



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

# SEED SYSTEMS IN SUDAN

Weighing of Vegetable seeds in Assar  
village-West Elgalabat, Sudan.  
Photo credit: courtesy of Mercy Corps.

## An Annotated Bibliography

1 November, 2023

A study commissioned by the SASAS Project, coordinated by CIMMYT



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# SEED SYSTEMS IN SUDAN

## AN ANNOTATED BIBLIOGRAPHY

Everlyne Binyanya<sup>1</sup>, Hugo De Groot<sup>1</sup>, Omer Abdalla<sup>2</sup>, Paswel Marenya<sup>1</sup>, Louise Sperling<sup>3</sup>

CIMMYT, Nairobi

(Emails: [everlynbinyanya@gmail.com](mailto:everlynbinyanya@gmail.com); [h.degroot@cgiar.org](mailto:h.degroot@cgiar.org), [p.marenya@cgiar.org](mailto:p.marenya@cgiar.org))

<sup>2</sup> CIMMYT, Khartoum, Sudan ([omerwadelkabashi87@gmail.com](mailto:omerwadelkabashi87@gmail.com))

<sup>3</sup>SeedSystem ([sperling@seedssystem.org](mailto:sperling@seedssystem.org))

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## 1. Introduction

The purpose of this literature review is to provide partners with information to aid them in developing the Sustainable Agrifood System Approach for Sudan (SASAS) initiative in Sudan. It consists mainly of a desk review of recent publications, scientific journals, project reports, and news articles to acquire information on seed systems in Sudan. Arabic documents were also reviewed. The main objective is to build on both successful and unsuccessful lessons learned to prevent repeating failed tactics or doing the same thing twice. This section includes best practices and insights gained from different states in Sudan regarding seed systems.

## 2. Methodology

Information for this review was gathered through desk research and field research which included both Key Informant Interviews (KII) over the phone, and in-person meetings. The desk research involved reviews of both English and Arabic seed system related documents. Representatives from the Ministry of Agriculture, NGOs, agencies, and SASAS partners participated in Key Informant Interviews (KII), which were done both over the phone and in-person meetings. The UN-FAO, CARE International, Plan Sudan, VSF, ADRA Sudan, World Vision, Action Against Hunger, Practical Action, Islamic Relief, Human Appeal, World Relief, Goal Ireland, DRC, Concern WW, and national NGOs such as Ariaf, Idafa, Tanmiat Alarfal, and Mobdioon participated in the KII which was conducted by the seed system research assistant, Omer Abdalla. Agriculture researchers from Agricultural Research Stations in the Blue Nile and South Kordofan States, as well as representatives from the Ministry of Production and Economic Resources (MPER), also took part. The lessons learned from the executed actions as well as current stakeholder seed system activities were recorded during this phase.

We explored the internet for scholarly articles for our study, focusing on Google Scholar and Research Gate, as well as Google for project documents and popular literature. The materials that were studied were those for case studies' documents, journals, project documents (assessment or evaluation reports), Arabic research papers, theses and popular press releases, such as blogs, news bulletins, magazines, websites, and conference proceedings. Referencing was done using EndNote. Each entry has an abstract and a list of key words. Key words used include: seed systems, informal and formal systems; seed supply; improved varieties; seed projects, local varieties, modern varieties, seed sector, seed policy, seed production, seed multiplication, community based seed, seed distribution; seed storage, Sudan; Blue Nile; South Kordofan; Khartoum; Sudan.

The analysis of this paper was conducted before the change in government that occurred on April 15, 2023, and therefore that change has not been included.

### 3. Results from the key informant interviews conducted

The interviews found that the two state research stations (Agricultural Research Stations in the Blue Nile and South Kordofan States) and the MPER are engaged in seed multiplication and distribution of sesame, sorghum, groundnut and millet seeds, but with limited capabilities. However, the Agricultural Research Council (ARC) station in South Kordofan State in 2022/2023 season produced 70 metric tons of sorghum seeds of two varieties (Wad Ahmed and Arfa Gadamak). The South Kordofan agricultural research station also multiplies two varieties of millet seeds (Ashana and Umbadir), sesame (Prumo variety) and groundnut (Gebaish variety). according to the director of Kadugli Research Station, all produced seeds have been sold to farmers directly and/or through seed companies and agro dealers.

In the interviews, the director of the Blue Nile ARC station revealed that the station produced a limited quantity of certified sorghum seeds (Arfa Gadamak variety) in 2021–2022, working with the FAO office in Damazin. The output was around 10 metric tons. The FAO distributed their portion to smallholder farmers, whilst the ARC contributed some of its share to the ARC head quarter in Wad Medani and sold the remaining amount to farmers and agrodealers.

Communication was also made with the representative of the National Seed Directorate, who confirmed that the directorate plays only regulatory and controlling role in seed trading, multiplication and certification as well as in the process of releasing and registering new cultivars of all domestic crops. But the directorate is not involved in any commercial seed trading or distribution activity.

### 4. Results from the literature Review - Key findings

- Importance of informal sector
  - Several studies mention that Sudan is dominated by the informal seed systems.
  - The studies indicate that the use of farmer-saved seed is dominant in Sudan.
  - Many studies show that the informal seed system provides almost all the seed of the local varieties.
  - Only few farmers using improved varieties.
  - There is a predominance of landraces and local varieties over modern, improved varieties.
  - Farmer seed systems largely dominate the seed sector.
  - Farmers mostly use recycled seed.
- Literature more on formal
  - Several studies focus on the formal seed systems with only a few on informal seed systems.
  - There are many projects delivering seed to farmers.
  - Public sector and NGOs are involved in the multiplication of certified seed.
  - NGOs are supplying certified and improved seeds.
- Government policy encourages private sector participation.

## 5. Results of the literature review – Annotated Bibliography

### 5.1. Definitions and concepts

#### I. Basic definitions (El Khoury & Delve, 2018)

El Khoury, W. and R. Delve (2018). Lesson learned: Supporting smallholder seed systems: Agronomy. Rome: International Fund for Agricultural Development (IFAD) Policy and Technical Advisory Division.

- This review on seed systems aims to provide a brief introduction to the importance, challenges and concepts in understanding the seed sector and how it can impact the livelihoods of poor smallholder households. It defines the informal and formal seed systems as follows:
  - Informal seed system: Refers to farmer and community-based seed systems for producing, saving and exchanging seed of landraces and uncertified improved varieties. The document indicates that this system is a significant source of seed of preferred varieties for farming households because of proximity to the farmers. The cost of seeds in the informal system is lower than the formal system and farmers may receive seed as a loan, a gift or through barter.
  - The formal seed system according to this publication represents certified/commercial seed production and marketing, usually by seed companies and sometimes by governments, and includes the importation of seed under the supervision of a national seed service. This seed is sold to farming households through, for example, agro-dealers, seed companies, government agencies and non-governmental organizations (NGOs). Farmers and traders may also sell seed of uncertified new varieties or local landraces in local markets (overlap of the circles in the middle).
  - The article at the end has a glossary consisting of detailed definitions and descriptions of various types of seeds, terms used in seed systems as well as regulatory elements.
- This publication presents some key lessons from the experiences of IFAD and the United Nations Food and Agriculture Organization (FAO), and other seed-related development projects. These lessons will help the reader of the How To Do Note (HTDN) to have a greater understanding and appreciation of the framework for analyzing national seed systems and how to use the HTDN to inform the design and implementation of more effective seed projects. Substantial lessons include:
  - Local seed companies play the essential role of taking new varieties and getting them into the hands of farmers, but they require sufficient early generation seed to produce certified seed to fulfill this role.
  - The formal seed market should be based on farmers purchasing seed and not provision of free seed to farmers.
  - Farmers require direct experience with new varieties through demonstrations, farmer field schools (FFS), on-farm trials or seeing the crop in a neighbor's field before they will decide to try it and potentially adopt it.
  - Project designers need to know farmers' cropping systems and their seed needs, and to determine if newly released improved varieties will be superior to what they already have.

- The article presents Sudan project- The Seed Development Program (SDP) as a case study. Substantial lessons from the Sudan SDP include:
  - Seed-grower groups were established to produce improved seed for sale to local communities, and grain- producer groups were established to buy this quality seed of improved varieties to produce grain for consumption and sale. No study was conducted on farmer seed demand during or after the design process, and it was finally conducted as part of the mid-term review.
  - The SDP planned to give grants to private seed companies to produce improved seeds in North and South Kordofan through contracting SGGs. This did not happen because the seed companies already had their seed farms under irrigation in other parts of the country to ensure stable seed production and they did not what to undertake seed production in risky rainfed areas where there are frequent droughts.
  - The Agricultural Research Corporation (ARC) was supported to produce breeder, foundation and registered seeds for certified seed production and to conduct participatory research and evaluation of new varieties. The capacity of the Federal Seed Administration (FSA) was improved to carry out seed-quality assurance activities. The extension services of the state ministries of agriculture were provided with training on certified seed production.
  - Assistance was provided on plant variety protection (PVP) legislation, national seed policy formulation and decentralization of the FSA to state level. After initial implementation, the national seed policy formulation is proceeding and plant variety protection is being developed, but the latter does not meet standards set by the International Union for the Protection of New Varieties of Plants (UPOV).

