

BENIN

Potentials and Possibilities for German Collaboration in Agriculture



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1 General background information of the agricultural and food sectors

The Republic of Benin is a coastal country in West Africa. With a stretched-out form in latitude, Benin covers a surface area of 114,763 square kilometers, limited in the South by the Atlantic Ocean, in the West by Togo, in the North by Burkina Faso and Niger and in the East by the Federal Republic of Nigeria (EDSB3, 2006). In 2014, the population of Benin was 10,599,510 inhabitants of which 51.5% were females (<http://data.worldbank.org/country>). The average annual growth rate of Benin is 3.25%, and 61.15% of the population live in rural areas (INSAE, 2013).

Benin's economy is mainly based on agriculture. According to the MAEP (2015), the agricultural sector in Benin contributes on average 32.7% to the GDP, 75% to the export earnings, 15% to government revenues and it generates employment for about 70% of the people. The agricultural production sector is characterized by the predominance of smallholder farming, which is vulnerable to climate change and extreme climate events. After a growth decrease recorded in 2010, there has been an increase in the growth of agricultural GDP from 1.5% in 2010 to 6.5% in 2014. The revenues and productivity factors are low and the labor force is only partially valued; a situation that makes agricultural products less competitive. Most farm operators use insufficient fertilizers and undertake mining activities, thus increasing the degradation of natural resources.

In Benin, there are opportunities to boost agricultural growth and thereby economic growth, with positive spillovers on food security. To do this, agricultural policy promotes several actions, including improving soil management and natural resources, improving access to markets and capturing new markets, implementation of institutional reforms, improving investments and coordinating research, and transfer of agricultural innovations. All these initiatives are recorded in the Strategic Plan to Boost the Agricultural Sector (PSRSA 2011-2015) that is perfectly in line with the Pan-African and international agricultural development instruments.

There is a huge cooperation potential between Germany and Benin for agricultural growth and development. It includes agricultural research partnerships for the technology generation, and the implementation of systems and means to transfer and add value to the innovations for the benefit of agricultural producers and sustainable development.

1.1 Pan-African policies and strategies

Benin is among the first countries that have signed the Comprehensive Africa Agriculture Development Program (CAADP). This Pan-African Program developed by the Commission of the African Union under the New Partnership for Africa Development (NEPAD) follows the Maputo declaration in 2003 and is the commitment of African countries to allocate at least 10% of their budget to agriculture in a global vision to induce an annual growth of 6% of the sector. As far as Benin is concerned:

- It has failed to allocate at least 10% of its expenditures to the agricultural sector in all years since 2005;
- Between 2003 and 2014 Benin surpassed the 6% growth target only in 2008 and 2014.

Benin is one of the West African countries that have adopted the agricultural policy of the Economic Community of West African States (ECOWAS) in 2005, to ensure food security, economic and social development and poverty reduction in the region. The country joined

the New Alliance for Food and Nutritional Security in 2013, with the commitment to ensure an inclusive and sustainable agricultural growth in the country. To this end, actions and policies should be directed towards improving business environment, land ownership, nutrition, gender, institutional reforms, resilience and risk management, trade and access to product markets.

Benin is also member of the Grow Africa Partnership. This is a multi-stakeholder platform whose goal is to accelerate investments in the agricultural private sector of the 12 member States. In 2013, an investment of US\$ 30 million was achieved, 13,430 households were reached and 326 jobs created in Benin by national and international companies through the Grow Partnership and the New Alliance for Food Security and Nutrition Initiatives.

1.2 National (and regional) policies and strategies

a. Strategic Development Orientations (SDO)

The strategic development orientations (SDO) document of Benin, elaborated to serve as a compass for the regime change over the period 2006-2011, identifies two major objectives (i) to develop growth hubs and (ii) to reduce poverty and improve life quality. The SDOs of Benin plan to promote an economic renewal by putting in place an institutional environment with international standard and production diversification, particularly in the rural areas. In the agricultural sector, the objective of the SDO is to make Benin a modern, dynamic, competitive and wealth creating agricultural country through the following actions:

- Mechanization adapted to the different agro-ecologic conditions;
- Water control;
- Promoting research and improved seeds;
- The development of, and providing information on, improved storage/conservation technologies and processing of plant, animal, fisheries and forest products;
- Exempting agricultural inputs and materials from customs duties;
- The creation of regional agricultural product markets;
- Strengthening the capacities of producers and supervisory structures;
- Funding agriculture through the creation of a Nation Agricultural Development Fund (FNDA), working out a code for agricultural investment and the creation of an agricultural bank.

b. Strategic Plan to Boost the Agricultural Sector (PSRSA 2011-2015)

In 2008, Benin adopted a strategy for agricultural diversification and development, which is known as the Strategic Plan to Boost the Agricultural Sector (PSRSA). The vision of PSRSA is to make “Benin a powerful dynamic agricultural powerhouse by the year 2015, competitive, environmentally safe, creating wealth and meeting the needs of economic and social development of the population”.

The global diagnosis of the agricultural sector carried as part of the PSRSA development process reveals that Benin agriculture has to meet three major challenges. These are:

- Meeting food and nutritional needs of the population: the agricultural sector should meet the increasing food and nutritional needs of the populations (13 million inhabitants by 2015);
- Improving the productivity and competitiveness of the agricultural and rural sector in order to ensure the increase in the revenues of agricultural producers, meeting

- nonfood needs (health care, education and others), as well as the contribution of the sector to the national economic growth;
- Improving the attractiveness of the agricultural activity and the rural area by creating the necessary conditions in the different agro-ecologic zones of Benin, thus making agriculture attractive, improving employment and livelihood conditions in the rural area and stabilizing dynamic forces, namely youths and women.

PSRSA's global objective is to "improve the performance of Benin's agriculture to enable it to ensure sustainable food sovereignty of the population and to contribute to the economic and social development of Benin, achieving the Millennium Development Goals (MDGs) and poverty reduction".

