



Strategy for the Development of Sustainable Seed Supply Systems in Cote d'Ivoire



**SEED SYSTEMS
GROUP**

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Country Snapshot



Population- 26 million



17.4% Agricultural share to GDP



3.5 m ha Arable land



19% Undernourished population



Age group < 15 - 39.8%; 15-65 - 57.2% > 64 - 3%



48% Agricultural employment



Climate Risk index- 77.67



Global hunger index- 24.9

Figure 1: Country Snapshot - Cote d'Ivoire

Nutrition Profile

- Although it performs well against other developing countries, Côte d'Ivoire still experiences a malnutrition burden among its under-five population
- National priorities are focused on food security and sovereignty, sustainable management of cash and export crops, private sector engagement through increased investment, and agricultural governance
- The Power of Nutrition and the World Bank are supporting the government of Côte d'Ivoire with a five-year, \$60.4 million investment to increase the coverage of nutrition and early childhood interventions in selected areas of the country

Food insecurity	Nutrition	Dietary diversity	Average per capita Fruits & Vegetable intake
<ul style="list-style-type: none">• About 28.6% of population affected by food insecurity• Poverty rate-46.3%	<ul style="list-style-type: none">• <5stunting-21.6%• <5 wasting - 6.1%• Anaemia in women of 15-49 years age -52.9 %	<ul style="list-style-type: none">• 67% of energy source derived from cereals, roots and tubers representing low dietary diversity	<ul style="list-style-type: none">• 210g and 109 g/ day against recommended guidelines 200-250g/day

Figure 2: Nutritional Profile - Cote d'Ivoire





Crop Profile

The principal food crops in Côte d'Ivoire are rice, maize, cassava, yams, vegetables, groundnut, and millets. The country is self-sufficient in cassava, yams, and bananas. Rice is the most consumed commodity, followed by cassava and yams. The principal grain is rice (Figure 3); it has become a staple for much of the urban

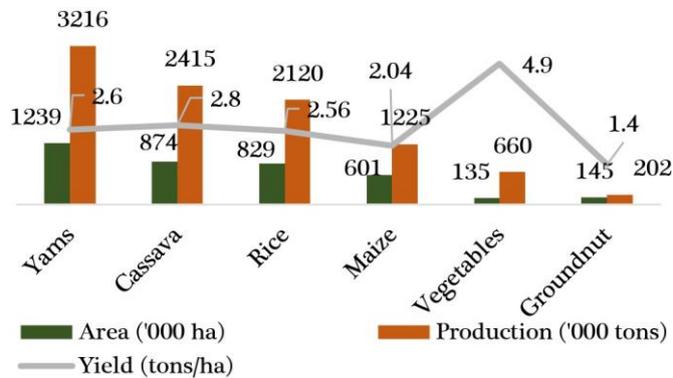


Figure 3: Nutritional Profile - Cote d'Ivoire

population and is also popular in rural areas because of its ease of preparation and storage. The food crop-based systems include yam, rice, plantain, cassava, and maize. The perennial plantation crops are grown on 7.92 million hectares with the production of 7.93 million tons. Major plantation crops are cocoa, coffee, and oil palm.

Fertilizer applications average 40 kg/ha, which is relatively high by African standards, but national average is heavily influenced by fertilizer use on commercial farms. The yield of groundnut increased from 1.1 tons/ha (2008) to 1.4 tons/ha (2017) (Figure 4). In 2017, the yields of maize (2 tons/ha), and cassava (2.8 tons/ha) were very low compared to global averages for maize (5.74 tons/ha), and cassava (12.8 tons/ha).