Keywords: IFAD, FAO, Seed related projects, Lessons, Seed Systems, Case studies, definitions in seed systems, Sudan, The Seed Development Program (SDP)

## 2. Seed systems definitions (Westengen, Dalle, & Mulesa, 2023)

Reference: Westengen, O. T., Dalle, S. P., & Mulesa, T. H. (2023). Navigating toward resilient and inclusive seed systems. *Proceedings of the National Academy of Sciences*, 120(14), e2218777120.

- This article reviews the state of knowledge on seed system development, outlining insights emerging from the literature that can help navigate the way forward.
- The article provides a synthesis of the evidence on the contributions and limitations of the different actors, activities, and institutions pertaining to all seed systems smallholder farmers use, formal and informal. The article further defines three types of seed systems as follows:
- The informal system—also called traditional, local or farmers’ seed system—refers to the practices and institutions that are involved in farmers’ on-farm management of crop diversity, and in their access to seed through own production, farmer-to-farmer exchange, and local markets. These practices are largely mediated by social rules and norms that have evolved over time and are closely linked to local cultures and traditions.
- The formal seed system is understood as the development, distribution, and sale of certified seeds of “improved” varieties in registered outlets. It usually covers only a few crops with

- higher commercial value. This system is generally governed by national policies and legal frameworks defining variety release, seed certification and phytosanitary controls.
- The intermediate seed system is also increasingly recognized, referring to individuals or organized farmers that produce and sell seed not sufficiently covered by the formal seed system, often following simplified certification schemes.
  - While the complexity of seed systems eludes a simple roadmap, we conclude by planting a “signpost” with principles to guide efforts to develop resilient and inclusive seed systems.

Keywords: Seed systems/informal, seed systems/formal, Seed systems/intermediate, definitions

## 5.2. Seed systems in Africa

### 3. Africa context (McGuire & Sperling, 2016)

Reference: McGuire, S., & Sperling, L. (2016). Seed systems smallholder farmers use. *Food Security*, 8, 179-195.

- This article documents the degree to which the informal sector remains the core for seed acquisition, especially in Africa.
- Conclusions drawn from a uniquely comprehensive data set, 9660 observations across six countries and covering 40 crops, show that farmers access 90 % of their seed from informal systems with 51 % of that from local markets.
- Further, 55 % of seed is paid for by cash, indicating that smallholders are already making important investments in this area.
- Targeted interventions are proposed for rendering formal and informal seed sector more smallholder-responsive and for scaling up positive impacts, including reducing distance to formal agrodealers, licensing non-seed outlets, reducing seed packet size, and improving marketing information systems.

Keywords: Seed systems/informal, seed systems/formal, Agricultural investment, Smallholder, Access to seed, Africa

### 4. Africa seed law (Africa Union, 2021)

Reference: Africa Union (2021). *The Seed Sector in Africa. Status Report and Ten-year Action Plan (2020-2030): A Summary African Union Commission (AUC)*.

- The objectives of the workshop were to review the status of the seed sector in Africa, and, informed by the findings of the report, to develop an Action Plan for the ASBP. Information on farmer saved seeds and the status of seed sectors in Egypt and Sudan was added during the workshop. Key findings relating to Sudan include:
  - Looking at other cereal crops, Kenya, Nigeria, and Sudan have recorded the highest numbers of varieties released: Nigeria for rice (26 varieties), Kenya and

Sudan for sorghum (25 varieties each). Egypt reports the highest number of variety releases among legume crops, led by sugar beet with 172 varieties.

- According to the International Service for the Acquisition of Agri-biotech Applications (ISAAA), by 2019, 44 countries, including the European Union, which is counted as one country, worldwide had approved the commercialization/planting/importation of GM crops within their territories. Of these, seven are in Africa: Burkina Faso, Ethiopia, Kenya, Nigeria, South Africa, Sudan, and Swaziland. The approved crops are canola, cotton, cowpea, maize, rice, sorghum, and soya bean. Specifically, transgenic Bt cotton has either been released or is nearly ready for release in Nigeria, Sudan, Burkina Faso, Kenya, Ethiopia, Tanzania, and Malawi. Similarly, significant progress towards the release of GM varieties has been recorded for Bt cowpea (in Nigeria, Ghana, and Burkina Faso) and for Bt/drought-tolerant maize (in Kenya, Mozambique, Ethiopia, Nigeria South Africa). Of these eight countries, only Sudan and South Africa engaged in the commercial production of GM crops in 2017.
- Common Market for Eastern and Southern Africa (COMESA): As of March 2019, only seven of the 19 AU Member-States – Burundi, Egypt, Kenya, Rwanda, Uganda, Zambia, and Zimbabwe – had aligned (through domestication) their national seed regulations with the COMESA Harmonized Seed Regulation. The harmonization monitoring process is ongoing in most of the other countries and has just started in Madagascar, Seychelles, and Sudan.

5. ASARECA research within the Eastern and Central Africa (ECA) sub-region (Odame, Oduori, Kimenyi, Kabutha, & Alemu, 2011)

Reference: Odame, H., et al. (2011). Why the low adoption of agricultural technologies in Eastern and Central Africa. Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA).

[https://www.researchgate.net/publication/280713950\\_Why\\_Low\\_Adoption\\_of\\_Agricultural\\_Technology](https://www.researchgate.net/publication/280713950_Why_Low_Adoption_of_Agricultural_Technology)

- The purpose of this study was to identify, analyze, establish and, where possible, engender the underlying causes for the poor adoption of agricultural technologies in Eastern and Central Africa, provide examples of successful and best practices on dissemination and out-scaling approaches from adoption case studies, and recommend strategic interventions that may address the causes identified for the poor adoption.
- This study covered 5 of the 11 member countries of ASARECA: DRC, Ethiopia, Kenya, Sudan and Uganda, where between 1997 and 2011 ASARECA supported the development and dissemination of agricultural technologies in collaboration with the respective NARS.
- The report reveals that in East and Central Africa, the capacity for seed distribution, especially for staples and livestock pasture, is inadequate mainly because the distributors (agro-dealers) are concentrated in urban centers.
- The report indicates that Sudan and Kenya have strong formal seed systems where private and public seed companies organize the production and marketing of seed.

Some countries like Kenya have a strong regulatory system, while others like DRC, Uganda, Sudan (privatized) and Ethiopia have limited regulatory frameworks along the seed value chain.

- The case study of vegetables in Sudan presented in the report shows that despite the increase in the area under vegetable production in Sudan, productivity (in yields) remains low, indicating high potential for improvement through adoption of improved varieties, and pests and disease control.
- The common weaknesses of the seed systems found in the countries visited including Sudan are poor demand assessment, poor responsiveness to production risks, poor seed distribution, and the pull–push challenges related to decentralization and centralization of seed systems, weak seed regulatory system, and lack of integration of formal and informal seed systems.

Keywords: Dissemination, Sudan, Vegetables, Seed systems, Horticultural policies

6. Africa seed systems and building farmer managed seed systems for food sovereignty in Africa (Alliance for Food Sovereignty in Africa, 2017)

Reference: Alliance for Food Sovereignty in Africa. (2017). Resisting corporate takeover of African seed systems and building farmer managed seed systems for food sovereignty in Africa. <https://afsafrica.org/wp-content/uploads/2018/09/seed-policy-eng-online-single-pages.pdf>

- Three West African regional economic communities (RECs) have harmonized their seed trade laws and regulations – the Economic Community of West African States (ECOWAS), West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (CLISS).
- In addition, the South African Development Community (SADC) in southern Africa and Common Market for Eastern and Southern Africa (COMESA) in Eastern Africa have each implemented harmonized seed trade regulations. All have developed regional variety catalogues for the regional trade of certified seed. However, the regulations of these RECs are not in harmony with one another or necessarily with the national laws of their members. For each of the mentioned RECs, the harmonization process may in many instances require amendments to national seed laws to ensure compliance and these processes could further threaten Farmer Managed Seed Systems (FMSS).
- For the most part, African seed laws require registration in the formal system for growers, sellers and often processors and distributors. In a few cases there are exemptions or lesser criteria for registration of farmer seed producers in communities and/or express support for farmer managed seed systems.

Keywords: Seed laws, harmonization, RECS, Sudan, South Sudan

7. African seed systems – laws and regulations (Herpers, Vodouhe, Halewood, & de Jonge, 2017)



Reference: Herpers, S., et al. (2017). "The support for farmer-led seed systems in African seed laws."

