



FEASIBILITY STUDY FOR THE DEVELOPMENT OF PUBLIC-PRIVATE SEED DELIVERY SYSTEMS IN CHAD



**FEASIBILITY STUDY OF SEED SYSTEMS IN CHAD AND THEIR POTENTIAL
FOR IMPROVEMENT**

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ACRONYMS

AIDA	Rural Cooperation Foundation in Africa and Latin America
AEF	French Equatorial Africa
AFD	French Development Agency
AFDI	French farmer and Industrial Development
AfricaRice	Africa Rice Center
ANADER	National Agency for Rural Development Support
ANIA	National Agency for Investment and Export
BAD	African development bank
BELACD	Consultancy and liaison shares charity work and development
IDB	Islamic Development Bank
BM	World Bank
CARBAP	African Center banana and plantain research
CECADEC	Christian Center for Community Development Support

ECOWAS	Development of West African States Community
CEMAC	Economic and Monetary Community of Central Africa
CGIAR	International Agricultural Research Centers
CILSS	Permanent Inter-State Committee for the Fight against Drought in the Sahel
CIRAD	Center for International Cooperation in Agronomic Research for Development
CNAR	National Center for Research Support
CNEV	National Catalog of Species and Varieties
NDRC	National Research Center for Development
NUMC	National Seeds and Plants Committee
COOPI	Cooperazione Internazionale
CORAF / WECARD	West and Central African Council for Research and Development
SN CotonTchad	Chad Cotton Company of New Company
VOC	plant variety certificates
CRRA / SHA	Regional Agricultural Research Center for the Sudan region
SDC	For Development and Cooperation
DHS	Distinct, Uniformity, Stability
DPVC	Plant Protection Department and Packaging
DRTA	Directorate of Research and Technology Agricultural
DSP	Directorate of Seeds and Seedlings
EPIC	public industrial and commercial
FAO	United Nations Food and Agriculture
FDMR	National Forum on Rural Development World
FENOPS-T	National Federation of Organizations of Seed Producers of Chad
IFAD	International Fund for Agricultural Development
FRPS	Regional Federation of Seed Producers
GIZ	German International Cooperation Agency for Development
ICRISAT	International Crops Research Institute for Semi-Arid Tropics and
IER	Institute of Rural Economy
IITA	International Institute of Tropical Agriculture
INERA	National Institute for the Environment and Agricultural Research
INRAN	National Institute of Agricultural Research of Niger
IRAD	Institute of Agricultural Research for Development
IRC	Institute of Warm Regions
IRED	Research Institute for Livestock Development
ISTA	International Association of Seed Testing or International Association SeedTesting
ITRAD	Chadian Institute of Agronomic Research for Development
IUSAE	University Institute of Agricultural Sciences and Environment
LASEP	Central Laboratory of Soil, Water and Plants
Loah	Orientation Law Agro-forestry-pastoral and Fisheries
LRVZ	Laboratory of Veterinary Research and Zootechnical
MPIEA	Ministry of Production, Irrigation and Agricultural Equipment
NEPAD	New Partnership for Africa's Development
ODD	Objective Sustainable Development
OFST	Operationalization of the seed sector of Chad
ONASA	National Office for Food Security
ONDR	National Rural Development Office
NGO	Non Governmental Organization
OP	producer organizations
PAHO	Operator Private Seed
P2RS	Project building resilience to food and nutrition insecurity in the Sahel
WFP	World Food Program
parsat	Support Project Resilience Agricultural Systems in Chad
CAADP	Detailed Development Program for African Agriculture
IRDPC-CL	Project Development Rizicole die in the plain of Logone Chari
PDRLIAT	Development Project Resilience and Combat Food Insecurity in Chad
GDP	Gross domestic product
PMTRA II	Medium Term Program for Agricultural Research in Chad
PND	National Development Plan
PNISR	National Investment Plan of the rural sector of Chad
NASP	National Food Security Program
UNDP	United Nations Development Program
PQDA	five-year plan for agricultural development

PRASAC	Regional Pole of Applied Research in Agricultural Systems Development in Central Africa
PROFISEM	Project the seed sector in Chad
ProPad	Project to strengthen climate resilience and sustainable agricultural productivity
PTF	Technical and Financial Partners
RADHORT	African Network for the Development of Horticulture
RCCM	Register of Commerce and Personal Property Credit
REPER	Project Enhancing Productivity of Agro-pastoral farms and Family Resilience
SAN	Food and Nutrition Security Program
SECADEV	Catholic Relief Development
NARS	National System of Agricultural Research
SOC	Official Control Service
SODELAC	Lake Development Company
SSG	Seed Systems Group
TIC	Information Technology and Communication
UDSP	Seeds and Plants unit
EU	European Union
UEMOA	West African Economic and Monetary Union
UPOV	International Union for the Protection of New Varieties of Plants
USAID	United States Agency for International Development
GO	Value Agricultural, Technological and Environmental

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INTRODUCTION

The Chad covers an area of 1,284,000 square kilometers and has 11.039 million inhabitants, 51% of women, according to the latest General Census of Population and Housing (RGPH 2) made in 2009. The population growth rate is at 3.6% per year and life expectancy is 50 years. Women and men respectively 50.7% and 49.3% of the total population (RGPH 2, 2009). Despite the advent of the oil era, the Chadian agriculture remains one of the most important sectors of the economy. The Chadian population lives mainly in rural areas (78%) and is characterized by its extreme youth (51% of the population under 15 years). His contribution to the gross domestic product amounted to 40% in 2013. The primary sector accounted for 31.9% of GDP in 2015. It employs the vast majority of the population. But agriculture represents only 23% of GDP, 20% for food crops and 3% for cash crops.

Chad has considerable potential to ensure consistent production to meet the needs of its population, with:

- 39 million hectares of arable land (30% of the territory), of which 19 million hectares of arable land. Arable land is divided between 13.3 million hectares cleared suitable for agriculture and 5.6 million potentially irrigable hectares. Easily irrigated areas are 435,000 ha including 100,000 ha in Borkou Ennedi Tibesti (BET);
- 84 million hectares of natural pastures that feed a herd of more than 20 million ruminants and 23.3 million hectares of natural forests that are home to a still abundant and varied wildlife; everything is an important heritage for biodiversity;
- 22.4 million hectares of protected areas and 7 million hectares of productive areas of fishery resources in the year of normal rainfall, with a very wide variety of fish species;
- 20 billion cubic meters annually renewable groundwater and aquifers exploitable estimated between 260 and 550 billion cubic meters.

Before the oil era (July 2003), 80% of exports were within the rural sector and specifically of four products: cotton, gum Arabic, livestock, hides and skins. Currently, Chad's economy, like that of most Sahelian countries continues to be based, in large part, on the rural sector with key sub-sectors: agriculture, livestock, fisheries, the environment and water.

However, special attention should be paid to the potential of easily irrigable lands already identified in the country amounted to about 335 000 hectares, spread around Lake Chad (90 000 ha), in the Logone-Chari Valley (80 000 ha), in the ouadis Kanem and Lake (10 000 ha) and around Lake Fitri (15 000 ha) in Sahelian and in Chari valley (20 000 ha) and in that the Logone (115 000 ha) in Sudan zone. These easily irrigable land can be grouped into recession lands, land areas floodplains, polders and Ouadis.

Despite the joint efforts of the Chadian government and development partners, agricultural yields are low. Several factors explain the low productivity of Chad's agricultural sector, including low availability of agricultural inputs such as quality seeds, which in the context of Chad is one of the prime factors of productivity improvement and production and most requested by producers, but also an important factor to deal with climate change effects.

In Chad three seed systems coexist, formal seed system run by the public services of the State, seed systems and community-based traditional seed systems held by producers.

Quality seeds have been identified as one of the inputs to intensify agricultural production, but the seed sector in Chad is very structured and organized, inefficient and does not respond by far not the demand. The seed utilization of improved varieties is low about 5% (all confused speculation) is in terms of appropriate strategic programs to be implemented in order to increase agricultural productivity and achieving food security. Despite the lackluster description of the seed sector, it is worth noting some progress in recent years with the development of the seed policy, law No. 016 / PR / 2016 on vegetable seeds and its various implementing regulations. In other regions of the country, the situation is much more delicate and producers have always taken recourse to seed their crops or seed stocks sold by traders. These stocks often have over time lost their varietal purity and sometimes even their genetic effect. But they are in many cases the sole and exclusive remedies.

Most farmers do not have resources to access to various improved seeds. The information on the availability and importance and improved seeds are insufficient.

In these new conditions, it is important to do a thorough analysis of the seed problem and propose appropriate solutions but adapted to new challenges. It rests on the will of the Chadian government to make agriculture the engine of economic and social development. The government will also results in an improvement of the regulatory framework of producer organizations gives a new dimension to the associative movement.

Given the prominent role the seed in all agricultural production and food security and the role of the latter times by the state by organizing this sector by providing it with all laws and regulations. But despite this policy displayed by the state much remains to be done to operationalize the seed policy.

In its strategy against food insecurity, the Chadian government wants to diversify the sources of economic growth, boost the sectors driving growth and support promising sectors including seeds prominently. In the context of support to the Government of Chad for the operationalization of the seed sector, seed Systems Group (SSG) proposes to carry out feasibility studies and propose a "business plan" for a period of 5 years the development of seed systems and also bring the benefits of improved seeds to small farmers.

2. Objectives of the study

2.1. Main objective

The aim is to provide farmers with a new generation of improved seed varieties that would help them adapt to climate change, enhance food and nutritional security and improve the livelihoods of producers and consumers. This would involve strengthening the institutional and organizational framework of the sector and the role of private sector in seed production as well as a throughout quality control of the industry.

2.2. Specific objectives

- Offer government support to improve seed systems;
- Identify trends and opportunities to improve seed systems;
- Strengthening the capacity of local seed and private entrepreneurs, private sellers of inputs and village-based and breeders;
- Propose a new seed supply model: public-private partnerships in which the public sector focuses on variety selection, dissemination of varieties, seed regulations and seed-related policies, while the private sector's 'handle the production and seed marketing and distribution channels focused on farmer demand;
- Set up the supply systems in public-private seed to increase supply by increasing average yields of major food crops in Chad.

3. Expected Results

The expected results are:

- Government support for the improvement of seed systems is obtained;
- Trends and opportunities seed systems improvement are identified;
- The capacity of local entrepreneurs and private seed companies, private sellers of inputs and village-based and breeders are strengthened;
- A new seed supply model: public-private partnerships with a distribution of public-private role is proposed;
- supply systems in public-private seed to increase supply by increasing average yields of major food crops in Chad are implemented;
- A business plan for the development of seed systems over the next 5 years has developed.

4. design and methodology of the study

The methodology comprises: (i) a document search; (ii) site visits for maintenance with key professionals providing seeds, the staff of the Ministry of Agriculture, breeders of crops, other scientists and executives of the National Directorate of agriculture research Institute, managers of private seed companies, local entrepreneurs and private seed companies, the private input dealers and village-based and breeders, distributors of private agricultural, leaders of organizations not government focus on agricultural development, leaders of farmers' organizations and other cooperative focused on providing seeds, management of seed regulatory agencies and donor agencies for agricultural development in the country. The interviews with the actors were mostly semi-open and covered the following topics: (i) characteristics, positions and analyzes from political, legislative and regulatory environment, (ii) their views on the functioning of the sector seed and the level of inclusion of the traditional system; (iii) their perceptions and their difficulties in taking into account the varietal diversity and seed systems and (iv) suggestions on actions to be taken at the policy level,

The report covers the topics and sections below (see Appendix 3):

I. SITUATION OF AGRICULTURE

a. Farming Systems

Most of the production comes from small family farms whose average size is 2 to 5 ha practicing subsistence agriculture. Agricultural production systems are extensive type, low productivity and rely on rain-fed agriculture.

This low agricultural performance was driven largely by the déficitpluviométrique, low farm productivity and poor quality seeds. According to FAO (1998), the quality of the seed alone contributes to almost 40% higher yields. Selected Seedlings access problems were also frequently identified among the major constraints to improving the productivity of major food crops production. Les systems are cereals (millet, rainfed sorghum, sorghum BereBere or decline, corn, rice, wheat), protein (bambara groundnut and cowpea), the roots and tubers (sweet potato, yam, cassava and taro) and oilseeds (groundnut and sesame), the vegetable crops (garlic, onion, okra, tomato).

Regarding agricultural production systems, millet is speculation that occupies the largest areas (1.5 to 2.3 ha) per household, with an average production of about 500 kg, and a

yield of 0.2 to 0, 3 T / ha. For this crop the quantities of seed used are generally of 10 kg per ha.

The areas occupied by the rainfed sorghum are lower than those of millet and vary from one to three following areas. For from 0.5 to 1.6 ha areas, production rarely exceed 500 kg, yield 0.4 t / ha. The seed rate is 8 to 10 kg / ha. For maize, sown area varies little regardless of the zone. About 0.5 hectares, the average size observed in middle peasant requires about 7.5 kg of seeds, a dose of sowing 15 kg / ha. Any time observed yields vary from one to three (0.6 to 1.6 t / ha) as it is in the polder or not. For BereBere or sorghum storm, areas vary between 0.3 and 2 ha ha according to the importance that the farmer pays to culture. The productions follow the same trend as whatever the crop area or the importance given to culture, the yield is 500 kg / ha. The dose of sowing 10 12 kg of seeds is necessary to achieve a emblavure ha. production systems are characterized by their diversity, due to the plurality Agroclimatic contexts. Note based systems: shifting cultivation in most pastoral nomads operations in the Sahel region of tropical or nomadic livestock in savannah, production of food crops with livestock, sugar cane, cotton and vegetables. Food crops are mainly sorghum, millet, maize and rice, while export crops are cotton, sugarcane.

b. Current and recent agricultural development initiatives

The rural sector is considered the main pillar of the food security policy and the fight against poverty. To enable it to effectively play this role, several strategic documents in all areas of life of the population have been developed during the 2013-2017 five-year period. These include:

In April 2013 Chad has adopted a National Development Plan (NDP 2013-2015), having as objectives for 2015 to accelerate economic growth and to stimulate sustainable development in order to meet the aspirations a better quality of living, reducing poverty especially in rural areas with special emphasis on women and youth.

The third axis aims to diversify the sources of economic growth and boost growth sectors. The diversification of the economy will be based on the comparative advantages of Chad and in particular the development of sectors in agriculture, livestock, fisheries and mining.

The strategies and policies adopted by the Chad establish explicit links between food security, nutrition and resilience, and pave the way for a gradual exit from the emergency response to a structural approach to multisectoral development according to the principles "Linking humanitarian, rehabilitation and development. "

More specifically related to the challenges in the agricultural sector, the Five-Year Plan for Agriculture Development in Chad (2013-2018) aims to facilitate the internalization of actions of the National Forum on World Rural Development (FDMR) and strategic Development Plan (Theme Agriculture). It was developed in a participatory manner, involving all stages of the process of its development actors (public or private) concerned around the fundamental themes of Chadian agriculture. The plan's objectives are to increase cereal supplies (food base of the Chadian population) and give a real boost to agricultural production remains uncertain and dependent on rainfall. The priority areas are: (i) control and water management; (ii) intensification and diversification of agricultural production; (iii) strengthening the prevention and food crisis management device; (iv) strengthening of technical support services capabilities and Producers Organizations; (v) support to the promotion of promising agricultural sectors.

The National Plan for the rural sector investment of Chad (PNISR 2016-2022) is the National Translation Program for Comprehensive Agricultural Development in Africa (CAADP) and constitutes the strategic framework for coordination and planning of all interventions in the rural area. Its specific objectives are, among others, improving the living environment of rural producers, resilience and governance. It provides for increased and sustainable development of agro-forestry-pastoral sectors in a logical value chain.

The Orientation Law Agro-forestry-pastoral and Fisheries (Loah) constitutes the legal framework of reference for agro-forestry-pastoral development and fisheries in Chad. It aims to build an Intensive farming, diversified and sustainable which provides healthy and sufficient food, income and secure jobs for the rural population in general and vulnerable groups in particular, to ensure food and nutrition security and reducing poverty in Chad. It forms part of the implementation of the commitment to achieve the goals of sustainable development including ODD2 "Zero Hunger" and vision 2030 "Chad we want." As such, it aims to make rural sector an important source of sustainable and inclusive economic growth.

The strategic development agro-forestry-pastoral and fisheries following involving agricultural research:

- intensification and diversification of agriculture, forestry and livestock production and fisheries;

- promotion and competitiveness of industries agro-forestry-pastoral and fish with strong involvement of the private sector;
- strengthening the resilience of vulnerable populations to climate change, disasters and food and nutrition crises.

In this context, the Agricultural Research must conduct research activities to meet the requirements of sustainable management of rural areas, preserving natural resources, food security, food safety, quality of food and takes into account the needs expressed by the Agricultural professional organizations.

On the sub-regional and continental, Chad country as a founding member of the Economic and Monetary Community of Central Africa (CEMAC) adheres to the PRODOC Strategy Phase II OFST Program (2018-2022), which is a part of coordination of agricultural policies in regional integration and the NEPAD African initiative through the Comprehensive Program of development of African Agriculture (CAADP). These initiatives are the reduction of poverty and food security issues and achieve common challenges together in solidarity and complementarity. In the common agricultural policy, the need to increase the production and productivity of livestock especially in the meat industry to reduce overall dependence of the sub-region is underlined.

c. Scope for development of agriculture

The Ministry of Production, Irrigation and Agricultural Equipments (MPIEA) provides sub-sector of agriculture responsibility. As such, he is responsible for the development, implementation and monitoring of the national development of agriculture and irrigation policy. It executes its mission through its central and regional structures and organizations under guardianship. Several advantages exist:

- Producer organizations (POs) are structured around the production, storage, processing and marketing of agricultural products;
- Non Governmental Organizations (NGOs) and international, involved in the field of agriculture and rural development;
- Private operators and microfinance institutions working in the field of agriculture and rural development;
- The Technical and Financial Partners (TFP) of the bilateral and multilateral cooperation of Chad accompany the Government's efforts to "boost" the country's economic growth;

- Chad has a wide range of human and agronomic potential for sustainable increase in the level of production and the reduction of poverty;
- Apart from these physical potential, priority to food security by the Government displayed a favorable environment and an opportunity for agricultural growth to the extent that it will boost agricultural production, processing and marketing of crops and livestock relying in particular on the dynamics of the oil sector to modernize agriculture;
- The markets of the neighboring countries (Cameroon, Nigeria, RCA) and the sub-region (CEMAC) are carriers for many products (peanut, sesame, cowpea, fruit and processed products) and are an ideal outlet for farmers Chad but also for seeds;
- The emergence and expansion of associative movements in rural areas, are a catalyst for the development of the sector. These associative and cooperative movements, provide more concrete answers to the empowerment of the rural world and, ultimately, the divestiture of service or production activities.