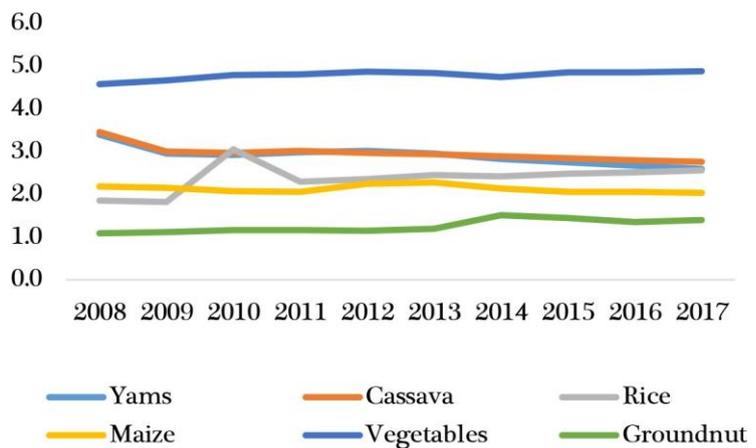


Figure 4: Yield Trends (tons/ha) - Cote d'Ivoire

The GDP per capita increased by 27% between 2012 and 2015, and exports, especially in agriculture, have increased sharply. However, despite the overall growth of the economy and the agricultural sector, Côte d'Ivoire is marked by a high level of poverty. Despite a recent, slight upturn, over 56% of the rural population is still below the poverty line.



The country's farms can be grouped into three main types:

- Family farms. The most numerous, these farms produce food to meet household needs, with the surplus sold on local markets. The size of subsistence farms, for the majority, ranges between 0.5 and 1 ha and 0.5 ha to 15 ha for cash crops
- Urban and peri-urban farms. Small (less than 1 ha in size), these farms located in large urban centers (Abidjan, Yamoussoukro, Bouake) and peripherally
- "Modern" farms. While few in the food sector, these farms specialize on speculation responding to strong market demand or integrating into an activity string (corn for industrial breeders). This is essentially the agro-industrial complex, combining production and processing products. These farms use agricultural mechanization in the coastal part of the country in the sectors of rubber, oil palm, and tropical fruit export (banana, pineapple, etc.)

Breeding, Variety Development and Release

The National Centre for Agricultural Research (CNRA) is involved in testing and release of varieties, supply of pre-basic and basic seed to private entities, and gene bank maintenance. CNRA is working on 25 different crops but mostly on OPVs and primarily on cash crops, including cocoa and coffee. Since 1971, 250 varieties of rice have been developed but only 10-15 varieties have been released by the government. Soybean is viewed as a potential crop for smallholder farmers, but so far suitable soybean varieties have not been introduced. The average age of varieties sold in the market is 5-12 years.





Table 1: New Varieties of Different Crops of Interest in Cote d'Ivoire

Export crops		
No.	Designation	returns
1	<i>Cocoa</i>	3 tons / ha from 11 years
	11 hybrid resistant CSSV	
2	<i>Cashew</i>	1.5 - 3.0 tons / ha from 6 years
	3 genotypes	
3	<i>rainfed sugarcane</i>	55-59 tc / ha; 5.3 tse / ha
	3 varieties	
4	<i>Oil palm tree</i>	30 tons / ha; THR = 32%
	10 hybrid	
5	<i>Coffee</i>	2.5 - 3 tons / ha = 12 months early
	1 variety	
6	<i>cotton Plant</i>	4 tons / ha
	2 varieties	
7	<i>Coconut tree</i>	5 tons / ha of copra from 5 years
	1 hybrid	
TOTAL	31	
Food crops		
1	<i>Yam</i>	20-40 tons / ha
	3 varieties	
2	<i>Cassava</i>	30-35 tons / ha
	4 varieties	
3	<i>Sweet potato with colored flesh</i>	15-25 tons / ha
	3 varieties	
4	<i>Tomato</i>	9-35 tons / ha
	3 varieties	
5	<i>Chilli pepper</i>	15-18 tons / ha
	3 varieties	
6	<i>Eggplant</i>	20-50 tons / ha
	5 varieties	
7	<i>rainfed rice</i>	4 tons / ha
	4 varieties	
8	Irrigated rice	4 tons / ha
	4 varieties	
9	<i>Maize</i>	2.3 - 3 tons / ha
	4 varieties	
TOTAL	33	

Ninety percent of the cassava in Cote d'Ivoire is affected by cassava mosaic disease (CMD). There are 650 accessions of cassava in CNRA; 77 are disease free, but the country lacks research capacity to develop and release new varieties. There is a Root Tuber Banana food project funded by the Bill & Melinda Gates Foundation working on cassava and yam.

