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INDUSTRIAL DEVELOPMENT ORGANIZATION



STANDARDS *and* TRADE
DEVELOPMENT FACILITY

PROJECT: STDF/PG/435

**UPGRADING THE SUDANESE SESAME SEEDS VALUE
CHAIN**

(UNIDO SAP ID: 160177)

FINAL REPORT

2 FEBRUARY 2023

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PROJECT INFORMATION

Beneficiary

SUDAN

Project number and title

STDF/PG/435

Upgrading the Sudanese Sesame Seeds Value Chain

Budget

Total project value: US\$ 1,281,189 (STDF contribution US\$ 904,989 and in-kind contribution US\$ 376,200)

Approved STDF contribution: US\$ 904,989 (incl. 12% of support cost)

Disbursed STDF contribution (i.e. during the project lifetime): US\$ 904,989

Period of implementation

Commenced: October 2018

Completed: March 2022

Implementing Agency

Lead Agency-United Nations industrial Development Organization (UNIDO)

Cooperating Agency-Food and Agriculture Organization of the United Nations (FAO)

Partners

Ministry of Agriculture and Forestry

Sudanese Standards and Metrology Organization (SSMO)

Chamber of Commerce

Ministry of Production and Economic Resources in North Kordofan

Ministry of Production and Economic Resources in Al Qadarif

LIST OF ABBREVIATIONS

ARC	Agriculture and Research Corporation
FAO	Food and Agriculture Organization of the United Nations
GAP	Good Agriculture Practice
LoA	Letter of Agreement
MOAF	Ministry of Agriculture and Forestry of Sudan
MoI	Ministry of Industry
NK MoPER	Ministry of Production and Economic Resources in North Kordofan
AQ MoPER	Ministry of Production and Economic Resources in Al Qadarif
MoT	Ministry of Trade
QI	Quality Infrastructure
SPS	Sanitary and Phyto-sanitary measures
STDF	Standards and Trade Development Facility
SSMO	Sudanese Standards and Metrology Organization
TBT	Technical Barriers to Trade
TOT	Training of Trainers
UNIDO	United Nations Industrial Development Organization
VC	Value Chain
WTO	World Trade Organization

1 EXECUTIVE SUMMARY

Agricultural sector is essential to the diversification of the Sudanese economy, as it remains the main source of income for its population, employing up to 70% of Sudanese households and making up a third of the country's Gross Domestic Product (GDP). The sesame seed is one of the most important exported agricultural products of Sudan.

However, export destinations of Sudan's sesame products are limited to Saudi Arabia, Egypt, Syria, Lebanon and Jordan despite Sudan's opportunity to increase its exports to some value-added markets such as Japan, Korea and the EU. This extensive market opportunity loss is caused by the non-fulfilment of the specified regulations on SPS measures of these aforementioned markets, in particular those relating to pests, microbiological contamination, mycotoxins-producing fungi and non-compliant pesticide residues in the final product. Referring to sesame seeds, specifically it is the aflatoxins, salmonella, and a restricted agricultural chemical use such as carbaryl that are the major reasons why the product is rejected at the border of importing countries, consequently decreasing export opportunities.

With the aim of tackling the above-mentioned issues, the project titled "Upgrading the Sudanese Sesame Seeds Value Chain" was developed and jointly implemented by UNIDO and FAO. The project was funded by the Standards and Trade Development Facility (STDF), starting from October 2018 and lasted for 3.5 years until March 2022, including a six-month non-cost extension due to the COVID-19 pandemic and instability environment in the country. The project was endorsed by the STDF Working Group during its meeting held between 30 and 31 of October 2017, and an Implementation Assignment with STDF's contribution to the project amounting to USD 904,989 was signed by UNIDO on 18 of September 2018 and respectively signed by STDF on 25 of September 2018. As requested by the donor, STDF, UNIDO, as the leading implementing agency, concluded an inter-agency agreement with FAO to implement Outcome 1 aiming to strengthening compliance of farmers with SPS measures. UNIDO mainly focused on Outcome 2 which aims to improve export opportunities. The two agencies have been collaborating closely in the project implementation in many areas to make use of their specific technical expertise and local capacities.

The project objective was to build the capacities of small-scale farmers in cultivating safe sesame seeds in the main sesame seeds growing states, namely North Kordofan and Al Qadarif. Moreover, the project aimed at reducing SPS deficiencies by strengthening the capacity of quality infrastructure institutions, as well as creating business linkages between Sudanese exporters and international buyers.

With the assistance of the project,

- 200 farmers were organized to formulate six Farmers Field Schools (FFSs) for developing their skills and adopting good practices;
- A directory of 350 sesame value chain actors (producers, traders, warehouse, auctions centres, transporters, exporters, etc.) were shared with the Chamber of Commerce for incorporating into their network, sharing market information and developing business linkage;
- Over 400 sesame farmers and other value chain actors in the two states have access to up-to-date knowledge on GAP-IPM, post-harvest, transportation, oil extraction, traceability and market compliance for improving their cultivation and post-harvesting practices;
- New market opportunities for the export of sesame seeds were explored, and 24 Sudanese exporters of sesame products were linked with 27 international buyers from Japan, South Korea, China, Italy and Middle East.