From an operational point of view, nine items have been identified as action areas for the implementation of the PSRSA. These are:

- Strengthening the availability and accessibility of quality seeds;
- Strengthening the accessibility of inputs;
- Adapted and accessible agricultural mechanization activities;
- Putting in place adapted and accessible funding;
- Facilitating access to markets;
- Improving access to professional knowledge and technological innovations;
- Development and operationalization of agricultural schemes;
- Securing and managing access to lands;
- Professionalization of family farms and promotion of vast cultivation and agricultural entrepreneurship.

c. National long-term vision "Benin Alafia 2025"

The document of the national long-term vision "Benin Alafia 2025" highlights eight strategic orientations from which the strategic options are derived that are operationalized through strategic lines. The agricultural sector, agricultural research, the development and dissemination of innovations appear at several levels. Agricultural development strategies are on the first line of the six options envisaged to build a strong and sustainable economy. They advocate "a better regional specialization in the diversification of agricultural production". These strategies envision to transform "Benin into a big agricultural product exporter" by 2025. The key strategies to reach this vision include:

- Strengthening poverty control in a secured environment;
- Promoting a country development that ensures regional development and a rational environmental management;
- Promotion of a culture and environment favorable to technological development;
- Strengthening human and material bases of the economy that aims at building by 2025, a prosperous and competitive economy.

1.3 Data on food and nutrition security

According to the statistics of the World Bank (<http://data.worldbank.org/country>) in 2011, 52% of Benin's population spent less than US\$ 1.25 per day. In Benin, poverty is higher in the rural areas than in the urban areas with an increase in the inequalities between men and women. In 2011, the rural population living on the poverty threshold was 40% of the national population. Table 1 summarizes the main information on the economic and social situation in Benin, while Table 2 presents the contribution of agriculture to Benin's GDP.

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Table 1: Selected national economic and social data

Indicator	Data	Year
Basic facts about agriculture sector		
Population, total	10,599,510	2014
Population growth (annual %)	2.6	2014
Rural population (% of total population)	56	2014
Socio economic and poverty		
GDP per capita, PPP (constant 2011 international \$)	1,779	2014
GNI per capita, PPP (constant 2011 international \$)	1,767	2014
Poverty headcount ratio at \$ 2 a day (PPP) (% of population)	74	2011
Poverty headcount ratio at \$ 1.25 a day (PPP) (% of population)	52	2011
Poverty headcount ratio at national poverty lines (% of population)	36	2011
Rural poverty headcount ratio at national poverty lines (% of rural population)	40	2011
Ratio of female to male secondary enrollment (%)	66	2013
Mortality rate, under-5 (per 1,000 live births)	85	2013
Malnutrition prevalence, weight for age (% of children under 5)	20	2006
Malnutrition prevalence, height for age (% of children under 5)	45	2006
Maternal mortality ratio (modeled estimate, per 100,000 live births)	340	2013
Agriculture and Rural area		
Agricultural land (% of land area)	33	2012
Agricultural irrigated land (% of total agricultural land)	no data	
Agriculture value added per worker (constant 2005 US\$)	1,278	2015
Agriculture, value added (% of GDP)	36	2014
Access to electricity, rural (% of rural population)	15	2012
Employees, agriculture, female (% of female employment)	33	2003
Employees, agriculture, male (% of male employment)	53	2003
Employment in agriculture (% of total employment)	43	2003
Literacy rate, adult total (% of people ages 15 and above)	29	2006

Source: World Bank, <http://data.worldbank.org/country>

Table 2: Overall agricultural growth

Years	Contribution of agriculture to GDP (%)	Agriculture GDP (billion XOF)
1995	22.7	358.4
1996	25.0	431.3
1997	25.2	437.7
2005	37.5	370.0
2006	38.2	390.2
2007	31.3	406.7
2008	32.3	421.2
2009	32.4	431.9
2010	32.4	438.0
2011	32.8	455.0

Source: National Accounts Service, Benin (2015)

1.4 Data on most relevant crops and value chains

1.4.1 Production

Table 3 presents the top 10 crops produced in Benin, taking into account the cultivated area, the volume produced and the sales value.

Table 3: Top 10 crops produced by area, volume and value

Area harvested (ha)		Production volume (tons)		Production value*	
Top 10	Share of total	Top 10	Share of total	Top 10	Share of total
Maize	30.5	Cassava	32.9	no data	
Cashew nuts, with shell	15.8	Yams	26.8		
Seed cotton	9.9	Maize	11.4		
Cassava	8.2	Oil, palm fruit	4.8		
Yams	6.6	Pineapples	3.0		
Groundnuts, with shell	4.8	Seed cotton	2.5		
Coconuts	4.2	Tomatoes	2.3		
Sorghum	3.7	Rice, paddy	2.0		
Beans, dry	3.6	Cashew nuts, with shell	1.6		
Rice, paddy	2.1	Cottonseed	1.5		
Rank 18: Soybeans	0.6	Rank 29: Soybeans	0.1		

* Gross Production Value (constant 2004-2006 million US\$)

Note: AIC value chains are marked in red nes refers to Not elsewhere specified

Data: average 2011-2013, FAOStat, accessed 9 July 2014

1.4.2 Consumption and nutrition status

Table 4: Food supply by tons, kg per capita and kcal per capita

Food supply quantity (tons)		Food supply quantity (kg/capita/year)		Food supply (kcal/capita/day)	
Top 10	% of total	Top 10	Kg	Top 10	Kcal
Yams	21	Starchy Roots	278	Vegetal Products	2465
Cassava and products	18	Yams	146	Cereals - Excluding Beer	1055
Rice (Paddy Equivalent)	11	Cassava and products	126	Roots & Tuber Dry Equiv	788
Roots & Tuber Dry Equiv	10	Cereals - Excluding Beer	118	Starchy Roots	788
Rice (Milled Equivalent)	8	Rice (Paddy Equivalent)	80	Rice (Milled Equivalent)	530
Maize and products	6	Roots & Tuber Dry Equiv	73	Rice (Paddy Equivalent)	530
Pineapples and products	3	Rice (Milled Equivalent)	53	Yams	400
Tomatoes and products	3	Maize and products	43	Cassava and products	371
Fruits, Other	2	Fruits - Excluding Wine	42	Maize and products	355
Vegetables, Other	2	Vegetables	38	Vegetable Oils	175