CNRA collaborates with IITA, AfricaRice, ICRISAT, and the World Vegetable Centre for conducting research on key staple crops (rice, maize) and millet. CNRA is currently working on short duration and water-efficient varieties for rice. Bayer Crop Science is conducting trials for



rice hybrids in northern parts of the country. Maize hybrids from SeedCo, Limagrain, and Advanta have been tested and show an average yield of about 3.5 to 4 tons per hectare compared to local varieties which yield 1 ton/ha. Vegetable crop seeds are mainly imported and sold by private companies. CNRA has two central laboratories with nearly 4,500 accessions across all crops stored in a germplasm bank.

Table2:Level of Adoption of Improved Varieties by Producers

Food crops	Level of adoption of improved varieties (%)
Rice	90
Maize	95
Cassava	75
Yam	40
Sorghum	20
Millet	20

CNRA consists of five regional offices in Abidjan, Korhogo, Man, Gagnoa, and Bouaké with 20 operational research units including 13 research stations. CNRA also has five stations for experimentation and production and three central laboratories (a) biotechnology laboratory at the CNRA Branch in Abidjan, (b) the laboratory of conservation and transformation in Bingerville and (c) soil laboratory in central Cote d'Ivoire. The universities also have research laboratories but are currently under-equipped.

Several researchers with Ph.D. and MSc-degrees have been recruited to contribute to the country's plant breeding and research capacity. Totalling 79 people, the scientific staff is focused on improving genetics for export crops and food crops. Côte d'Ivoire's agricultural research capacity has been improved considerably in recent years. Between 2012 and 2016, the country added nearly 80 agricultural researchers with Ph.D. degree to its work-force. Currently there are 30 crop breeders: rice (2), maize (2), cocoa (5), coffee (3), cotton (2), cassava (1), yam (1), vegetables (2), and palm oil (3), plus nine breeders involved in plantation crop breeding.

In addition to these researchers, the CNRA has also recruited 10 researchers in production programs focused on livestock, fisheries and inland aquaculture; 16 researchers for agrarian systems and management of natural resources; and 14 researchers for biotechnology and post-harvest technology. A special MS course is starting this year on seed production.



Proposed Interventions

- Introduce improved rice, maize, varieties/hybrids, soybean varieties and vegetable hybrids with focus on key traits, specifically blast resistance in rice that will be sourced through regional research programs. The aim would be to release 20-25 varieties/hybrids of key crops and vegetables in the country over a period of five years. Some of the key sources and yield gain potential for these crops include;
 - *Rice*: Improved rice varieties/hybrids can be introduced for high yield, blast and yellow mosaic virus resistance from major global seed companies, Mali, Niger and Africa Rice. Existing drought resistant varieties from Africa Rice will be promoted if their yield potential is adequate
 - *Maize*: Maize hybrids with the yield potential of 3-4 times over current productivity will be sourced from private companies, IITA and CIMMYT
 - Varieties of *Soybean* can be sourced from Ghana, IITA and Asian countries.
 - *Vegetables* – okra, eggplant and tomato hybrids can be introduced in collaboration with global private companies. These crops can be validated with the help of local private companies and commercialized.
- Capacity in the national institute for validating performance of traits and selection for key crops and vegetable hybrids will be strengthened.
- BILOHF, a local seed company, will be supported to access varieties from CNRA, AfricaRice and other countries for testing and late stage validation and commercialization.
- Capacity building for the current agricultural researchers for rice, soybean, and vegetable breeding.
- Development of human resources for soybean, groundnut, and vegetables by fellowships to eight MS students and one Ph.D student that will include exchange programs with universities in African countries like Ghana (WACCI), Uganda (Makerere University) and others.

Seed Systems

The supply of early-generation seeds (EGS) is done primarily by CNRA. AfricaRice also supplies EGS for rice to private companies and farmer producer organizations for production. The seed



regulation department of the Ministry of Agriculture has a provision for basic seeds supply by the private sector; however, none of the seed companies currently have the technical expertise to produce basic seeds, and CNRA lacks the capacity to produce enough early generation seed. Private seed companies and farmer organizations produced the bulk of the 8,000 MT seeds supplied in 2018.