Seed is one of the essential elements in the lives of farming communities. Thus several projects managed by the Ministry for Agriculture are running the seed component in their components. These projects are:

➤ **The Operationalization Project Seed die Chad (SEM PROFIT) funded by the Swiss Cooperation (SDC):** Implementation by GIZ International Services, the Swiss Cooperation contributes to securing and increasing agricultural production and incomes of family farms (overall objective of the Program), consistent with the objectives defined by the policies and Chad's development strategies. The specific objective of the Program is to enable the national level, the development of key elements of the seed sector and, at the regional level, the operationalization of the production of quality seed in adequate quantities and following appropriate models for the seed is accessible and plays its key role in increasing agricultural production. The program has an expected duration of twelve years, 2014 to 2025, structured around three phases of four years each.

- Strengthening the policy and institutional framework;
- Building framing structures capacities of the seed sector (research, control and extension);
- Improving production quality seeds by private operators (individual and / or collective), but also by the farmers themselves;

- Improving the access of family farmers to quality seeds, enabling them to increase crop yields.

➤ **Project to strengthen climate resilience and sustainable agricultural productivity (ProPad)** whose project development objective is to promote the adoption of improved technologies leading to increased productivity and strengthen climate resilience of farming systems in areas targeted by the project.

This project will bring the quality of seed available, particularly in the Middle Chari and Salamat. This project aims at strengthening institutional capacity for agricultural research and make available seeds and seeds available to small producers.

➤ **Project to improve the resilience of farming systems in Chad (parsat)** aims to contribute to the sustainable improvement of food security and income of rural households in its area of intervention. The parsat covers Guera Region, Fitri Department in the Batha region and the Department of Dababa in Hadjer-Lamis Region Region. This intervention area located in the Sahel Chad, is characterized by the production systems typically impact the consequences of climate change and particularly to rainfall. This dependence of the rainy season is increasing year by year with the risk of food crises prone to climatic hazards and damage enemies culture (locusts and grain-eating birds). In addition to these natural constraints, households have limited capacity as inadequate agricultural equipment and plant material considerably limits the success of activities. However, production and access to plant material, especially the quality of improved seeds remain a major constraint to intensification, diversification of production and access to improved varieties.

➤ **Project Enhancing Productivity of Agro-pastoral farms and Family Resilience (PD Net).** This project is the logical continuation of parsat with extension of the zone of the project beyond the traditional area. The overall objective of REPER is to sustainably improve food and nutrition security and incomes of rural households in the project area. Its development objective is to improve the performance and resilience of family targeted agro-pastoral farms. PD Net intervene through three components: (i) Component 1: Productive investments in the agro-pastoral farms Family resilient; (ii) Component 2: Human Capital Strengthening and professionalization of producer organizations; and Component 3: Coordination and management, monitoring and evaluation. In its under Component 1 2.

➤ **Other projects resilience**

These projects are typically projects that depend on the Minister of Production, Irrigation and Agricultural Equipments. These are the following projects: ProPad, P2RS, PDRLIAT, PDRICL1 and PDRCL2, PGRN, etc. It is often question ITRAD make available to the projects, the technologies and knowledge necessary for intensified food crops, providing quality basic seed, to strengthen the skills and expertise of the actors and project beneficiaries. In addition to these requests, it should also be noted that some projects provide financial support for maintenance, varietal improvement and production of pre-basic seed. Diversified institutional support as the restoration being and construction of infrastructure facilities, Major donors active in the sector of agriculture and rural development include the World Bank (WB), the African Development Bank (AfDB), the French Development Agency (AFD), the European Union (EU) the World food program (WFP), the United Nations food and Agriculture Organization (FAO), the International Fund for agricultural development (IFAD) and the Islamic development Bank (IDB).

➤ **Regional Pole of Applied Research in Agricultural Systems Development of Central Africa (PRASAC)**

The development and adoption of Seeds and Biotechnology Program for Africa (AOSP) provides a framework in which a Seed Sector Development Program Regional CEMAC will be provided by the African Union, given its key role in the development of Africa through the New Partnership for Africa's development (NEPAD). The process of harmonization of seed system in CEMAC countries, committed with the support of FAO since 2008 has been entrusted to PRASAC which aims to provide the sub-region of a legal framework for harmonization seed policies.

II. STATE OF PLAY OF THE PROVISION AND SUPPLY OF SEEDS

a. History of varietal selection and provision of seeds countries

Agricultural research in Chad began in 1921 with the creation of the breeding center Moussoro. It was relayed in 1938 by that of Ngouri. A cotton agronomy department committee of French Equatorial Africa was established and began the first trials on cotton in Fort Archambault (current Sarh) in 1931. He created the cotton research station Fianga (Mayo-Kebbi) in 1934 and selection of farm and testing Bémia (Logone) in 1936.

The Cotton Research Institute and textiles (IRCT), created in 1946, resumed the same year the agriculture department and animal production of the territory of Chad, cotton farm Tikem (Mayo-Kebbi) and that Bébédjia soon converted into a research station. Created

in 1940, the Bébédjia station has had several names: Agricultural Station from 1940 to 1942, agricultural station from 1942 to 1946, from 1946 to 1992 Station ESRD, CIRAD-CA station from 1992 to 1998 and ITRAD station since 1998. It is the headquarters of the Regional Center of Agronomic Research for the Sudanese region (CRRA / SHA).

The colonial agriculture department devoted solely to food crops and should stimulate research by the creations of research stations on grains (sorghum, millet, maize) Ba-Illi (Chari-Baguirmi) in 1948, the farm Logone pilot rice to Boumo (near Lai in Tandjilé) in 1951 and crop improvement department in 1953. In 1960, the central station of improvement of food plants Deli resumed the work of Ba-illi and gave a national vocation relying on the network of administrative farms fairly well distributed over the entire cultivated area of Chad.

Indeed, it was in 1972 that the research structure of the Ministry of Agriculture was reduced to the division of Agronomic Studies. She was responsible for the planning and execution of the research programs on food crops, the establishment of appropriate cultivation techniques and the settlement of cultures as well as the production and distribution of improved seeds. From its inception and until 1976, this division had received substantial support from the French cooperation to develop work on sorghum and millet from both stations: that of Deli and the Dougui to 45 km by road north N'Djamena and to set up a national network fulcrum for experimentation in the administrative farms Ministry of Agriculture.

The agronomic Studies Division was an implicit aim of coordinating all national research on food crops, but she could not play the role of supervision of the work undertaken in this area by development agencies under the Ministry of Agriculture as the Lake Development Company (SODELAC) and the Office Setup Sategui value Déressia (OMVSD). Shortly before the 1979 war, the division of Agronomic Studies was transformed into agricultural research division, but events had ceased operations. The Agricultural Research division revived in 1984, but in a redénomination in Agronomic Research Office (ARO). Thus the "seed" project was attached to him in 1985.

Designed as in 1975, the BRA should start operations by relying on Dougui station, but for lack of sufficient water resources, the station had proved very conducive to a secure seed multiplication. To overcome this difficulty, it was established agricultural station Gassi (located 15 kilometers east of N'Djamena, upstream on the Chari River) in 1984.

The "seed" had broader goals experiment seed production in rainfed and irrigated, and the test of cultural practices to the Gassi station and dissemination of middle peasant seeds.

In 1985, a UNDP / FAO project entitled "Support for seed production in the Sahel" and called "seed project" was attached to the Ministry of Agriculture. This project was part of the research activities and research in agricultural research organization at the time, the BRA is actually the descendant of the former colonial service for crop improvement. In 1986, the BRA was receiving support from the World Bank in the agricultural structures Restructuring Project (RSA), funded by the IDA loan. One of the two objectives of this support was to provide short-term minimal work means the BRA, especially for restarting the network administrative farms to seed production purposes and regional experimentation.

A reorganization of the BRA does have two divisions, one responsible for agricultural research and the other for seed production. Inside the country, the BRA was responsible for a network of 7 administrative farms used for seed production and research covering fairly large ecological and administrative areas of the country. In 1987, after the damage suffered during the war and lack of future service, the network was no longer functional and had no specific goals. Under the leadership of the seed division and with the support of the RSA project, it has been streamlined and a reordering. The vocation of the firm has been redefined to better reflect the resources available in the short to medium term. Three of them (Bokoro, Delis, Moussafoyo) were preferred to establish regional centers for seed production and research, two others (Am-Dam, Am Timan) would be nothing more than points of support for research; the last two (Békaou, Poudoué) could be made to the Ministry of Agriculture as has been done for Kandili farms, Kelo and Pala in the Sudan region.

In terms of seed production, creating two separate units under the formal authority of the ARO at the time, could be explained by the partially complementary vocations (the agro ecological zone view), basic seed / multiplication first breeding seeds (R1), the possibility for Chad to take advantage of two sources of assistance. But this duplication aroused competitive situations with organizations and development projects, including seed supply, fueled by differing conceptions of seed policy most suitable for Chad.

ARO then held in a very cautious proposal to be limited to the sale of "mini-dose" of self-replicating improved varieties by farmers. The project proposed a more diverse and daring policy that would be to sell the low-dose, but other sales based on the finding of relatively frequent purchases of rural-run seed.

Given that the 1979 events had caused the destruction of some farms including that of Deli, while Bébédjia station was spared, it hosted the first research programs on food crops in 1982. These activities were extended to seed multiplication of certain food crops in 1988 and the installation of a timber yard for fruit growing in 1989 Deli and Bébédjia.

A creation of a draft commission coordinating the activities of state structures in the field of horticulture; recognition by the political authorities of the importance of horticulture and the need to structure the sector; the idea of CCNH was appreciated, it will replace that of the former ONADEH who played this role until 1991.

In 1992, the BRA was elevated to the Directorate of Research and Agricultural Technology (DRTA).

Since the study of the Ministry of Rural Development (1991), the National Agricultural Research System (NARS) of Chad has evolved into more formal creation in 1988 of the Agricultural Research Institute for Development Chad (ITRAD). ITRAD is a prominent component of the National Research System (NARS). The NARS has a number of challenges to rise in a context of recurrent food insecurity and rampant population growth, constrained by climate change phenomenon that assumptions growing agricultural production. ITRAD Its primary duties are to:

- Support the implementation of national agricultural research policy;
- Perform scientific and technical research for the development of plant production, forestry and fisheries while ensuring sustainable management of natural resources;
- Contribute by scientific contributions to the identification of rural development projects;
- Ensure the production of pre-basic seed and basic grains, oilseeds and protein-forest trees, vegetables, roots and tubers, fruit trees;
- Contribute by scientific contributions to the conservation of plant genetic resources;
- Provide education in vocational training institutions or scientific.

However, despite the adoption in 1993 of the National Long-Term Plan for Agricultural Research (PNLTRA) in Chad, and in 2002 the First Medium Term Plan for Agricultural Research (PMTRA I) for 2003-2007 the search remained Chadian agriculture has been very limited in its ability to support agricultural policies.

In 1998, with the creation of ITRAD by Law No. 001 / PR / 98, 27 January 1988. The organization and operation are governed by Decree No. 330 / PR / MA / 98 of 29 September 1998 which took over the administrative farms created by the colonial administration. Thus the 11 Farms and Support Points in the Sudanese region (Deli, Mala / Boumou, Bekao, Moussafoyo and Youé) and in the Sahel region (Am-dam, Am Timan, Bokoro / Dilbini, Dougui, garden Walia test and fruit Center and Park wood Koundoul) affirmed the need to sign contracts in the production of R1 certified seeds and seedlings with individual farmers or organized to meet the needs of producers

Thus, a replay PMTRA I was made and resulted in the development of PMTRA II for the period 2010 to 2014.

In 2014, the Department reaffirmed its commitment to restructure the seed sector in the Agricultural-days Balance 2012-2013 and 2013-2014 programming organized in Moundou (Logone Occidental) from 7 to 9 February 2013. Thus the production of R1 seeds were removed from the search and by the private sector (individual producers and associations). Now research was to stop production base.

A diagnosis of the seed system conducted in 2014 (Salifou, 2014) led to the restructuring of the sector with, the key, the development of an Action Plan for the revival of the seed sector in Chad for the period 2017- 2020.

The national seed policy was developed in 2016 takes into account all the cultivated plant species or not, constituting the plant genetic heritage of Chad. This policy is intended to be horizontal and inclusive of a range of actors, actions and measures that enhance the different components of the seed sector to enable them to move smoothly in the direction of the emergence of a reliable national seed industry. The Document of National Seed Policy provides broad guidelines on the matter and clearly defines the roles and responsibilities of key actors of the seed sector (government, individual Peasants,

farmers' organizations, private sector) and the coordination mechanisms. The modernization of the seed sector in Chad will of

The National Committee on Seeds and Plants was established, pursuant to Article 32 of Law No. 016 / PR / 2016 of 15 November 2016 on seeds and seedlings of vegetable, it is created a National Committee Seeds and seedlings (NUMC) under the Ministry in charge of Agriculture. This clearly reaffirmed the transfer of responsibility for production, distribution and marketing of certified seed producer organizations. He also confirmed the Directorate for Seeds and Seedlings (DSP) in the role of control and seed certification in Chad.

The CNSP is an advisory body whose mission is to assist the government in developing and monitoring the implementation of the national seed policy. It is based on the participatory principle.

Several text of application of Law No. 016 / PR / 2016 have been developed to better organize the actors of the seed sector in Chad to improve the availability and accessibility to improved seeds.

The PMTRA II was made and resulted in the development of PMTRA III for the period 2020 2024. Dans this program and other strategic documents (SDA PND, PNSIR ...) aimed at improving the availability and accessibility seed quality.

Creation of the national center of specialization in Kolobo rice cultivation in 2019 by ITRAD. This center belonging to the Chinese mission to Chad has decided to give in ITRAD. The first mission of this center is to produce pre-basic seed and basic rice at least twice a year

b. Recent and ongoing activities aimed at dissemination of improved crop varieties, by crop

Several methods of promotional outreach can give individual farmers an understanding of improved seeds, and get farmers in a situation where an individual contact is possible.

This includes :

- Plots and demonstration farms;
- Conduct some advertising activities;
- Information Technical days;
- Varieties and crop test plots;

- Training program for farmers;
- Meetings of farmers;
- Farmers clubs and schools projects that educate the children of farmers;
- Meetings of youth and women meetings that educate youth and women of farms;
- Technical information days and demonstration;
- Organizing seed fairs nationally and in the regions;
- Using new methods of Extension (use i-Vaucher, i-farming);
- Extension of seeds: demonstration plots, kids or mini-doses of seeds;
- Construction input shops (seeds, pesticides, fertilizers);
- Use of Information and Communication Technologies (ICT) (SMS, Web, Website, WhatsApp), radio, TV, newspapers, etc. may be useful very to facilitate the transmission of information on operations and commercial transactions.

c. Recent and ongoing to increase the seed capital of the country

Concrete actions or seed policy set by the government, private, NGOs, etc. in order to increase the seed capital of the country.

In some cases, seeds bought in research and disseminated by the programs or development projects go through extension. These seeds are accompanied by data sheets. In other cases, during the formation of seed technology training that is provided by researchers ITRAD, the extension agents (ONDR, projects and NGOs) are invited.

The number of varieties introduced during the last ten years is relatively high because of the active involvement of the ITRAD researchers in the various activities of research networks in Africa.

For example, more than 500 varieties of rice were mostly introduced AfricaRice and tested in the various rice ecologies of the country with the participation of extension workers and farmers through participatory varietal selection approaches.

The number of varieties of sorghum, rice, maize and millet introduced are around 500. These varieties were obtained from "International Crops Research Institute for Semi-Arid Tropics and" (ICRISAT), the "International Institute of Tropical Agriculture" (IITA) of Ibadan (Nigeria) some national research institutions such as national Agricultural research Institute of Niger (INRAN) of Niger, the University of Maiduguri (Nigeria), the National Environment and Agricultural Research Institute (INERA) in Burkina Faso, the Institute of Rural Economy (IER) of Mali, and the Institute of Agricultural Research (IRAD)

Cameroon. These varieties undergo organoleptic tests are chosen or abandoned in favor of local varieties which give a good taste or other interesting agronomic characteristics.

More than 400 varieties of roots and tubers are introduced from IITA Ibadan in Nigeria. This is cassava and yam.

Compared with beans, cowpea varieties 8, 3 soybean varieties and 3 groundnut varieties have been introduced recently INERA Burkina Faso, ICRISAT, IITA and IER of Mali, INRAN Niger and IRAD of Cameroon.

Several varieties of maize were also introduced from IITA and IRAD of Cameroon.

Forty (40) banana variety collections, mango trees and rootstocks of citrus, guava, were introduced to the Kismatari experimental station near Garoua (Cameroon) and Burkina Faso.

Hybrid varieties (dwarf varieties) were introduced Shongaï the center of Porto-Novo (Benin).

Very recently, thanks to the C4 + Togo project, 13 cotton varieties including 10 from Brazil and 3 C4 countries (Benin, Burkina Faso and Mali) were introduced in Chad and have been the subject of evaluation which proved very conclusive.

Several varieties of maize have been introduced in areas of the Sahel and Sudan Chad during the 2019/2020 campaign for their high performance, high levels of minerals (zinc, iron and folic acid), drought tolerance and different biotic :

- Seven (7) millet varieties were introduced ICRISAT Niger of which hybrids and varieties biofortified (Zinc, Iron and folic acid);
- Twenty-two (22) sorghum varieties were introduced from ICRISAT in Mali;
- Thirteen (13) new varieties of maize which 3 IITA hybrids Kano;
- Fourteen (14) new peanut varieties from ICRISAT and EIR of Mali;
- Eight (8) new cowpea varieties introduced from IITA Kano;
- Several new rice varieties were introduced the Rice Center (AfricaRice).