More specifically, the following results were achieved under the project:

Outcome 1: Capacity of farmers in two target states strengthened to improve compliance with SPS measures by enhancing implementation of GAP

FAO implemented this component and the following results were achieved:

- Six farmers field schools (FFSs) were established, three in North Kordofan and three in Al Qadarif, in order to provide season long trainings related to land preparation, use of improved seeds, good agricultural practices and weed control were organized in North Kordofan and Al Qadarif.
- Two manuals were developed and disseminated to facilitators to guide their trainings for farmers.
- 30 extension officers were trained based on the two manuals on FFSs and GAP.
- Training of 200 farmers (32% were women and more than 50% were young farmers) through FFSs on GAP contributed to cultivation of quality sesame seeds.
- Inputs including certified seeds and equipment were purchased and promote good practices.

Outcome 2: Export opportunities for Sudanese sesame-seed improved by complying with SPS measures and other international food safety standards

UNIDO was implementing this component and the following results were achieved:

- In collaboration with FAO, eight practical guides (on GAP-IPM, post-harvest, transportation, oil extraction, traceability and market compliance) developed and disseminated.
- In collaboration with the two state governments, 200 farmers and 50 post-harvest handlers, of which 40% women and youth, were trained by 6 extension officers trained by UNIDO and FAO.
- A paper-based traceability system was prepared as part of the guides to ensure that transactions between buyers and sellers are recorded, and that batches are identifiable and distinguished from each other.
- To support in building the national network, a directory of sesame value chain (VC) actors developed, consisting of 200 farmers from North Kordofan and 200 farmers from Al Qadarif states, as well as auction centers and transporters was prepared and shared.
- A B2B event was organized which linked 24 Sudanese exporters of sesame products with 27 international buyers from Japan, South Korea, China, Italy and Middle East, to promote business linkage.
- Based on the needs of the stakeholders, trainings on the WTO/SPS Agreement, SPS enquiry point, SPS risk analysis, and pesticide management were organized.
- Technical support provided to Sudanese Standards and Metrology Organization (SSMO) for their implementation of international standards and development of aflatoxin¹ testing for international accreditation.
- The plant health legislation reviewed to identify weaknesses and gaps of the legislation system against international standards and multilateral agreements.
- A proposal of Export Control System prepared and submitted to the Government.

Experience and the lessons learned:

- Farmers Field Schools with engagement of the research and extension service organization has been proven as an effective approach to reach the farm level and improve the knowledge and skills of small farmers.

¹ a microbiological contamination identified in sesame seeds by international buyers

- Consolidation of knowledge and dissemination of good practice in the form of practical guides has been well recognized by the government, sectoral associations, extension organizations at federal and state level and private stakeholders as a means to ensure sustainability of the project results.
- B2B event was welcomed and attended actively by Sudanese companies, while without institutional support by functional sectoral associations, follow-up actions to secure business agreements are unsecured.

The project faced obstacles during its implementation, especially due to the political instability which grew into a coup in October 2021, and the COVID-19 pandemic which occurred throughout most of the project implementation period. Government instability, which caused changes in senior government officials, made it difficult to obtain responses from stakeholders for the implementation of project activities. It was especially difficult to implement the activities related to export control and traceability systems due to lack of leadership and understanding of the systems which were newly introduced by the project. Also, due to COVID-19 pandemic, the project activities had to shift into online mode and planned missions were cancelled. However, based on achievements made under the project the recommendations would be to support Sudan in establishing export control and traceability systems based on foundations established under the project.

The project was jointly conceptualized with the two UN agencies, UNIDO and FAO for the implementation with complementary interventions and joint elaboration of good practices along the value chain. Taking this opportunity, UNIDO and FAO would like to express their appreciation to the STDF for the generous funding of the project, which enabled the two agencies to support Sudan in their effort to meet international market requirements and thus increase exports of sesame seeds for income generation.

Background

Sudan's sesame sector lacks sufficient capacity to meet quality standards and international market requirements including SPS measures in importing countries especially those of value-added markets. To address these challenges, systematic interventions are needed along the value chain starting from cultivation, transportation, storage and exportation. Capacity building at policy and institutional level are also required, so that the root cause can be addressed through updating the SPS-related laws and regulations, and strengthening the capacity of the quality infrastructure system to provide competent service to the sector. In Sudan, the majority of the production and trading of sesame seeds have limited communication or forward/backward linkages along the supply chain. This limitation prompted the lack of information on quality standards and market requirements and ultimately the non-fulfilment of SPS measures in foreign markets. Accordingly, the project was designed with the following interventions to address the aforementioned issues:

Outcome 1: Capacity of farmers in two target states strengthened to improve compliance with SPS measures by enhancing implementation of GAP

- **Output 1.1:** Support the development of farmer cooperatives in targeted two states to develop baseline for horizontal cooperation among farmers.
- **Output 1.2:** Sesame-seed growers strengthen their capacity to implement GAP and develop better understanding of international standards.

Outcome 2: Export opportunities for Sudanese sesame-seed improved by complying with SPS measures and other international food safety standards

- **Output 2.1:** Improved quality and hygiene conditions in the supply chain
- **Output 2.2:** Strengthened SPS measures

- **Output 2.3:** Improved laboratory testing, inspection and certification assessment capacity and procedures
- **Output 2.4:** Economic activities of sesame-seed industry enterprises improved by enhancing development of new business linkages in the international market

The agricultural sector is the most important economic driving force of Sudan as it contributes about 30% of the country's GDP and provides inputs to many major food-processing industries. The manufacturing sector in Sudan is overwhelmingly agriculture-dependent, receiving about 60 percent of its needed raw material from agriculture. Also, it is the backbone of the rural economy, where around two thirds of Sudan's population live. The majority of rural populations, if not directly engaged in agricultural production activities, undertake activities closely related and supportive to the sector such as provision of services, e.g., transport, trading, procuring inputs, etc. Therefore, despite its modest performance, agriculture continues to be the main source of incomes in rural areas, as well as an important contributor in urban areas through economic activities such as trade, storage and processing.