Among the global seed companies present in the country, only Bayer, East West Seeds and Advanta have testing locations, but none have production and processing facilities. Other global seed companies like Technisem, Limagrain and SeedCo are engaged only in seed sales. SeedCo is currently selling maize hybrids through local partners. Advanta has plans to sell 800 tons of maize hybrids in the next five years and is currently selling 100 tons annually. Callivoire (Advanta) sold 500 kg hybrid rice from Bayer. Callivoire is the leader in maize hybrids followed by RMG (Syngenta and Bayer distributor). Technisem is the leader in vegetable seeds followed by GSN, a French company.

There are two levels of collaboration between the state and the private sector in seed supply:

- Since 2007, through the TCP project entitled “Support for the revitalization of the seed sector in Côte d’Ivoire”, funded by FAO, the state has set up 13 regional seed associations, which in 2009 were federated to create the National Association of Seed Producers of Cote d’Ivoire. This association aims to ensure good governance of the seed industry.
- The tenders for the supply of seeds: In the context of the implementation of projects and programs, the state launched a tender to private companies for the provision of seeds and other inputs.

The major supply of quality seeds (Figure 5) is through the government distribution system; however, farmers prefer using their own seeds as they often don’t receive the government seed supply on time for sowing season and it is expensive. AN- DERIZ (public entity) is responsible for rice seed production by partnering with private seed producers.

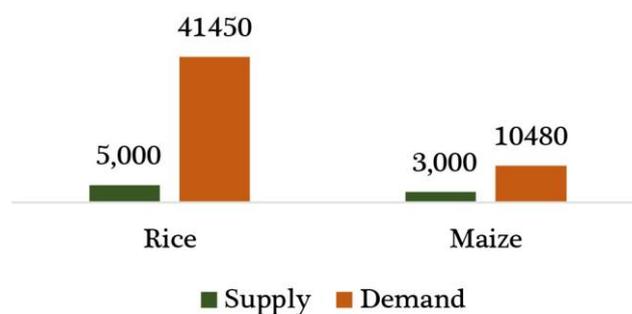


Figure 5: Seed Supply Demand Gap (MT) -Cote d'Ivoire



BILOHF is the only private seed company in Côte d'Ivoire with a national recognition. As with other national seed companies and seed producing cooperatives, it does not have its own breeding activities but works with the CNRA to test and select new varieties. The production and use of improved plant varieties are permanent concerns of the ministries in charge of agricultural development.

The agricultural sector uses domestic varieties created by the National Agricultural Research System (NARS), but also benefits from varieties introduced from abroad, including from CG centers. Only standard seed of vegetables are imported in large quantities. The quantity of imported cereal seed of the neighboring countries is negligible.

Access by private seed companies to basic seed: Agricultural research in Côte d'Ivoire is essentially entrusted to CNRA. Research results are automatically entered in the public domain. Access to basic seed is made on request by the interested company. There are two levels of collaboration for the supply of basic seeds produced by the CNRA to organizations involved in seed production. (A) The annual agreements with the seed sector such as coffee and cocoa, cashew, palm, etc. In this case, these sectors sign agreements specifying the estimated required quantities of basic seeds. (B) The second type of collaboration is established between the CNRA and projects that demand for production of pre basic seed according to their need. Sales are executed based on the availability of seeds at the CNRA.

BILOHF currently produces 200 MT of seed annually and can increase to 800-1000 MT with capacity and infrastructure enhancement. There are six other national seed companies with annual production of 50-100 MT each through seed cooperatives and seed growers. Seed multiplication and production is done by farmer cooperatives and groups of farmers contracted by private seed companies and government. However, this capacity is not enough to meet the seed demand of the country. Private companies can be funded to increase seed production capacities and develop capabilities for hybrid seed production of key crops and selected vegetable crops.





Table 3: Companies and Individual Producers Involved in the Production of Certified Seed