- The objective of this report is to compare regional and national seed laws in Africa, and analyse the extent to which they support (or undermine) farmers' participation in seed systems. More specifically how current seed laws affect informal (farmer-based) seed systems and in what manner seed laws can be adapted to support these seed systems.
- Policies, laws and regulations of 32 African countries (including Sudan) were carefully reviewed to identify some best practices and key issues and challenges in regulation. Findings from the study indicate that the main challenge for many African countries is that their seed regulations don't include provisions that support farmer-led seed systems. Substantial findings mentioning Sudan and South Sudan include:
  - ✓ Legislation in 23 countries forbids the trade of unregulated seed – Algeria, Angola, Benin, Botswana, Burundi, Burkina Faso, Cameroon, Cote d'Ivoire, DRC, Egypt, Gabon, Ghana, Guinea, Kenya, Madagascar, Mali, Morocco, Mauritania, Mauritius, Rwanda, Sudan, Togo, Tunisia.
  - ✓ Legislation in nine countries allows for local sale and exchange within farmer-led seed systems: Senegal, Niger, South Africa, Tanzania (full certification is not obligatory, yet seed does need to have its quality declared), Zimbabwe, Zambia, Malawi, Ethiopia and South Sudan
  - ✓ Also in South Sudan, Mali, Benin and Guinea, recognition can be found for the important roles played by landraces and local varieties in the context of crop improvement, adaptation to climate change and resistance/tolerance to pests, diseases and soil disorders, etc.
  - ✓ The following countries allow for the sale of seed produced by smallholder farmers under certain conditions: Senegal, Burkina Faso, Niger, South Africa, Tanzania, Zimbabwe, Ethiopia, South Sudan, Malawi and Zambia.
  - ✓ Currently, eight countries mention Quality Declared Seed (QDS) in either their acts or policies: Ethiopia, Ghana, South Sudan (draft policy), Tanzania, Uganda (draft policy), Mozambique, Malawi and Zambia
  - ✓ The draft policy of South Sudan supports farmers in the following provision: "Farmers or any group of farmers who produce seed for their own use or for use by their neighbors or others in their immediate area shall be eligible for all Government guidance and support, so as to improve the quality of their seed and operations." South Sudan intends to set up different standards for categories of seed production fields and seed lots, in order to secure high seed quality and cost-efficiency, seeking "a balance between the needs of farmers for high quality vs. realistic production capabilities" (1 Draft Seed Policy 1993, South Sudan, Section 17.2: Seed and seed field quality control.).

Keywords: Seed laws, 32 African countries, Sudan, South Sudan

## 8. Arab food security status report for the year 2005, Sudan (AOAD, 2007)



Reference: Arab Organization for Agricultural Development (AOAD). (2007). Al dirasa Hawl Tanseeq Tegarat Albozoor Wa Altaqawi Lil Mahasel Al Gizaeia Alraiesia Fi Addwal Alarabeia. Study on coordinating seed trade of main food crops in Arab Countries. Available at [https://aoad-app.org/Linked\\_Studies/](https://aoad-app.org/Linked_Studies/)

- The report explained the role of both government and private sector in the seed industry of Arab countries including Sudan
- The Sudanese government and the private sector provide seeds for sorghum, millet, sesame, peanuts and vegetables for small scale farmers in the rain-fed and traditional sectors as well as in the national state-owned agricultural schemes like Rahad and Gezira Schemes.
- The report stresses the big role of government to assist the small-scale farmers across the country by providing them with certified seeds.

Keywords: private sector, government, Rahad, Gezira Scheme, Arab countries

### 5.3. Seed systems in Sudan – description and analysis

#### 9. Seed assessment security in Sudan (FAO, 2022)

Reference: FAO (2022). Seed assessment security in Sudan. FAO.

- The Seed Security Assessment (SSA) took place in six states representing the farming zones of Sudan. The six states are South Darfur, North Kordofan, Northern Sudan, Khartoum, Gezira and Gedaref. The farming zones included i) traditional rain-fed agriculture in sandy and clay soils, ii) semi-mechanized agriculture in South Darfur, North Kordofan and Gedaref and iii) the irrigated zones including Gezira Scheme, pump irrigation schemes in Khartoum and basin irrigated in Northern states.
- The seed security assessment in Sudan focused on understanding the seed production systems, channels of distribution, effect of continuous seed distribution to small farmers as well as the difficulties facing seed security of farmers in the country.
- The tools deployed in SSA included secondary data Individual Household Questionnaires, Focus Group Discussion (Men and Women), and interviews with seed producers, agro-dealers, agro-processors, traders in local markets, seed companies and local officials and NGOs experts.
- Findings reveal that the formal and informal seed sectors are the main sources for seeds in Sudan. The informal sector is the main producer of seed in the country and produces about 86% of the seed requirements while the formal seed sector produces about 14% of seeds requirements in Sudan.
- The report highlights main findings in relation to seed sources and availability, access to seed, quality of seeds, adoption of new varieties, Ministry of Production and

Economic Resources (MoPER) and NGOs and gender. MoPER and NGOs used to distribute seeds annually to displaced and vulnerable HHs

- The formal sector includes plant breeding, testing and development of new crop varieties, variety release in coordination with Agricultural Research Council (ARC) and Seed Council, and organized seed production including quality assurance.
- The informal seed sector produces, stores, markets and disseminates seeds, of local varieties and materials derived from improved varieties, among farmers and through local markets.
- The study describes the trends of change in seed industry reflecting the seed law, Private Plant Breeding, Storage Capacity for seeds, quality of products. Table 5 shows Varieties Released Suitable and Available to Farmers for various crops in Sudan.

Keywords: seed system assessment, six states, Sudan, seed systems

#### 10. Sudan Seed sector, (Mohamed Abdulla Ali, 2018)

Reference: Mohamed Abdulla Ali (2018). Sudan Seed Sector Market Research Winter Season 2018. Embassy of the Republic of Sudan, Washington, Library of Congress., Agriculture, livestock, fisheries and forestry in Sudan.

- The research goal was to identify existing and future market requirements and potential for the vegetable/Field crop seed industry in Sudan.
- In the study, 14 states were included. Data were obtained through field surveys and interviews; 26 vegetable crops were considered in this study.
- Results show that the seed sector in Sudan are divided across two main seeds systems, the informal and the formal sector. The article details that the Informal Sector is comprised of farmer-saved and farmer-to-farmer seed systems which represents the majority of seed volumes in crop farming in Sudan. The formal sector is identified by Certified Improved Local Varieties and Imported Improved and Hybrid Varieties, dominated by the private sector for both categories.
- While farmer-saved seeds and farmer-to-farmer seed exchanges represent the majority of seed volume in Sudan in general, estimated at 89% of total, adoption of improved varieties has become more significant in vegetable farming with particular emphasis of certain crops. The farmer-saved seed system remains the most important source of seed volume in the vegetable farming sector, estimated at 53%.
- Sudanese seed was perceived as the best by small farmers, mainly because they have been tried. American and Dutch seeds had the highest recognition within the imported category according to farmer perception.
- The network of agro dealers is quite extensive and well distributed across the country. The estimated number of agro-dealers active in Sudan approx. 1,050 dealers, the bulk of their business 85% is with small farms. Importers are fewer in number only 28 registered companies are active in producing, importing, marketing and distribution of vegetable seeds to the Sudanese

farmer. Importing Seed companies face challenges, including high import costs and competition from cheaper, uncertified seeds in the informal market.

- The use of seed depends on the type of the crop; certain crops such as leafy vegetables (arugula, parsley, fennel, mallow) are dominated by farmer-to-farmer distribution of seed of local varieties, together with beet, squash and chili pepper, whereas a higher adoption of imported improved seeds in watermelon, carrots, tomatoes. Local varieties are available in a few crops mainly okra and egg plant.
- Commercial farms have been more efficient in producing vegetables for local consumption. Some export initiatives have been witnessed however at a very low scale. Higher adoption of improved inputs in commercial farms are witnessed. Cash crop farming, mainly ground nuts, maize, sorghum, cotton is dominant with little focus is on vegetable farming.

Keywords: Seed systems, improved seeds, local varieties, vegetable crops,

## 11. Sudanese Seed Sector, (Anonymous, 2011)

Reference: Anonymous. (2011). A baseline study /survey. <https://www.afsta.org/wp-content/uploads/2022/10/SUDAN-SEED-SECTOR-BASELINE-STUDY-FIRST-DRAFT.pdf>

- The paper discusses the current status of the seed sector showing statistics that most of the seed used in Sudanese agriculture are farm retained seeds (89%). These come from local varieties and land races kept by farmers or seeds from improved varieties but not under the seed certification program.
- It indicates that the challenge for the formal sector is to expand and attract more farmers to adopt the use of certified seeds.
- It discusses on the breeding activities mentioning that most of the breeding activities in the country are carried by ARC scientists. Mentioning that other varieties introduced by private companies or from other breeding activities outside ARC are introduced in collaboration with ARC scientists to go through the variety release committee (VRC). It further highlights organizations engaging in breeding programs and activities in the private sector.
- The paper outlines the seed supply to the seed market but the author is concerned here with seed produced by special arrangements or formal seed sector under seed certification.
- Table (1) shows the Total Seed Production (2006/2010) whereas Table 2 shows the Annual Seed Requirements and Average Seed Production of Main Crops (2006/2010)
- The paper also details on the size of sudanese seed business with estimated value of local seed production being the highest with US\$ 22,718,665.
- The following content is also discussed in the paper
  - ✓ Regulatory Framework and Infrastructure of Sudanese Seed Industry
  - ✓ Seed Categories
  - ✓ Variety Evaluation, Release and Registration
  - ✓ Phytosanitary Measures
  - ✓ Plant Variety Protection (Intellectual Property Rights)

- ✓ Seed Import /Export Procedures and Documentation
- ✓ Appendix II highlights released varieties

Keywords: Seed systems/formal, Seed systems/informal, seed categories, seed sector, Sudan

## 12. Agribusiness environment in Sudan, (Mansfield & Markhof, 2016)

Reference: Deborah Mansfield, M. M. M. (2016). Diagnostic Review of Business Environment Constraints: Sudan Business Environment Reform Facility.