ARO 1985 has implemented the sale of "mini-dose" of self-replicating improved varieties by farmers. The project proposed a more diverse and daring policy that would be to sell

the low-dose, but other sales based on the finding of relatively frequent purchases of rural-run seed.

The program Multiplication Seed product certified seed multiplication through a family plan. The strategy is to entrust subcontracting multiplication of producers. The service is responsible for monitoring and supervision during the campaign to ensure that the appropriate agronomic practices are followed. Moreover, the firm is responsible for providing farmers with inputs (seeds and fertilizer) on credit. ITRAD before the period 2015 produced R1 commercial seed under contract with multipliers producers around his farms. A seasonal credit (seeds, fertilizer and plowing) early in the season and repayment is to harvest first in kind equivalent credit and the rest is purchased.

The NGO approach to seed production is to engage in contract production, mainly through the farm that provides the initial seed stock. The farm uses of farmers to produce seeds and provides inputs and technical guidance to ensure the quality of seeds produced.

Access to seeds is apparently free for the rice farmers get either their previous productions, either by donation or exchange them. In one case as in the other these seeds have value because farmers have incurred costs for its production, sorting, preservation and storage. Do not the value here would be an aberration. The seeds have been valued at local market prices of each study area.

Research participatory varietal, which is a new approach in which the researcher associate producers and development agents in the first year to the varietal research (several new varieties and the most popular local variety). In 2 years maximum in relation to the old approach which lasted more (4 to 5 years) producers choose the best varieties according to their own criteria and pass their multiplication.

The community-based seed system or Community Based Seed System (CBSS), which is born from the merger of modern seed systems and the traditional seed systems. This approach is to produce quality seeds for her community and communities around.

The project "Operationalization of the seed sector in Chad" during Phase I of the 2015-2018 project has developed the approach to self-production of seeds has been very effective for the dissemination of seeds.

d. Current options for small farmers to access improved and certified seed

The quality of seed access is a major challenge in Chad. Quality seeds have been identified as one of the inputs to intensify agricultural production in Chad safer and cheaper. Seed is only one element of improving the productivity of agricultural production systems; however, in the Chadian context they constitute the first factor in improving production and the most requested by producers. Moreover, it is really the only external input used by farmers. As part of the fight against food insecurity, the national seed policy was to produce adequate quantities and accessibility to quality seed farmers and adapted to the agro-ecological conditions of the country. This would involve strengthening the institutional and organizational framework of the sector and the role of private sector in seed production as well as a throughout quality control of the industry. Chad's agriculture is characterized by the lowest rate of use of modern inputs. This low use of improved seeds (5%) largely explains the low level of productivity of the Chadian agriculture. Thus, the government's concern is to create an appropriate institutional framework for the development of sustainable seed sector to ensure the availability of improved seeds in quantity and quality to meet the needs of farmers. More specifically, the objectives of the national seed policy are as follows: Chad's agriculture is characterized by the lowest rate of use of modern inputs. This low use of improved seeds (5%) largely explains the low level of productivity of the Chadian agriculture. Thus, the government's concern is to create an appropriate institutional framework for the development of sustainable seed sector to ensure the availability of improved seeds in quantity and quality to meet the needs of farmers. More specifically, the objectives of the national seed policy are as follows: Chad's agriculture is characterized by the lowest rate of use of modern inputs. This low use of improved seeds (5%) largely explains the low level of productivity of the Chadian agriculture. Thus, the government's concern is to create an appropriate institutional framework for the development of sustainable seed sector to ensure the availability of improved seeds in quantity and quality to meet the needs of farmers. More specifically, the objectives of the national seed policy are as follows: This low use of improved seeds (5%) largely explains the low level of productivity of the Chadian agriculture. Thus, the government's concern is to create an appropriate institutional framework for the development of sustainable seed sector to ensure the availability of improved seeds in quantity and quality to meet the needs of farmers. More specifically, the objectives of the national seed policy are as follows: This low use of improved seeds (5%) largely explains the low level of productivity of the Chadian agriculture. Thus, the government's concern is to create an appropriate institutional framework for the development of sustainable seed sector to ensure the availability of improved seeds in

quantity and quality to meet the needs of farmers. More specifically, the objectives of the national seed policy are as follows:

- (i) regularly provide producers with improved seed quality and in sufficient quantities, at the right time and at an affordable price;
- (ii) Extend the range of plant species and varieties to contribute to the diversification of agricultural sectors;
- (iii) Facilitate trade in plant seeds by applying the principles and rules that minimize trade barriers;
- (iv) Promote partnership between the public sector and the private sector;
- (v) Strengthening the institutional and legal framework of the subsector seed by a legislative and regulatory. It is difficult to quantify and locate the quantities of seed produced by the traditional system and to check the quality of these seeds. The information about the importance and availability of quality seeds are insufficient in rural areas because of the lack of coordination and consultation bodies. Chadian farmers do not know the advantages of using quality seeds; they use almost exclusively seeds from the informal system.

e. Number of private seed enterprises of operating in the country and an annual quantitative estimate of their seed production

Private players (for multiplication and marketing of seeds) are struggling to emerge outside of a few OP multiplier supported by projects located mainly in the South.

The seed industry is now heavily subsidized and supported by projects according to often remote logical support economic concerns. To develop a sustainable seed sector, yet it seems imperative to anchor the outset the actions in an economic sense and promote reflections on financial aspects and seed markets.

The legal texts and specific national institutional framework to provide solid foundations and adapted to the development of the sector in a sustainable way have been developed.

Seed companies do not exist, but ESCOR Agro through the partnership it has signed with NAFASO of Burkina Faso that we are on track to become a seed company.

Chad has a body of some seed operators are regularly identified, assessed and registered in the national directory of professional seed operators as seed producers. These operators are generally followed; their production is controlled, certified and sold

or at least put in the distribution channels. Known operators and stuck; they must be recorded in the directories of approved suppliers of programs, project and institutions involved.

Appropriate measures should be taken to interconnect national networks of seed operators. This directory will be updated at the end of each crop year and will be connected to the sites and areas open to any user who so requests.

f. nongovernmental organizations and peasant organizations involved in the production and supply of seeds

Although the informal seed sector remains predominant, recurring droughts and the modernization of agriculture encouraging more farmers to use quality seed. Since 2002, a number of NGOs and small seed producers operators appeared. The Regional Federation of Seed Producers (FROPS) who are often members of a larger central association such as the National Federation of Seed Producers Organizations (FENOPS-T) Chad, which ensures coordination and defends their interests National level. While the seed sector Chad, which was regulated by the public authorities adopt a more open structure in which the private seed companies playing an increasingly important different types of seed producing cooperatives also provide essential mission in the seed supply chain. Seed producers produce certified seed they supervise simultaneously marketing. The FENOPS-T Projects and Programs (PROFISEM, parsat, PDRLIAT, P2RS, ProPad ...) meet the operators to understand their needs for improved varieties. They identify local climate zones and select the suitable varieties of research institutes. Cooperatives then act as multipliers of these quality seeds to supply local markets. Seed producers produce certified seed they supervise simultaneously marketing. The FENOPS-T Projects and Programs (PROFISEM, parsat, PDRLIAT, P2RS, ProPad ...) meet the operators to understand their needs for improved varieties. They identify local climate zones and select the suitable varieties of research institutes. Cooperatives then act as multipliers of these quality seeds to supply local markets. Seed producers produce certified seed they supervise simultaneously marketing. The FENOPS-T Projects and Programs (PROFISEM, parsat, PDRLIAT, P2RS, ProPad ...) meet the operators to understand their needs for improved varieties. They identify local climate zones and select the suitable varieties of research institutes. Cooperatives then act as multipliers of these quality seeds to supply local markets. They identify local climate zones and select the suitable varieties of research institutes. Cooperatives then act as multipliers of these quality seeds to supply local markets. They identify local climate zones and select the

suitable varieties of research institutes. Cooperatives then act as multipliers of these quality seeds to supply local markets.

Seed groups of this type are estimated thirty of which 19 individual operators and 11 operators with a status of "corporation" formed by cooperatives, ICG technicians or SARL. The country has more than 10 major seed producers.

The status of major producer is linked to the operator's production capacity, determined by: the size of its operations, the level of equipment and the volume of production. Based on these criteria, the country has eight (8) major seed producers. It is among the major seed producers, three individual producers, whose two SARL Sahel Agritech finger Green, two seed groups, and a seed cooperative. Great operators mainly produce grain seeds (maize and sorghum) and legume seeds (groundnut and cowpea). They are linked to projects and NGOs by delivery contracts commercial seed.

From the point of view of the equipment in agricultural equipment, there is a good rate of equipment in manual and mechanized tillage equipment, the highlight is the presence of tractors and storage units in the majority of them. Those installed in farms use on-site facilities including storage medium capacity of 20 tons.

Small producers are essentially composed of village associations and members of producer groups, for projects or ANADER. The breeding programs are made at sites that have been regrouped covering on average 5 ha or just in individual parcels of medium size area of about 2 hectares. Corn production programs, sorghum are the most extensive up to 10 ha.

The level of equipment of small seed companies is very low. Their equipment fleet consists of the hoe and the plow, few producers have the plant treatment materials, tarpaulins for drying the crop.

g. existing infrastructure for processing and packaging of seeds

➤ The general level of equipment of seed systems is relatively low:

At the plant breeding and producing elite seeds : RGPA management is deficient, research institutes do not have idoine facilities to conserve, maintain and secure germplasm seed lots quality. ITRAD has a small bedroom cold in principle to ensure proper conservation of collections in refrigerated stores to keep the tanks feet and lots elite seeds, laboratory water plants and soil to perform analyzes for control internal quality pre-basic and basic seeds, packaging and seed treatment stations.

At the level of control and seed certification services: the Branch has Seeds and Plants whose primary mission is the control and certification of seeds their responsibility. Its weakness is the lack of qualified and professional technical staff, regarding the vastness of the territory and crop diversification. One lab at the central level that are intended to seed analysis, centralized in the capital.

➤ **At the production and marketing of reproductive seed (R1 and R2)**

The lack of seed packing stations negative impact on the quality of seeds produced and delivered by the seed operators. If seed traders use homemade hube practices, winnowing and sorting to clean the seeds. The methods used are not adequate to ensure proper cleaning of grain and thus ensure quality. The shortcomings in practice are responsible for the poor quality of seeds; seed lots have low specific purity, low density grains not a balanced treatment of lots and low vigor seeds, etc. The seeds are kept in poor conditions because the country lacks adequate infrastructure for the storage and preservation of seeds. The storage infrastructure is an important element for the preservation of seeds given environmental conditions. The conditions of temperature and humidity among others are very important for seed storage. The highlight is the lack of seed storage units in the majority of them compared to food grains storage units ONASA and community shops in villages.

But in the current environment, storage is carried out under conditions not taking account of these factors; this is added that the seeds are packaged without considering also the structure of holdings, particularly in the average size of the areas. Untreated seeds are in non-ventilated plastic bags packaging 80 kg for groundnuts, 25 kg for maize and cowpea, millet 10 kg, 5 kg sesame, rice 40 kg and 10 kg for sorghum.

The following facilities are not available or if any of them, they are very limited:

- Centers and mobile conditioning units;
- Stores of inputs (seeds, fertilizers, pesticides) and possibly small agricultural equipment;
- 200 tons capacity storage warehouses for the conservation of basic seed;
- Grain Stores medium capacity of 100 tons for the conservation of seeds purchased directly from the hands of producers. The conditions listed above are not likely to create a favorable environment for the professionalization of farmers' organizations and the establishment of a regulatory framework.

h. Quantity of certified seeds sold in the last 3 years, by crop

➤ The seeds of food crops marketed certified

The quantities of certified seed produced during the last three years, all speculations and categories, cf. tables above), are increases. Seed requirements (in tons) are: 3856 kg for groundnuts, 6100 kg for maize, 13 400 kg for sorghum, 9,658 kg for rice, 7344 kg for millet and 876 kg sesame.

The amounts of pre-basic seed, the last 3 years based certified R1 marketed are reflected in the following tables (Tables 1 to 3):

Table 1. Quantity in tonnes of certified seeds (2015-2016)

Cultures	But	Sorghum	Rice	Peanut	Mil	Sesame
breeder						
Based	5,648	4,355	0	4,140	1,156	0
Certified R1 and R2	74.789	38.670	74.060	50.156	17.987	2, 431
Total	80, 437	43, 025	74, 060	54, 296	19, 143	2, 431

Source: DSP and ITRAD 2016

Table 2. Seed certified in tonnes (2016-2017)

Cultures	But	Sorghum	Rice	Peanut	Mil	cowpea	Sesame
breeder							
Based	2,655	38.7	0	6, 300	0.8	0	0
Certified R1 and R2	80.437	72.465	22.31	60.815	4.6	5.58	5.88
Total	83.092	72.465	22.31	67.081	4.6	5.58	5.88

Source: DSP and ITRAD 2017

Table 3. Quantity in tonnes of certified seeds (2017-2018)

Cultures	But	Sorghum	Rice	Peanut	Mil	Sesame
breeder						
Based	8,840	5, 155	7 990	5 178		1, 629
Certified R1 and R2	88.782	58, 656		4,887	29.159	2,000
Total	100.120	66,00	8,756	13.553	30.689	3,629

Source: DSP and ITRAD 2018

➤ coverage and commercial certified seed needs

Certified seed needs to cover 20% of the seed requirements of the country by certified seeds by 2024.

To start production it is essential to have 311,60 Base seed Tons in 2019. The 5% coverage in 2020 in field crops (cereals, pulses) corresponds to 5 953.45 tonnes of R1 to

produce an area 6 067.02 ha. In 2022 the production of R1 will reach 20% to 23 813.80 tonnes of R1 seeds for field crops to produce on an area of 24 268.09 ha.

Tables 4 and 5 in Annex 4 show the production projections in terms of R1 seeds (commercial) to occur between 2018 and 2024 to achieve the goals of 5% in 2020 and over 20% in 2024.

➤ Production of certified vegetable seed base

Seed basis of the main enterprises are, in descending order, onion, okra, tomatoes, lettuce, eggplant, chili. The seeds of exotic crops such as carrots, cabbage, beets, parsley are not produced locally and are subject imports. Quantities are limited and statistics are not available because of the quantities that are not declared all except Fingers Green, Sahel Agritech, Food Company, ...

The quantities of certified basic seed maraichères 2014-2018 are shown in Table 6.

Table 6 Quantities of certified basic seed maraichères 2014-2018

No.	cash	variety	2014	2015	2016	2017	2018	Total
01	Onion	Variety of Abeche	30	25	44	36	20	155
02	Okra	Rasis	-	30	32	25	28	115
03	Tomato	Roma VFN	10	-	15	20	18	63
04	Lettuce	Batavia	-	-	25	15	-	40
05	Jew's mallow	Local	15	12	-	20	-	47
06	Rocket	Local	8	15	-	14	-	37
07	Eggplant	Black beauty	-	-	60	-	-	60
08	Melon	Endor	-	7	14	10	-	31
09	Watermelon	Sweet climson	12	-	16	-	8	36
10	chilies	Cayenne	-	7	-	-	11	18
11	Cucumber	Local	5	6	-	-	-	11
12	green bean	Kilomètre10	-	27	-	18	-	45

source: ITRAD (2019)

➤ Production of R1 certified vegetable seeds

R1 certified seed produced, in decreasing order, garlic, potato, okra, watermelon, onion, tomato, cabbage and cucumber. The quantities of certified seed produced R1 are inadequate and fail to meet demand that is mostly very high FAO partners, NGOs, WFP, UNHCR, involved in the area of food security through their partners who are NGOs or state.

The quantities of certified basic seed maraichères 2014-2018 are shown in Table 7.

Table 7. Average quantities of vegetable seeds produced by R1 species 2012-2014

speculations	2012	2013	2014	Total
Onion	0	615	1259	1874
Tomato	424.48	202	620	1 246.48
Okra	1 143.6	343	1250	2 736.6
Cucumber	126.8	195	112	433.8
Watermelon	2162	195	145	2502
Cabbage	627.39	50	348	1 025.39
Potato	13800	0	0	13800
Garlic	12232	0	1850	14082
TOTAL (kg)	30 516.62	1600	5584	37 700.27

source: FAO (2015)

➤ **Production plants**

The Fruit Center and Park Wood Koundoul undertook varieties of recovery activities citrus suspended it a few years ago. The Center is reached to produce some rootstocks nursery: 180 mango, citrus 210, 112 guava which may be added 2430 rootstocks where 2000 mango, citrus 30, 230 jujube, 130 guava and papaya 40.

The fruit and forest plants are produced in all farms ITRAD and at research stations in the Regional Agricultural Research Centers (CARRA) but the amounts are not all reported. The need for fruit trees and forest of the population are very high, and the supply can not meet demand.

i. Number of small and medium businesses involved in agriculture / seed currently active, by Region

The National Federation of the Chad Seed Producers Organizations (FENOPS-Chad) has 7 regional and interregional federations covering 15 regions of 23 currently. It aims to facilitate the activities of seed producers organizations to produce quality seeds that meet the needs of the country. Its members as all certified seed producers buy (or receive) the basic seed ITRAD and multiply on two generations to produce certified seed R1 and R2. This federation is established in 2015, can not normally carry out his functions, and needs to be strengthened (means of work, management training) and consolidated. The other sectors of the industry including distribution and import and export are not yet organized.

j. level of imports of certified seeds, by crop

The level of import of seeds are not known, because for most the amounts are not declared to customs. However, it is important to point circuits border trade of vegetable seeds and seedlings. These circuits are characterized by informality, irregularity and the small amount of volumes that pass through them. It is ultimately marginal circuits. The exercise of marketing activity of seeds and seedlings by distributors-producers and distributors is subject to obtaining a license renewable annually. Currently 15 retailers will obtain approval to regularize their situation.

k. the seed sector improvement Prospects

Chad has ratified regional agreements (WAEMU / ECOWAS / CILSS and CEMAC) on the harmonization of certification and the seed trade, the fact remains that imports of the best regional seeds seem limited and informal. The main actions that would help the seed industry to move forward are:

- Implementation of a regulatory framework, especially for regional seed trade;
- Strengthening public organizations involved in seed development and approval of varieties, production of foundation seeds as well as inspection, testing and certification of seeds;
- Seed grants for review and their impact on the seed trade in the private sector. In the authors' opinion, subsidies should be phased and producers, companies and private seed traders should be supported so that they can perform these functions they are probably able to run more efficiently than public agencies;

- Removal of price controls on seed multiplied. Indeed, such liberalization would be accompanied by greater financial incentives pushing companies and private multipliers to produce and sell improved seeds;
- Strengthening links between seed and basic seed producers, seed multipliers private, seed importers and farmers. Formal contracts between ITRAD, DSP and producers of certified seed and is a basic measure to formalize and enhance strong working relationships to facilitate information sharing and distribution of quality seeds;
- Funding seed system: Grants allowing seed companies to close and support a portion of the price to encourage private seed operators to make the seed available and accessible in the community.