Note: AIC value chains are marked in red

Data: Average 2009-2011, FAOStat, accessed 10 July 2015

1.4.3 Trade

Table 5: Benin's imports

Import volume (tons)		Import value (US\$)	
Top 10	Share of Total	Top 10	Share of Total
Rice – total (Rice milled equiv.)	53.8	Rice – total (Rice milled equiv.)	33.1
Oil, palm	14.4	Oil, palm	15.4
Meat, chicken	6.4	Meat, chicken	14.6
Sugar refined	4.8	Meat, turkey	8.5
Meat, turkey	3.1	Sugar refined	4.5
Flour, wheat	2.8	Food prep nes	2.6
Apples	1.5	Flour, wheat	1.9
Macaroni	1.4	Apples	1.9
Wheat	1.2	Macaroni	1.2
Oil, groundnut	1.1	Sugar confectionery	1.2
Cake, soybeans	0.1	Cake, soybeans	0.0

Data: average 2010-2012, FAOStat, accessed 31 August 2015

Note: nes refers to Not elsewhere specified

Table 6: Benin's exports

Export volume (tons)		Export value (US\$)	
Top 10	Share of Total	Top 10	Share of Total
Rice – total (Rice milled equiv.)	27.7	Oil, palm	35.1
Oil, palm	25.9	Cotton lint	24.9
Cashew nuts, with shell	17.1	Cashew nuts, with shell	19.9
Cotton lint	9.8	Rice – total (Rice milled equiv.)	5.6
Sugar refined	4.6	Meat, chicken	4.4
Maize	2.8	Sugar refined	2.5
Cake, cottonseed	2.2	Meat, turkey	1.3
Meat, chicken	2.1	Maize	1.1
Food wastes	1.6	Sugar Raw Centrifugal	0.8
Sugar Raw Centrifugal	1.0	Oil, palm kernel	0.7
Cake, soybeans	0.7	Cake, soybeans	0.4
Oil, soybean	0.0	Oil, soybean	0.1
Soybeans	0.0	Soybeans	0.0

Data: average 2010-2012, FAOStat, accessed 31 August 2015

Note: nes refers to Not elsewhere specified

Rice is the most important import and export product in Benin. It accounts for more than half of the import volume and over 30% of the import value. The import of chicken meat accounts for 6.4% of the import volume and 14.6% of the import value. In export trade, chicken meat plays a less important role and accounts for 2.1% of the export volume and 4.4% of the export value. Goods that are based on soya play a negligible role in Benin's trade.

1.5 National (and regional) innovation system

1.5.1 Research system and organizations

Benin, like the countries in the sub-region, has a National Agricultural Research System (NARS) that ensures the development of technologies. The rules and regulations of the NARS were developed in a General Assembly in April 2004. It is coordinated by the National Institute of Agricultural Research of Benin (INRAB). The implementation policy and strategies of agricultural research are initiated and coordinated by INRAB, a public scientific and technical structure with financial autonomy. The NARS is composed of the agricultural research centers of INRAB, universities, private laboratories and research-based NGOs. The components of the NARS exploit the facilities of INRAB throughout the national territory and through covering the different agro-ecological zones. Activities carried out in international research centers that are based in Benin are also taken into account in the coordination of scientific knowledge and technological innovations developed.

The generation of agricultural technologies supported by the program "Support to Agricultural Research" is done through protocols that deal with varied crops and domains. However, the accompanying mechanisms and measures to ensure the adoption of the developed technological innovations in the farmers' fields are one of the weaknesses of the system. The NARS does not have consolidated financial resources for its functioning and agricultural research still remains largely dependent on external funding.

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Table 7: Major actors of the agricultural research system in Benin

Type	Organization	Research Focus
International		
Agency	The United Nations Food and Agriculture Organization (FAO)	Agricultural Research
	International Development Agency (IDA)	
	French Agency for Development (AFD)	
Institute	Centre de coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)	Crops, livestock, food and energy security, public policy
	International Institute of Tropical Agriculture (IITA)	Crops
	Biodiversity International	Agricultural and tree biodiversity
	AfricaRice	Rice
Regional		
Organi- zation	Forum for Agricultural Research in Africa (FARA)	Agricultural Research
	Africa Rice Center	Agricultural Research
	West African Economic and Monetary Union (WAEMU)	Agricultural Research
	West and Central Council for Agricultural Research And Development (WECARD)	Agricultural Research
	West Africa Agricultural Productivity Program (WAAP)	Agricultural Research
National		
Govern- ment	Institut National des Recherches Agricoles du Bénin (INRAB)	Crops, livestock, off-farm post-harvest, natural resources, socioeconomics
	Beninese Center for Scientific and technic research (CBRST)	Scientific and technic research
Higher Education	Faculté des Sciences Agronomiques (FSA), Université d'Abomey-Calavi (UAC)	Pastures and forages, forestry, off-farm post-harvest, fisheries, agricultural engineering, natural resources, socioeconomics
	Laboratoire d'Étude des Climats, des Ressources en Eau et de la Dynamique des Écosystèmes (LECREDE), UAC	Natural resources, climate change
	Laboratoire de Génétique et des Biotechnologies (LGB), UAC	Crops
	Faculté d'Agronomie (FA), Université de Parakou (UP),	Crops, forestry, pastures and forages, off-farm post-harvest, socioeconomics.
	École Polytechnique d'Abomey-Calavi (EPAC), UAC	Livestock, pastures and forages, fisheries
	Laboratoire de Biologie et de Typage Moléculaire en Microbiologie (LBTMM)	Crops
	Ecole Nationale Supérieure des Sciences et Techniques Agronomiques de Kétou (ENSTA), ENSTCTPA-Sakété, UKA	Crops, forestry, livestock, off-farm post-harvest, pastures and forages, fisheries, natural resources, agricultural engineering, socioeconomics.
NGO	Réseau de Développement d'Agriculture Durable (REDAD)	Crops
	Groupe d'Action et de Recherche pour le Développement Communautaire (GARDEC)	Livestock, pastures and forages, off-farm post-harvest
	Centre Béninois pour l'Environnement et le Développement Economique et Social (CEBEDES)	Socioeconomics, natural resources
	Groupe de Recherche et d'Action pour l'Auto-Promotion rurale (GRAAP)	Socioeconomics

Data source: Zofoun *et al.*, 2014

1.5.2 Innovation Platforms

In Benin, multi-stakeholder platforms (MSPs) are being used to manage research and innovation transfer in the agricultural sector. The positive effects of MSPs in Benin include the adoption of new rice varieties, production techniques, and better access to inputs and market opportunities (Dalohoun *et al.*, 2010).