- The main obstacles to enabling a sound agribusiness environment in Sudan are related to agricultural land, finance, markets, seeds and fertilizers, machinery, information and extension services, and skills.
- The fruit and vegetable export potential is currently limited by lack of certified seed among other challenges. In Sudan most of the seeds used in local agriculture are farm retained seeds (89%).
- Farmers use local varieties and landraces, and keep some parts of the harvest as seed for the next season. The quality of non-certified seed, with often limited genetic potential, is low and consequently affects agricultural productivity.
- As retaining seed from last year's harvest does not work with modern hybrid seed the (smaller) farmers often do not use hybrids for crops like sunflower, maize, sorghum and millet.

Keywords: Sudan, Obstacles, Retained seeds, Field trials

## 13. Seed requirements, Sudan (FAO, 2023)

Reference: FAO. (2023). Special report – 2022 FAO Crop and Food Supply Assessment Mission (CFSAM) to the Republic of the Sudan. CFSAMs Special Reports, 20 March 2023. Rome.

- In 2022, the Federal MoAF delivered 803 tonnes of sorghum seed to the state ministries of agriculture in the 18 states, and they were distributed mainly to smallholder farmers in western traditional rainfed agriculture areas (Table 5). The amount of distributed seed is similar to the very low quantities delivered in 2021, half of those distributed in 2020.
- The majority of the farmers interviewed during the field visits, especially in the traditional and semi-mechanized sector, reported to have utilized seeds retained from the harvest of the previous year due to the limited seed distributions by state authorities and the high prices prevailing on the market.
- Farmers' access to seeds has improved through seed distributions carried out by FAO, which provided about 5 400 tonnes of seeds (Table 6), 56 percent higher compared to the amount distributed in 2021. Out of the total amount distributed, 3 764 tonnes were seeds of staple cereals (3 637 tonnes of sorghum and 127 tonnes of millet) and the remaining were seeds of cash crops, mainly groundnuts (1 392 tonnes). Smaller quantities of seeds of pigeon peas, cowpeas and chickpeas were distributed.
- Seed requirements for 2023 planting are estimated at about 122 000 tonnes on the basis of the average planted areas during the last three years and the recommended seed rate in the country. The following seed rates have been used: 7.5 kg/hectare for sorghum; 4 kg/hectare for millet; 20 kg/hectare for maize; 120 kg/hectare for wheat and 75 kg/hectare for rice.

Keywords: Seed systems/formal, Seed systems/informal, sorghum seeds, FAO, Sudan

#### 14. Seeds and their contribution to the production of agricultural crops in Sudan (SUNA, 2022)

Reference: SUNA, (2022) Seeds and their contribution to the production of agricultural crops in Sudan. Available at <https://suna-sd.net/read?id=741680>

- This seed related work is a report presented by Sudan News Agency (SUNA). The report explains that both public and private sector are involved in seed production.
- The report highlighted that the public seed sector has recently received financial and technical support from external parties. This helped in developing the infrastructure for the production and approval of improved seeds. The external support has also been used for qualifying and training a number of cadres in the field of seed technology.
- One of the key issues raised in the report is that the National Council for Seeds at the Ministry of Agriculture and Forests in cooperation with the International Fund for Agricultural Development have recently organized a workshop headed by the Minister of Agriculture and Forests, Dr. Abu Bakr Omar Al-Bushra, in Khartoum to launch the National Seed Policy. This action clearly defines the public sector commitment for building legalized, resilient and effective seed systems.
- The report also indicated that the government represented by the minister of agriculture decided to encourage the private sector to invest in the seed industry. Although, in the past such policies of encouraging the private sector to invest in this field were launched, the private sector could not invest much in the seed industry for several reasons, including the well-known risks in agriculture in general, and the rates of return of capital invested in the seed industry are not attractive compared to other investment alternatives.
- The report reveals that this necessitates the use of encouraging means to push the private sector to enter these important vital areas. The report proposes encouraging policies which may include announcing the seed industry as an investment activity that qualifies for tax exemptions.

Keywords: seed policy, seed industry, investment, seed systems

#### 15. FAO Crops and Food Supply Assessment Mission (CFSAM) to the Sudan (FAO, 2021a) (English version)

Reference: FAO. (2021). Special Report - Brief FAO mission to Sudan to assess crop production and food supply for 2021. <https://www.fao.org/documents/card/en/c/cb9122en>

- This report was conducted by FAO to assess productivity of agricultural crops and food supply.
- The report suggested that instead of the current system of distributing seeds, it would be of great significance to adopt a national program for expanding the production of improved seeds and increase the availability of certified seeds to ensure their timely delivery to farmers.

Key words: distributing seeds, improved seeds, certified seeds, timely delivery



16. Crop production assessment, Sudan (FAO, 2021b) (Arabic version of the previous document, 15)

FAO, (2022). Special Report - Brief FAO mission to Sudan to assess crop production and food supply for 2021 (in Arabic). Available at <https://www.fao.org/3/cb9456ar/cb9456ar.pdf>

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Keywords: distributing seeds, improved seeds, certified seeds, timely delivery

17. Agriculture, challenges and opportunities, Sudan (Elbadawi et al., 2022)

Reference: Elbadawi, I., et al. (2022). Sudan's Challenges and Opportunities: A Renaissance Project for Sudan: From Poor Agriculture to Agro-Industrial Growth and Sustainable Development. Economic Research Forum Working Papers.

- Part 1 of the report contains a preliminary analysis of the aggregate and sectoral value-added (VA) in Sudanese agriculture by estimating an empirical agricultural growth model using global data covering more than 120 countries.
- Part 2 provides a detailed SWOT (strengths, weaknesses, opportunities, and threats) analysis of the three main agricultural sub-sectors (traditional rainfed, non-gum Arabic and gum arabic field crops; semi-mechanized; and irrigated). The analysis provides a summary of actors in the inputs and service supply chain, related constraints faced by each actor and Priority needs and interventions. Key are the challenges faced by seed companies and small-scale farmers with regard to seed supply and quality and the priority interventions aiming at improving the seed systems.
- In Part 3, the report considers the role of institutions and the empowerment of rural communities through the establishment of a robust agricultural commodity development council, an agricultural research system, a seed industry, and farmers' cooperatives.
- The report further discusses the seed industry in Sudan and characterizes the seed systems in Sudan. The seed systems in Sudan can be divided into informal and formal systems.
- The report reveals that the majority of farmers, particularly in the traditional rainfed sector, get their seed supply from the informal seed system. As a result, this system provides almost all the local varieties of seeds compared to the formal seed system in Sudan which is led by the private sector after the government policy change toward the privatization of seed production activities. The government's role is now concentrated on quality control through the Seed Administration (SA) of the Ministry of Agriculture.
- The report further outlines the fundamental elements of seed security. It highlights some major steps to accelerate the use and demand of improved varieties.

- Part 4 discusses the critical need to invest in agricultural supply to drive the much-needed transformation by mainstreaming fertilizers use, expanding irrigation systems and renewable energy, and (considering the impending digital revolution) incrementally embracing the adoption of technology and precision agriculture. It reveals that there is a great potential for increasing the productivity of agriculture in Sudan significantly with modest investments in agricultural technology (increased use of fertilizers and improved seed varieties).
- In Part 5, it proposes a new business model for transforming agriculture by making the sector look more like an industry.

Keywords: Sudan, Agriculture, Improved Seed variety, Seed systems, Seed security

## 5.4. Regional and local seed systems studies in Sudan

### 18. Seed system security assessment, Darfur (FAO, 2012)

Reference: FAO. (2012). Seed System Security Assessment Report for Darfur Region Sudan. [https://www.fao.org/fileadmin/user\\_upload/emergencies/docs/Darfur\\_Report.pdf](https://www.fao.org/fileadmin/user_upload/emergencies/docs/Darfur_Report.pdf)

- The Darfur Seed System Security Assessment (SSSA) report aims to provide the reader with the following:
  - insight into seed system security scenarios;
  - processes and methods used;
  - a clear picture of past and current situations; and
  - opportunities and actions that may be undertaken to improve the current situation.
- Chapter IV describes the functioning of the seed system in Sudan by reviewing both the formal and informal sectors. It reviews the past and current formal plant breeding structures and processes, and how the formal seed production has been organized in the past and present, with specific reference to Darfur. It provides an extensive section describing how decentralized seed multiplication and distribution unfolds in Darfur.
- Chapter V is the heart of the field findings and presents the current seed security situation in Darfur. It a) reviews the major crop types and varieties being grown; b) looks at issues related to seed availability, access, and quality (for 2010 and also projecting to 2011) at household level; c) reviews the functioning of the local grain/seed markets and agro-input dealers in improving availability, access and quality of grain for seed, as well as d) suggests alternative sources of quality vegetable seed and other agro-inputs.

Keywords: Seed systems/formal, Seed systems/informal, seed security, Darfur, Sudan

### 19. Major crops and seed sources in North Kordofan (Gamar et al., 2016)

Reference: Gamar, Y. A., Bakhit, O. A., Murdi, H. G., Ahmed, T. E., Suliman, A. A., Yagoub, A. Y., & Abdalla, E. A. (2016). Identification of Field crop structure and production constrains with special consideration of gender aspect of resource poor farmers in north Kordofan state of Sudan. *Journal of Agricultural Extension and Rural Development*, 8(3), 19-28.

