/F), which is responsible for providing initial and ongoing training for agricultural sector executives, participates in the development and promotion of research in the agricultural sector and the acquisition of appropriate technologies. The ISAV/F contributes to rural development in the country in general and the settlement area in particular by ensuring production, support research, and development activities, and participates in the development and promotion of cultural, sporting and socio-educational youth, developing exchanges and cooperation, varietal adaptation.

Guinea is a reservoir of important genetic resources in *Oryza glaberrima* rice that are maintained mostly in situ in farmers’ fields. Since 1982, 64 varieties of all crops have been released which is nearly two per year. Research capacity and funding are the limiting factors. Major rice varieties cultivated in Guinea are CK90, CK 43, CK 21, NERICA 4, CK 801.

At Foulaya, there are 63 species variety of citrus, 72 mango varieties, 186 accessions and



varieties of cashew, four varieties of pineapple, 25 varieties of bananas and plantains, 40 varieties of avocado, and 91 varieties of cassava. At Koba, there are 260 varieties of rice in the collection. The Bordo station has 80 rice varieties plain, 40 upland rice, 34 yam, 104 cassava, 9 cottonseed, 12 peanut, 14 cowpea, 4 bean, 2 soya and 2 wandzou, and 48 ecotypes of corn, 4 of millet, and 72 of sorghum.

In Sérédou station, an ethnobotanical study identified 90 different specimens of fertile herbarium; 400 dry specimens scanned and 800 dried specimens entered into the database RIHA SERG; 189 new plant species have been identified; 207 rare plant species and/or endemic have been introduced and retained in the herbarium of SERG IRAG. This station also features live collections consisting of 5 clones and 88 hybrids Robusta coffee, 3 hybrids selected cola, 4 hybrid cocoa, 7 Hevea clones, and 110 legume plant species. The Kilissi station has a collection of 143 varieties of rice lowland and 3 hillside rice varieties; 60 peanut varieties, 130 beans, and 13 corn. The Bareng station supports a rich vegetable crops collection of 3 varieties of eggplant, 34 pepper, 7 okra, 2 amaranth, 6 shallot, 2 cucumber, 68 cassava, and 6 forages.

IRAG faces many structural, scientific, technical, and financial constraints that limit performance. The lack of medium- and long-term planning is one of the constraints that does not allow IRAG to achieve target.

Table 1: Research Programs

Natural regions	Stations of Agricultural Extension	Research Programs
Lower Guinea	Foulaya	<ol style="list-style-type: none"> 1. Agricultural Systems Program, Territory Management and Savings 2. Program fruits (mango, pineapple, banana, citrus and various fruit) 3. Food Technology Program 4. Biodiversity Program and Conservation
	Kilissi and Koba	Rice program
Middle Guinea	Bareng	<ol style="list-style-type: none"> 1. Fonio program 2. Maraichères Crops Program and Potato 3. Animal Production Program and farming systems 4. Soil fertility program and sustainable ecosystem management
Upper Guinea	BORDO	<ol style="list-style-type: none"> 1. Cotton Program and energy plants 2. Program other cereals (maize, sorghum and millet) 3. Peanut and other legumes Program 4. Plants Program roots and tubers
	FARANAH	
Forest Guinea	Sérédou	<ol style="list-style-type: none"> 1. Perennials program (oil palm, rubber, coffee, cola, cocoa, and cocoa) 2. Forestry and Agroforestry



The weakness of human resources is characterized by:

- Insufficient staff and administrative and accounting manager;
- The aging workforce;
- The difficulty in recruiting and training young researchers
- The weak representation of women;
- The lack of expertise in the fields of biotechnology, economics, sociology, mechanization, hydrology, administration, and financial management

Table 2: Scientific Staff

Staff	Effective
Researchers	65
Support staff	26
Contract staff	25
Total	116

Scientifically, we note:

- Low utilization of research results, resulting in a reduced number of scientific publications and communications;
- Low participation of researchers in scientific meetings (seminars, workshops, conferences)
- Low mobilization of research funds

In terms of infrastructure and equipment:

- Advanced obsolescence and degradation of built infrastructure;
- The deterioration of the pumping stations;
- Lack of drinking water at Koba, Bareng, and Faranah stations;
- The lack of reliable structures threshing, drying, and storage of basic seed;
- Dilapidated and inadequate equipment;
- Lack of internet access in offices and stations;
- Insufficient transportation (cars and motorcycles) In agricultural areas, it should be noted:
- The poor state of roads to access the experimental plots;
- The illegal occupation of plots;
- The lack of secure areas;
- Destruction by wildfires, excessive cutting of timber, and mining of plots, collections, forests, and streams