Several innovation platforms have been initiated, and some of these platforms are presented below:

- A Varietal Innovation Platform (VIP) has been put in place as part of the “Participatory Varietal Evaluation of Plantains” project. Two VIPs have been created in the big plantain producing zones in Benin (Tori-Bossito and Zè). These VIPs involve research organizations (INRAB) and extension (CeRPA), producers’ organizations, producers, processors, etc. and one development NGO;
- The National Platform for Innovation in the Agricultural Sector in Benin (PNISA) aims at achieving the vision of the agricultural sector and contributing to poverty reduction through a synergy of competences of innovation actors in the agricultural sector. PNISA brings together all entities of the public and private sectors operating in the agricultural and agro-industrial fields in Benin. Various actions have been undertaken, the most important being the facilitation of multi-actors project development in the rice and pig sectors;
- In the implementation of the Convergence of Sciences (CoS) programme, Multi Stakeholder Platforms (MSP) have been used in participatory knowledge building in order to better manage the proliferation of two dreadful weed species in Damè-Wogon (Commune of Bonou) and Somè (Commune of Za-Kpota). MSPs are composed of producers, extension agents, scientists, NGOs and local decision-makers. The programme has built synergy between several disciplines (social and biological sciences) and between modern and traditional sciences. It has also contributed to building producers’ capacities (human capital) in seeking solutions to agricultural problems and the organizational capacity of producers (social capital);
- Farmer Field Fora (FFF) is a capacity building mechanism that supports decision making based on the agro-ecosystem analysis (AES). The ultimate goal being to develop sustainable exchange platforms between producers, scientists and extension agents. The development of the FFF under the cowpea project for Africa at IITA (PRONAF-IITA) made it possible to enhance integrated management, agro-ecosystem-based decision making by producers, the spontaneous networking of trained producers, the effectiveness of producer to producer training, the promotion of endogenous innovations and the replication of acquired knowledge to other crops by producers;
- As part of the implementation of the lowland agricultural identification project, two MSPs were established in two villages. The MSPs were composed of internal actors (direct users of lowlands; producers, consumers), external actors (research and support structures including INRAB, IITA, CIRAD, ICRA, FSA, AfricaRice, CeRPA, PROTOS, GRADID, etc.) and local and religious authorities. The establishment of these platforms has allowed actors to have an exchange framework for the cultivation of lowlands and to participate fully in research and development activities. The success observed in these villages has aroused interest in the adoption of the MSP approach in the other villages;

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- In the implementation of the research project “Realizing the agricultural potential of the inland valley systems while maintaining their environmental services in sub-Saharan Africa (RAP)”, capacity building multi-stakeholder platforms were used to ensure coherence of activities and linkages between the components in Agbédranffo / Vovokanmey (Dogbo) in Houinga-Houégbé (Houéyogbé). These MSPs were composed of land owners, agricultural producers, animal breeders, fish farmers, traders, processors, transporters; processors, NGOs, Town councils; research (INRAB); and extension. This approach has had convincing results in terms of sustainable lowland value addition;
- The Syprobio project is also using innovation platforms to test innovations in cotton producing systems in Benin. The innovation platforms have helped producers to gain confidence in personal organization process as well as in research.

1.5.3 Extension system and organizations

In Benin, technology and innovation transfer is ensured by the National Agricultural and Extension System (NARES). The NARES was created in 1992 with the advent of the Project to Restructure Agricultural Services (PRSA). It is composed of private and public extension structures, agricultural professional organizations and agricultural research. The functions of the NARES, defined in administrative acts, include the identification of producers’ concerns, the search for solutions (to take into account existing innovations or encourage research activities on constraints that are not yet covered) and technology transfer.

The following organizations and universities provide extension services in Benin.

- Ministry of Agriculture, Animal Husbandry and Fisheries (MAEP):
 - Department of Agricultural Council and Operational Training (DICAF);
 - Central Region for Agricultural Promotion (CePRA);
 - Regional Action Center for Rural Development (CARDER).
- Public Research and Extension Institutions:
 - National Institute of Agricultural Research of Benin (INRAB);
 - Agricultural Research and Training Center.
- University Extension Services:
 - Faculty of Agronomic Sciences (FSA), University of Abomey-Calavi (UAC);
 - Faculty of Agronomy of the University of Parakou (UP).

Private extension service provision is not common.

1.5.4 Private R&D activities

In Benin, very few development research activities are carried out by the private sector. However, private operators who supply inputs and gin cotton are key actors in the innovation processes. Their active involvements in the generation and dissemination of innovations has improved the types of public/private partnerships promoted by the PSRSA and all other agricultural development strategic documents. Through the “Grow Africa Partnership”, several private actors are now investing in the agricultural sector in Benin. Among these private companies include Nad & Co Industry, Orabank, Pepite d'Or, Royal Fish, Société des Huileries de Bohicon (SHB) (ICA Group), Sotracom, etc.

1.6 Key challenges, emerging needs and potentials in the agricultural sector

The challenges in Benin's agricultural sector include:

- Degradation of land and water resources;
- Land insecurity mainly in the South of the country;
- Degradation of roads;
- Very low involvement of smallholder farmers in the decision making process;
- Volatility of international prices of key agricultural products such as cotton and palm oil;
- Competition (in quality and price) of imported products such as Asian rice with local products;
- Rapid deforestation and desertification;
- Climate change and aggravation of technical constraints in the production systems through the modification of rainfall regimes and the weak capacity of family farmers;
- Limited access to rural credits for the implementation of production activities;
- Malnutrition and lack of infrastructures (transport, storage, processing, etc.);
- Low funding of research and transfer of agricultural innovations.

Based on the general approach (see Africa-wide study Chapter 4) and in pursuit of efficiency and effectiveness, investment by Germany into the agricultural and food sector are suggested in those African countries, which:

- Show actual progress in sustainable agricultural productivity driven by related innovations, as indicated by comprehensive productivity measurement and innovation actions on the ground;
- Have a track record of political commitment to foster sustainable agricultural growth, as indicated by performance under CAADP; and
- Prioritize actions for hunger and malnutrition reduction and show progress, but where agricultural and rural development and nutrition interventions are likely to make a significant difference, as indicated by public policy and civil society actions.

Based on this approach, investment into the agricultural and food sector of Benin has a 47% success rate and can be expected to have relatively low effects on food and nutrition improvement in the country.