In Sudan, sesame seeds cultivation accounts for the most significant portion of agricultural activity among major cash crops. In terms of area of cultivation, Sudan has the largest sesame seeds harvest area of the world with around 2.5 million hectares cultivated annually with sesame. However, Sudan is the fourth largest country in terms of total volume of production because of the low yield per hectare.

In addition to the low productivity level, Sudan sesame seeds export has been encountering challenges in complying with quality standards and SPS measures at foreign markets. The major challenges for Sudanese sesame to maintain international markets are presence of aflatoxins and the improper use of pesticides and fertilizers, as well as the lack of implementation of the GAP. Sudan also lacks well-established traceability and export control systems and therefore the ability to maintain high-end market access for more value addition is limited.

In order to support Sudan in managing the deficiencies that led to the above-mentioned problems the two UN organizations, UNIDO and FAO, through their innovative collaboration and sharing of expertise, was cooperating with national counterparts, namely the Ministry of Agriculture and Forestry, Ministry of Industry, Ministry of Trade, Agriculture Research Corporation applied and obtained the approval for the implementation of this project from STDF in 2017.

United Nations Industrial Development Organization (UNIDO)

UNIDO is the specialized agency of the United Nations that promotes industrial development for poverty reduction, inclusive globalization and environmental sustainability. The mission of UNIDO, as described in the Lima Declaration adopted at the fifteenth session of the UNIDO General Conference in 2013, is to promote and accelerate inclusive and sustainable industrial development (ISID) in Member States. Moreover, UNIDO's mandate is fully recognized in SDG-9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation". The relevance of ISID, applies in greater or lesser extent to all SDGs. Accordingly, the UNIDO's programmatic focus is structured in four strategic priorities: i) Creating shared prosperity; ii) Advancing economic competitiveness; iii) Safeguarding the environment; and iv) Strengthening knowledge and institutions

In line with its strategic priorities focusing on advancing economic competitiveness and strengthening knowledge and institutions, UNIDO has been cooperating with developing countries to develop and strengthen their value chain and quality infrastructure, improve competitiveness of their enterprise

especially SMEs, and promote their access to international markets, including through partnering with other international organizations and technical institutions.

Food and Agriculture Organization of the United Nations (FAO)

The Food and Agriculture Organization of the United Nations (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger. The goal of the organization is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. Moreover, FAO has a long history in the development and implementation of Good Agricultural Practices (GAP) in food markets.

Through GAP activities FAO supports developing appropriate protocols and processes which fit the local context, especially focusing on small-scale farmers in GAP oriented markets, which will continue to ensure they are important in the global food system.

Ministry of Agriculture and Forestry

The Ministry of Agriculture and Forestry is in charge of agricultural policies, and performs important SPS functions, including the accession to the World Trade Organization (WTO). Responsibility for plant health and pesticide management in the Sudan rests with the Plant Protection Directorate (PPD) within the Ministry of Agriculture and Forestry. Moreover, the ministry provides import licenses for active compounds and controls the use of pesticides.

Agriculture and Research Corporation (ARC)

Research on agricultural products in Sudan is carried out by the Agricultural Research Corporation Sudan (ARC) under the Ministry of Agriculture and Forestry where its mission is to plan and implement research for sustainable production system in Sudan. Moreover, it aims to contribute to the achievement of food security, alleviation of poverty, generation of incomes, promotion of agricultural export and conservation of natural resources.

Ministry of Industry

The Ministry of Industry is in charge of developing the industrial sector in a way that can increase the contribution of industrial products to exports, by rehabilitating, modernizing and operating factories and idle factories, developing production efficiency, and directing industrial investment according to comparative advantages, production capabilities and target markets, in a way that strengthens the competitive capabilities of national industrial products.

Ministry of Trade

The Ministry of Trade is in charge of developing foreign and internal trade by upgrading the infrastructure of trade and related services, increasing the competitiveness of exports, diversifying the structure of Sudanese exports, strengthening partnerships with the private sector, and enhancing Sudan's position at the level of regional and international trade.

The project was approved during the STDF Working Group Meeting which took place from 30 to 31 of October 2017 and the project started its implementation from 1 of October 2018 and ended on 31 of March 2022 with a six-month non-cost extension. Since the launching of the project, political instability in the country has resulted in changes within the government at different levels. The global COVID-19 pandemic outbreak in early 2020 and related restrictions on traveling and gathering also

contributed to difficulties in project implementation. Upon the request of the government coordination agency, the Ministry of Agriculture and Forestry (MoAF), a no-cost project extension was approved by the STDF.

2 PROJECT GOAL

The overall objective of the project was to support sesame seeds value chain stakeholders by contributing to the increase of their revenue through strengthening the capacities of cultivation, compliance with SPS measures and international standards for exports, as well as creating business linkages between exporters and international market. Furthermore, the project aimed at contributing to increase the Sudan's export revenue from non-oil exports.