In terms of financial resources:



- Current funding level indicate the high level of priority for agriculture. However, these amounts are modest in relation to research needs, staff recruitment, training of researchers and accounting managers, rehabilitation and / or construction of infrastructure and equipment. Funding should also take into account the need for communication and dissemination of research results which are many and little known.
- Delays in mobilizing grants are a disruptive factor in research programming. Delays in the provision of financial resources affect the mobilization of researchers and technicians in their activities and the quality of deliverables.

Proposed Interventions

- Recently developed rice and maize varieties/hybrids with focus on key traits, specifically blast resistance of rice, will be sourced through regional research programs and private MNCs. The aim is to release 20-25 varieties/hybrids of key crops and vegetables in the country over the next 5 years. Some of the key sources of yield potential for these crops are:
 - *Rice*: Improved rice varieties/hybrids will be introduced for high yield, blast and yellow virus resistance from Burkina Faso, India, Mali, and Africa Rice. Blast-resistant varieties from Ghana will also be introduced
 - *Maize*: Yellow maize hybrids with the yield gain potential of 3-4 times over current productivity will be sourced from CIMMYT and IITA
 - Germplasm (EGS, varieties) for Soybean will be sourced from regional research centers in neighboring countries (Ghana)
 - *Cowpea* varieties will be sourced from IITA, Nigeria and Burkina Faso
 - *Groundnut* varieties will be sourced from the ICRISAT varieties previously introduced in Senegal and Ghana
 - *Vegetables* –tomato hybrids will be introduced in collaboration with public institutions and global private companies. These hybrids will be validated with the help of IRAG for commercialization
- Breeding capacity will be enhanced for key crops (rice, maize, soybean, cowpea, groundnut, and vegetable hybrids) with focus on validation trials, seed multiplication programs, and development of human resources.



- Development of newly trained plant breeders for existing and new crops will be done by awarding fellowships to ten MS and two Ph.D. (for rice and vegetable) students, who will be included in exchange programs with WACCI and University of Ghana for four months, and India wherein the government of India will provide fellowships to students from Africa. MS breeders will be trained to work with breeding programs to introduce, evaluate, and select hybrids for their country.

Seed Systems

The inventory of the seed sector reveals that it faces constraints plaguing the entire agricultural sector. Additionally, it also faces specific obstacles and constraints related to the nature of the seed sub-sector. Indeed, despite some achievements (improved varieties, various infrastructure, existence of a formal private sector), the national seed sector is currently characterized by absence of its links to: (i) varietal selection, retention, and the renewal of the available plant material; (ii) regular supply of the die pre-basic seed and / or base; (iii) the production of certified seed or commercial in sufficient quantity and quality; (iv) the quality control of seeds produced and marketed;(v) packaging and storage of the seed produced; (vi) marketing and distribution; (vii) promoting the production and use of quality certified seeds; and (viii) the organization of the sector.

Most of the seeds used are locally recycled from previous harvests. Only potato, onion, and certain other vegetable seeds are imported from France, Israel, and Senegal by the Federation of Fouta Djallon Farmers and some private importers. The use of uncatalogued varieties is still dominant (57%) for cereal crops on the national and lower level in some areas. Improved varieties account for about 40%. Local varieties are more dominant in rice farms, although it is difficult to pin down an actual statistical value of local vs improved varieties. More than 100 local varieties are encountered in the production areas, which differentiate them from the growing cycle, agroecological zones of production, the ability to withstand stress, floods, and pests. The rice varieties can be structured according to the ecosystems or ecotypes.



The supply of early generation seeds (EGS) is managed primarily by IRAG via contracts to farmer producer organizations for production. There is no private seed company engaged in seed production in Guinea, although the government is open for a public-private partnership model for enhancing seed systems. Farmer organizations produce the bulk of 3,310 MT for rice and maize

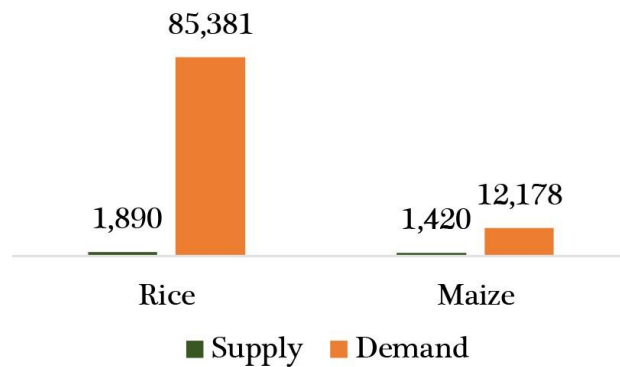


Figure 5: Seed Supply Demand Gap (MT) - Guinea

Figure 5.