Results of assessment (Table 8):

Expected agricultural growth performance:

- Benin has increased its agricultural growth only for two years by more than the annual 6% agricultural growth target defined by CAADP, between 2005 and 2014 (www.resakss.org);
- However, Total factor productivity in Benin had improved by 11 percentage points between 2001 and 2008 (Fuglie and Rada, 2011).

Government commitment:

- Benin has a track record of political commitment to foster sustainable agricultural growth by being active in the CAADP process and having completed all the eight steps in the CAADP process (www.resakss.org);
- However, Benin had not shown any willingness to invest in agricultural sector. In no single year, the government has invested more than 10% of total government

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expenditures (CAADP target) in the agriculture between 2005 and 2014 (www.resakss.org);

- Benin had also spent only 0.5% of its agricultural GDP on agricultural research and development, which is much lower than the Sub-Saharan Africa average (www.asti.cgiar.org) and the AU target value of 1% spent on R&D. This indicates that Benin's investment on agricultural innovation is not yet sufficient.

Food and nutrition security progress and need:

- Benin is prioritizing actions for hunger and malnutrition reduction and shows more than 10 percentage point improvement in undernourishment between 2001 and 2011 (FAO, 2014);
- Still, Benin has the GHI score value of 11.2 reflecting a serious level of hunger (von Grebmer *et al.*, 2014)¹. This makes the investment into the agricultural and food sector in Benin justifiable to fight the high numbers of food insecure people;
- However, the overall economic, political, and social/nutrition framework in Benin does not seem to suggest accelerated investment into the agricultural and food sector of the country. Hence, it is questionable whether Benin should be a priority country for German investments.

Table 8: Country level Performance Indicators

Indicator	Index	Performance (%)
1. Number of Years with more than 6% agricultural growth (2005 to 2014)	2	20
2. Percentage point change in TFP index between 2001 and 2008	11	60
3. Number of years with more than 10% government expenditure (2005 to 2014)	0	0
4. Average share of agricultural GDP spent on R&D (2005 to 2011) in %	0.5	53
5. Steps in CAADP completed	8	100
6. Percentage point improvement in undernourishment between 2001 and 2011	11	100
7. Global hunger index (2014)	11.2	0
Total score (weighted)		47

Source: Own computation based on World Bank (2015), FAO (2015), ASTI database and von Grebmer *et al.* (2014)

Note: the % performance (rounded) is defined as follows for the respective indexes: 1. % out of 10 years; 2. classes: if <1, or negative= 0; 1 – 7= 30, 8-15= 60, > 15= 100; 3. % out of 10 years; 4. % of the AU target value of 1% spent on R&D; 5. % of the desired 8 steps; 6. classes: if < 2 = 0; if 3-5= 30; if 6-10=60, if>10=100; 7. classes: if < 12= 0; 12-16: = 60; 17-20: = 60; > 20= 100.

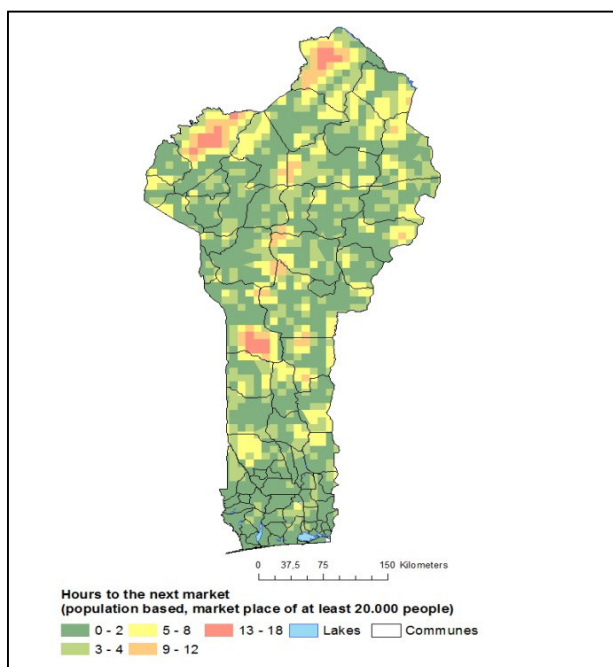
Total score (weighted) performance and need to invest: (sum of (1.+2.)/2 (expected growth performance); + sum of (3.+4.+5.)/3 (expected government commitment); + sum of (6.+7.)/2 (performance in food and nutrition security and need)) divided by 3.

¹ GHI score Values less than 5.0 reflect low hunger, values from 5.0 to 9.9 reflect “moderate” hunger, values from 10.0 to 19.9 indicate a “serious” level of hunger, values from 20.0 to 29.9 are “alarming,” and values of 30.0 or greater are “extremely alarming” (von Grebmer *et al.*, 2014).

Nonetheless, there are a number of potentials in Benin's agricultural sector, and these include:

- Benin has sufficient farm lands of which only 17% are currently cultivated;
- Benin has a potential of 322,000 ha of favorable land for rice production with only 33,294 ha currently in used;
- Existence of accompanying structures (projects and NGOs), for rice and other priority sector development;
- Existence of a tropical climate favorable to several crops that can be commercialized on national markets as well as on regional and international markets;
- Emergence of several qualified pioneers who can increase the level of agricultural production and become examples for the others, particularly the youth;
- Increase in food demand in the national market;
- The government is willing to modernize agriculture through the development of several inland valleys and the implementation of several supporting programs and projects;
- Existence of a National Agricultural Research System.

Figure 1: Distance to market



Data sources: Hours to next market - HarvestChoice, 2015;

Administrative areas: <http://www.gadm.org/>, accessed 20.9.2015

Inland water bodies: <http://www.diva-gis.org/gData> (water bodies), accessed 20.9.2015

Transport intensive products should be promoted in areas that are well connected to markets, whereas the remote areas should focus on low volume and livestock value chain segments.

2 Most relevant value chains in the country

2.1 AIC- value chains

2.1.1 Rice value chain

Rice is a significant food item in Benin (15-20 kg of milled rice per capita per year). Benin has an important potential for rice promotion in terms of irrigable lands, ground and surface water resources, and proven technologies developed by research. Through its national rice development strategy, Benin plans to achieve a production of at least 385,000 tons per year to meet the needs of the population and export the surplus by the year 2018. However, there are huge constraints that limit the development of the rice sector. Among the constraints include biotic and abiotic stresses, lack of adapted credits, lack of adapted working materials and equipment, and lack of specific quality inputs.