No.	Seed companies	Crops concerned	Average bid annual
1	CNRA	Cereals : Rice, Corn, Soybean, Vegetable crops : Tomato, Okra, Eggplant, Pepper, tubers : Yam, Cassava, cash crops : Cocoa, coffee, oil palm, rubber tree, Cotton, etc.	This is seed production of first generation (pre-basic and basic): 50 tons / year
2	BFGD	Cereals : Rice, Corn, Wheat, Cowpea, Groundnut Vegetable crops : Onion, Tomato, Eggplant, pepper, okra, shallots, etc.	
3	SPV - CI	Cereals : RICE, CORN Vegetable crops : Chilli pepper ; okra; Eggplant plantain : Plantain	Rice : 100 to 200 tons / year Plantain : 38,000 vitroplants cocoa : 20,000 seedlings
4	FARM SERVICES	Cereals : Rice, maize, cowpea, millet, groundnuts Vegetable crops : Tomato, pepper, eggplant, okra, cucumber, zucchini, squash, cabbage, celery, bell pepper, onion, watermelon, melon, lettuce, basil, nightshade,	On average, 200 tons per year
5	Callivoire	<i>Vegetable crops</i>	2-3 tons of vegetable seeds
6	BILHOF	Cereals : rice; But ; Soy ; tubers : Cassava Vegetable crops : Tomato, Pepper; Pepper ; Lettuce	Rice: 195 tons Corn: 200Tons Cassava: 20,000 cuttings of cassava variety bocou 1
7	SEMIVOIRE	Cereal crops and vegetables : rice, corn, okra; bean; paris blonde lettuce; parsley; pepper; chilli pepper ; tomato;	Between 02 and 03 tons of vegetable seeds
8	GSN CI Seeds	Vegetable crops : Tomato, Onion, Pepper, African eggplant, carrot, pepper, okra, turf	12 to 15 tons of seeds per year.
9	APROSEC	Cereals : Rice, Corn;	Rice : 45 tons Maize : 22 tons
10	ORIZA	Cereals : rice; maize	Rice : 32 tons / year Maize : 12 tons / year
11	SIPRODIS	Rice	20-35 tons / year
<i>Some individual producers</i>			
1	Marcel YAO Kouakou	Rice	10 to 15 tons
2	Abdoulaye Bamba	Rice	5-10 tons
3	Bernard Kouakou	But	5-10 tons
4	KOUMOUE HENRI	Rice	5- 10 tons



Table 4: List of Agricultural Cooperatives Involved in Seed Production

No.	Cooperatives	Location	Crops	Contacts	
				PCA	Manager / President
1	WOMIENGNON	Korhogo	Rice, Corn	KELEMORY	Soro TAMIGUE May 22 52 43
2	CHONGAGNIGUI	Korhogo	Rice, Maize, Vegetables	YEO Naminata 45 December 14 67	YEO FANTA Tiawa 06 37 84 76
3	KONIFAK	Kagbolodougou	Rice, Corn	S / C CHONGAGNINI	
4	Chigata	Napié	Vegetables		
5	KATANAN	Natio	Vegetables		
6	BINKELEMAN	Dopiankaha	Vegetables		
7	WEWEDJO	Nahoualakaha	Vegetable		
8	COORIA	Aboukro	Rice, corn	Kangah Kouassi 49 09 37 89	KANGA Koffi SERAPHIN 47072096
9	Coproriz	Nanan	Rice	Beugré Albernanty 07828811 55280344	N'Dah Konan Clément 58487396
10	AGREEMENT	Nanan	Rice, Corn,	Yao Kouakou Marcel 05424069 09436129	Kouame Kouakou Frejus 77847799
11	CORIBKSY	Subiakro	irrigated rice	President: Konan Kacou Theodore 08022214	
12	UNION COOPERATIVE of the food WEST MOUNTAIN	Man	Rice, Corn, Cassava	President: Zodi Simone (57 54 35 47)	
13	CODERIZ ZOUEUSSEU	Biankouman	Rice	President: Bamba Sahi August 36 40 38	
14	SCOOPS Adoke	Man	Rice	President: Bamba KANVALY (49 65 56 33)	
15	SCOOPS SINIKOSSON	Facobly	Rice	President: BELEM (87 67 55 68)	
16	SCOOPS KOUAKOUNGBE	Sipilou	Rice	President: LOHI Sadia (08 99 30 49)	

Private sector participation is very low in the case of rice, whereas it is increasing in maize due to the introduction of hybrids. Vegetable seeds are in the hands of private sector. Currently, there is only one vegetable seed processing facility (LANADER) in Côte d'Ivoire with a capacity of around 3-5 tons/day. The Islamic Development Bank has plans to build six public seed processing centers. RMG started a seed processing center and local production this year in collaboration with BILOHF.