The above-mentioned objectives were expected to contribute to long term impacts of improvement of SPS compliance followed by market access and poverty reduction through the achievement of the following outcomes:

- Outcome 1: Capacity of farmers in two target states strengthened to improve compliance with SPS measures by enhancing implementation of GAP
- Outcome 2: Export opportunities for Sudanese sesame-seed improved by complying with SPS measures and other international food safety standards

Given their expertise, an innovative cooperation modality was promoted and established between FAO and UNIDO (as the leading agency), allowing two organizations to implement in a collaborative manner the two outcomes respectively.

FAO in close coordination with the Ministry of Agriculture at federal and states levels engaged with the local extension officers and the two agricultural research stations in the targeted states on all project activities with local farmers. The capacity of local extension officers was strengthened through ToT trainings on GAP and SPS compliance. Trained extensionists were also equipped with manuals and guidelines that would support dissemination of knowledge gained to wider range of farmers than those targeted by the project.

FAO also adopted the Farmers Field School approach to train targeted farmers on GAP and SPS compliance. Season-long trainings were provided in two consecutive seasons through the established FFSs by the project. The FFS approach helped in organizing farmers in groups, improved exchange of knowledge and experience between farmers groups, developed strong relations between research, extension and farmers, and established linkages between farmers and sesame-seeds traders and exporting companies, hence contributes to the sustainability of the project interventions.

In collaboration with FAO, UNIDO developed eight practical guides for farmers, post-harvest handlers and exporters on the following topics: GAP-IPM, post-harvest, transportation, oil extraction, traceability and market compliance. These were prepared with the aim to consolidate and disseminate the knowledge and good practices developed under the project, promote best practices at each stage of the sesame value chain for quality assurance, and support Sudan in their effort in producing sesame seeds that are compliant with SPS measures and other quality requirements for increased export opportunities. The guides were also used for the implementation of the national training programme for 200 farmers and 50 post-harvest handlers, of which 40% women and youth who are engaged in sesame seeds production, processing and exportation in North Kordofan and Al Qadarif.

A paper-based traceability system was prepared as part of the guides to ensure that transactions between buyers and sellers are recorded, and that batches are identifiable and distinguished from each other.

To support in building the national network, a directory of sesame VC actors was developed, consisting of 200 farmers from North Kordofan and 200 farmers from Al Qadarif states, as well as auction centers and transporters.

A B2B event titled “Promoting Trade of Sesame Products between Sudan and International Market” was organized which linked 24 Sudanese exporters of sesame products with 27 international buyers from Japan, South Korea, China, Italy and Middle East, to promote business linkage. To deliver this event, UNIDO was in close collaboration with the Japan External Trade Organization (JETRO) and the China Chamber of Commerce of Import & Export of Foodstuffs, Native Produce & Animal By-Products (CFNA), as well as UNIDO’s Investment and Technology Promotion Offices (ITPO) in Japan, South Korea, Italy and Germany to promote Sudanese sesame seeds to international market.

Based on the needs of the stakeholders, a number of training sessions on the WTO/SPS Agreement, SPS enquiry point, SPS risk analysis, and pesticide management were organized, aiming to improve the knowledge and skills of the governmental officials and experts involved in SPS issues and quality assurance, contributing to their better understanding on the multilateral agreement and internationally recognized approach and techniques.

The project also capacitated the quality infrastructure system in Sudan, mainly focusing on the Sudanese Standards and Metrology Organization (SSMO) for their implementation of international standards for conformity assessment such as ISO/IEC 17020 and ISO/IEC 17025. To build the capacity of SSMO for accreditation of aflatoxin² testing, the project provided various supports, including laboratory devices and chemical standards, capacity building trainings as well as technical support in developing validation plan.

Upon the request of the plant health authority, the plant health legislations were reviewed to identify weaknesses and gaps of the legislation system against international standards and multilateral agreements. A number of recommendations were developed aiming to inform policy makers in Sudan of the areas in the legal system to reform and improve.

A proposal on an Export Control System was prepared and submitted to the Government, with the aim to inform the gaps in quality control of sesame exports and improve multi-agency coordination among government agencies and the QI system in a risk-based approach.

With respect to experience and the lessons learned, application of Farmers Field Schools with engagement of the research and extension service organization has been proven as an effective approach to reach the farm level and transfer knowledge and skills to small-scale farmers. Consolidation of knowledge and dissemination of good practice in the form of practical guides has been well recognized by the government, sectoral associations, extension organizations at federal and state level and private stakeholders as a good mean to ensure sustainability of the project results. Moreover, the B2B event was welcomed and attended actively by Sudanese companies, while without institutional support by functional sectoral associations, follow-up actions to secure business agreements are unsecured.

3 PROJECT IMPLEMENTATION AND MANAGEMENT

The project was jointly implemented by UNIDO and FAO in close coordination with the Ministry of Agriculture and Forestry of Sudan. While UNIDO was the lead implementing organization of the

² a microbiological contamination identified in sesame seeds by international buyers

project and through an-inter agency agreement, FAO was subcontracted to implement Outcome 1. The two organizations assigned project managers, one from UNIDO HQ and one from FAO Sudan Office. Both project managers supervised and guided their project teams for the project implementing activities and coordinated for collaboration and synergies between the two components and their development cooperation in Sudan. Consequently, the project team consisted of the following personnel:

UNIDO	FAO
<u>UNIDO HQs in Austria</u> Project Manager Project Associate International Expert on Value Chain Development and Quality Infrastructure International Expert on Food Chemistry and Quality Testing National Project Coordinator	<u>FAO's field Office in Sudan</u> Project Manager Agro-Industry Specialist Senior Agronomist Food Safety Specialist Field Coordinators Consultant

The Technical Expert Group was established which comprised of 16 members from the MoAF, MoT, MoH, SSMO, Chamber of Commerce and Arab Organization for Agricultural Development with the aim to support the implementation of the project. The Project Steering Committee was established which comprised of 13 members from the MoAF, MoT, SSMO and ARC as the project governance structure with the aim to oversee and supervise the implementation of the project.