On the market, local rice faces a number of constraints, such as the non-availability of the product throughout the year and the less attractive quality-price ratio. Also, the average quality of rice produced locally is very poor (often 30 to 35% of broken rice). To achieve better performance and make the rice sector competitive, the country needs to: (i) adopt rice varieties that are better adapted to local conditions, (ii) facilitate access to good quality inputs, (iii) support producers to develop rice producing sites, (iv) create the required post-harvest conditions to ensure greater presence of better quality local rice on the markets.

2.1.2 Soya value chain

Introduced in Benin in the 1945s, soya has started to gain importance with the increasing demand from mills that substitute cotton seeds for soya, and the sub-regional market. Improved seed is the major input in soya production. Some seed varieties have potentials of about 2 to 3 tons/ha. Dissemination of good cultural practices of soya by research institutions has resulted in an increase in yield from 700 to 900 kg/ha, but access to seeds remains a major constraint. Soya seed distribution is ensured by structures which are not very competent. There is no seed multiplication structure, resulting in limited supply of seeds.

Throughout the country, soya producers' organization is at a nascent stage. At the level of the producing communities, there are producers' unions without formal representation on the ground. The keys soya commercialization actors are producers' organizations (PO) who initiate the collective marketing. There are also collectors who buy products at farm gate, traders maintaining an important network of middlemen, oil mills, processing units, feed mills and animal breeders. Regarding processors, there are two categories: (1) enterprises that are oil mills, roasted soya processing or soya-based flour units, feed mills, etc. that process and market their products and (2) women processors who practice artisanal soya processing.

2.1.3 Poultry and small ruminants value chains

Animal production is still marked by traditional animal husbandry practices of goats and poultry, despite quite positive results of modern animal husbandry projects over the last decade. The number of farm animals is estimated to be 2,216,000 small ruminants and 14,500,000 poultry in 2007. Concerning local poultry farming-based value chains, they do not have a significant impact on Benin's trade balance because there is no import or export of

consumable eggs. The commercialization of living poultry (traditional poultry farming products) from collection, wholesalers to retailers is predominantly performed by women, with some men who are more active in collecting animals.

2.2 Other relevant value chains

2.2.1 Maize value chain

Maize is the most consumed cereal in Benin, and it is highly important for food security in the country. However, there is a high variability in maize output, placing serious threats on food security and the revenues of producers. In addition to climate vagaries and cyclical phenomenon of drop in sales for this product, this situation can be explained by the non-availability of specific fertilizers in a context of constant degradation of lands and low availability of good quality seeds. Also, post-harvest losses (fluctuating between 30 and 40%) and exports of the national production to neighboring countries are contributing factors. Moreover, specific needs of maize utilizers (breweries, sweet corn/legume, fodder, etc.) are not yet covered by local production. It is therefore urgent to take specific actions in the maize sector in order to improve its contribution to food security and to producers' revenues.

2.2.1 Pineapple value chain

Although appreciated on the European market for its color (golden yellow) and its taste, Benin supplies only 0.24% of the pineapple exported to the European market. The varieties of pineapple cultivated are the *Cayenne Lisse* and the *Pain de sucre*. Pineapple production zones are located in Southern Benin. According to FAOSTAT 2014, the national pineapple production is increasing. There is an increase in the harvested areas and productions while yields are decreasing. Post-harvest sector is confronted with a multitude of constraints thereby lowering export performances of this commodity. Exports are organized individually and the sector does not enjoy effective support from the government.

The European market is the main outlet for big producers who are limited in number in Benin. A great share of their production (about 80%) is intended for this market. However, to have the tonnage required to export, they buy from the other producers. Five added value chains have been identified concerning the pineapple sector in Benin: fresh pineapple for the European market, fresh pineapple for local market, fresh pineapple for the sub-regional market, pineapple juice and syrup for local and sub-regional market and dried pineapple for local, regional and European markets. The different value chains are categorized based on the type of product, the intervening actors and the destination.

2.2.2. Cashew nut value chains

Cashew nut is the second most important export crop in Benin after cotton. With a production area covering six out of the twelve departments of the country, the crop is becoming more important socio-economically and environmentally. The interest of farmers and other operators for cashew cultivation during the past years has resulted in an increase in the cultivated areas of cashew plantations (from 165,000 ha in 1998 to 191,000 ha in 2007). Export of Benin's raw cashew nuts to the international market (China, Indonesia, Vietnam, European Union, etc.) have increased a lot these last years, from 19,174 tons in 1997 to 69,357 tons in 2006.

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This increase in Benin cashew penetrating the international market coupled with an improvement of producers' and other actors' margin has made cashew a strategic crop with promising development perspectives. Despite the many advantages of the cashew sector, several constraints still hinder its development, particularly the low yield of varieties used. Ongoing research activities on varietal improvement should be continued. Other constraints include low availability of pesticides and non-utilization of fertilizers. Addressing these constraints will promote cashew nut in the country's agricultural exports and make this crop a means of revenue diversification for producers at the local and national level.

3 Innovations in value chains in the past 20 years

3.1 The most crucial limiting factors in Benin / AIC-region / in AIC-VCs

Very low funding from the Government to research organizations

- The NARS does not have consolidated financial resources to operate, and agricultural research still depends largely on external funding. The management cycle of agricultural research (CGRA) and its mechanism of competitive funding are not enough to fund research projects of the entities;
- There is almost no involvement of the private enterprises in the research-development activities, contrary to what is done in other nations, where these private operators allocate an important part of their budgets to research;
- Lack of human resources because of movements to other organizations and the prevalence of the non-replacement policy;
- Inadequacy of logistics, laboratory materials, energy and water.

Weakness of technology innovation transfer systems

- The low rate of adoption of technological innovations has always been one of the major characteristics of family farming;
- Limited access to information on technological innovations;
- Difficulty in strengthening the public-private partnerships to help clients obtain the information they want from the public sector;
- Limited required resources for the provision of good extension services;
- Weak capacity and lack of knowledge on new technologies;
- Poor linkages between research institutions and producers' and processors' groups.