III. NATIONAL SYSTEM OF AGRICULTURAL RESEARCH

at. public institutes and universities actively engaged in plant breeding

There in Chad two public research institutions for agricultural use, the Chadian Agricultural Research Development Institute (ITRAD) and the Institute of Research for Livestock Development (IRED), the Center for Research and development (NDRC) and Universities (N'Djamena, Abéché, Sarh, Ati and Lai) with skills and activities in scientific and technical research and producing seed:

1. Chadian Institute of Agronomic Research for Development (ITRAD)

The missions and goals

ITRAD, main agricultural institute in the country, is a public company with a scientific and technical nature with legal personality and financial autonomy; created by Act No. 001 / PR / 98 of 27 January 1998 ITRAD Its primary duties are to:

- Support the implementation of national agricultural research policy;
- Perform scientific and technical research for the development of plant production, forestry and fisheries while ensuring sustainable management of natural resources;
- Contribute by scientific contributions to the identification of rural development projects;
- Ensure the production of pre-basic and basic seed;
- Contribute by scientific contributions to the conservation of plant genetic resources;
- Provide education in vocational training institutions.

One of the major objectives was assigned to ITRAD is the creation of efficient varieties from local varieties well adapted to different agro-ecological zones or from the introduction of varieties developed in general by public research institutions regional and international.

What is meant by this objective is primarily to get well-adapted varieties in the middle, resistant or tolerant to diseases and various major abiotic stresses (floods and drought) prevailing in agro ecological zones adoption particularly in the Sahel where these phenomena are very common.

2. Research Institute for Livestock Development (IRED)

Created by Ordinance No. 029 / PR / 2012 of October 2, 2012 in place of the Veterinary Research Laboratory and Zootechnical Farcha (LRVZ).

IRED (eg Veterinary and Zootechnical Research Laboratory, LRVZ) Farcha existed since the early 1950s Its purpose then was to conduct livestock and especially veterinary research profile of the countries of French Equatorial Africa (AEF). Subsequent to his transfer to the Government of Chad in 1985, Ordinance No. 06 was established as a public industrial and commercial (EPIC). IRED is a public institution Scientific and Technical character, with legal personality and financial autonomy. IRED is under the Ministry in charge of Livestock.

IRED's missions are:

- The scientific and technical research for the conservation, development, improvement of the national herd and the value of its products;
- Vaccine production, serums and other biological and chemical products for the maintenance of the national herd in good health;
- The review and analysis of various samples for diagnostic purposes;
- Participation in education and training in academic institutions and professionals;
- The services, studies, advice and expertise;
- The checks and analyzes related to the field of public health;
- The valuation including the pre-extension of research results;
- IRED has a hundred employees, including 29 researchers (5 PhDs).

The laboratory occupies an area of 25 ha in the urban and industrial area of N'Djamena. It has no infrastructure outside the capital while researchers and technicians conduct research throughout the national territory.

IRED is organized into two divisions working closely with the departments of Animal Husbandry Department: Animal Health Division and Animal Production Division. The division Animal Health includes virology laboratories, bacteriology, parasitology and biochemistry. Animal Production Division is actively involved in interesting research and development projects particularly pastoral areas.

Each type of farming is the type of seed crop. As part of the intensification of the production of milk and meat, the focus will be on Panicum maximum which produces irrigated 40 tons per year. IRED, enrolled in a seed network to define requirements used in the production of forage seed.

3. Graduate Institute of Agricultural Science and Environment (IUSAE)

The University Institute of Agricultural Sciences and Environment (IUSAE) within the University of Sarh which houses within the Agricultural Sciences Institute and Environment (ISAE) Sarh. It performs certain research activities in agriculture. Research teams working on research projects and production of seeds and seedlings:

- Production of 10 hectares of Moringa oleifera to fight against malnutrition and for its medicinal properties through its leaves, seeds and roots and Jatropha for biofuel and other medicinal properties;
- Generation project oilseeds (corn, sesame, peanut, sunflower);
- Nurseries fruit trees (mango, lemon, guava, custard apple, cashew) and forestry (jujube, Jatropha, Leuceana, Acacia albida, shea butter, Khaya senegalensis, Melina and Moringa).

4. Regional Pole of Applied Research in Agricultural Systems Development of Central Africa (PRASAC)

PRASAC is a specialized agency of the Economic and Monetary Community of Central Africa (CEMAC). Its headquarters in N'Djamena. It strengthens the institutional and scientific capacity of national agricultural research systems (NARS) through sub-regional cooperation, promoting the sharing of knowledge, promotion of innovative partnerships, and the accentuation of the steering of research by the development goals. Under the auspices of CORAF, PRASAC provides a framework uniting teams of researchers NARS Chad, Cameroon and the Central African Republic. Became operational in 1998, its activities cover certain research themes but especially on scientific animation and training of researchers. Since 2000, PRASAC mandated to build and implement priority research

projects for sustainable development in all 6 countries CEMAC Central Africa. Its activities are organized into three areas: human and animal health, food safety, environment and biodiversity.

The development and adoption of Seeds and Biotechnology Program for Africa (AOSP) provides a framework in which a Seed Sector Development Program Regional CEMAC will be provided by the African Union, given its key role in the development of Africa through the New Partnership for Africa's development (NEPAD). The process of harmonization of seed system in CEMAC countries, committed with the support of FAO since 2008 has been entrusted to PRASAC which aims to provide the sub-region of a legal framework for harmonization seed policies.

5. The partners of Research

ITRAD is the leading agricultural research in Chad and is fully engaged in several networks at the subregional, regional and international levels. the research topics included in their collaborations also include the Chad concerns and thus help to implement certain activities that otherwise would not have been. For example, from 2011 to 2013, the Director General (DG) ITRAD is a member of the National Experts Committee at the Africa Rice Center (AfricaRice); likewise, the DG ITRAD a member of the Western Council of Administration and Central African Council for Research and Development (CORAF / WECARD), the CARBAB's board of directors.

As part of implementation of regional projects on cotton, partnerships are established between national institutions of Brazil Research, Benin, Burkina Faso, Mali and Togo. Nationally, the Scientific Director of ITRAD is the Chairman of the Scientific Committee of the National System of Agricultural Research (NARS), which includes all research institutions working in agriculture. This body is not operational to date and crippling agricultural research critical mass of researchers.

Can be broadly grouped ITRAD different partners into two groups:

- Technical and financial partners are: the African Development Bank (AfDB); the Islamic Development Bank (IDB); World Bank (WB); West and Central African Council for Research and Development (CORAF / WECARD); the Rice Center (AfricaRice); the United Nations Food and Agriculture Organization (FAO); the Regional Center of Applied Research Development Agricultural Systems of Central Africa (PRASAC); the United States Agency for International Development (USAID); the Embassy of France through the Cultural Action Service (SCAC); the Center for International Cooperation in Agronomic Research for Development

(CIRAD); the Warm Regions Institute (CRI); NARS. Other partnerships are established with international centers such as the Institute of the Sahel, the International Research Institute for Tropical Zones cultures Semi-Arid Tropics (ICRISAT), the International Institute of Tropical Agriculture (IITA) and AfricaRice , CIRAD in the framework of joint projects, the Institute for research and development (IRD) and the National development research Center (CNRS). With the latter two institutions (French Institute), the partnership translates mainly through missions of scientific and technical support of researchers from the IRD and the CNRS at their counterparts Chadian Chadian and mentoring students.

- Development partners locally. They are: COTONTCHAD SN, the National Rural Development Agency (ANADER), the Institute of Livestock Research for Development (IRED), the National Development Research Center (NDRC), farmers' organizations (POs) Organization and No local governmental organizations (NGOs).

IRED has many scientific and financial partners including: IAEA, FAO, WHO, OIE, CIRAD, AU-IBAR, Swiss TPH, Wellcome Trust, Swiss Center for Scientific Research in Côte d'Ivoire, EISMV, French Cooperation, Swiss cooperation, MCI, BOIP.

b. Current situation of the recent varietal selection or current species

In the Medium Term Program for Agricultural Research in Chad (PMTRA II) 2010-2014 and the operational plan for the implementation of the PMTRA ITRAD activities are concentrated in three major programs: (1) Intensification, Diversification and Rating Plant Production; (2) Sustainable Management of Natural Resources; (3) Saving and Rural Sociology. The program of the 4th PMTRA "Intensification, Diversification and Value of Animal Production" is run by the Institute of Livestock Research for Development (IRED). This plan has expired, it is currently under review by the ProBAD.

Without a monopoly, varietal research is only conducted by the Chadian Institute of Agronomic Research for Development (ITRAD). Its mission includes varietal selection, creation, adaptation of new introductions, research and development of efficient varieties that meet the needs of users, maintenance and renewal of plant material available and regular supply of the sector pre-basic seed and / or base. Because of funding problems in the years prior to 2010, these activities are only partially fulfilled and little recent performance varieties are offered for multiplication and distribution.

Given the scarcity of specialists in the field of plant breeding, the intensification program, Diversification and Value of Plant Production favors the selection based on introductions. Collaboration with international institutions such as the "International Crops Research Institute for Semi-Arid and Tropics" (ICRISAT), "International Institute of Tropical Agriculture" (IITA), the Center for International Cooperation in Agronomic Research for Development (CIRAD), the West and Central African Council for research and Development (CORAF), the Africa rice Center (AfricaRice), but also with other national agricultural research systems (NARS) in the countries of the subregion was ideal for this purpose.

These introductions are based on station adaptability tests then relocated to middle peasants, often with the participation of producers in these regions. Local multi trials last three years and the best entries are subject to organoleptic tests before the fulcrums of the research is not getting into the production of basic seed.

The conduct of local multi testing is performed by officers ITRAD through a participatory approach with the involvement of agents of the National Agency for Rural Development Support (ANADER), projects and certain non-governmental organization (NGO) from the resort. The fields are also organized tours with them during open houses.

Varietal improvement is from local germplasm and advanced lines mainly from NARS of the countries of the subregion and the CGIAR (IITA, ICRISAT, AfricaRice).

The methods for creating varieties boil down to the applied selection (crossing, hybridization) and local multi trials. Biotechnology (in vitro plants) is not yet used in Chad. Regarding maintenance, the starting material called Seed breeder or parental material "G0" or "breeder seed" is the standard variety and should be behind each seed multiplication process. Its conformity to the original type and maintenance are carried out by research.

AT ITRAD, varietal Maintenance takes place virtually on farms and stations by the researchers responsible for this plant material or by farm leaders. The plant material is sown on two or three lines in the reduced size plots, the "breeder seed" that was kept at the store for two years. The researcher harvest only the best plants, those that reflect the characteristics of this variety. To preserve the varietal characteristics of cereals such as sorghum, maize and millet, self-fertilization is also practiced. This has the advantage of avoiding any loss due to a lack of germination while restoring the variety.

Maintenance is costly in time and financially. It requires the driver of the familiar variety. It has the disadvantage of taking up space and is not immune to natural disasters that could result in its final loss. The ideal solution is to create a gene bank which could be a cold room or refrigerators appropriate. Otherwise, ITRAD also retains its varieties in gene banks international partners in the sub-region.

Chad has more than 358 accessions (germplasm) including 222 of sorghum, millet and 53 of 31 peanuts in gene banks in Sadoré ICRISAT, Niger and especially for rice at AfricaRice in Bouake, Ivory Coast and to IITA in Ibadan, Nigeria.

This maintenance method is risky because the purity of the variety is not 100% guaranteed due to imperfect isolation and there are also risked losing the variety in case of poorly controlled weather. It should here be emphasized that any improved varieties development program and strain of seed production and pre base from a base collection / reference in which is maintained germplasm that will be used in the work crossing of sampling genes and multiplication.

ITRAD has a limited collection base for the major crops with local accessions imported. The collections for other species are much less provided and significant losses of the entries have been recorded in recent years in these collections lack of adequate infrastructure and conservation of funds for maintenance in the field. These collections must be maintained in situ and ex situ, and strengthen their evaluation according to descriptors developed by "Plant Genetic Resources Institute" s (IPGRI). This is an absolute priority ITRAD must grant this year and production of pre-basic seed.

Given the limited resources of research, this collection of material is not regularly regenerated to check the germination and genetic quality in general. To maintain these collections, it takes a special and adequate infrastructure (cold rooms, freezers, in vitro systems, but also in vivo collection of fields) that must be maintained and professionally managed and continuously.

The means of this maintenance are important and can not be provided by the budget ITRAD. ITRAD received a cold room for the conservation of seed strains that broke down. Efforts at the agricultural research, ITRAD are collecting cleaning and maintenance of local cultivars of millet, sorghum, rice, cowpea, groundnut, appreciated by producers compared to their performance, quality and organoleptic resistance to biotic and abiotic factors.

The following table shows the varieties developed by breeders and other ITRAD in Chad.

Table 8. List of varieties speculation worked by ITRAD

Family	Speculation	variety
Cereals	rainfed sorghum	Maraguesseré, K3R, Kolmon red, yellow Kolmon, Doumkiro, Sorghum local
	Sorghum recessional	Djiressé Red, yellow Djiressé, Djiressé White
	Mil	DBS3, DBS5
	Rice,	ITRAD MP-1, TM ITRAD 2, KB-ITRAD 3, Q5
	But	Maka Matafo I and II Matafo
oilseeds proteoglycans	Peanut	Rose's Deli
	Sesame	DLS1, DLS2, Local Gaya, BRS-12, Local Nguelendeng
	cowpea	Bouga
Vegetables	Onion	Variety of Abeche

Source : Sougnabé (2019)

In view of the table varieties ITRAD worked by the researchers are mostly purification, characterization and maintenance of local varieties and rarely involve varietal creations. These local varieties although having sought hardiness characteristics do not have high yields. To address the challenge of food and nutrition insecurity. The aim is mainly to obtain varieties well adapted to the environment, resistant or tolerant to diseases and abiotic stresses major (floods and drought) in the different agro-ecological zones. It is essential to cross its varieties with more productive varieties or introducing improved varieties (hybrids and bio-fortified).

c. State of the art research institutions seed for public purposes

➤ scientific staff

A ITRAD, is designated by a researcher, any agent who completed at least one tank study cycle + 5 years. So this researcher receives monthly allowances research, accommodation and travel according to their rank.

On this basis, ITRAD has 54 researchers of which 9 have their thesis. There are also 4 enrolled in thesis. The rest of the workforce is made up of agronomists, agricultural economists or food technologists.

The 54 researchers and 44 research technicians are unevenly distributed in the regional centers of agricultural research in three agro-ecological zones of the country as follows:

- Forty-eight (48) in the Sahel region including the general management and scientific management;

- Four (4) in the Sudan region;
- Two (2) Saharan zone.

Quantitatively and qualitatively, this number of researchers is certainly very low and less varied. He sorely lacking certain specialties that ITRAD claims to complete the mission entrusted to him. There is no sociologist ITRAD while for the implementation of projects included in the operational level, the presence of a sociologist is essential, not seed specialists and seed technologists.

ITRAD We currently have 2 geneticists / researchers breeders and technicians working on sorghum, and the date palm. However under various courses conducted by the researchers, it should be noted that ITRAD has specialists on crops such as cotton, rice, peanuts, cassava and other roots and tubers. These specialists were trained after various training courses often donated by the Chad partners.

The quantitative and qualitative weakness of human resources, most researchers is young, without a specialization. The number of experienced researchers at ITRAD is actually below 10; it comes to the aging class whose age is between 45 and 55 years.

Given this lack of human resources, researchers need to network (thematic and geographic networks) to exploit possible synergies, increase the efficiency of their actions, and fill existing gaps.

➤ **Infrastructure**

ITRAD is a relatively young institution, with regard to the date of signature of its two statutory texts (Law and Enforcement Decree). However, she inherited infrastructure of the former Directorate of Agricultural Research and Technology (DRTA) of the Ministry of Agriculture and the Center for International Cooperation in Agronomic Research for Development (CIRAD), which gives it a old face with its infrastructure. ITRAD the amenities consist of:

- A building of a relatively impressive level, located on the road Farcha which houses the services of the Directorate General of the Scientific and Administrative and Financial Division. This building was acquired financially from CIRAD is housed in a vast area of 200 120 m along the Chari River;
- A central laboratory soil, water and plants (LASEP) based N'Djaména and built on 4 lots of 60 x 30m;

- Three Regional Centers for Agricultural Research cut according to the agro climatic zones that are (i) the Sudan region, (ii) the Sahelian zone and (iii) the Sahara.
- The three agricultural research stations are distributed in accordance with these agro ecological zones. The most important stations are Bébédjia and Gassi. The Bébédjia station was sold to ITRAD by CIRAD and includes offices, housing researchers, meeting rooms and accommodation for participants, shops and garages. The Bébédjia station has 360 ha for various research activities.
- As against the Gassi was bequeathed looking at the end of the seed FAO project. It has today only 67 hectares of the 200 hectares due to rapid urbanization facing the city of N'Djamena. The Gassi station has facilities worthy of a seed center but not a research facility. The Faya-Largeau station was provided recently by staff and lacks structure. On this station construction project should be released in the coming months.
- Eleven (11) farms serving as fulcrum for research activities and germplasm production. These 11 farms are divided into the two agro climatic zones. In Sudan zone, Farm Deli has 967 ha, that of Békao has 600 hectares, with 500 hectares Moussafoyo, Boumou 10,000 ha, 300 ha Mala and farm Youhe with 300 ha. In the Sahelian zone, there are 7 farms with Am-dam with 100 ha Am-timan with 270 ha Bokoro 272 ha Dilbini 300 ha Dougui 30 ha Walia 32 ha (horticulture specialist center) and finally Koundoul 10 ha .
- ITRAD just embarking on the process of specialization of these structures by interest. This is the case of the center of Kolobo inherited from the Chinese mission to Chad in 2019 was erected Specialization National Center for Rice. The center area is about 30 hectares.