The responsibilities of each organisation in the project are listed in the table below.

Organization	Responsibility
Ministry of Agriculture and Forestry	<ul style="list-style-type: none"> - Chaired the SC - Member of the TEG - Main partner and focal point for project activities implementation - Provided technical inputs on reports and guides - Provided venues for workshops/trainings and meetings - Disseminated project information and materials through its channels
Ministry of Trade	<ul style="list-style-type: none"> - Member of the SC and TEG - Provided technical inputs on technical reports and guides
Ministry of Health	<ul style="list-style-type: none"> - Member of the TEG - Provided technical inputs on technical reports and guides
Ministry of Production and Economic Resources in North Kordofan	<ul style="list-style-type: none"> - Trainings to Farmers on Good Agricultural Practices for Sesame Crop - Implemented the national training programme
Ministry of Production and Economic Resources in Al Qadarif	<ul style="list-style-type: none"> - Trainings to Farmers on Good Agricultural Practices for Sesame Crop - Implemented the national training programme
North Kordofan Research Station	<ul style="list-style-type: none"> - Strengthened the capacity of sesame seeds growers to implement GAP - Raised awareness on international standards
Al Qadarif Research Station	<ul style="list-style-type: none"> - Strengthened the capacity of sesame seeds growers to implement GAP

	Raised awareness on international standards
ARC	<ul style="list-style-type: none"> - Member of SC - Provided technical inputs on technical reports and guides - Conducted research on sesame seeds production - Facilitated TOTs on GAP - Established FFSs
SSMO	<ul style="list-style-type: none"> - Member of the SC and TEG - Provided technical inputs on technical reports and guides
Chamber of Commerce	<ul style="list-style-type: none"> - Member of the TEG - Facilitated creation of business linkages between Sudanese companies and foreign buyers - Provided technical inputs on technical reports and guides
Arab Organization for Agricultural Development	<ul style="list-style-type: none"> - Member of the TEG - Provided technical inputs on technical reports and guides

During the project implementation, the following Letters of Agreements (LOAs) and sub-contracts were concluded:

FAO

1) Two LoAs were signed in 2020 with North Kordofan Research Station, and Al Qadarif Research Station. The objective of both LoAs was to strengthen the capacity of sesame seeds growers to implement GAP and develop better understanding of international standards. Under these LoAs, each research station implemented the following activities:

- Established three Farmer Field Schools in coordination with the local department of agricultural extension in the state's Ministry of Production and Economic Resources.
- Established Participatory Technology Development Farm (2 feddans (~0.42 ha) in each village).
- Provided season-long trainings: For each FFS, at least 16 sessions on technical issues concerning with GAP, and 2-4 sessions on special topics and cross-cutting issues were conducted.
- Involved in training 15 facilitators to supervise the training of farmers in FFS (Nine from the State Ministry of Production and Economic Resources, one from ARC, in addition to 5 leader farmers). Also, the facilitators were involved in the different activities of FFSs (PTD and field days) and engaged with the research scientists.
- Conducted at least one field day in each FFS.
- Strengthened linkages between private sector (local traders, exporters, processing companies) and farmers through arrangements of visits from private sector to the FFS sites.
- Provided extension/advisory services for the targeted farmers in each village throughout the season.

2) LoA with ARC was signed in 2021 for Training of Trainers (TOT) on Good Agricultural Practices (GAP) and Farmer Field Schools (FFS). Below are the activities carried out by ARC under this LOA:

- Developed the training materials and submitted together with the CVs of the lecturers for FAO review and approval.
- Organized 5-day TOT for 30 extension officers and lead farmers as following:
 - 2 days on the Manual on GAP, as per the subjects presented in below work plan.
 - 2 days on the Manual on FFS, as per the subjects presented in below work plan.
 - 1 day on the Booklets for farmers and post-harvest handlers, in collaboration with UNIDO.

- 3) Two LoAs were signed in 2021 with the ministries of Production and Economic Resources in each of the targeted states for Trainings to Farmers on Good Agricultural Practices for Sesame Crop. The main activities implemented under each LoA include the following:
- Implemented 4 training sessions at each location of the three established FFS (total 12 sessions for 100 farmers). These training sessions mainly relied on the MANUALS and the BOOKLETS on which the extension officers has received the ToT training.
 - Organized two field days at two FFS locations.
 - Collected data on farmer's production and productivity
 - Documented the training activities, including field days.

UNIDO

- 4) Two sub-contracts were concluded with the Ministry of Production and Economic Resources in North Kordofan and Al Qadarif, in order to implement the national training programme through training sessions for farmers and post-harvest handlers who were engaged in sesame seeds production, processing and exportation. UNIDO trained 6 extension officers from the two states and developed 8 guides, to facilitate the trainings in the two states. The trainings included the topics on GAP/IPM, post-harvest, transportation, traceability, sesame seed oil extraction, and testing, certification requirements and SPS measures. The following main activities were implemented under the contract:
- Organized 15 training events for 100 farmers and 25 post-harvest handlers in each state, North Kordofan and Al Qadarif
 - Collect data on farmer's production and productivity
 - Documented training activities

UNIDO and FAO prepared the three-month progress reports for updating, monitoring and evaluating each other's activities and the reports also included the monitoring table. Moreover, the six-month project progress reports were shared with the Steering Committee for their review and monitoring of project activities. UNIDO also submitted bi-annual reports to the donor STDF. The reports included the logical framework which was updated on a three and six monthly basis. Therefore, the project management achieved the RBM through its reporting mechanism which served as the monitoring and evaluation tool of the project.