3.2 The most important / beneficial innovations in the relevant VCs of Benin

Table 9: Innovations in the rice value chain

Innovation		
Production	Harvest	Post-harvest
Technical itinerary of rainfed and low-land rice production	Paddy rice thresher-cleaner	Improved paddy rice parboiling device
Tracer and marker for rice sowing	Pedal paddy rice thresher	High capacity improved paddy rice parboiling device
Power tiller for puddling in the low-lands for rice cropping	Powered paddy rice thresher	Improved paddy rice drying process
Row weeder	Mechanical paddy rice cleaner	Improved paddy rice parboiling process
Rowling rice seeder	Manual rice grading machine	Rice straw-based feed for ruminants
NERICA, BERIS 21, IRAT127, BL19, IR841 Rice varieties, performing and adapted to parboiling	Powered rice grading machine	Rice bran-based feed for cattle
Azolla organic fertilizers and herbicide	Mechanical rice milling machine	Rice-based combustible briquettes
Digging of cased wells		Production of cakes, biscuits, etc. from NERICA

Table 10: Innovations in the soya value chain

Innovation	
Production	Transformation
Inoculation of soya to improve its agronomic performances	Very nutritious dried soya flour technologies, especially for children
Improved production technique	Soya yogurt production
Leaves and other parts of the plant are transformed into organic fertilizers	Soya cheese production highly appreciated by Benin population and consumed all over the country
	Soya biscuit production

Table 11: Innovations in the pineapple value chain

Innovations	
Production	Transformation
Good practices of pineapple production for fresh export	Improved techniques for drying biological pineapple
Pineapple cultural practices	Production of natural pineapple juice
Techniques for pineapple rapid shoot production	Production of pineapple jam
Pineapple cultivation (multiplication and packaging of shoots)	Production of pineapple jelly
Techniques and procedures of compost production from pineapple by-products	Production of canned pineapple pulp
	Production of pineapple powder
	Production of pineapple-based alcohol
	Production of pineapple-based wine
	Production of pineapple-based vinegar

Table 12: Innovations in the cashew nut value chain

Innovations		
Production	Harvest	Post-harvest
Grafting cashew plants using lateral cleft grafting	Improved cashew nut peeler	Preparation of cashew-based pella cake with cereals
Grafting cashew plants using chip budding	Mold cashew nut peeler	Cashew apple delight
Top grafting of nonproductive cashew plants	Pliers cashew nut peeler	Cashew apple delight
Good practice of cashew plantation management	Powered cashew nut grinder	Cashew juice press
Rehabilitation of old cashew plantations	Cashew nut harvesting basket	Cashew-based table wine
Production of quality cashew seeds	Cashew fruit harvesting net	Cashew-based jelly
Production of quality cashew plants	Cashew fruit harvesting tarpaulin	Cashew juice and cassava starch
Direct seeding of cashew nuts		Cashew juice with rice meal
		Cashew juice with gelatin
		Flour of dried cashew

Other innovations include:

Poultry and ruminant innovations:

- Improved technology for poultry castration;
- Genetic improvement of the Djalonke breed;
- Yam bean flakes in the feed of small ruminants;
- Improved technologies in the feed of small ruminants and poultry.

Fish culture innovations

- Reproduction of black cat fish (*Clarias gariepinus*) by injection of hormones;
- Mullet farming in pond;
- Off-soil farming of aquatic species;
- Ground farming of aquatic species, etc.

3.3 Most promising approaches for farmer and small business-related value chain innovations

- pending further information -

4 Suggestions for Collaboration

4.1 Promising agricultural products and value chains

Besides assessing the returns of investments into institutional innovations in Benin, analysis to choose the most promising value chains in the country is also undertaken. In compliance with the availability of data and the purpose of the study, four criteria which focus on poverty and market potential, are used to select the five most promising agricultural products from the long list of agricultural products the country produces and sells. The first indicator, the trade potential (revealed comparative advantage (RCA) index), is computed to identify value chains over which the country has revealed (but not potential) comparative advantage. In the present case, the RCA index compares the share of a given agricultural product in Benin's export basket with that of the same product in total world exports. The second indicator, yield gap, is used to assess the expected return of the envisaged German investment on the given AIC country value chains. A third indicator, average yield growth, is used to examine the potential of the product for poverty reduction. The production share of total supply is also used to assess the present integration of the poor in the market (relevance).

The summary of the five most promising value chains based on Revealed Comparative Advantage (RCA) index, average yield growth and relative yield gap is reported in Table 13 below. The production share, RCA index, actual yield growth and relative yield gap for the GIZ selected value chain(s) is also reported at the bottom of the table, when they are not included in the list of the first five most promising value chains.

Table 13: Selection of the most promising agricultural product /value chain

Rank	Rank by RCA		Rank by yield progress**		Rank by relevance of crop	
	Name of agricultural product	RCA index (2011)*	Name of the crop	Average annual yield growth (2005-2012) %	Name of agricultural product	Production share of supply (2011)*
1	Cashew nuts, with shell	114	Chillies and peppers, green	14	Cottonseed	121
2	Cake, cottonseed	16	Cashew nuts, with shell	7	Maize and products	104
3	Oil, palm	3	Sweet potatoes	6	Nuts and products	101
4	Sugar refined	2	Vegetables, fresh	5	Millet and products	100
5	Pineapples	1	Rice, paddy	5	Soybeans	100
GIZ Selected products	Rice	0.01	Soybeans	6	Rice	24
	Soybean oil	0.01			Poultry meat	13

Source: * Own computation based on FAO 2015 data

Note: ** a minimum of 0.5% production (volume) share threshold is used as a screening (crop relevance) criteria.

Results of assessment (Table 13):

- The trade potential (revealed comparative advantage (RCA) index), is very high for cashew nuts, cottons, palm oil, refined sugar and pineapples. This indicates that Benin has comparative advantage (in the export) of these commodities. The RCA value for the GIZ selected crops is less than 1 indicating that Benin has comparative disadvantage in (the export) of the GIZ selected products namely rice and soybean;
- The yield performance indicating progress suggests that over the CAADP period (2005 to 2012), chillies, cashew nuts, sweet potatoes, vegetables and the GIZ selected value chains are the five most promising crops. The other GIZ selected crop, soybean, also grows at a relatively higher rate, 6%, though its production volume share is less than 0.5%;
- In terms of relevance (production share of supply) cottonseed, maize and products, nuts and products, millet and products, and the GIZ selected soybeans are leading. The production quantity of the first three products exceeds the total supply and the latter two are also fully produced in the country. On the other hand, only less than a quarter of the total supply of rice (GIZ selected value chain) and a slightly higher than a tenth of the other GIZ crop, poultry meat, is domestically produced.