All these listed structures, including farms and points of research support are functional; However, some such as Bokoro, Am-dam, Gassi, Dougui, Walia Boumou etc. were reduced in size because of the anarchic occupations. Land titles governing the powers of these areas date back to colonial times and found in many cases. There is a phenomenon of squatting because access in the areas of these farms is facilitated by the absence of fences and cadastral documents. In many cases the farms are not fully utilized and

because nature abhors a vacuum of squattages are quite common as pet damage. These farms do not always have land titles and claims of former owners are frequent.

ITRAD has no spikes infrastructure such as biotechnology laboratories to conduct research and generate quality data. This can probably explain the scarcity of publications in various fields of research. And one seed conditioning unit in Gassi, which is not adequate to ensure proper cleaning of grain and thus ensure quality.

As for the areas of the fields mentioned above, they are assets to allow ITRAD to carry out its missions, one of which is to ensure the production of pre-basic and basic seed to meet demand seed producers.

➤ **the facilities**

Lare visible equipment ITRAD consist mostly of tractors, tillage equipment, trailers and vehicles 4 x 4. In fact, in each farm or station, it is not uncommon to have at least two tractors that not work. Tillage tools are not available in sufficient numbers to make time for plowing if the farm budget is released in time. Material sowing / transplanting and maintenance of cultures are missing and causing the high cost of labor. On some farms, there are seeds of conditioning chains. This is the case Gassi, Delis, Moussafoyo, Mala, Bokoro although for the past three farms, machinery acquired as part of an old agricultural project (RSA) had not been mounted. It may be noted also that the fleet ITRAD which was well stocked it a few years ago, the vehicles are in a state of wrecks. Almost all the leaders of farm or no research support has 4x4 vehicle.

Much remains to be done. The researchers are under-equipped and perform only work based on comments; making it unreliable data. Retool or build laboratories and infrastructure are therefore a challenge.

ITRAD received a cool room installed in the context of partnership with the operationalization of the Project Seed Sector in Chad (Profi-SEM-T) funded by the Swiss Cooperation and implemented by GIZ that never worked.

ITRAD has a laboratory of soil, water and plants whose primary missions are the analyzes of samples of agricultural parcels soil and water analyzes in agricultural development to monitor soil salinity.

The methods for creating varieties boil down to the applied selection (crossing, hybridization) and local multi trials. Biotechnology (vitro plant) is not yet used in Chad as having neither molecular laboratory or laboratory plant pathology.

Organization of seed production at the Institute:

Law No. 016 / PR / 2016 on seeds and vegetable plants adopted unanimously by MPs October 16, 2016 and promulgated by the President of the Republic November 15, 2016, limits the intervention to maintenance, plant breeding and the regular supply of pre-basic seed and basic. The separation between research and seed production activities is obvious and decided since the beginning of 2019 with the creation of the Unit of Seeds and Seedlings (UDSP).

Seed production involves four successive stages resulting in four categories of seeds: strain seed (parental material or G0), pre-basic seed (G1 G2 G3), basic seed (G4) and commercial seed or certified (R1 and R2). A seed production is being developed in Chad. The state has taken the measure since 2014 in seed production ITRAD limited to the production of basic seed. The production of certified seed (R1 and R2) is provided by private operators or seed producing farmers' organizations. Until then, these operators are far from providing enough quality seeds and they do not generally operate according to real economic bases: all costs are taken into account, the state, projects and NGOs are sometimes the seed buyers and there is a risk that some operators "transform" all from seeds' quality seed. " The private sector is practically not involved in the production or marketing of seeds of food crops. The conduct of participatory breeding of new varieties station and middle peasant is highlight of seed improvement. In particular, the culinary tests, essential in the choice of variety for the varieties to be accepted by consumers, carried out with the involvement of peasants and farmers have been successful. Indeed, agronomic seed (adaptation to ecologies and good returns) are important, but we must consider the fact that agricultural production should be used first and so appreciated, hence the importance of the culinary tests. The low efficiency of research in the field of plant breeding is that the Chadian seed germplasm remains inadequate and poorly diversified.

d. Recent collaborations or underway with the private sector and farmers' organizations seed supply material

Seed markets are virtual, in general; Seeds are sold mostly free way; major markets comprise the request of humanitarian agencies including the WFP, FAO, NGOs, projects and state companies. There is the seed transactions that governance is improving; seed demand is also relatively low. FAO, UNHCR and projects buy basic seed to ITRAD and

deliver producers on their operation site; both parties are bound by an agreement. WFP conducted a Food for Work program, which distributes food and seeds to heads of households to cultivate the fields to foster resilience. Furthermore, cross-border trade of seeds and plants grows timidly.

e. current situation of seed production license agreements by third entities

Chad has not yet signed the seed production license agreements for third-party entities, nor with seed companies.

But be aware that vegetable varieties may be the subject of intellectual property rights, whether through plant variety certificates (COV) in Europe or patents in the US.

The protection of intellectual property helps to ensure a fair return on investment. An effective system of protection also benefits consumers and the general public, to the extent that it encourages fairness in business practices. It also encourages creativity and helps make products more attractive on the quality and price plan. The government encourages this protection not only to stimulate domestic researchers but also foreign companies that could make available to producers Chadian improved varieties adapted and more efficient than local varieties. In this case, they can be registered in the national catalog of species and varieties.

IV. STRATEGIC FRAMEWORK NATIONAL SEEDS

at. Administrative formalities for seed production

Seed production involves four successive stages resulting in four categories of seeds: strain seed (parental material or G0), pre-basic seed (G1, G2 and G3), basic seed (G4) and commercial or certified seed (R1 and R2). The pre-basic and basic seed are the responsibility of ITRAD and are produced governed. The production of certified seed (R1 and R2) are provided by private operators or farmers' seed producing organizations.

The production of the starting material, pre-basic and basic seed seeds are placed under the responsibility of the grower (search) which, subject to compliance with technical regulations, is the master control these seed categories . natural or legal persons that wish to produce basic seed of varieties listed species and varieties in the national catalog of public domain must apply to the DSP.

Annexes technical regulations specify the conditions of production of different categories of seeds (strain, pre-basic, basic and certified) for each species or species groups. They establish, among others, the number of generations of pre-basic seed, basic and certified, regulations to be met cultures and standards to be met lots of different types of seeds.

Before the start of each season, the natural or legal persons admitted to the control shall send a crop declaration to the control and certification service or other approved private organization.

Administrative documents required are:

- form for admission control;
- Report Form crops;
- seed multiplication contract;
- Application for approval technician - seeds.

b. Administrative formalities for the registration of new varieties

Pursuant to Article 32 of Law No. 016 / PR / 2016 of 15 November 2016 on seeds and seedlings of vegetable, it is created a National Seeds and Plants Committee, abbreviated CNSP. The CNSP is under the Ministry in charge of Agriculture.

There is a regulatory framework assessment criteria DUS (Distinction, Uniformity, Stability) and VATE (Values Agricultural, Technological and Environmental) established by Decree. The sub-committee within the CNSP responsible for evaluating new varieties is not always operational and in addition the lack of funding to conduct the DUS tests and make VATE variety registration has not really started.

A decree establishing the national catalog of species and varieties of plants in Chad in 2017 was made by the President of the Republic. Now for inclusion in the national catalog, a new variety must be certified. Conditions of registration are:

- Be recognized Distinct, Uniformity, Stability (DUS) through DUS testing protocol in accordance with the UPOV guidelines;
- To be recognized sufficiently efficient compared to the range of the most common varieties without major flaw to users through a test protocol of Value Agricultural, Technological and Environmental (VATE);
- Being designated an approved name. The species and varieties are listed in the catalog for a period of 5 years renewable.
- The DHS conducted and VATE tests are carried out under the supervision of NUMC for at least two years in one place for DHS and several localities VATE.

c. Administrative formalities for certification of new varieties

The technical procedures defined in the technical regulations are implemented, it is:

- Ministerial Decree No. 070 / PR / MPIEA / SE / SG / 2017 of August 14, 2017, on the specific technical regulations the different species of food crops and vegetables ;
- Interministerial Order No. 81 / PR / PM / MPIEA / Mesri / MDICPSP / 17 of 27 September 2017, on the general technical regulation of the production, control and certification of seeds, into places of specifications actors.
- The Decree No. 032 / PR / MPIEA / DGM / CSP / 2019 of 18 March 2019 laying down the conditions and procedures for the certification of vegetable seeds and plants. The conditions and procedures for the certification of vegetable seeds and plants. Control of seeds and seedlings is exercised at all stages and in all places of production from field to store the producer or the distributor previously admitted to the control.

In application of these technical regulations, paperwork to fill are:

- A statement of completed cultures must be sent to the DSP two months before the implementation of the seed plot;
- The area, minimum and maximum per crop per plot, are defined as follows:
 - ✓ Cereals and pulses: minimum 1 and maximum ha: 20 ha
 - ✓ Vegetable crops: Minimum: 0.5 ha and maxima: 10 ha
 - ✓ Nurseries: Minimum: 0.2 ha and maxima: 10 ha;

These characters being essentially analytical purity, varietal purity, germination, health status, the germination vigor and synthesized through any crop value of the batch.

Seed certification was put in place to ensure consistent quality seeds to farmers. Moreover, it constitutes a traceability, an item sought by manufacturers, processors and consumers.

When the conformity of the product has been verified, the DSP affix an official certificate on each package of seeds certifying that it meets the quality standards required for its category: Carte blanche, white Barée and blue and red for different seed generations (Pre-basic seed, basic seed, certified seed) based on ISTA standards for variables which include the minimum isolation distance, the maximum percentage of off-types, the minimum number of inspections, the minimum percentage of germination , minimum proportion of pure seeds and the percent maximum moisture. The seed inspectors would have to visit the seed plots two to four times during the growing season depending on the culture and the type of seeds produced. available seed lots for certification then require

laboratory analysis in accordance with the ISTA rules to ensure that the seed complies with the agreed specifications. Seed crops Successful inspections "on foot" and laboratory would then be labeled according to the system and would be eligible to receive after paying the fees required certificates mutually recognized seed.

Any seed or seedlings, is labeled with regulatory references to refer to precisely identify the product characteristics (species, variety, batch number, manufacturer name) and certify that they meet the required quality standards.

For seed and certified, is an official label certification provided by the DSP that is applied to each package of the lot. It carries a unique number that provides additional safety traceability.

At the time of sampling, all packaging must be labeled or marked with a reference lot identification corresponding to the range on the ballot. The amount payable for the analysis of a seed sample is fixed according to the species group in 8000 FCFA for cereals and pulses 10 000 FCFA per hectare for peanuts, vegetables and plants. Some producers found that these inspection costs per hectare are high.

Samples having answered to laboratory standards are packaged in bags polystyrene in the presence of the DSP inspectors. Uno label is placed inside the package and a second is sewn to the outside of the package. The weight of packaging for packaging Seed for field crops is determined based on the doses of seedlings per hectare (5 kg to 80 kg). Vegetable crops are packaged in bags varying from 10 g to 5 kg. The sealing material bags Tips for the inviolability of bags is not yet available. The label of a package costs 150 CFA francs.

The Directorate for Seeds and Seedlings (DSP) does not have all the powers to introduce penalties and sanctions for non-implementation of production standards, storage and seed marketing.

d. State of the art of agencies responsible for regulation and certification of new varieties

➤ Staff

The Directorate for Seeds and Seedlings (DSP) created by Law No. 016 / PR / 2016 of 15 November 2016 on seeds and seedlings of vegetable origin in Article 33. For the implementation of this law regulations techniques have been developed. The DSP has to fulfill its mission:

- A directory of approved seed operators who held and evaluated annually;
- A body 30 inspectors and seed controllers which provide all control operations.

The Directorate has not management autonomy or receive grants from the state, which somewhat limits its room for maneuver. Producers who are not in the project intervention area pay themselves the cost of field inspections and analysis at the national laboratory seed. The fact that some projects pay producers control costs seed in their area of operation this takes us to wonder about the sustainability and durability of the control and all the seed sector.

➤ **Infrastructure**

The control service does not have enough of the necessary human resources, equipment and materials required to carry out its mission (iii) the standards and procedures organizing the seed controls are developed and implemented (procedures manual control techniques conduct field inspections and laboratory analyzes). The investment control department of the monitoring mission still lacks the human, and material to fulfill their mission with rigor and professionalism required. A single seed analysis laboratory equipped centrally, not seed analysis laboratory at the regional level;

No space for offices of all the staff and rolling means do many default for control of field work.

In addition it will create jobs in rural areas, the quality control will generate wealth. The DSP has a seed analysis laboratory at the central level. The realization of decentralized controls should cause the DSP to focus its activities and move towards other activities such as the organization of conflicting controls and training.

The appropriate infrastructure for the production, processing, packaging, storage and distribution of seeds remain insufficient in the country.

e. Inventory of basic seed

The quality of seed access is a major challenge in Chad. quality seeds have been identified as one of the inputs to intensify agricultural production in Chad safer and cheaper. Seed is only one element of improving the productivity of agricultural production systems; however, in the Chadian context they constitute the first factor in improving production and the most requested by producers. Moreover, it is really the only external input used by farmers. The use of quality seeds is low among Chadian farmers. At the root of this situation, several factors, including:

- The disruption of seed sector largely dominated by traditional methods;
- The lack of information on available stocks and seed requirements, due to the persistence of the barter system;
- The high cost of quality seeds;
- Seed systems not adapted to the needs of small farmers;
- The national seed network construction;
- Ignorance and / or resistance of some producers to quality control.

f. Procedures for the production and supply of basic seed

➤ **Access private seed companies to basic seed**

The distribution channels of improved seeds are short circuits within which producers usually have to contact an organization (ITRAD), projects and NGOs are responsible for purchasing their products. These circuits are not the result of a normal and regular market but the seed supply system put in place by these public services, institutions and projects.

The main characteristics of these circuits are:

- Irregularity: they are irregular because only dependent on requests from seed programs; when these programs lack funding these circuits are highly disturbed;
- Not taking into account the real needs of producers: these circuits are rather more oriented towards the needs of institutions and NGOs as to those producers, the latter being perceived as mere seed users;
- The lack of direct trade between seed producers and users of the seed.

Besides these circuits, there is the lively marketing system by several operators on different links to a fairly wide distribution of seed production with users throughout the country. Some NGOs like ATADER, CECADEC BELACD and tried to set up their own sales system in favor of members of the groups they have created; volumes passing through these circuits are generally lower demand and it is not uncommon that most of this production remains unsold due to difficulties related to distribution to members.

Until then, these operators are far from providing enough quality seeds and they do not generally operate according to real economic bases: all costs are taken into account, the state, projects and NGOs are sometimes the seed buyers and there is a risk that some operators "transform" all-from seeds' quality seed. " The private sector is practically not involved in the production or marketing of seeds of food crops.

g. Policies in place for the supply of basic seed by the private sector

The Decree No. 028 / PR / MPIEA / DGM / CSP / 2019 of 7 March 2019 laying down the conditions for obtaining approvals for the marketing of certified seed and plants produced locally or imported are issued by the Minister in Charge of Agriculture to any natural or legal person who is committed to:

- Sourcing and market basic seeds and plants and commercial produced locally or imported, belonging to varieties listed in the national and / or regional official catalog (CEMAC-CILSS-ECOWAS-UEMOA) or after departure of the Minister in charge of the Agriculture and meet the provisions of the common rules in force;
- Having a qualified technical staff composed of at least a seed technician;
- Have premises suitable for the storage and preservation of seeds and plants;
- Participate in the promotion of sub-sector of seeds and seedlings;
- Keep a register;
- Share with DSP any information related to the import, export and distribution of seeds;
- Presenting the data sheet and phytosanitary issued by the services of the country of export seed certificate;
- Produce a phytosanitary certificate from the Directorate of Plant Protection and Packaging (DPVC) for seeds for export;
- Making control seeds at the border cord and warehouses by the DSP. Amounts payable for obtaining approval operator category are set at 75,000 FCFA for Distributors / Importers / Exporters and 25,000 FCFA for Retailers.

The authorization application is filed with the Department of Seeds and Seedlings (DSP) and includes the following parts:

- An application form provided by the DSP and completed by the applicant;
- A certified copy of the extract from the Commercial Register and (RCCM) specifying the performance of marketing activity except for producer organizations, individual producers and nurseries only sell their own production;
- A commercial practice certificate stating the import and export granted by the National Agency for Investment and Export (ANIA);
- A certified copy of the professional card;
- A detailed 3-year program detailing the measures envisaged to promote the subsector of plant seeds and seedlings;
- Proof of possession of a suitable room provided for the storage of seeds and accessories.

V. AGRICULTURAL PRODUCTION SYSTEMS

a. Main products of food crops, yields and trends

The area and production of major food crops are rising for the past 5 years in two agro-ecological zones of Chad.

The average production over the last five years shows that cereals (maize, millet, rice, sorghum), tops the 2,501,194 tons followed protein crops (sesame, cowpea and groundnut) with an estimated production of 1,223,825 tons and roots and tubers (taro, sweet potato and cassava) with a production of 529,353 tons. The area, production and yields the past 5 years for major crops are presented in Table 1.

The area and production of major food crops are increases since the last 5 years in Chad (Table 9 and Table 10 in Appendix 4).