A mid-term evaluation and a final evaluation were planned. However, due to the fact that the project implementation was delayed due to the situation in Sudan, and given the budget constraints, the mid-term evaluation was cancelled. The final evaluation was conducted at the end of the project using UNIDO and STDF evaluation guidelines. The evaluation was led by an experienced international evaluator twined with a national evaluator who conducted interviews and meetings with key stakeholders under the guidance of the international evaluator, as international traveling was still restricted due to the COVID-19 pandemic. The final evaluation was submitted to the donor after finalization.

4 PROJECT OBJECTIVE, OUTPUTS AND ACTIVITIES

4.1 Project objective

The project objective was to build the capacities of small-scale farmers in cultivating safe sesame seeds in the main sesame seeds growing states, namely North Kordofan and Al Qadarif. Moreover, the

project aimed at reducing SPS deficiencies by strengthening quality institutions capabilities, as well as creating business linkages between exporters and importers.

The project objective falls within the Sudanese Government's effort in increasing export revenues from non-oil sector. In relation to this, the project enhanced capacity of farmers, post-harvest handlers, exporters, quality institutions and governmental organizations in assessing the basic SPS conditions for the export of sesame seeds through training sessions and review of laws and regulations which were mainly focused on GAP, SPS and plant health.

The capacity building activities were implemented through use of locally available knowledge of ToTs, who provided inputs in the formulation of the guides, which were used for the implementation of the National Training Programme. International expertise on value chain development and quality infrastructure were brought to Sudan and good practices and new approaches were introduced to capacity building activities based on specific needs of Sudanese counterparts.

As a result, FAO trained 200 (32% women) farmers mainly on GAP in North Kordofan and Al Qadarif, through FFSs established, and UNIDO trained 200 (40% women) farmers and 50 (40% women) post-harvest handlers as part of the National Training Programme in North Kordofan and Al Qadarif through cooperation with the state governments which are providing extension service to local farmers and other VC actors. In total, 400 farmers and 50 post-harvest handlers benefited from the project. Moreover, 242 (59% women) government officials benefited and gained knowledge from 22 different trainings organized by UNIDO. To strengthen the testing capacity, the project also supported SSMO through providing chemical inputs, a Nitrogen Evaporation System, and spare parts. Also, one sesame oil extraction machine and one sesame oil cleaning machine were purchased for each state with the purpose of introducing new technology and demonstrating value addition to producers.

The guides developed by UNIDO and FAO are well-recognized as the first consolidation of quality-related knowledge and good practice in Sudan and appreciated by public and private stakeholders such as MoAF, MoT, Mol, ARC, Chamber of Commerce and SSMO. The guides were widely disseminated to various VC stakeholders in Sudan to guide them in addressing important issues in improvement of sesame seeds quality, which in long term will contribute in increase of sesame exports to high-end markets.

Outcome 1: Capacity of farmers in two target states strengthened to improve compliance with SPS measures by enhancing implementation of GAP

Output 1.1: Support the development of farmer cooperatives in targeted two states to develop baseline for horizontal cooperation among farmers.

This output aims at supporting the development of farmer cooperatives/producers' associations in partnership with local authorities to enhance knowledge of the GAP and SPS measures. By developing horizontal connection among farmers, strong and efficient cooperatives will act as a service provider in order to help its farmer members adopt GAP under this project; cooperatives will also be instrumental to providing information to its farmer members as well as training activities.

Output 1.1 was achieved through the implementation of the following two activities:

Activity 1.1.1: Organize farmer cooperatives taking enhancing gender equality and youth employment into consideration. Select trainers for leading the cooperatives on strengthening their capacity.

Based on the baseline survey conducted by the Technical Expert Group (TEG) and supported by UNIDO in September 2019 (Annex 1.1, 1.2), FAO in consultation with the TEG, the National Coordinator for

Producers Associations, and the state ministries in EIObied and Gedarif areas, as well as relevant stakeholders in the two targeted states, selected 100 farmers and 15 extension officers and lead farmers, as following:

A. North Kordofan State:

- 35 farmers from Kondoh village, Umroaba Locality (18 males + 17 females)
- 35 farmers from ElMeraiheba village, Umroaba Locality (26 males + 8 females)
- 30 farmers from Alkra village, Sheikan Locality (20 males + 10 females).
- 10 Agriculture extension as Facilitators (7 males and 3 females, 50% of them are youth).
- 5 Lead farmers (3 males and 2 females, 50% of them are youth).

B. Gadarif State:

- 35 farmers from Doka village, East Galabat Locality (25 males and 10 females)
- 35 farmers from Al mafaza Locality (26 males and 9 females)
- 30 farmers from Galaa Alnahal Locality (20 males + 10 females)
- 10 Agricultural extension as Facilitators (7 males and 3 females, 50% of them are youth).
- 5 Lead farmers (3 males and 2 females, 50% of them are youth).