- The study aimed at providing essential information of the field crop structure and major field production constraints for resource poor farmers in North Kordofan. Two localities, Sheikan and Elrahad were selected.
- The study identified; sorghum, pearl millet, sesame, ground nut, hibiscus, cow pea, okra, watermelon, snake cucumber as main cultivated crops in Sheikan and Elrahad localities of North Kordofan in Sudan.
- The stakeholders identified include local leaders, households, and local markets constituting the farmer sources of new technologies. The farmers highly relied on local material in both localities which produced annually from their farms and kept in the storage. The seeds flow from farmer to farmer, from one neighbor village to another and from the local market.
- The paper concludes that in North Kordofan, most of the planted varieties are farmer varieties and that the informal seed system plays major role in seed dissemination.

Keywords: Seed systems/informal, participatory tools, resource poor farmers, North Kordofan, Sudan.

#### 20. Assessing and Mapping sources of high quality seeds (Elgali, Khalifa, & Abdalla, 2022)

- Reference: Elgali, M. B, Khalifa, A. B. A. and Abdalla, O. A. M. (2022). Assessing and Mapping sources large town markets.
- The study aimed at identifying, mapping and assessing sources of high quality seed, agricultural inputs and farm implements in two states in eastern Sudan.
- It was requested by ZOA International organization, under their project of
- Integrated Measures to Promote Rural-Urban Value Addition and Employment (IMPROVE)
- The study covered both formal and informal seed systems in the area
- Farmers' adoption and practice of seed selection shows that, 72% of the surveyed farmers are using local varieties that is normally acquired from informal seed sector (farmers saved seeds, or bundling between farmer, to farmer seeds from local village market or small town markets), on the other hand, 28% of the surveyed farmers are using improved seeds obtained from Agricultural Input Companies Agents (AICAs), agro dealers and seasonal seed suppliers distributed in the locality or in
- A local groundnut seed multiplier was found in Rashid area of Galabat Al Garbeia locality, which produces seeds for local demand.
- The study suggested promoting programs that might raise awareness about adaptive technologies to climate change including the use of improved varieties which could attain higher yields.

Keywords: mapping, quality seeds, adaptive technologies, Rashid, inputs, agro dealers, seed suppliers, climate change, Gedaref and Kassala, Sudan

#### 21. Improved seed varieties and climate resilience in 3 villages in East Sudan (United Nations Framework Convention on Climate Change, 2023)



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Reference: United Nations Climate Change. Building Resilient Livelihoods I Sudan.  
<https://unfccc.int/climate-action/momentum-for-change/women-for-results/building-resilient-livelihoods-i-sudan>

- Women farmers are provided with training and a climate resilient agricultural package, which contains improved seed varieties.
- The project has established 200 seed multiplication farms in 3 villages in East Sudan.

Keywords: Seed systems/formal, improved seed varieties, East Sudan

## 5.5. Seed systems for specific crops

### 5.5.1. Wheat

#### 22. Wheat: ARC (national research) Innovation platforms for wheat (Tahir et al., 2020)

Reference : Tahir, I. S. A., et al. (2020). "Enhancing wheat production and food security in Sudan through scaling up improved technologies using innovation platforms. International Journal of Agricultural Sustainability 18(4): 376-388.

- Six community-based Innovation Platforms (IPs) were established in four states. A range of activities were implemented within IPs including technology demonstration, seed production, capacity strengthening, field days, etc.
- A total of 440 farmer-managed demonstration plots were conducted and yields up to 6.0–8.0 t/ha achieved in some fields. The 4-year average yield across all IPs was 3.8 t/ha compared to the national average of 2.3 t/ha. A total of 2031 (66.6% female) trainees participated in 31 training courses targeted all stakeholders along the value chain.
- A total of 4335 tons of seeds produced and distributed to seed producers and farmers. More than 2500 tons of seeds produced by farmers diffused to neighboring farmers. Due to the raised awareness of improved varieties, demand for quality seeds increased. Overall, more than 15,700 (31% female) stakeholders were directly reached. Coupled with enabling production measures, improved technologies encouraged national wheat production and productivity to significantly increase since 2011/2012 by 118,000 ton/year and 0.39 ton/ha/year, respectively.
- The IP approach was able to engage all stakeholders and brought changes in the attitude of many of them. The IP concept was adopted for technology dissemination and enhancing interaction among stakeholders of a number of crops in Sudan.

Keywords: Innovation platforms (IP), Sudan, demonstration plots, improved varieties, attitude

#### 23. Wheat: Scaling up of proven technologies by the Wheat Compact of Technologies for African Agriculture Transformation (TAAT) (Opaluwah, 2021)

Reference: Opaluwah, A. (2021). "TAAT News: A quarterly publication of technologies for African Agricultural Transformation (TAAT) program. January–March 2019. Vol 1." Gates Open Res 5(168): 168.

- Lack of improved wheat seed in sufficient quantity and quality at affordable price was widely regarded as a driving factor significantly contributing to the poor adoption and weak performance of wheat in Sudan among which prompted the scaling up of heat-tolerant wheat technologies for farmers in Sudan.
- To tackle the wheat crisis, Sudan's National Agricultural Research System, in collaboration with international Centre for Agricultural Research in Dry Areas (ICARDA) and International Maize and Wheat Improvement Centre (CIMMYT) developed and released a number of high yielding heat tolerant wheat varieties with production potential of 5-8 t/ha.
- Experiences to promote these heat tolerant wheat varieties in Sudan through the AfDB-funded SARD-SC (wheat) project revealed that technology adopting wheat farmers at project intervention sites increased their wheat productivity to 4-7 t/ha, while farmers with their traditional varieties rarely exceed 2.5 t/ha.
- Particular attention was given to train youth and women in wheat production, value addition and farm machinery maintenance services at the Basatna, Wad Elbur and Mukashfi innovation platform (IP) sites.
- The document reveals that Field days, seed production farms visits, along with farmers' fields were involved in scaling-up activities.

Keywords: Sudan, Wheat seed, heat tolerant wheat varieties, Seed production, certified seed

### 5.5.2. Sorghum

#### 24. Sorghum: Productivity of Sorghum under Adoption of Conservation Agricultural Technology (Elnour, 2017)

Reference: Elnour M.A.E. (2017). Impact of Extension Services on Productivity of Crop Sorghum Adoption of Conservation Agricultural Technology Bassonda Locality – AlGadarif State Sudan University of Science and Technology (SUST)]. <http://www.secheresse.info/spip.php?article69562>

- The study was part of a conservation agriculture project implemented in Gedarif State in Eastern Sudan.
- The project distributed certified improved sorghum seed to all beneficiary farmers for free.
- Interestingly, the study found 68% of farmers to have actually used the improved seeds distributed by agricultural extension and ARC.

Keywords: seed distribution, improved seeds, farmers, conservation agriculture



25. Sorghum: Applying Agricultural Technologies on Increasing Sorghum Productivity (Ibrahim, 2021)

Reference: Ibrahim, A. A. M, (2021). The Impact of Applying Agricultural Technologies on Increasing Sorghum Productivity Tuzi scheme - Abu Hugar Locality- Sinnar State case study. Masters thesis. Available

at: <https://repository.sustech.edu/bitstream/handle/123456789/26308/%d8%a7%d8%ab%d8%b1%20%d8%aa%d8%b7%d8%a8%d9%8a%d9%82%20%d8%a7%d9%84%d8%aa%d9%82%d8%a7%d9%86%d8%a7%d8%aa%20%20.....pdf?sequence=1&isAllowed=y>

- The study found that Sudan has a large number of traditional sorghum varieties that have been selected by farmers over the years. Actually, farmers are found to prefer their local varieties for location specific considerations such as tolerance of drought, resistance to pests and diseases, for cultural and economic considerations like taste, quantity and quality of cane and its suitability for animal feed or building shelters.
- Sorghum varieties mostly adopted by farmers include Arfa Gadamak, Mugud and Eryana in Gedaref State, and Qeshish Wad Aker, Al-Hijir and Gadam Al-Hamam in the Blue Nile State, and Kurgi and Karmaka in South Kordofan State.
- The study asserts that the Sudanese Variety Releasing Committee approved a large number of improved sorghum varieties. Field experiments and surveys show that, the most successful released sorghum varieties include Wad Ahmed, Tabat, Arfa Gadamak, Butana and Bashaier.

Keywords: traditional, sorghum varieties, cane, animal feed, Arfa Gadamak, Mugud, Blue Nile, South Kordofan, Sinnar State case study

### 5.5.3. Vegetables

26. Vegetable crops in Khartoum State (Babiker, 2017)

Reference: Muna Haddad Omer Babiker (2017). "Production and marketing of vegetables crops in Khartoum State, Sudan." *Int J Agric Innov Res* 6(2): 320-324.

- This paper's aim is to develop a detailed description of the socioeconomic characteristics, farming system, production and marketing of vegetables' crop in Khartoum State. It also aims to assess the problems and obstacles which face the vegetables farmers.
- Results reveal that farmers use both local and improved seeds varieties to grow vegetable crops. The use of seeds however depends on the type of the crop; for example, imported improved seeds are a must to use when growing crops like potatoes due to the unavailability of technology to produce them locally while local or imported seeds can be used to grow the onion crop.
- A problem is that the quality of imported seed potato has declined because the commercial companies and individual importers focus on high profits and ignore the quality of seed potato and consequences on potato production and farmers loses. The other problem that farmers suffer from is the very high cost of potato production, especially the cost of imported certified seeds (planting materials).