Table 9. Average data of the areas and productions for five (5) from 2014 to 2018 for major crops

Source : DSA / MPIEA

Cultures	Mil	Sorghum	Berber	But	Rice	Sesame	Corn	Peanut	cowpea	Cassava	Yam
(Ha)	1177821	1133062	440139	332637	181755	266308	1335	789 517	207822	31764	30523
Productions (t)	676122	948 722	460586	412 747	266378	143091	3017	944871	135863	274 142	255 211
Yield (kg / ha)	574	837	1046	1240	1466	537	400	1197	538	8630	8361

This production is evolving in terms of area planted through irrigation schemes, price subsidies for mechanized plowing, subsidized prices of improved seeds and fertilizers.

b. Main vegetable crops production

Three types of vegetables are produced:

- Vegetables Leaves: lettuce, cassava leaf, celery, cabbage, sorrel, moulikié, amaranth, spinach and parsley;
- Fruits Vegetables: okra, eggplant, pepper, bell pepper, zucchini and cucumber;
- Roots vegetables or bulbs or tubers: onion, garlic, carrot, radish and cassava.

This production is evolving for the past 5 years based on, beans, cucumber, melon, carrot, turnip, squash, zucchini, peppers, cabbage, peppers and potatoes . The limited

information available, the annual output of 547,257 tons would be 50 750 hectares. Onion ranks first in total production (360,782 tonnes annually). The onion and okra have the highest productions 158 tonnes to 149 500 tonnes, respectively (Table 11).

Table 11. Seed quantity of vegetable crops all varieties combined.

seeds	Area (ha)	Quantity (kg)
Onion	19,850	360 782
Potato	17,000	1350
chilli pepper	6,000	11,525
Garlic	2700	10800
Okra	2900	149 500
Tomato	2,300	13,300
Total	50750	547257

Source: Rhadort (1989), ANADER (2009) and SOS Sahel (2013-2014)

Regarding vegetable production is concentrated in a few regions. The N'Djamena region offers significant amounts of all productions in fresh period for the supply of the capital. The Ouaddai region produces massively onion and garlic. A significant tonnage of dried products comes from the regions of Ouaddai and Salamat. There are five main areas of production of vegetables and fruits:

- The area of N'Djaména, which consists of irrigated by Chari and Logone rivers, extends over a distance of about 200 km long;
- The area includes the South Sudanese regions (Moyen-Chari, the Logone, Tandjilé and Mayo-Kebbi);
- The Sahelian zone of the East brings together the Ouaddai, Biltine, Salamat and Guéra (ouaddis and shallows)
 - ✓ The Western Sahel includes Kanem and Lac (the ouaddis and polders);
 - ✓ The eastern Sahel zone that comprises Ouaddai, Biltine and Salamat is the largest in terms vegetable producing area amount representing 86% of the total vegetable production. Onion and garlic are the main products in this area specializing in the production of these vegetables (90% of vegetable production in this region).
 - ✓ Large irrigation facilities are located mainly around the Lake Chad and floodplains Chari and Logone rivers of. Besides, irrigated crops including vegetable crops are grown in the lowlands and especially in ouaddis (Kanem and Ouaddai).

Market gardeners ouaddis systems are located in the western Sahel (Kanem and Lake) and in the eastern Sahel (Ouaddaï / Biltine); the main products are the onion, tomatoes, okra and garlic in some parts of Ouaddaï / Biltine, Salamat and Gera, abundant flood recession crops are grown on impermeable soil after rains. These crops are irrigated but then not take advantage of soil moisture retained after the rains. In these areas, farmers have specialized in the production of dried vegetables (peppers, tomato, okra) which are the main crops with onion and cucurbits. 80 to 90% of the production is dried over instead. The irrigated collective and private are found mostly along the Chari and Logone rivers in the Chari Baguirmi; the main crops are okra, peppers, tomatoes and cucurbits. In the polders of the lake, the main vegetable crops grown in order of importance are: okra, tomato, onion, and to a lesser extent lettuce, melons, potatoes, sweet potatoes and garlic . In irrigated areas surrounded Ouaddaï, Biltine, Kanem, Lac, BET (Borkou, Ennedi Tibesti), and Gera, a large part of production is consumed on. However, cash crops dominated perishable vegetables are on the outskirts of major cities of these regions (Abéché, Bol, Biltine Faya-Largeau, Mao ...) And in the outskirts of N'Djamena, Moundou, Sarh ... In more remote areas to load centers, yet serviced regularly by road hauliers can find cash crops focused on less perishable vegetables (apples earth bowl, onion and garlic in Abéché onion Karal and Binder) or dried and / or powdered. Non-traditional crops (melon and green bean) are essentially made in the N'Djamena region. Other important production areas are the Kanem-Lac and Ouaddaï. Horticultural statistics are, in general, very vague. The extreme diversity of vegetable crops, they burst into many small family area gardens

In the case of several vegetable crops varieties were introduced as part of a regional project of the global center of vegetables (AVRDC) in Mali, FAO, IRAT, INRAN and ISRA. The objective is to implement the project in the area funded by USAID "Deploying vegetables of improved technologies to overcome malnutrition and poverty." This project aims to reduce poverty, hunger and malnutrition by promoting the production, processing and consumption of vegetables and creating activities based on water, sanitation and hygiene (WASH) in 12 countries African.

c. Description of the main agro-ecological zones and farming systems

The territory of Chad is divided into three agro-ecological zones with different climatic and agricultural conditions, largely influenced by rainfall, which varies from north to south, between 100 mm and 1200 mm (Fig. 1). These agro-ecological zones with specific natural and productive potential are, from south to north, the Sudan region, the Sahel and the

Sahara.Chad is a country vulnerable to climate change challenges marked by cycles of drought and / or flooding aggravating factors and detrimental to agricultural production. Three major crop production systems based on agro-ecological zones are observed:

➤ **The Sudanian Zone**

The Sudanese zone covers about 10% of the country and is characterized by diversified production systems, combining food crops (cereals, pulses, oil seeds and tubers) and the cultivation of cotton in a small ruminant and animals (oxen) stroke, plus a transhumant, with a tendency to settle down more and more marked.

Located in the south, this zone includes the southern parts of the regions of Chari-Baguirmi and Salamat and regions of Logone Occidental, Logone Oriental, Mandoul, Mayo-Kebbi Est, Mayo-Kebbi West, Middle -Chari and Tandjilé.

The Sudanese zone covers an area of 130 000 km² or about 10% of the national territory. It includes the basins of two major rivers (the Chari and Logone). Rainfall ranges from 700 mm to over 1000 mm. It reaches 1 200-1 300 mm further south (Moundou, Goré Mbaibokoum).

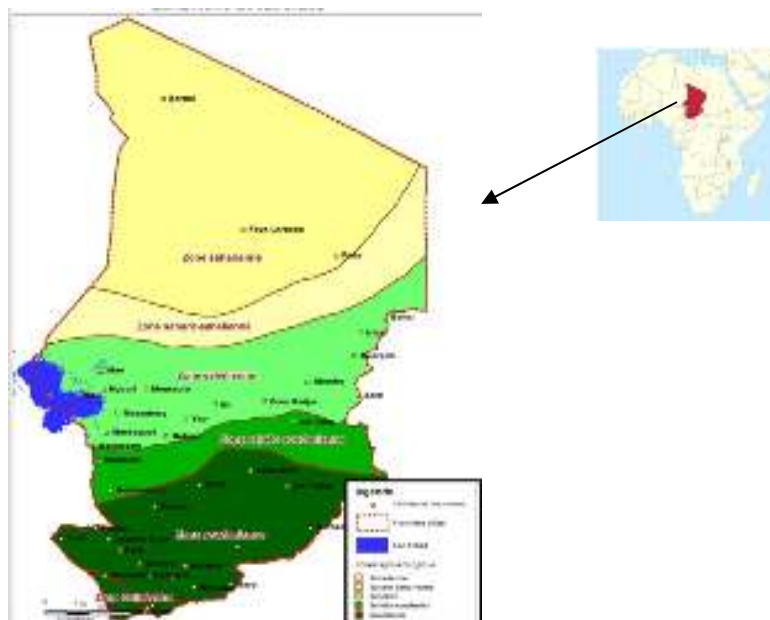


figure 1. The agro-ecological zones of Chad

However, it should be noted that in the area Sudanese analysis of the production system emphasizes the importance of cotton cultivation in the economy of family farms. The

difficulties knows the cotton sector in recent years have forced operators to focus more on other carriers speculations include: corn, peanut, rice, horticulture, arboriculture, the roots and tubers (yams, taro, cassava, etc.). In the Sudanese region even though cereal production would be more than 80% rain, people in some areas depend almost exclusively on natural flood irrigation or controlled.

These are the rice-growing areas between Bongor and Lai. Regarding irrigation urban and suburban, thousands of families live only for this activity around major cities. Irrigation is practiced to develop cash crops.

➤ **Sahelian Zone**

It is between isohyets 300 and 700 mm with a rainy season from June to September and occupies 374 000 km² or 43% of the national territory. The natural vegetation is dominated by herbaceous cover of annual grasses, dotted with Sahel-Sudan type of shrubs which are essentially thorny.

The Sahel is the breeding area par excellence, though farming is widely practiced there. The main crops are among others, millet, sorghum, berbere, corn and wheat cereals, groundnut and sesame for oilseeds and tuber (cassava, sweet potato) in places (Provinces of Chari Baguirmi Guera, Salamat and Lac). Rice and vegetable products are grown in the lowlands, the ouaddis and along the Chari River. It should be noted that the Ouaddai is a large production area of onion and garlic. Peri-urban arboriculture also grows in this area (Abeche, Am-Zoer, Bitkine, Mongo, etc.).

➤ **Saharan Zone**

The Saharan zone represents 47% of the land area. It is characterized by low irregular rainfall (60 mm / year) and pronounced temperature differences. The scarcity of rainfall limits the activity of irrigation in the oases (growing vegetables, wheat and dates). This is essentially the dates of production area, leading to a sustained exchange current between the Faya region and the rest of the country. There are over a million palm trees spread over all plantations totaling 6-7000 hectare. In addition to the date palm, the culture is practiced fruit trees, wheat, millet, vegetables, and fodder for the needs of local farmers. In the Saharan zone, agricultural production is entirely dependent on irrigation, with the exception of dates (non-irrigated).

d. Current status of agricultural extension activities, public and private

There is currently no binding Research and Extension between formal and ITRAD ANADER. Both institutions evolve independently. Therefore, There is not a formal

framework for transfer of research technology popularization. This is why many search results are unknown extension. In the past, there was a pre-extension service ONDR which served as an interface between research and extension. This service is testing different technologies proven by research in multisite trials in a participatory approach with farmers and then popularize mid peasant. The improvements are saved from researchers during the implementation phase of their research projects. Indeed, there to ITRAD themes that require the participation of extension workers of the locality during their implementation phase. Thus, proven technologies and tested by researchers in the presence of extension agents and producers are appropriate for them through a participatory approach.

The national extension and supervision system producers has significant achievements in Chad, but suffers from a number of handicaps to achieve the objectives set by the Government for rural development. Stakeholders are numerous: parastatal structures, projects and NGOs sometimes not working in synergy. There is no coordination, it may happen that the field stakeholders on a site do almost the same thing.

The impact of agricultural extension services in the seed sub-sector is relatively small or even marginal; current structures rarely involved in awareness, formal framework for technology transfer; ignorance of research results through extension; absence of a pre extension service, the introduction of technical innovations of demonstration programs, technological or organizational. Extension services often perform activities for the benefit of national programs and projects. Within these partnerships, extension services help in the distribution of agricultural inputs (seeds, fertilizers), in the field of training and advisory support to seed propagators.

e. public extension system capacity level

Producers who received seeds do not always use them in the most optimal conditions, very often: (i) the delivered seeds and for the planted area is diverted to consumption; (ii) production techniques routes are not mastered by the beneficiaries of the seeds, which results in poor production; (lii) the producers selected to carry the seed multiplication not mastered production techniques, seed treasury and conservation, (iv) the producers are poorly informed about accidents that could result from the consumption of seeds and hazard handling treated seed with toxic chemicals, etc.

➤ The National Rural Development Agency

ANADER created by Law No. 035 / PR / 2016 of 31 December 2016 instead of ONDR, SODELAC and NASP. This new structure is the main tool of state policy in supporting and coaching the rural world, is welcomed by all the technical and financial partners. It is part of a dynamic integration of the actions of agro-forestry-pastoral and fisheries sector and wants a real lever for the country's economic growth.

Missions of the agency

The main tasks of the Agency are:

- Support expansion and diversification of agro-forestry-pastoral production and fisheries;
- Promoting sectors agro-forestry-pastoral and fisheries;
- Support training and structuring of organizations capable of managing collective action;
- Provide support - advice for producers and their organizations in the field of management, servicing and maintenance of agricultural works, forestry, pastoral and fisheries;
- Support the modernization and industrialization of agricultural production sectors, livestock, fisheries and forestry.

Structures ANADER

Under the coordination of the General Directorate, the National Agency for Rural Development Support is divided into four (4) technical departments and ten (10) Regional Branches, Divisions 10 and 22 services.

Human resources

ANADER has a staff of 752 officers device (set out the support staff) distributed as follows:
i) 44 agents at the central level and 708 at regional level.

The device has 708 officers including: ten (10) Heads of antenna, ten (10) Responsible for Monitoring Evaluation, ten (10) Monitoring Evaluation assistants, ten (10) Extension and Training Officers, ten (10) accounting, ten (10) accounting Assistants. At the extreme west antenna, it also counts two (2) Head of one (1) Unit for improvement and preservation of bovine "Kouri" and another for rural developments and reforestation .

Under the responsibility of Heads of antennas included 46 heads of sectors, 46 sectors trainers, 120 Heads of Sub-sectors, 434 Heads of areas including 236 contractual employees and 198). In addition to the technical staff, there are the support staff such as

secretaries, messengers, drivers, guards. Note that the position of contract staff remains to be clarified in accordance with the provisions governing the Agency. Although the number of database agents seems important, however the villages coverage remains low (12.36%).

➤ **The Cotton Company of Chad (Chad Cotton SN)**

The Cotton Company of Chad (CotonTchad) is an organization created by 1972, 75% owned by the government of Chad to 19% Dagrsto 6% by local banks, whose mission is to provide the tools and fertilizer to farmers and market the seed cotton.

The various successive crises in the CotonTchad led the State to be the largest shareholder, with the aim of a revival of cotton production, to undertake a deep restructuring of the Company through the dissolution of the old and the creation of a new , CotonTchad New Society (CotonTchad SN), December 30, 2011. These changes and the planned accompanying measures have created an enthusiasm that gives hope to a genuine revival of the sector activities, especially as the price of cotton fiber on the market International experienced a sharp increase. Yields for both cotton cultivation for food crops are generally low compared to other countries in sub-Saharan Africa: 0.50 to 0.70 tonnes / ha for seed cotton.

In terms of plant genetic material production in the Sudan region, there are the seeds of the cotton plant. To this end, two activities are distinguished on the basis of an agreement signed each year between CotonTchad and ITRAD:

- The multiplication of seed by self-fertilization and isolated patches to maintain varietal purity, for seed strains for Z00 seed production with five cotton varieties: A21, A24, A26, A51 and STAMF;
- The production of seeds for CotonTchad Z00 SN, about 30 hectares are sown each year to produce stem seeds (Z00), the two varieties popularized in Chad STAMF in the eastern part and the western area A51dans reason. In total 15 ha of breeder are produced for each variety each year. Basic seed multiplied in seed farm CotonTchad SN Bekamba and seeds are multiplied by groups of seed producers in Gounou Gaya. This area was quadrupled during this campaign that the interest shown this year cotton production with the acquisition of the company by a Singaporean company Olam. This has led the company to introduce Sodecoton in Cameroon, 85,000 tons of seeds of the variety IRMA to fill the gap.

f. entities activity level of non-government and private sector in agricultural extension

NGOs and organizations like COOPI SECADEV, CECADEC, UNHCR, FAO, ... buy basic seed to ITRAD and put them in small amounts at the disposal of seed producers in their area of operations, which they multiply to other producers in their respective communities under their supervision or the supervision of state services in the area especially with the refugees in the areas of returnees and displaced conflict with Boko Haram in the Province of Lake in the southwest, the Sudanese refugees in eastern Darfur and returned to the Central south.

The financial crisis in his last years that led the authorities to merge the extension structures that share the territory, ONDR the whole territory with the exception of the Lake Province entrusted to SODELAC. The reconstruction of the chain of technical supervision is necessary and useful to the extent that the extension services remain the main instrument to support and train the producers either to produce seed cost (mini kit practice) or for train farmers for proper use of seeds (good farming practices).

The projects shall make available to the population of their area of intervention cereal seeds, legumes and vegetables in response to the food crisis, including the rebuilding of livelihoods and strengthening the resilience of agro-pastoral populations. For maximum effectiveness of their interventions, these humanitarian organizations are doing a lot of effort to simultaneously meet the challenges of transition and humanitarian emergencies but also active in the field of food security by purchasing basic seeds for ITRAD multiply with producer organizations.

g. adoption of improved seed level, Culture

Regarding major speculation, some varieties were sold to extension. The seeds adapted to different agro-ecological zones: short cycle 60-80 days, 80-90 days via cycle, long cycle 90-120 days. Table 1 lists the varieties sold to speculation extension.

The seeds of the adoption of improved levels of cereal crops (rice, corn, millet ...), the protein-oilseeds (groundnut, cowpea and sesame) and vegetables (tomatoes, onion, okra, pepper) by producers are presented in tables 12 to 16.