Farmers lists are included in Annex 2, while the lists of extension officers and lead farmers are included in Annex 3.

From the surveyed localities by the mentioned baseline, in North Kordofan State two localities were selected (Umroaba and Shiekan Localities). Within which 45 farmers associations were established. All the farmers associations were registered except Kondoh. The location of the two localities is relatively easy to access and the educational level of farmers is better compared with other localities. More than 70% of the farmers are between 20-50 years old. The total area grown with sesame is bigger than other localities and the average production is also higher in the two selected localities. The use of certified seeds is a real challenge for all farmers in selected localities.

In Gedarif State, the selection considered that more than 20% of lands in North and South Gadarif State are normally re-sown because of heavy rains in the early season. Therefore, Doka and Galaa Alnahal were selected from the central area. However, Al mafaza Locality from the South was selected to support farmers to face the challenge of infestation by Sesame Gall Midge (insect pest on sesame). There is no big difference between the localities in average production of sesame, but gender participation, age, cultural practices, use of certified seeds, use of pesticides are a real challenge in these three localities compared with the others.

Selected farmers were trained under activity 1.2.3 of this project through Farmer Field Schools (FFS), where three FFS were established in each state. The selected 10 agriculture extension officers and the five lead farmers (total 15 in each states), were trained as FFS facilitators under activity 1.2.2.

Activity 1.1.2: Conduct inception workshops for farmers in the target states of North Kordofan and Al Qatarif, in partnership with local authorities and sector associations.

Following the selection of project beneficiaries, a training workshop was conducted in North Kordofan, where 95 out of the 100 selected farmers attended the workshop. All 15 FFS facilitators were present. In addition, relevant stakeholders also attended the opening of the workshop, including representatives from the state's ministry, seeds producers, micro-finance institutions, NGOs, and the African Development Bank. The aim of the workshop was to train selected farmers on quality and food safety aspects of sesame-seed for export and on SPS implementation measures. The workshop also aimed at assessing farmer's knowledge through their participation in the workshop. Their feedback

was used to align the training and coaching approach for the selected farmers in the in-depth programs (Annex 4).

With the same objectives, a second workshop was conducted in Gedarif State, where all targeted farmers and FFS facilitators attended the workshop. The workshop was opened by the Governor of Gedarif State. The opening session was attended by high level officials and representatives from the research, plant protection, agriculture and animal production chambers union, and other stakeholders.

Output 1.2: Sesame-seed growers strengthen their capacity to implement GAP and develop better understanding of international standards.

The goal of this output was to enhance farmers' knowledge on SPS measures, as well as to train trainers for implementing training program on GAP. Three activities were implemented under this output to benefit members of the producers associations by enhancing their capacities of sesame-production to comply with SPS standards from implementing GAP as following:

Activity 1.2.1: Develop training materials and training curricula on adapting GAP for sesame-seed farmers.

Based on the knowledge gap identified in above mentioned workshops (Activity 1.1.2), FAO developed and published two manuals for agriculture extension officers and Farmer Field Schools facilitators as following:

The Facilitator's Training Manual on Good Agricultural Practices for the Sesame Crop in Sudan³ has been prepared to be accessible to the agricultural extensionists, who work as facilitators, supervisors, and coordinators of Farmers Field Schools (FFS). The manual aims to enhance their knowledge on modern agricultural technologies, with the main focus on Good Agricultural Practices (GAP) that have significant impact on increasing quantity and quality of production. Training of facilitators on GAP enables extensionists to build farmers' capacities through various extension activities, which are mainly based on trainings in FFS, demonstration farms and Participatory Technology Development Farms (PTD) that enable farmers to benefit from the practical application of modern agricultural technologies through implementing the concepts of learning-by-doing. In addition, such participatory approaches help farmers acquire skills that lead to the process of innovation and creativity based on ideas produced by farmers as a result of accumulated experiences that may lead to a positive change in their behaviour and attitudes, which will be reflected in a better change in the productivity and the quality of the sesame crop. In addition, adopting and improving GAP will increase the quality and safety of sesame seeds throughout the value chain.

The Facilitator's Training Manual on Farmer Field School for the Sesame Crop in Sudan⁴ has been prepared to be accessible to the agricultural extensionists, who work as facilitators, supervisors, and coordinators of Farmer Field School (FFS). The manual aims to enhance their knowledge on establishing, facilitating, preparing curricula of schools and managing the accompanying activities; from planning, implementation to monitoring and evaluation. Facilitators from farmers can also benefit from this training manual to help their colleagues in expanding the spread of these schools on a large scale to make a change in knowledge, skills, behaviour and attitudes, in order to improve the productivity of different agricultural crops and sesame crop in particular. In addition, adopting and improving GAP by farmers will also increase the quality and safety of sesame seeds throughout its value chain.

³ <https://www.fao.org/3/cb7537ar/cb7537ar.pdf>

⁴ <https://www.fao.org/3/cb7533ar/cb7533ar.pdf>

The two manuals were used in the ToT for the 30 FFS facilitators (15 from each state) (Activity 1.2.1), who trained selected farmers along the growing seasons 2020 and 2021 through FFS approach (3 FFS in each state) (Activity 1.2.3).

In addition, FAO contributed to the development of eight booklets prepared by UNIDO for dissemination of short and concise information on GAP and SPS to farmers in simple texts that is supported with illustrative drawings.

Activity 1.2.2: Conduct Training of Trainers (ToT) and expert capacity building training programme to build the technical and outreach capacities of sector associations and/or advisors to provide advice to farmers in the area of GAP, compliance with SPS measures.