There are four mini seed quality testing labs within the public sector but these are old, primitive, and poorly equipped. In four regions of Guinea, there are seed processing infrastructures established under a project by FAO and World Bank but these are old and underutilized due to unavailability of trained technical staff. Additionally, there are two mobile processing units which are not functional. Other farm equipment such as rice transplanters are available but are not in use. The supply and demand gap for certified seeds for rice and maize crops is due to the lack of capacity to produce seeds, the inability of farmers to purchase seeds, and weakness of the emerging private sector.

Although the existing seed laws do not forbid the entry and activities of the private sector, the private sector presence is minimal because of the lack of favorable seed laws, adequate infrastructure, and other inputs. There are very few agro-dealers in operation, and existing ones mostly deal in chemicals. The current seeds are disseminated through a public distribution network for all key crops.

Since 2011, the situation of state support for pre-basic and foundation seed by the various agricultural research stations under IRAG through projects and programs is shown in Table 3.



Table 3: Seedling Production Status (Tons)

Cultures / Categories	Year of production in tonnes							
	2011	2012	2013	2014	2015	2016	2017	Main varieties multiplied
<u>Upland rice / Down Back / plain</u>								
Regions: Bordo, Sérédou, Kilissi and Bareng								
Pre-basic seed	5	5	6	6	10	12	15	CK801, CK21, CK90, CK211, CK73, M6, NERICA4, NL19
Basic seed	100	100	150	110	200	225	250	
<u>Irrigated rice</u>								
Regions: Bordo, Sérédou, Kilissi Koba and Bareng								
Pre-basic seed	0.5	0.5	1	1	1	1	1	CK801, CK21, CK90, CK211, CK43, M6, NL19
Basic seed	10	10	30	20	30	35	40	
<u>Maize</u>								
Regions: Bordo, Breng and Kilissi								
Pre-basic seed	0.5	0.5	1	1	1	1	1	K5, K9101, DMR ESR Y
Basic seed	15	15	20	30	30	35	40	
<u>Peanut</u>								
Regions: Bordo and Kilissi								
Pre-basic seed	0.2	0.2	0.3	1	1	1	1	AK10, AK11, AK12, AK13, AK14
Basic seed	2	2	4	5	8	9	10	
<u>Cassava (Number: thousands of cuttings)</u>								
Regions: Bordo, Sérédou and Bareng								
Pre-basic seed	2	2	3	5	5	8	10	Tokoumbo Package 92 0581, TME 60142
Basic seed	20	20	40	60	60	70	80	
<u>Horticultural seeds (Kg)</u>								
Regions: Bareng and Foulaya								
Pre-basic seed	0.5	0.5	1	2	2	3	4	Tomato, Onion, Aubergine, Pepper, Okra, Watermelon, cabbage
Basic seed	30	30	60	90	90	100	120	
<u>Potato (tons)</u>								
Regions: CRA Bareng								
Basic seed	0.5	0.5	0.5	0.5	0.5	1	1.5	Nicola Spunta, Arnova, Arizona Desiree etc.
Certified seeds	4	4	4	5	5	8	10	
<u>Fonio (Kg)</u>								
Region: CRA Bareng								
Basic seed	500	500	500	600	600	700	800	Varieties: Niathia, Oar, Konso
<u>Coffee tree (In plants in Thousands)</u>								
Website: CRA Sérédou								
coffee tree	5000	10000	10000	20000	20000	75000	100000	
<u>Cacao (In plants in Thousands)</u>								
Website: CRA Sérédou								
cacao	5000	10000	10000	20000	20000	75000	100000	
<u>Oil palm tree (In plants in Thousands)</u>								
Website: CRA Sérédou								
Oil palm tree	5000	10000	10000	30000	30000	35000	35000	
<u>Citrus (In plants in Thousands)</u>								
Sites: CRA Foulaya, Bareng								
Citrus	10000	10000	10000	25000	25000	30000	30000	orange tree



In order to encourage traders to invest in seed activities, incentives are needed such as tax exemptions, privileges to import and export financing loans to subsidized interest rates. In addition, the state will provide support and coordination of promotional efforts at both the public and private sectors by organizing marketing campaigns in addition to the extension and the proper training of farmers. In order to accelerate the distribution and promotion of newly created varieties, certified seed kits are provided to farmers by the state either free or subsidized. In addition, exchange transactions between farmers and seed producers are encouraged to accelerate the popularization of these new varieties. To ensure better dissemination of information on seeds from different stakeholders, a national information network will be set up with the support of development partners.