Table 12. Level of adoption of improved seed rice producers

speculations	variety	adoption level (%)
Upland rice (plateau)	NERICA 4	20
	NERICA 6	30
	NERICA11	20
	NERICA37	10
	MP-1 ITRAD	2.5
	TM ITRAD 2	2.5
	KB-3 ITRAD	5
	CH3	10
	TOTAL	100
Lowland rice (irrigated)	BW 348-1	5
	WAB P18-2-1-450-4-1-1 (NERICAs 37)	5
	NERICA-L28	20
	NERICA-L50	10
	TOX 728-1	30
	WITA 4	20
	MadjitoIngar	3
	ARICA 1	2
	CH8	2.5
	TAISHEN2	2.5
	TOTAL	100

Source : Sougnabé (2019)

Table 13. Level of adoption of improved maize seed and sorghum producers

speculations	variety	adoption level (%)
But	8501 CMS	12.5
	CMS8504	10
	8705 CMS	25
	2019 CMS	2.5
	9015 CMS	2.5
	QPM-Obatanpa	2.5
	I Matafo	5
	Matafo II	5
	Maka	2.5
	97 Tse-W2-C1	5
	Mexican Early 17	2.5
	2009 W Tse STR	15
	Tse-Y1	5
	TZE-Y	2.5
	Tse-W	2.5
		TOTAL
rainfed sorghum	GWS	5
	S35	40
	Kolmon red,	10
	IRAT 204	10
	ISKVII	2.5
	Malisor-28	2.5
	K3R	10

	Kolmon yellow	5
	CS 54	10
	Zouaye	5
	TOTAL	100
Sorghum recessional	white Diressé	30
	Djiressé red	50
	yellow Djiressé	20
	TOTAL	100

Source : Sougnabé (2019)

Table 14. Level of adoption of improved millet and wheat producers

speculations	variety	adoption level (%)
Mil	LCIC9702,	5
	CAMI	10
	DBS3	15
	DBS5	15
	S42	10
	GB8735	25
	SOSAT C87	20
	TOTAL	100
Soft wheat	Penjamo	50
	Mexipack	15
	Somps 90	5
Durum wheat	Diulio	30
	TOTAL	100

Source : Sougnabé (2019)

Table 15 Level of adoption of improved seeds for protein and oleaginous by producers

speculations	variety	adoption level (%)
Peanut	55-437	15
	flower 11	30
	73-33	10
	ICGS11	3
	ICG-13416	5
	ICG-3734	3
	Rose's Deli	10
	Grimari	5
	washed	4
	JL24	10
	IGV86003	5
	TOTAL	100
Sesame	S42	40
	Pachequeno-salt	25
	GS-17-25 (L25-LDB)	2
	GS 88	2
	BLG (White Gera)	3
	NDG (Black Guera)	3
	DLS1	15
	DLS2	10
	TOTAL	100
cowpea	TN 5-78	40

	TN 88-63	5
	VITA 5	5
	IT99-573-1-1	20
	IT 81D985	25
	LORI 24-130	2.5
	VYA	2.5
	TOTAL	100

Source : Sougnabé (2019)

Table 16. Level of adoption of improved seeds of vegetables by producers

speculations	variety	adoption level (%)
Onion	White Soumarana	10
	Galmi Violet,	30
	Red Creole	20
	Onion Abéché	40
	TOTAL	100
Tomato	Roma VF	50
	Xina	20
	Tengeru 97	30
	TOTAL	100
chilli pepper	Safi	40
	Big sun	60
	TOTAL	100
Okra	boul	20
	Tchouloum	30
	Rasis	50
	TOTAL	100

Source : Sougnabé (2019)

Is are also varieties that are disseminated without going through the search. They went through the projects, NGOs, FAO's emergency programs, WFP or individually and are found at the extension. Measures are taken to limit these anarchic introductions (see Act No. 016 / PR / 2016 on seeds and seedlings of vegetable origin).

ITRAD not an ambitious program on vegetable crops and fruit, yet it has an experimental garden that can become a reference center for vegetables in particular and generally horticultural crops.

The diffusion of new varieties is operated by ITRAD without further intervention. Sometimes through a participatory approach ITRAD in the presence of producers and agricultural advisors ANADER or NGOs and projects that contribute to their assessment before the broadcast.

There is a Sub-Committee of Admissions Catalog of Varieties (Canadian Stroke Strategy) within the National Committee of Seeds and Seedlings (NUMC) which is not yet operational, which is responsible for evaluating varieties to be approved and their inclusion in the national catalog.

h. Level of use of fertilizers and organic manure to increase yields by crop

Chad's agricultural productivity is limited by a low use of improved seeds and certified, low fertilizer use, whether chemical or organic (less than four operator uses fertilizers and to very low doses of the order of 15 kg / ha) also being a major factor limiting the productivity of agricultural farms. FAO established by standards of 50 kg / ha. At the continental level, the AU had agreed at the 2006 Abuja Summit to pass the use of fertilizers in the average time of 8 kg / ha to 50 kg / ha in 2015 . A lens ever made, since the average utilization in 2015 does not exceed 15 kg / ha.

Organic fertilizers are used by only a few producers and crop residues are not valued. Fertilizers are applied only on the so-called strategic food crops (maize and rice) and vegetables and industrial crops (cotton and sugar cane). Other crops do not benefit as attention.

There are no shops of inputs (seeds, fertilizers, pesticides) and possibly small agricultural equipment in the basins of major productions. If there is often the price is not in the stock market of the small producer because of customs duties. If the state could subsidize the price initially and raise taxes on agricultural inputs.

i. General description of the marketing system of excess production of staple crops (maize, millet, rice, vegetables, etc.)

The cereal balance is overall surplus in 2019 (185 975 tonnes) of which 18 667 tonnes for rice, and 167,308 tonnes for sorghum / millet / corn and others. The cereal balance is in deficit of 89 964 tonnes of wheat.

Table 17 shows the results for grain rice, wheat, sorghum / millet / corn and others.

Table 17. The cereal balance sheet for rice, wheat, sorghum / millet / corn and other

		RIZ	BLE	MIL/SORGHO MAIS/AUTRES	TOTAL
	POSTES				
	Population au 30/04/2019				15 692 969
I.	DISPONIBILITES	159 103	13 594	2 377 195	2 549 892
	Production				
	Production brute	259 540	1 798	2 760 635	3 021 973
	Production disponible	142 747	1 528	2 346 540	2 490 815
	Stocks initiaux	16 357	12 065	30 656	59 078
	. Paysans	2 135	-	8 933	11 068
	. Commerçants	8 225	12 065	17 722	38 013
	. Gouvernement	5 996	-	4 000	9 996
	PAM		-		-
II.	BESOINS	160 063	126 864	2 221 852	2 508 779
	Norme de consommation (kg/hbt/an).	10	8	141	159
	Consommation humaine totale	156 930	125 544	2 212 709	2 495 182
	Stocks finaux	3 134	1 321	9 143	13 597
	. Paysans	133	-	334	467
	. Commerçants	3 000	1 321	8 810	13 130
	. Gouvernement	-	-	-	-
	. Autres	-	-	-	-
III.	EXCEDENT (+)/DEFICIT (-)	(960)	(113 271)	155 344	41 113
	BRUT.				
IV.	SOLDE IMPORT/EXPORT.	19 627	23 306	11 964	54 898
	. importations commerciales	19 627	23 374	12 116	55 117
	. aides prévues	-	-	-	-
	. exportations prévues	-	68	152	219
V.	EXCEDENT/DEFICIT () NET.	18 667	(89 964)	167 308	96 011
VI.	DISPONIBLE APPARENT/HBT	11,4	2,4	152,2	166,0
	(kg)				

Source: DSA / MPIEA (2019)

The surpluses of the marketing strategy

The marketing of surplus production after the repayment of credit and consumption. It focuses on increasing quantities as production increases. The ability of the marketing system to satisfy this segment marketings in terms of price and purchasing speed is an important issue, since it determines the attractiveness of the sector for producers. This segment currently address the majority of traditional traders circuit and husking, which values less paddy and does not offer the desired consistency.

Rice marketing was essentially treated by the traditional circuit of local merchants and village shellers. This marketing system does not allow a conquest of the market, because it does not achieve the required quality, the existing factory owners lacked the financial means to purchase the rice and it results in an offer too atomized to interest urban wholesalers. The result of these malfunctions difficulties in selling the production, recurring at this time.

Maize marketing, is ensured by individual women and / or organized groups, Mosso, has become formal with the active involvement of women and men. The circuits are maintained by wholesalers cities that rely on intermediaries who collect in large production (Pala, Bol, Deli, ...). We also meet groups of producers who buy and store to sell at better prices. As for places to market, there are mainly: the supply markets located in production areas, on which the producers, with the assistance of wholesalers, meet the collector; wholesale urban markets mainly supplied by wholesalers. These collector lack information on specific request, face the low creditworthiness of customers (detailing) and must finance part of the downstream channel for customer loyalty. Wholesalers urban markets are mostly collectors wholesalers dealing with limited quantities of products, provide a classic function of grouping in urban markets and burst vis-à-vis the semi-wholesalers and retailers, in large cities that constitute the bulk of consumption. In N'Djamena, the market millet, the magnitudes are much the same: about 70 wholesalers, some six traders only sell between 600 and 1000 tonnes per year, most not exceeding 300 tons. These wholesalers can also sell their products to the state through the National Food Security Agency (ONASA) to constitute security stocks distributed in department stores across the country. Wholesalers often do not have a vehicle and dependent on transportation.

They involve, among others, the purchase campaign among producers: fixing the appropriate time of a floor price which will be placed at a level slightly higher than that prevailing on the production market, awareness and organization of producers for the collection of products, start collecting early harvest from producers at the collection markets and in intermediate markets or relay of large cities. Wholesalers traders come off products for large agglomerations (N'Djamena, Moundou, Abéché and Sarh). They show that the inventory credit ("warehouse receipt") can be an instrument of increase producers' incomes. But this is only possible under certain conditions, in particular the understanding of pricing mechanisms.

For vegetable products, four major types of actors can be identified in the marketing channels for horticultural products:

- Wholesalers, traders and collectors for the collection and routing of garden produce to the wholesale markets, sometimes develop close ties with some producers by providing them with seeds and fertilizers on credit;
- The collectors, commission intermediaries are responsible for delivery of the goods made by the producers find buyers and negotiate prices between producers and

wholesalers. We can distinguish two types: rural collectors, who work in rural markets and mediate between producers and wholesalers; urban collectors in urban wholesale markets, which play an important role in the distribution of vegetables;

- urban markets wholesalers are mostly collectors wholesalers dealing with limited quantities of products, provide a classic function of grouping in urban markets and burst vis-à-vis the semi-wholesalers and retailers in major agglomerations that make up the bulk of consumption.
- Retailers sell the lot or koro sometimes the customer demand in the markets. As for places to market, there are mainly: the supply markets located in production areas, on which the producers, with the assistance of the collectors, meet wholesalers; wholesale urban markets mainly supplied by wholesalers, which operate on wholesalers, working alternately on local and imported vegetables. These marketing channels appear relatively long, but correspond to an economic logic, since each professional category has a specific role. These circuits are sometimes short-circuited,

j. Trends in the development of industries and sales channels for staple crops

In the field of manufactured products, market supply, mainly from the circuits of fraud, is the highlight of the current situation. It is in the circuit of marketing imported food that observed the highest investment in storage capacity (various stores and shops in the markets) and heavy vehicles (trailers).

This tour takes in the urban fabric of always clearly defined areas and great readability - concentration areas warehouses around the markets or in some neighborhoods, well-built shops in the markets - and whose occupation is the status for essentially defined (lease, rent, titled property), which guarantees durability, unlike the characteristic instability of food products wholesale facilities.

The supply lines of food are still dominated, as noted by a group of a few large importers or authorized distributors (in countries where the import sector is controlled by the state) styling pyramid not only many regional and urban wholesalers, but also semi-wholesale markets. The distribution channel is based on a cascade of credits between operators

The import system supplies most of the industrial needs for the manufacture of poultry feed, and part of the human consumption needs. There are two categories of operators to import:

- Large industrial processors import directly from international traders for almost all of their needs. Maize imports mainly from Europe, Asia, Africa. Using the import is for them a solution to ease over supply in the local or regional market, since it allows them a supply and a regular and predictable quality with minimal transaction cost.
- Some wholesalers importers, working on rice, wheat and corn, also import for resale or to processors of lesser importance (for which direct access to international trading is more difficult because their needs correspond to lower orders) or to wholesalers flowing their products on the markets. Some of the smaller poultry feed manufacturers supply partly imported corn from countries in the subregion (Cameroon and Nigeria in particular), when the price they can get are lower than those offered by importateurs- wholesalers.

The marketing of local maize involves relatively small amounts, due to the importance of consumption. It is ensured by a traditional network collectors in the markets of production areas, wholesalers and retailers in urban and rural markets. It is striking that this circuit supplies virtually the needs of industrial processing. Trade flows of maize are presented globally:

- The needs of industry and brasseries are mainly supplied by imports;
- human consumption needs (and the needs of family farmers to feed their animals) and the needs of small-scale processing are powered by both the import and marketing of local corn.

VI. SUMMARY AND CONCLUSIONS

a. Current state of access to improved seeds among small farmers

There is currently a lack of promotion of improved seed on-farm and insufficient consultation between the various partners, developers and seed farmers. Farmers do not have quality seeds, experiencing low productivity and low production. This does not allow them to increase their income significantly.

Essentially, we must remember that in Chad, farms in staple crops evolve in an environment that lacks seed circuit capable of making available the producers of good quality seeds. Today, the rate of use of improved seeds is low (about 5% of the potential needs). Yet, the state has made large investments to install a seed system performance

built around a modern seed industry. This seed circuit is unsuited to the realities of peasant farms.

Several causes have been identified, the main ones: (i) a marked lack of human, physical / infrastructural and financial level extension and control; (li) Operating seed unsuitable systems to the needs of small farmers who are still responsible for over 98% of agricultural production; (lii) even timid initiatives structuring and development of agricultural sectors.

b. Current state government support to improve seed systems

The country has built an institutional framework, and has a legal arsenal and regulatory framework for organizing the seed sector. The implementation of the law and legislation and regulations to support the entire device; in particular, it will put in place a technical regulation governing the production, quality control and seed trade, but also a catalog of species and varieties grown in the country concerned; an action plan whose objective is aimed to strengthen the operational capacities of the seed system elements will complement this. The organization of the seed system remains crucial, since it clearly defines the assigned missions involved structures especially those that must bear the official control authority and seed certification. The sustainable increase in agricultural productivity necessary to achieve food security and inclusive economic growth is not possible without an efficient seed sector.

Sustainable intensification of agriculture is one of the conditions for the achievement of "The Declaration of Malabo" in 2014 aimed at the eradication of hunger and halving poverty in Africa to 2025, only 6.10% of the national budget is devoted to the development of agriculture on the 10% recommended. The use of certified seed is considered the first step in the process of agricultural intensification. The seed is the first factor of farmers, it contributes significantly (40%) in the formation of crop yields. Its role is more prominent than the other key factors such as the use of good agricultural practices, soil fertility and water supply of the soil,

These efforts are reflected in recent years through the irrigation facilities, the subsidy prices of inputs (seeds, fertilizers and pesticides) and plowing, agricultural mechanization, etc.

Chad's agriculture is characterized by the lowest rate of use of modern inputs. This low use of improved seeds largely explains the low level of productivity of the Chadian agriculture. Thus, the State has created an institutional framework for the development of

sustainable seed sector to ensure the availability of improved seeds in quantity and quality to meet the needs of all farmers.

In this context, the Government of Chad, aware of the strategic importance of seed, has established a national seed policy and seed legislation that will allow contribute to the promotion of seed varieties of crops with high performance adapted to local conditions, which will enable local farmers to increase yields, improve food security of the population and promote economic development.

c. Trends and opportunities to improve seed systems

The diagnostic study of the seed sub-sector showed that the seed sub-sector has several opportunities and challenges:

Opportunities :

Opportunities are the most numerous:

- Chad has a huge agricultural potential still untapped;
- Institutionally, the facts are marking the adoption of the Seed Law and the national seed policy that led to the creation of a seed management and Plants, of a harmonized national seed Regulation on quality control, certification and marketing of seeds;
- One private seed company exists. The support by the state for the creation of private seed companies should be able to contribute significantly to the provision of improved seeds in the coming years;
- There are individual producers, producer groups or associations of seed producers that are grouped in a national federation of seed producers of Chad (FENOPS-T);
- Some initiatives to increase production, supply and use of certified seeds were supported by several projects (PROFISEM, PDRLIAT, parsat, ProBAD, P2RS, PDR-CL, PGRN, etc.);
- ITRAD has an area of about 10 000 hectares, more than enough to be able to satisfy seed production needs of breeder and foundation seed companies.
- **A growing demand for food**
Chad's population is constantly growing and is growing at a very rapid rate (more than 3% per year). Food demand therefore necessarily increases each year, and

every year, therefore, the seed needs increase. This is why the seed sector is first in line to meet the challenges of production and supply induced by this demographic change.

- **Increased demand for quality seeds and improved varieties**

Chad's population is on average over 80% rural. Seed consumers, including the beneficiaries of humanitarian distributions, need quality seeds, appropriate and high efficiency. The present improved seed utilization rate of only 5%, which increases to 20% within 5 years.

- **The political will to run the seed sub-sector**

The will of the Chadian government to refocus its economy on sources of diverse and sustainable growth including agriculture part is very strong, as demonstrated by the national plans such as PNDs and PNISR. In particular, the seed sub-sector is expected to play an important role in the revival of agriculture in Chad, with particular reference to the challenge of increasing agricultural yields. The Seed Law adopted in October 2016 demonstrates the commitment of the Chadian government in promoting the seed sub-sector. In particular, the law allows the free exercise of the seed business in Chad, which has a large opening to the private sector. This law protects those who invest in the business,

- **The vast expanse of arable land available**

The high availability of arable land facilitates the provision of surfaces for commercial seed multiplication.

- **Climate change, especially the erratic nature of rainfall that is a consequence**

In the current context of climate change, where rainfall is erratic and more unpredictable, the demand for new varieties adapted to a shorter growing season, could strengthen. Indeed, the varieties developed by research institutes offer higher yields and are more resistant to challenges of climate change, such as drought. Thus, one of the solutions to help small farmers adapt to climate hazards is to improve their access to new drought resistant ecotypes for the main crops.