Keywords: Production, Marketing, Vegetable, Sudan

#### 5.5.4. Sesame

#### 27. Upgrading the Sudanese Sesame seeds value chain, (UNIDO, 2017)

Reference: UNIDO. (2017). Upgrading the Sudanese Sesame seeds value chain. STDF Project Grant Application Form (160177) [Grant]. North Kordofan and Al Qatarif states.

- This project aims to increase export revenues of sesame-seeds in Sudan by improving the quality of sesame-seed, increasing capacity to comply with food safety and phytosanitary requirements, and enhancing market access to value-added markets.
- The document highlights on-going and closed projects and programs that relate to export commodity production and quality improvements of Sesame-seeds in Sudan including:
  - ✓ In December 2015 FAO completed a project in Sudan named “Development of a Quality Seed Production System and Value Addition in Sudan”. The project provided the basis for the development of viable, sustainable source of local and improved germ plasma for the oil and vegetable seed sector including sesame-seed through; 1) Strengthening the capacity of plant breeding, seed production, marketing, and seed certification administration; 2) safeguarding and improving the indigenous oil and vegetable crop varieties including sesame-seed; 3) enforcing the legal framework of the Seed law regarding the protection of breeders' rights and regulations to create a favorable environment for the development of the seed sector and reinforcing of the technical capacity of the Seed certification administration/agency.
  - ✓ Seed Development Project in Sudan aims at increasing crop productivity for about 108,000 smallholders adopting certified seeds in North and South Kordofan. The seed supply system for sesame-seed in Sudan is at the embryonic stage characterized by limited human, technical and financial capacity of the National Seed Administration (NSA) compounded with an ineffective organizational set up causing inadequacy of the existing seed quality control standards. It is believed that the IFAD project could contribute to the identification of quality sesame seed ideal for targeting the international market. Recently released sesame-seed varieties: NCRIBEN-01M and NCRIBEN-02M, and Ex-Sudan (exotic variety), readily meet the premium quality requirements for sesame-seed export (1000 seed weight 3.0 g, 40- 50 per cent oil content and pearly-white seed color).

Keywords: Sesame-seed projects, policies and laws, North Kordofan and Al Qatarif states, Sudan

## 5.6. Projects on seed and seed systems

### 5.6.1. Supporting to the formal seed industry

#### 28. Project idea for seed in six states, Technology Needs Assessment (TNA Project)



Reference: Tna Project idea. Production of improved seeds and seedlings. Republic of Sudan.  
[https://www.ctc-n.org/sites/www.ctc-n.org/files/UNFCCC\\_docs/tna\\_project\\_idea\\_sudan\\_adaptation\\_production\\_of\\_improved\\_seeds\\_and\\_.pdf](https://www.ctc-n.org/sites/www.ctc-n.org/files/UNFCCC_docs/tna_project_idea_sudan_adaptation_production_of_improved_seeds_and_.pdf)

- The farmers in Sudan rely heavily on farm saved seeds and have little access to commercial improved seed. Improved crop varieties seed reach only 10 per cent of farmer producers in Sudan.
- In addition, the production of improved seed variety on large-scale will strengthen the capacity of research, extension and the private sector in the development, dissemination and adoption of improved seed varieties. This can lead to improved food security and sustainable crop production intensity and livelihoods.
- Provision of improved seeds and seedlings of the different crops to all small farmers in the rain-fed areas, which will improve food security and diversify crops. The project will benefit from 16 local nurseries that will have a positive impact on yield of all crops (15 to 50 per cent increase, depending on crop and climatic conditions).
- The project is designed for small-scale farmers in six states (South Gadarif, Sennar White Nile, North Kordofan, North Darfur and Blue Nile states) under rain-fed agriculture. The project will focus on farmers presently relying on saved local varieties with low yield, farmers with lack of know-how and skills in producing improved seeds and seedlings. The main crops to be covered are cereals and fruit trees

Keywords: Seed systems/formal, Seed systems/informal, 6 states of Sudan, improved seeds

29. Mercy Corps Seed support project in Southern Kordofan State (Mercy Corps, 2021)

Reference: Mercy Corps. (2021). Itar Alamal Li Tasea Shabakat AlBai Bil Tagzia Alreefia Lil Taqawi Almotamada Wa Altarweeg Limabeaat Albozoor Wa Bai Altaqawi Be Shaki Madoom Lil Muzareen Ashab Alheiazat Alsaqeera Fi Ganoob Kordofan [Framework for Expansion of Rural Retail Networks for Certified Seeds, Promotion of Seed Sales, and Subsidized Sale of Seeds to Smallholder Farmers in Southern Kordofan State]. [https://www.mercycorps.org/sites/default/files/2021-02/1.%20SOW\\_%20Rural%20Seed%20sales%20network%20expansion%20and%20sale%20of%20ubsidised%20seeds%20in%20South%20Kordofan%20State%2C%20Sudan%20-%20Arabic%20Translation.rtf](https://www.mercycorps.org/sites/default/files/2021-02/1.%20SOW_%20Rural%20Seed%20sales%20network%20expansion%20and%20sale%20of%20ubsidised%20seeds%20in%20South%20Kordofan%20State%2C%20Sudan%20-%20Arabic%20Translation.rtf)

- The goal of this framework was to support seed companies and suppliers to expand and strengthen rural seed sales networks and encourage the adoption of certified seeds by smallholder farmers in South Kordofan State.
- Main activities included the establishment of new and strengthening of existing rural retail networks, conducting seed promotion campaigns and subsidize sale of certified seed to smallholder farmers.
- Project location: localities of Kadugli, the eastern countryside, Dilling and Habila
- The program was designed to support at least two seed companies to implement the following activities:



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- Company No. 1 will operate in Kadugli and Eastern Countryside localities and target 5,000 male and female smallholder farmers.
- Company No. 2 will operate in Habila and Dilling localities and target 5,000 male and female smallholder farmers
- Support can also be provided to a company with proven potential to operate in all four localities and have the capacity to reach the targeted 10,000 smallholder farmers. The products whose prices will be reduced will include peanuts, sesame seeds, sorghum, and a variety of vegetables such as tomatoes, onions, okra, cucumbers, carrots, and others.
- Developing a network of retail seed business in 20 villages by April 15th, 2021.
- Capacity building of seed sellers in rural areas to provide basic agricultural advisory service to farmers by May 15, 2021.
- Develop and implement a specialized marketing and sales strategy to increase the number of women as seed retailers and customers of certified seeds by May 15, 2021.
- Develop and implement complementary activity(s) by August 30, 2021, that minimize potential negative impacts of increased adoption of improved seeds and improved agricultural practices on the environment. These can be environmental awareness messages of tree planting, proper disposal of packaging etc.

Keywords: rural seeds, sales network, agricultural practices, environmental awareness, packaging, adoption, certified seeds, sales strategy

#### 5.6.2. Supporting farmer and community seed production

##### 30. World Vision seed multiplication concept (Murunga & Ghallab, 2019)

Reference: Ghallab., L. M. a. G. (2019). "World Vision's Seed Multiplication Concept Contributes to Increased Food Security in South Darfur." <https://www.wvi.org/stories/sudan/world-visions-seed-multiplication-concept-contributes-increased-food-security-south>

- The blog presents stories on how World Vision implemented a seed multiplication project in two localities in South Darfur.
- The seed multiplication was conducted by groups of farmers who agree to a payback system through a community-managed seed bank. There were 12 seed multiplication groups in two locations, consisting of 10 farmers each.
- World Vision supported the groups by ploughing the 8land that would be used for the seed farms (10 feddans per group) and then provided the groups with certified seeds. After that, the farmers were responsible for planting and managing the crops until harvesting.
- In total, 1,720 kilogrammes of improved sorghum, millet and groundnuts (staple in most households) seeds certified by the Agriculture Research Centre were distributed to the farmers. In terms of capacity building, farmers were taught different farming techniques including storage of seeds.
- Key is that seed multiplication groups could be a community-managed seed banking system that will be a collection point for seeds, multiplied through the group farms. This was to be achieved through the establishment of the seed banks stores.

- The Seeds collected from the multiplication farms, were then be distributed to farmers for the next planting season. Key is that seed multiplication groups were expected to continue contributing to the stock at the seed banks. Additionally, it was expected that each farmer who received the improved seeds will return at least the amount they received to the seed banks. Beyond the group multiplication farms, each member also had their own individual farms.