The state has the responsibility to conduct pilot operations for the development of the agricultural sector in general and the seed sub-sector in particular. The state ensures the production of seeds needed for these operations as well as those for the emergency assistance seed operators of the private sector to help develop financial and technical capacities to organize and become full operators of the subsector. Also, the state encourages investments in the areas of processing and the food industry to create profitable outlets for surplus agricultural products generated as a result of the use of improved seeds and technologies. Finally, to facilitate access to the various rural agricultural inputs (including quality seeds), the state encourages the establishment and expansion of a distribution network performance of these inputs.

Table 4: List of Seed Structures

Region	Structure	Crops grown	Production capacity (annual)
Lower Guinea	Seed Cooperative Koba	Rice	50 tons
	Union of seed producers Kindia	Rice	140 tons
Forest Guinea	Agricultural cooperative Boussedou (COABOU)	Oil palm tree	15 ha (8 to 10 tons system)
Middle Guinea	Union of Coffee Producers	Coffee	
Upper Guinea	Unions Federation of Rice Producers / Upper Guinea (FUPRORIZ / HG)	Rice	



Proposed Interventions

- Provide seed grant funding to four start-ups to function as local seed companies
 - Increase the capacity of quality seed production: aim to increase the quality seed production of existing varieties/hybrids and newly introduced ones by 31%
 - Production of hybrids seeds and capacity development
 - Strengthen business entrepreneurship skills of 88 personnel through professional training courses over a period of five years
- Support to IRAG for EGS seed production through infrastructure development
- Agro-dealer development
 - Provide grant to 600 agro-dealers in Guinea 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 microenterprises through courses on bookkeeping, cash management, inventory management, quality standards, customer relations, and compliance. All the 600 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 175 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 100 seed inspectors on proper seed quality assessment and seed certification aspects



Facilitate an increase in quality seed production for the key crops from 3,390 tons to 8,731 tons covering an area of 13% under quality seeds (Figure 6) at the end of five year period, and 19,816 tons covering 28% area at the end of 10 years.



Figure 6: Projected Seed Quantity (MT) - Guinea

Budget

Table 5: Guinea Budget

Components	Amount (USD million)					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Component 1: Crop Variety Improvement						
NARS varietal Trials	0.19	0.19	0.13	0.00	0.00	0.50
Early generation seed production	0.05	0.08	0.03	0.00	0.00	0.15
MSc fellowships	0.11	0.14	0.11	0.00	0.00	0.35
PhD fellowships	0.15	0.15	0.00	0.00	0.00	0.30
Component 2: Seed Enterprise Development						
Grants for start-up seed companies	0.15	0.15	0.15	0.15	0.00	0.60
Multiplication support for vegetative crops	0.10	0.10	0.00	0.00	0.00	0.20
Hybrid seed production training	0.15	0.15	0.05	0.00	0.00	0.40
Professional trainings	0.05	0.08	0.05	0.00	0.00	0.17
Component 3: Agro-dealer Development						
Grants to agro-dealer development agencies	0.23	0.38	0.30	0.00	0.00	0.90
Capacity Development (Book keeping, information dissemination, inventory management etc.)	0.01	0.02	0.01	0.00	0.00	0.04
Component 4: Seed extension						
Grants to NGOs for demos, small packs, etc.	0.42	0.32	0.00	0.00	0.00	0.74
ICT, infrastructure and training support	0.25	0.00	0.00	0.00	0.00	0.25
Professional trainings	0.06	0.06	0.05	0.00	0.00	0.17
Component 5: Seed Policy and Advocacy						
Seed Policy and Advocacy (grantee and stakeholder meetings)	0.05	0.08	0.00	0.00	0.00	0.13
Professional trainings	0.02	0.03	0.02	0.00	0.00	0.06
Total	1.95	1.87	0.91	0.15	0.00	4.88