Approximately 30 agro-dealers are active across different regions of the country, mostly selling pesticides and fertilizers. These ago-dealers are insufficient for seed dissemination services. Major global companies (Advanta, Technisem) own dealer shops in Abidjan.



Policy Advocacy

Recently, a model has emerged which focuses on capacity building of local seed entrepreneurs. The model incorporates private input dealers and village-based and national public crop breeders to work in a complementary manner to provide new varieties of certified seed grown by national and international institutes selection for local smallholders. The establishment of these supply systems in public-private seed increased supply and helped increase average yields of major food crops in a number of African countries.

There are two coordination service officers, five seed inspectors, 38 seed controllers, and six laboratory technicians.

Côte d' Ivoire has many strengths:

- Favorable natural conditions (climate, rainfall, etc.) that enable the production of several plant species;
- Government initiatives for agricultural development and improved food and nutritional security;
- The existence of an institutional framework;
- The existence of capacity and resources (human and material) at some institutions (CNRA, ONDR, ANADER);
- Projects supported by development partners to ensure availability of quality seeds

These assets represent enormous opportunities to create an improved seed system in Côte d'Ivoire.

Proposed Interventions

- Provide seed grant funding to six private national companies (including BILOHF) to:
 - Increase the capacity of quality seed production with the aim to increase the quality seed production of existing varieties/hybrids and introduce new varieties/hybrids by 32%
 - Production of hybrid seeds and capacity development
 - Business management practices and vital information systems



- Technical skill improvement such as seed standards and quality and controlled storage especially for early generation seed
- Strengthen business entrepreneurship skills of 80 personnel through professional-training courses over a period of 5 years.
- Support to CNRA for accelerating the testing and release of new varieties of major food crops and EGS seed production through infrastructure development
- Strengthening of seed processing infrastructure to install additional capacity of 3-4 tons/day in the country at private sector premises
- Training for varieties/hybrid seed production technology in field crops/vegetables and nursery/ clonal production technology in vegetatively propagated crops
- Agro-dealer development
 - Provide matching grants to 750 agro-dealers 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 the 750 agro-dealers will be trained on these modules over a period of 5 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 150 extension professionals over a period of 5 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 80 seed inspectors on proper seed quality assessment and seed certification aspects.

Facilitate an increase to 5,913 tons of quality seed of key crops covering an area of 12% under quality seeds (Figure 6) at the end of five-year period, and 16,719 tons covering 34% area at the end of 10 years.

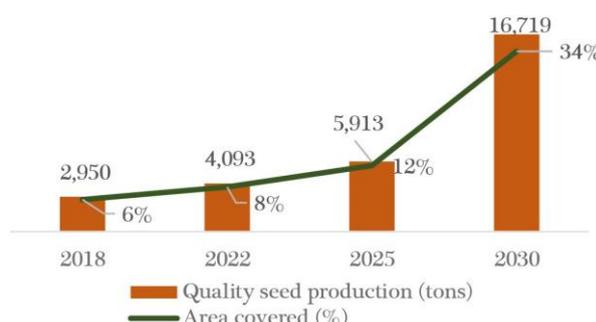


Figure 6: Projected Seed Quantity (MT) - Cote d'Ivoire

Budget

Table 5: Cote d'Ivoire 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	0.10	0.00	0.00	0.48
Early generation seed production	0.06	0.09	0.00	0.00	0.00	0.15
MSc fellowships	0.11	0.18	0.00	0.00	0.00	0.28
PhD fellowships	0.15	0.00	0.00	0.00	0.00	0.15
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	0.13	0.25	0.08	0.00	0.00	0.50
Professional trainings	0.05	0.06	0.05	0.00	0.00	0.15
Component 3: Agro-dealer Development						
Grants to agro-dealer development agencies	0.15	0.53	0.45	0.00	0.00	1.13
Capacity Development (Book keeping, information dissemination, inventory management etc.)	0.02	0.02	0.02	0.00	0.00	0.05
Component 4: Seed extension						
Grants to NGOs for demos, small packs, etc.	0.53	0.53	0.00	0.00	0.00	1.05
ICT, infrastructure and training support	0.20	0.00	0.00	0.00	0.00	0.20
Professional trainings	0.05	0.06	0.05	0.00	0.00	0.15
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	1.92	2.25	0.95	0.15	0.00	5.27