Keywords: World Vision, Seed Multiplication concept, South Darfur, sorghum, millet and groundnuts, seed banks stores, distribution, seed storage

### 31. Local seed multiplication, Darfur (ICRC, 2009)

Reference: ICRC. (2009). Strengthening seed multiplication locally in Darfur. Available at: <https://www.icrc.org/ar/doc/resources/documents/update/sudan-update-280509.htm>

- In Darfur, the ICRC is distributing different types of local seeds to avoid dependence on aid. The ICRC conducted an assessment of agricultural yields after distributing seeds and planting tools in Darfur in 2008. One of the findings showed that some of the seeds distributed were not adapted to local conditions. The ICRC decided to adopt a new approach of multiplying seeds locally in an effort to improve production and maximize efficiency.
- The ICRC is to purchase an agreed quantity of crops for 2009, after approval by the National Seed Authority, in order to redistribute them to the population in dire need in different parts of Darfur.
- ICRC signed agreements with three local research centers in the cities of Zalingei, Nyala and El Fasher. The purpose of this plan is to help the centers revive the production of climate-appropriate seed varieties that have been certified and make them available in local markets.
- The families who work will benefit in agriculture and participate in the project at a higher price when producing the agreed quantity based on an agreement. Perhaps this incentive will encourage those families to produce a surplus that they sell for their own account
- A similar distribution campaign is currently taking place in different parts of Darfur. This new campaign will make it possible to provide at least 340 000 people with seeds and basic agricultural tools, taking into account lessons learned in the past, such as making sure not to distribute seeds that were found in the past to be unsuitable for local conditions. Farmers will also receive food rations for their own consumption for one month, allowing them to focus on their work during the planting season rather than looking for ways to provide for their families.

Keywords: local agriculture, foundation seeds, Zalingei, El Fasher, climate-appropriate, local markets, local conditions, ICRC, Sudan

### 32. Community based seed supply in North Kordofan (Osman, 2007)

Reference: Osman, A. K. (2007). Community based seed supply in Sudan. *Leisa Magazine*. 23: 18.



- Between 2002 and 2005 CARE International in Sudan implemented a project to enhance the food security status of approximately 65 000 rural families in Sheikan and Enhoud, two localities in North Kordofan.
- One of the projects' component was to improve seed availability through distribution of high quality seeds of improved varieties released by research, capacity building and training of local communities, and the promotion of seed multiplication at community level.
- During its three years of operation, the project distributed 136 tonnes of sorghum, 138 tonnes of millet, 447 tonnes of groundnut, 27 tonnes of sesame, and 9 tonnes of cowpea. Each household was provided with 2.5 kg of sorghum, 1.5 kg of millet, 15 kg of groundnut, 1 kg of sesame, and 2 kg of cowpea.
- Seed distribution was co-ordinated through linkages with relevant government institutions such as the Ministry of Agriculture, agricultural research stations, and community organisations.
- The project conducted several trainings to strengthen farmers' capacity and knowledge regarding technical aspects of seeds and seed production. Topics covered included quality (e.g. genetic and physical purity, germination rates, absence of weed seeds and diseases), testing, storage, multiplication, and certification. As a result, farmers have become more aware of the importance of high quality seeds, new varieties, and seed multiplication techniques.
- These farmers have since become a source of quality seeds of the improved varieties and were also able to sell their inspected seeds to the project, to individual farmers, and to formal seed sector companies. It then became possible to purchase seeds locally instead of buying externally produced seeds, and transport and seed distribution costs were reduced. Another benefit was that the prices the farmers were able to charge for the seeds became an incentive for promoting and establishing the informal seed production sector.
- The study found out that community-based system is very effective in improving the dissemination, accessibility and availability of quality seeds of the adopted improved varieties.
- The report provides the following substantial considerations provided to ensure the projects sustainability:
  - Supporting the formation and capacity building of the community-based organizations,
  - Continue decreasing dependency on external resources,
  - Increasing the involvement and interaction of government counterparts and strengthening their linkages with the communities,
  - Improving seed repayment rates and building seed storage facilities.

Key words: Sudan, North Kordofan, Seed distribution, seed repayment system, Improved varieties, Community based organisations

### 5.6.3. Free seed distribution

#### 33. Free Seed Aid Distribution in Bor, Twic East, Pochalla and Pibor, South Sudan (Maguet, 2014)

Reference: Maguet, S. D. (2014). "Free Seed Aid Distribution in South Sudan and its Effect on Local Varieties of Sorghum and Maize." *IOSR Journal of Agriculture and Veterinary Science* 7(4): 62-74.



- The purpose of this study is to explore effects of free sorghum and maize seed distributions to farmers in Jonglei state and to assess how these distributions affect farmer seed use of local varieties of these two crops.
- The guiding question: does free seed aid distribution have an effect on farmers' use of local varieties of sorghum and maize? The sub-questions are: do combination of local and modern (formal) seed makes farmers dependent on seed aid distribution? How do modern sorghum/maize varieties perform (in terms of yield) compared to local sorghum and maize varieties?
- A positive effect is defined as follows: despite free seed aid distribution to farmers, local seed varieties are still being grown by farmers. A negative effect is seen as the inverse: free seed aid distribution limits the use of local seed varieties.
- The project data was collected from four selected Counties in South Sudan: i.e. Bor, Twic East, Pochalla and Pibor. The project was delimited to two Payams (sub-county) per County. The sample size of those interviewed included 152 individual respondents and 10 focus groups.
- Findings indicate that local varieties have advantages over formal varieties as they are adapted to the environment and often have good resistance to flood dry spells, pest and diseases. Local varieties are also said by farmers, to be palatable. Grain from local varieties is also transformed into local brew which is consumed during special events like marriage or even at leisure. This is commonly practiced in Pochalla County.
- Although farmers liked local varieties, there are varieties they could not do without e.g. athil for beer in the case of Bor and Twic East. Gannue and zichinolo varieties are liked most in Pochalla and Pibor respectively.
- It is apparent that free seed aid distribution does not affect local varieties use in Bor, Twic East and Pibor. However, the inverse is true for Pochalla because farmers prefer either local or formal varieties. This indicates that, continued distribution of free seed aid by Agencies/NGOs in the County could result in likelihood of local varieties extinct in the County. It was also evident that some varieties which used to be in circulation before the war are now not in circulation.

Keywords: Free seed aid distribution effect, local/formal varieties, sorghum/maize performance, South Sudan

#### 34. Seed distribution in Sudan (OCHA, 2019)

Reference: OCHA (2019). Alnashra Alinsania, Sudan [Humanitarian Bulletin of Sudan] (in Arabic). [https://www.unocha.org/sites/unocha/files/dms/OCHA\\_Sudan\\_Humanitarian\\_Bulletin\\_Issue\\_05\\_28May\\_-\\_June\\_2019\\_29\\_Arabic.pdf](https://www.unocha.org/sites/unocha/files/dms/OCHA_Sudan_Humanitarian_Bulletin_Issue_05_28May_-_June_2019_29_Arabic.pdf)

- This report was prepared by UN-OCHA Sudan, in coordination with their relevant partners within the period of June to July 2019.
- In the context of seed security in fragile and conflict affected areas, the report indicated that, The International Committee of the Red Cross distributed seeds and tools to 138,000 in Darfur.

- The ICRC after consultation with the Ministry of Agriculture distributed to farmers more than 475 metric tons of seeds including sorghum, peanuts, cowpeas, sesame, Egyptian beans, tomatoes, eggplant, okra, onions and melons.

Keywords: seed security, fragile, Darfur, ICRC, formal seed system

### 35. Evaluation of the Sudanese Zakat Office projects (Gismeia & Fatima, 2013)

Reference: Gismeia, L. & Fatima, G. (2013). Evaluation of the Sudanese Zakat Office projects under an investigative approach development. Paper presented in the second international scientific conference on the role of non-profit Islamic financing (Waqf and Zakat) in achieving sustainable development, May 20-21st, 2013. <https://baitalzakat.com/files/articles/baitalzakat.com-A100292.pdf>

- This study is a research paper presented in the second international scientific conference on the role of non-profit Islamic financing (Waqf and Zakat) in achieving sustainable development, On May 20/21, 2013.
- The study aimed at providing a cross sectional assessment of the Zakat office projects on achieving sustainable development, and part of this work was focused on agricultural sector support.
- The Diwan (office) provides improved seeds, and other agricultural services for fragile and disadvantaged farmers in Gedaref, Sennar, Blue Nile, Upper Nile, South Kordofan States.
- In Al-Rashad Locality of South Kordofan State, the Diwan Zakat distributed mango seedlings for poor families.

Keywords: waqf, improved seeds, South Kordofan, Diwan Zakat, agricultural services, Blue Nile, Sennar.

#### 5.6.4. Seed fairs and vouchers

### 36. Seed fairs and Seed vouchers (Croft, Davis, Ferris, Longley, & Templer, 2021)

Reference: Croft M, et al. (2021). The Role of Seed Vouchers and Fairs in Promoting Seed Market Development: Opportunities and Limitations A Feed the Future Global Support Seed systems for Development activity (S34D) report.

Croft M, Davis V, Ferris S, Longley C, & Templer N. (2021). The Role of Seed Vouchers and Fairs in Promoting Seed Market Development: Opportunities and Limitations.

- This article examines how seed vouchers, seed voucher fairs, and their variants have expanded in their use and application over the last two decades. This report aims to identify whether or not seed vouchers, seed voucher fairs, and their variants implemented through emergency and/or resilience programming can promote seed market development over time, e.g., 2-5 year projects instead of 1-2 year projects. The article

points out that strengthening capacity within the seed sector to support the emergence of a sustainable, market-based seed system can offer quality, affordable seeds to smallholder male and female farmers in the long term, but this has not always been an objective of seed vouchers and fairs. A review of both adjustments to the seed voucher model itself as well as alternatives used in similar emergency and/or resilience contexts, numerous instances were found of approaches to foster sustainable market linkages which do not rely on seed fairs. Key examples from Sudan and South Sudan include:

- CRS Sudan's RISING II and Taadoud II projects where seed multiplier groups were trained by Taadoud II project and then linked to DiNER fairs offered in the emergency response RISING II project, allowing them to benefit from temporary boosts in sales through the fairs while encouraging connections between emergency and development projects.
- FAO South Sudan worked with seed multipliers to build their capacity in interventions where cash was the selected modality. FAO combined business and seed technical capacity strengthening in their work with seed producer groups and local seed producer associations in Haiti and South Sudan, where FAO strengthens their capacities to produce high-quality seed and their ability to compete with existing seed businesses.
- The evidence from both case studies and the documented literature suggest that seed voucher fairs are not the most effective way to promote seed market development over long-term projects, but that many alternatives exist to these approaches.