Challenges :

The challenges are manifold and numerous:

d. recommendations

Based on comments and shared in-depth discussions with the various stakeholders in the sector during the mission, recommendations for short and medium term actions are:

Short term :

- Improving governance seed sector is needed to enable actors to fully play their specific roles: a breeding through research, multiplication and distribution by the private sector (companies, OP) in respect more or less stringent regulatory provisions;
- Capacity building (structure / professional and technical skills development) and facilitate the involvement of producers and seed entrepreneurs to support the emergence of an efficient private sector;
- Improved communication about the laws and regulations necessary to facilitate their adoption and compliance by industry players;
- Develop collaborative dynamic by creating functional spaces for dialogue at both national and provincial level "innovation platforms" needed including consultation, identifying needs in innovation, consistency of interventions and more generally the development responses to the challenges of the seed sector;
- The renewal of the genetic basis for the production of primary food crops is more than necessary, especially sorghum, millet, maize, rice, groundnuts, cowpeas, sesame and maize;
- Study possibilities of relocation certification services under the DSP at the provincial level (allocation of officers in the regions, eg Bébédjia and Bol), to minimize delays and costs for seed producers. In the same context, also deploy ANADER officials in these production areas for technical support to farmers in seed multiplication;
- Creating local circuits adapted and regular distribution of fertilizers to facilitate access for producers (ANADER Antennas);
- Strengthening the role of planning and monitoring in the chain of the seed sector, capable of guaranteeing the effectiveness of interventions;
- The conditions must be taken to ensure the sustainability and scaling of the effects of projects working to increase seed supply to farmers improved the country (ownership by the Department).

Medium term :

- Introduction and creation under certain conditions, new varieties of hybrid species of interest to producers;
- Create favorable conditions for private investment (development of public private partnerships): enhance awareness of operators on the investment opportunities in the seed sector, reduce market fragmentation and secure investments;
- The Empowerment (status, funding) service in charge of the enforcement of regulations on seed (DSP) would reduce their vulnerability and improve their efficiency;
- Improve the performance (human, material, infrastructural) of the device research and development and other public technical services involved in the sector;
- Facilitate the creation of seed distribution systems improved local (small private shops in villages);
- Create an efficient communication service and set up a programming system, monitoring and evaluation to create the institutional memory;
- Provide ITRAD advanced laboratories and establish greenhouses in the stations to do applied research and integrated.

e. Impacts and benefits of a better smallholder access to improved seeds

Improved seeds are a critical input for increasing agricultural productivity, along with increased use of fertilizers, selective use of other agro-chemical agronomic practices and improved products. ITRAD, the Institute for Agricultural Research Chadian, introduced and developed improved varieties of crops, pulses and oilseeds, vegetable and cotton. The multiplication of improved seed for staple crops has increased significantly over the past decade although the use of improved seeds by small farmers who do not cultivate cotton is limited. While she is yet the focus, only 95% of demand for seeds of food crops improved is satisfied (through local propagation) while only 5% of the demand of improved varieties is satisfied. If the government controls the production of basic seed, a single seed company (ESCOR-Agro) private but many seed producers (about 4000, organized in 9 cooperatives) that take in hand all the multiplication of certified seed but its cooperatives less equipped and less resources for their operation. The production by the basic seed does not meet the ITRAD seed private producers specifications hoping to meet national needs. Therefore, seed supply does not meet demand, or more specifically, the conditions necessary to plant the entire area under staple crops. The proportion of the demand for seed that is satisfied is particularly low for coarse grains (millet and sorghum) and crops such as cowpeas and groundnuts for which producers keep the seeds for each crop for planting the following year . Some seed imports are permitted but

most (excluding rice seed) appear informal in nature from neighboring countries and, consequently, are not controlled. Also, the imported varieties are they not subject to a screening or a routine test. The medium-term trends in national yields are stagnant and expected yield increases from the use of improved and subsidized fertilizer imported seeds have not materialized. The legal and regulatory framework exists only in theory and is not implemented, obviously because of the limited financial and human resources. Also limited are the field inspections of seed multiplication operations by producers and, moreover, although conducts laboratory testing and certification of improved varieties, quality certified seed is often called into doubt on suspicion of bad germination rate. Chad has ratified regional agreements (WAEMU / ECOWAS / CILSS and CEMAC) on the harmonization of certification and the seed trade, the fact remains that imports of the best regional seeds seem limited and informal. The main actions that would help the seed industry to move forward are:

- Increased genetic potential to respond to user requests;
- Securing seed production (facilities, mechanization, irrigation) for producing irrigated and rainfed seeds;
- Creation of seed companies throughout the territory and strengthening initially by the state. These companies serve as locomotive in the production of R1 seeds will supply smaller quality seed producers at acceptable costs;
- Strengthening public organizations involved in seed development and approval of varieties, production of foundation seeds as well as inspection, testing and certification of seeds;
- Subsidizing input prices (seeds, fertilizers, pesticides) and small agricultural equipment.
- Removal of price controls on seed multiplied. Indeed, such liberalization would be accompanied by greater financial incentives pushing companies and private multipliers to produce and sell improved seeds.
- Strengthening links between seed and basic seed producers, seed multipliers private, seed importers and farmers. past formal contracts between ITRAD and certified seed producers and seed companies for basic seed is able to formalize and enhance strong working relationships to facilitate the exchange of information and the plasma distribution germs.

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NOTES

APPENDIX 1: Backgrounder on Seed Operators
seed centers,
Associations or groupings farmers
private individual or company,
Projects,

NGO

Name.....

Address.....

Year of creation.....

Do you have a license to practice?

Nature of your structure

Number of members

List of species and varieties produced

Total area of holding or holdings (ha)

Area exploited annually (hectares)

produced seeds categories

Your seed-controlled?

Your seeds are- they certified?

Do you have packaging facilities?

Quantities of seeds produced during the last 5 years

years	cash	variety	Quantities
2014			
2015			
2016			
2017			
2018			

Productions projected during the next 5 years

Number of staff

Do you have partners?

Get technical support:

By who?

Nature supports

Receive financial support

By who?

Existing facilities:

Major customers:

The sales prices:

Average cost of certified seeds per ha

loads	Amount	Unit price	FG / ha
Preparation of soil			
Basic seed			
inputs			
Irrigation fees			
Workforce			
Screening & sorting			
Other expenses			
Financial expenses			
Total expenses			
Selling Products			
Gross margin			

What are the major constraints that you face?

What are your suggestions to remove identified constraints?

NOTES: 2. Backgrounder on Research Centers producing seeds

Name.....

Address.....

Year of creation.....

institution status

Nature Search

Method of production Variety

List of species and varieties obtained or created

Number of species and varieties in collection

varieties of disposal scheme for seed producers

Number of regularly maintained varieties

produced seeds categories

total farm area (ha)

Area exploited annually (hectares)

- for maintenance
- for seed production

Quantities of seeds produced during the last 5 years

years	cash	variety	Quantities
2014			
2015			
2016			
2017			
2018			

Productions projected during the next 5 years

years	cash	variety	Quantities
2020			
2021			
2022			
2023			
2024			

Number of researchers in total in the center:

Number of species by breeders

Number of junior staff

- technical officers
- Workers
- maneuvers

Existing facilities:

- seed testing laboratories
- Laboratories for in-vitro culture
- Cold rooms
- Packaging Machines
- Agricultural Production Facilities

Seed disposal scheme for producers

Major customers:

The sales prices:

Average cost cost seed pre-basic ha

loads	Quantity (kg)	Unit price	CFA / ha
Preparation of soil			
parent seed			
inputs			
Irrigation fees			
Workforce			
Screening & sorting			
Other expenses			
Financial expenses			
Total expenses			
Selling Products			
Gross margin			

average cost of basic kilogram of seed per ha

loads	Quantity (kg)	Unit price	CFA / ha
Preparation of soil			
pre-basic seed			
inputs			
Irrigation fees			
Workforce			
Screening & sorting			
Other expenses			
Financial expenses			
Total expenses			
Selling Products			
Gross margin			

ANNEX 3. TERMS OF REFERENCE

In a national study of existing seed systems and their potential for improvement

Context.Population growth, persistent malnutrition levels, low agricultural productivity and the stagnation of rural economies are major concerns that the African continent faces for decades and are subject to significant investments on the part of donor agencies and

African governments. Among the interventions targeting directly the lives and livelihoods of poor small farmers, few have shown as much interest as the adoption of seed of high yielding crop varieties adapted to local conditions.

Unfortunately, Africa has suffered decades of failed attempts seed supply oriented supply systems managed by the government, the supply of community-based seed or seed multinational interventions, none of which demonstrated its ability to operate in a sustainable manner to achieve a majority of farmers. Recently, however, a pattern has emerged which focuses on capacity building of local seed entrepreneurs and private private sellers of inputs and village-based and national public crop breeders to work in a complementary manner in a seed value chain that provides new varieties of certified seed grown by national and international institutes selection for small local operators. 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.

However, many African countries with significant agricultural potential not participated in passing to public seed systems / private and therefore have little or no progress in improving food security and rural economic growth. To also bring the benefits of improved seeds to the farmers, the Seed Systems Group (SSG) proposes to carry out feasibility studies for the development of seed systems in these countries and to intervene in at least 10 of them with great success a period of 10 years.

Therefore, SSG is soliciting proposals from consultants trained professionals with expertise in agricultural development and seed systems for the collection of data, information and ideas related to crop selection, seed supply, agricultural extension and related activities awareness of farmers and supply networks in rural inputs. The information, analysis and proposed interventions will be compiled in the form of a report whose contents are described below.

Work's extent. The consultant will prepare a report covering the topics and sections below:

a.Introduction and Background

a.Farming Systems

b.Current and recent agricultural development initiatives

c.Scope for development of agriculture

d. State seed supply

- a. seed supply History
- b. Recent and ongoing activities aimed at dissemination of improved crop varieties, by crop
- c. Current options for small farmers to access improved and certified seed
- d. Number of private seed companies operating in the country and their annual offer
- e. Other non-governmental organizations and farmers' organizations active in the production and supply of seeds
- f. Facilities available for processing and packaging of seeds
- g. Tonnages of certified seed and marketed during the past five years, by crop
- h. Number of agro-dealers currently operating, by region
- i. Seeds Import
- j. Seed supply Prospects for improvement

e. National Agricultural Research System

- a. public institutes and universities actively engaged in plant breeding
- b. Nature of improvement activities or recent cultures underway
- c. capacity level of public institutions
- d. scientific staff
- e. Infrastructure
- f. or recent collaborations underway with the private sector in seed supply
- g. Current situation of crop variety of license agreements

f. National Strategic Framework on seeds

- a. Documents that control the seed supply
- b. Recent or ongoing activities to improve seed supply
- c. Registration Process improved crop varieties
- d. Seed Certification Procedures
- e. Current situation of the regulatory bodies responsible for seed certification
- f. active staff
- g. Infrastructure
- h. Current state of the supply of basic seed (basic)
- i. Procedures for production and supply of basic seed
- j. Access private seed companies to basic seed
- k. Policies supply of basic seed by the private sector

g. Crop production systems

- a. Main products of food crops, yields and trends
- b. Description of major agro-ecologies of the country and their culture systems
- c. Current status of agricultural extension activities
- d. public extension system capacity level
- e. entities activity level of non-government and private sector in agricultural extension
- f. adoption of improved crop varieties level, Culture
- g. Level of use of fertilizers and manure to increase yields by crop
- h. General description of the marketing system of excess production of staple crops
- i. Trends in the development of markets for staple crops

h. Summary and Conclusions

- a. Current state of access to improved seeds among small farmers
- b. Current state government support to improve seed systems
- c. Trends and opportunities to improve seed systems
- d. recommendations
- e. Likely impact of improving smallholder access to improved seeds

More specifically, the consultant will carry out desk reviews of literature and relevant data for each country, will organize site visits for talks with leading professionals providing seeds, staff of the Ministry of Agriculture, the breeders cultures, other scientists and executives of the national Department of agriculture. Research Institute, private seed companies managers, distributors private agricultural, non-governmental organization leaders focused on agricultural development, leaders of farmers' organizations and other cooperative focused on providing seeds, organizations management seed regulations and donor organizations agricultural development in the country.

The consultant will gather relevant information on the following topics: and expected deliverables. The consultant will be required to produce a report of a maximum of 100 pages covering topics described above.

Responsibilities Seed Systems group. Seed Systems Group will actively work with the consultant on all matters related to the completion of work, including joint visits in some countries, consultations on best methods of intervention, the availability of improved crop varieties, etc.

institutional arrangement. The consultant will report directly to the SSG direction for the duration of the contract. However, the consultant will be allowed to freely interact with the consulting firm hired by ASG to establish national feasibility reports and a business plan for SSG operations covering work phases five and ten years. In pre-identified specific intervals, the consultant will inform the SSG progress in achieving the deliverables of the contact.

Duration of the study. This study will last 30 working days, from contract signing to delivery of the final report.

Skills. The consultant will have extensive knowledge of the key factors that contribute to the productivity of smallholder farmers in Africa. The consultant will have a history of achievement in the field of analysis and evaluation of the agricultural sector in Africa, including in Francophone countries and / or Portuguese. The consultant will organize and conduct meetings in English and French, and review the literature in English and French.

APPENDIX 4.

Table 4. Productions of pre-basic, basic and R1 tons of 2020-2023

Speculation	2019		2020				2021			
	P. Pre-basic (T)	P. Base (T)	P. Pre-basic(T)	P. Base(T)	P. R1 (T)	R1 S (ha)	P. Pre-basic (T)	P. Base (T)	P. R1 (T) (T)	S. R1 (ha)
Mil	0.17	6.12	0.25	12.25	453.02	765.44	0.33	18.37	906.04	1530.89
Sorghum	0.15	6.50	0.23	13,00	560.29	649.90	0.30	19.50	1120.58	1299.81
But	0.48	9.87	0.73	19.75	402.24	394.98	0.97	29.62	804.48	789.96
Rice	4.85	43,03	7.28	86.07	763.45	537.93	9.70	129.10	1526.89	1075.87
Berber	0.09	3.20	0.13	6.40	231.14	320.03	0.18	9.60	462.29	640.06
Corn	0,004	0.07	0.01	0.14	2.28	1.16	0.01	0.21	4.56	2.32
Peanut	30.41	215.08	45.62	430.15	3041.82	2688.44	60.83	645.23	6083.64	5376.88
Sesame	0.03	1.08	0.04	2.15	92.08	179.37	0.05	3.23	184.15	358.75
cowpea	0.72	9.72	1.08	19.43	261.06	388.66	1.45	29,15	522.12	777.31
Earth pea	3.93	16.93	5.89	33.86	146.08	141.10	7.85	50.80	292.16	282.20

Table 5. Productions of pre-basic, basic and R1 tons of 2021-2023

Speculation	2022				2023				2024			
	Breeder (T)	P. Base (T)	P. R1 (T)	R1 S (ha)	P.Prébase (T)	P. Base (T)	R1: 20% Needs (T)	R1 S (ha)	P.Prébase (T)	P. Base (T)	P. R1 (T)	R1 S (ha)
Mil	0.41	24.49	1359.05	2296.33	0.50	30.62	1812.07	3061.78	0.58	36.74	2265.09	3827.22
Sorghum	0.38	26.00	1680.87	1949.71	0.45	32.50	2241.16	2599.62	0.53	38.99	2801.45	3249.52
But	1.21	39.50	1206.71	1184.94	1.45	49.37	1608.95	1579.92	1.70	59.25	2011.19	1974.91
Rice	12,13	172,14	2290.34	1613.80	14.55	215.17	3053.78	2151.73	16.98	258.21	3817.23	2689.67
Berber	0.22	12,80	693.43	960.09	0.27	16,00	924.58	1280.12	0.31	19,20	1155.72	1600.15
Corn	0.01	0.28	6.84	3.47	0.01	0.35	9.11	4.63	0.01	0.42	11.39	5.79
Peanut	76.04	860.30	9125.46	8065.32	91.24	1075.38	12167.28	10753.76	106.45	1290.45	15209.1	13442.2
Sesame	0.06	4.30	276.23	538.12	0.08	5.38	368.30	717.49	0.09	6.46	460.38	896.86
cowpea	1.81	38.87	783.18	1165.97	2.17	48.58	1044.24	1554.62	2.53	58.30	1305.29	1943.28
Earth pea	9.81	67,73	438.25	423.31	11.78	84.66	584.33	564.41	13.74	101.59	730.41	705.51

P: Production; T: Ton / ha; S: Surface area (ha)

Table 10. Average data of area, production and yield for the five (5) years (2014-2018) of major food crops

Year	Mil			Sorghum			But			Rice			bereBere			Corn			Total	
	S	R	P	S	R	P	S	R	P	S	R	P	S	R	P	S	R	P	S	P
2014	1103180	630	694751	1095365	841	921662	285993	1164	332889	193717	1570	304112	533307	927	494445	622	1300	809	3212184	2748668
2015	1098366	539	592 124	1074356	778	835405	304942	1146	349500	172012	1415	243478	408083	1056	431056	689	1400	965	3058448	2452528
2016	1224570	593	725677	1191355	832	991045	348716	1273	443 779	182404	1413	257701	454065	999	453716	871	2000	1742	3401980	2873660
2017	1165459	566	660 175	1147470	825	946295	335637	1181	396506	191029	1380	263555	451873	993	448500	950	1968	1870	3292417	2716900
2018	1221948	619	756616	1138787	867	987558	341872	1281	437898	185825	1397	259 540	494943	1169	578562	801	2244	1798	3384176	3021973

Source : DSA / MPIEA (2019)

Year	Peanut			Sesame			cowpea			Earth pea			Cassava			Potato			Taro			Total	
	S	R	P	S	R	P	S	R	P	S	R	P	S	R	P	S	R	P	S	R	P	S	P
2014	774604	1021	791088	421562	486	204848	211 607	538	113922	444	999	444	30682	5439	166888	9330	15292	142 677	2299	1849	4252	1450528	1424118
2015	577805	1246	720 138	305882	499	152624	204 282	676	138 088	24641	1342	33079	24290	5804	140 971	13389	7254	97,128	10542	1923	20274	1160830	1301919
2016	790769	1102	871249	279017	551	153611	211 453	681	144 070	35688	1052	37551	35152	14012	492534	33 842	5036	170431	9741	1948	18974	1395661	1888418
2017	768056	1133	870094	297654	533	158 715	209309	726	151974	30098	1153	34,710	35194	8257	290584	28982	6898	199912	12621	2270	28652	1381914	1734641
2018	786890	1136	893940	325 114	531	172539	222 182	684	151932	28874	1069	30880	35059	8109	284307	36974	6909	255447	9146	2302	21055	1444239	1810099

Source : DSA / MPIEA (2019)