4.2 A systematic assessment of promising partnerships for each promising innovation area

Collaboration between Germany and Benin in agricultural research and development dates back to several decades. The different partnerships between these two nations cover several

sub-sectors within which several technologies and other convincing results can be observed. Agricultural research lies today in the heart of all agricultural issues and is targeted by all national and international initiatives as an indispensable pillar for economic growth in Africa.

It is therefore important to look into the effective utilization of approaches, such as multi-stakeholder platforms, in order to develop sustainable innovations and ensure their adoption by the target groups. Innovation system approaches will be more geared towards a supplementary process that can convert research result into development products, following the research or supply process depending on the demand of the ultimate beneficiaries.

Throughout this document, we have presented the characteristics of Benin's agricultural sector, and particularly those of the National Agricultural Research System (NARS) of Benin. The collaboration paths and lines have also been described and can be consulted in the document. However, we would like, for a good partnership between Benin and German some support for the implementation of innovations in order to:

- Remove the constraints to the development of the key sectors retained by the PSRSA;
- Identify other profitable sectors and ensure their development;
- Investigate and develop relevant adaptation strategies of human and natural systems to climate changes;
- Support and build the capacities of family farmers in order to meet key issues and challenges of climates.

Finally, we will have to strengthen the technical, material and financial capacities of INRAB and the National Agricultural Research System in order to secure these well qualified centers of dynamic teams who work in good conditions. This is one of the necessary conditions for obtaining good results. Strengthening the financial autonomy of the NARS will effectively accompany the transfer of innovations and their conversion into useful products and information for agriculture, producers, the society and the economic and social development of the country.

4.3 Some potential partners for the German collaboration: in science and research, private sector and NGOs and governmental organizations

- pending further information -

4.4 Needed implementation research

- pending further information -

5 References

Ahouandjinou M.F. and Arodokoun D.Y. 2008. Rapport d'analyse de l'environnement du secteur de l'agriculture pour la micro finance en zones rurales. Rapport d'étude préliminaire au projet. 165 pages.

Ahoyo N.R., Zoffoun A., Adje A.I., Gotoechan M.H. and Mensah A. 2013. Technologies éprouvées de production, de conservation et de transformation du riz, de l'ananas, de l'anacarde et des produits aquacoles existantes au Bénin. Document Technique et d'information. Dépôt légal N°6948 du 04 novembre 2013, Bibliothèque Nationale (BN) du Bénin, ISBN : 978-99919-1-613-2, 52 pages.

Arodokoun U. 2011. Impact socio-économique de l'usage des NTIC dans les stratégies d'adaptations aux changements climatiques en milieu rural : Cas des producteurs de coton du Centre-Bénin. Thèse d'Ingénieur Agronome, Abomey-Calavi, FSA/UAC. 139 pages.

ECOWAS. 2005. Regional Plan of Action for the Implementation of the ECOWAS Agricultural Policy (ECOWAP) and NEPAD/CAADP in West Africa, Presentation by Dr. J. Q. Subah P P O (Agriculture) 22 September, 2005, Accra

FAO. 2014. The State of Food Insecurity in the World 2014. Rome: FAO, WFP, IFAD.

FMI. 2011. Stratégie de Croissance pour la Réduction de la Pauvreté (2011-2015). Rapport du FMI n° 11/307, Septembre 2011. 220 pages.

Fuglie K. and Rada N. 2011, „Policies and productivity growth in African agriculture“, in Agricultural R&D: Investing in Africa's Future. Analyzing Trends, Challenges and Opportunities, Bd. 19 (ASTI/IFPRI-FARA Conference, Accra, Ghana: Citeseer, 2011), <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.371.9698&rep=rep1&type=pdf>.

INRAB. 2010. Programme de Recherche en Amélioration génétique et Phytatrique des denrées de base. Document de projet. 99 pages.

INRAB. 2011. La Recherche à l'INRAB : Acquis et Perspectives. Rapport Scientifique 2011. Dépôt légal N°7215, du 28 Avril 2014. Bibliothèque Nationale (BN) du Bénin, ISBN : 978-99919-1-8-846-4, 58 pages.

INRAB. 2012. La Recherche agricole à l'avant garde de la promotion des filières agricoles. Rapport Scientifique 2012. Dépôt légal N°7216, du 29 Avril 2014. Bibliothèque Nationale (BN) du Bénin, ISBN : 978-99919-1-87-1, 64 pages.

INSAE. 2003. Troisième Recensement Général de la Population et de l'Habitation. Cotonou.

Kessous J-C. and Boutaud D. 2002. Etude diagnostic du dispositif de suivi/évaluation de la stratégie de réduction de la pauvreté

MAEP. 2007. Programme de Développement des Production Animales pour les Cinq Prochaines Années (2007*2012). Document de projet. 147 pages.

MAEP. 2008. Programme National de Sécurité Alimentaire (PNSA) au Bénin PROJET SPFM/BEN/6601 (Version Finale) Volume II : Rapport Principal

MAEP. 2008. Synthèse des documents de Politique du Secteur Agricole au Bénin. Rapport d'Activité. 30 pages.

MAEP. 2009. Programme de Productivité Agricole En Afrique de L'Ouest (PPAAO/WAAPP) Document de Formulation. 74 pages.

MAEP. 2010. Stratégie Nationale pour le Développement de la Riziculture au Benin. Draft de Projet. 20 pages.

MAEP. 2011. Plan Stratégique de Relance du Secteur Agricole (PSRSA). Document de Politique. 177 pages.

MAEP. 2015. Rapport de Performance du Secteur Agricole, Gestion 2014. Rapport d'Activité. 92 pages.

von Grebmer K., Saltzman A., Birol E., Wiesmann D., Prasai N., Yohannes Y., Menon P., Thompson J. and Sonntag A. 2014. Global Hunger Index 2014: The Challenge of Hidden Hunger. Bonn/Washington D.C./Dublin: Welthungerhilfe, International Food Policy Research Institute (IFPRI), Concern Worldwide.

World Bank. 2015. World Development Indicators 2015 (Washington D.C.: World Bank,).

Zoffoun A. 2014. Répertoire des chercheurs en sciences agricoles, Rapport d'Etude PPAAO, Benin

Zoffoun A. 2014. Acquis de la Recherche Agricole sur les dix (10) dernières années au Benin. Rapport etude. 12 pages.