Keywords: South Sudan, seed vouchers, seed voucher fairs, market-based seed system, seed market development, market linkages

### 37. Voucher System, Mercy Corps, South Kordofan (Mercy Corps, 2018)

Mercy Corps (2018). Assisting The Vulnerable Conflict affected Communities in South Kordofan. Assisting the Vulnerable Conflict-Affected in South Kordofan' Program. .

- Vouchers offer short-term solutions to provide access to new varieties
- The 'Assisting the Vulnerable Conflict-Affected in South Kordofan' Program aimed at addressing the emergency lifesaving water, sanitation and hygiene (WASH) and food security needs of internally displaced persons (IDPs), returnees and conflicted-affected populations.
- The report highlights the food security and livelihood (FSL) component of the project which focused on the provision of key agricultural inputs - seeds and agricultural hand tools to 12,894 IDPs.
- The report describes how Mercy Corps identified a Certified Seeds Supplier to facilitate the distribution of the seeds through the value voucher system.
- Additionally, the ability of the seed source to deliver the seeds on schedule was severely hampered by the quick rise in transportation costs and the fuel shortages. Mercy Corps chose to use a value voucher system, in which beneficiaries redeemed the voucher for their preferred seeds with local pre-selected vendors, in order to respect beneficiary choices and increase their dignity.
- The report points lack of qualified certified seed suppliers in South Kordofan with the ability and desire to participate in the initiative. In the areas of Abukershola and Umbaraka, there were no local seed suppliers. To overcome this challenge, Mercy Corps contracted the Sudanese Arabian Company for Improved Seeds Production to participate in the project based in North Kordofan.

This seed supplier agreed to open two new seed distribution points in Abukershola and Umbaraka localities to facilitate the project. Fortunately for Mercy Corps, the company had a strategy to expand its operations in South Kordofan and this project provided it with an opportunity to do so, supporting the building of the local market system for seed distribution.

- The report provides the several lessons that Mercy Corps gained from the Voucher system use in the project which it will integrate into its future programming including:
  - o Many individuals in the target area lack formal identification which created challenges in verifying the identity of the beneficiaries. To overcome this, Mercy Corps worked with the local community leadership, Village Farmer Committees and other stakeholders in the project to verify the identity of the beneficiaries and facilitate the participation of those without formal identification papers.
  - The need for partner in this activity with a strong supplier. The strong technical and financial capacity of the seeds supplier enabled Mercy Corps to overcome the challenges caused by inflation and rapid price increases which occurred during the delivery time and was exacerbated by fuel shortages and heavy rains in May and June.
  - Mercy Corps leveraged its existing and long-standing relationships with the communities and local authorities to pave the way for the seeds supplier to build its own relationships and networks in the area.
- Successes reported include:
  - o Beneficiaries reported that the voucher system was easier to use than direct distributions as they can go to the seed outlet at a time that suits them. It was however observed that the value of the voucher did not take into account the different households sizes as households received the same value voucher regardless of their number of dependents.
  - o The impact of the FSL activities beyond the scope of the project- opening of the two new seed distribution points in Abukershola and Umbaraka localities.
  - o During the seeds distribution, non-project participants also utilized the seed outlets to purchase seeds with their own resources. The seed outlets have remained open and continue to operate beyond the closeout of the project.
  - o The seed outlets are now providing a service to the wider community and the increased local availability of improved seeds in a previously underserved community should have a larger impact on the overall agricultural production in the community.
  - o This project helped meet the unmet needs of the wider community through the opening essential agricultural input distributors in the target community.

Keywords: Voucher System, Mercy Corps, Seed suppliers, Certified seeds, South Kordofan

#### 5.6.5. Support to extension to increase seed demand

### 38. Digital Extension to Supports Seed Systems (Benett, 2020)

Reference: Benett, G. (2020). "Digital Extension Supports Seed Systems in South Sudan " [AGRILINKS https://agrilinks.org/post/digital-extension-supports-seed-systems-south-sudan](https://agrilinks.org/post/digital-extension-supports-seed-systems-south-sudan).



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- The Alliance for a Green Revolution in Africa (AGRA) had been strengthening seed systems in South Sudan and disseminating information of new and improved seed varieties through a Farm Inputs Promotion Services model, which relies on in-person visits and trainings to smallholder farmers to promote uptake of new practices.
- AGRA requested the support of the Feed the Future Developing Local Extension Capacity (DLEC) to effectively scale their reach by introducing digital extension approaches in South Sudan.
- DLEC conducted farmer and stakeholder needs assessments and identified the need for better training on the use of improved varieties, quality seeds, and fertilizers, as well as on improved seed production practices such as roguing and gap filling for crops like maize, sorghum, groundnuts, and millet.
- DLEC trained representatives of nine local private seed production companies in the use of Digital Green's community video approach, which includes how to develop and disseminate short videos, while also creating a system for collecting farmer feedback and tracking progress. By integrating use of video to visually convey the benefits of high-quality seed and improved agronomic practices, these private seed companies were able to increase the number of farmers reached five-fold.
- The nine seed companies that DLEC trained in partnership with AGRA have begun using video as one of the tools for delivering information on improved seeds to smallholder farmers. This local ownership of the approach builds sustainability and contributes to the growth of seed systems in South Sudan.

Keywords: Community video approach, improved seed varieties, Farm Inputs Promotion Services model

#### 5.6.6. Policies and Regulations

#### 39. Seed policies and programs (CSA & ORC Macro, 2001)

Reference: Sudan- Current State of Food Security in Sudan.  
[https://www.unescwa.org/sites/default/files/event/materials/2006\\_-\\_food\\_security\\_policies\\_adopted\\_in\\_several\\_arab\\_countries\\_-\\_sudan.pdf](https://www.unescwa.org/sites/default/files/event/materials/2006_-_food_security_policies_adopted_in_several_arab_countries_-_sudan.pdf)

- This PowerPoint presentation elaborates on the current food security in Sudan and discusses policies in the agricultural sector, key reflecting on the seed sector include:
- The Darfur development strategy (2013-2016) which elaborates agricultural development policies ranging from seed supply issues, agro-input dealers among others
- National agricultural and development policies. For instance, Agricultural Revival Program (ARP) I & II (2008-2014): The agricultural revival program (a.k.a. the Executive agricultural revival or revitalization Programme) targeted the expansion of domestic productivity through various measures including expansion of irrigation infrastructure, development of seed varieties and investing in research and development, facilitating private investment and land lease deals

- At program level:
  - Development of a Quality Seed Production System and Value Addition in Sudan (2014-2016): The project provided the basis for the development of viable, sustainable source of local and improved germ plasma for the sorghum, millet, ground nut, sesame, and vegetable seed sector through strengthening the capacity of plant breeding, seed production, marketing, and seed certification administration; safeguarding and improving the indigenous sorghum, millet, ground nut, sesame, and vegetable crop varieties; enforcing the legal framework of the Seed law regarding the protection of breeders' rights and regulations to create a favourable environment for the development of the seed sector and reinforcing of the technical capacity of the Seed certification administration/Agency
  - Enhancement of food security and livelihoods of vulnerable households in South Kordofan, Blue Nile, Kassala, Red Sea, Gedaref, Sinnar, White Nile and North Kordofan States, Sudan (2011-2014). The objective of the project was to improve food, nutrition and seed security of 95,400 vulnerable households of IDPs, returnees and vulnerable host communities in the target states.

Keywords: Sudan, seed systems/formal, seed policies, seed programs

#### 40. Export and Import Procedures of Plants and Plant Products, Sudan (Republic of Sudan, 2016)

Reference: Republic of Sudan (2016). Sudan Export and Import Procedures of Plants and Plant Products.

- The policy provides the regulatory framework. The import of Plants and Plant Products in Sudan is regulated by three laws: i) the Seeds and Variety Protection Act 2010 executed by the Seed Department of the Ministry of Agriculture, ii) The Plant Disease Act 1913 executed by the Plant Protection General Directorate of the Ministry of Agriculture (NPPO), and iii) the Sudanese Standards and Metrology Organization (SSMO) law 2008.
- The policy highlights the general plant import procedures. It additionally includes the export certification procedure as well as the seed import procedure. Only Companies registered with Seed Administration are allowed to import crop seeds. Other content present in the policy include: seed export procedure, import of seeds for research purposes etc.
- Tests undertaken for imports include:
  - Seed health testing
  - Genetic modification testing is only performed for soy beans and maize, by SSMO laboratories and verified by the biosafety laboratory when needed.
  - Germination test,
  - other tests are performed when the situation dictates so.

Keywords: Seed export, seed import, Companies, policy, procedures

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