The first round of training was conducted in 2020, where two ToT training workshops were organized for Farmer Field School's facilitators. One in Gedarif and one in North Kordofan state. 15 Farmer Field Schools' facilitators were trained in each workshop. The participants to each workshop were 10 extension officers and 5 lead farmers. Each workshop covered the following topics:

- Sesame Good Agricultural Practices (GAP): Land Preparation and Water
- Harvesting, Plant Pathology, Weed Control, Agricultural practices.
- Sesame, Quality Control and Export Development.
- Importance of Post-harvest for different crops.
- Sesame Integrated Pest Management.
- Producers' organizations and their role in developing the sesame sector,
- Leadership and Negotiation, Technology Transfer and Participatory Approach.
- The concept of Farmer Field Schools (FFS): Establishment of FFS, Principles and skills of FFS, Implementation of FFS, Participatory Monitoring and Evaluation.
- See Annex 5 for the training report.

In 2021 the second round of training was conducted (Annex 6). A five-day ToT training was organized for the same 30 extension officers and lead farmers from the two targeted states. The training was conducted by experts from Agricultural Research Corporation, where the trainers were trained on the developed two manuals on Good Agricultural Practices (GAP) and Farmer Field Schools (FFS). The same trainers were also trained by UNIDO on the developed eight booklets. Extension officers were equipped with the knowledge and tools to train the target farmers in the two states. The training covered the following topics:

- Introduction to sesame value chain.
- How to establish FFS and determine the stages of implementation.
- The technical side of training in FFS.
- Facilitation Process.
- Monitoring and Evaluation.
- Preparing the training curriculum and action plan for the farmer field schools.
- Sanitation, land preparation, mechanical sowing and harvesting of sesame.
- Sesame varieties, seed multiplication and production, seeds law and its associated regulations.
- Post-harvest operations.
- Testing pesticides residues, and certification requirements.
- Impact Assessment of FFS.
- Agricultural Risk Management.
- Integrated Pest Management (IPM) of sesame pests.

- Weed control.
- Sesame Good Agricultural Practices (GAP) (Cultural Practices).

Activity 1.2.3: Organize practical training on GAP implementation and monitoring, compliance with SPS measures for farmers and sector associations in the target states of North Kordofan and Al Qadarif

During the agricultural season 2020, and in collaboration with the agricultural research station and the extension department in each state, six Farmer Field Schools (3 in each state) were established to train targeted farmers (100 in each state) along the agricultural season on GAP and SPS measures. See Annexes 7.1, 7.2, 7.3 for more details on the trainings delivered in 2020.

FAO's expert conducted a mission to North Kordofan and Al Qadarif to discuss training with project stakeholder (see Annex 8). During the 2021 agricultural season, and in collaboration with the extension department at the Ministry of Production and Economic Resources in each state, the 200 farmers received season long training to consolidate their knowledge on GAP and compliance with SPS measures. The trainings were conducted by the same extension officers trained under activity 1.2.2. The training to farmers were delivered during the entire growing season from July to November, where the training sessions were distributed in accordance to the plant growth stages. 12 training sessions were conducted in each of the three FFS in Gedarif and North Kordofan (Total 24 sessions) covering the following topics:

- Use of improved seeds and seeds treatment
- Illustration to farmers the Booklet on Good Agriculture Practice
- Illustration to farmers the Booklet on Field & Water management
- Illustration to farmers the Booklet on Sowing
- Weed control
- Control of plant pests and diseases
- Illustration to farmers the Booklet on Integrated Pest Management
- Optimum use of pesticides
- Illustration to farmers the Booklet on Traceability (at farm level)
- Harvest and reduction of post-harvest loss
- Illustration to farmers the Booklet on Harvesting and Post-harvest practices

In addition to the training sessions to farmers, exchange visits between farmers were organized to learn from each group experience on the good practices for sesame production.

Also, field days were organized with participation of decision makers, private sector and other stakeholders to exchange lessons and experiences among farmers, strengthen relationships between farmers, research and extension officers, as well as enhance networking between farmers and private service providers, inputs traders and sesame seeds traders. Annex 9.1 and 9.2.

Value Addition:

The project introduced modern equipment to clean the sesame seeds and extract oil to support the small-scale farmers. The small-scale farmers will enhance their knowledge on the importance of cleanliness to improve the quality of their products and will gain practical experience using the machines. By familiarizing themselves with the machines, the final product and with value addition sales the farmers should start to increase their yield and their profits.

As per the procurement plan agreed with UNIDO and the TEG, FAO procured two sesame cleaner machines (dry sieves) and two sesame oil extraction machines (cold press). Each state received one

sesame cleaner plus one oil extraction machine. The following operational arrangements were made in each state:

In Gedarif state, FAO handed over the equipment to the MoPEC, who in its turn has handed the equipment to the farmers groups. The following arrangements were made between the ministry and the farmers:

The equipment will be installed at the women training centre in Kasab town in West Galabat locality. The location was selected because the building is relatively new and secured, close to the paved road, and has permanent electricity supply. In addition, the location is accessible to around 20 active producers associations and women cooperatives in the area, who can benefit from these equipment. The ministry is committed to provide professional mechanical engineer for the installation and position of the machine for operation, has appointed permanent guards for security purpose, and committed to provide permanent operator for the machines. Fees collection, operation and maintenance will be fully managed by the farmers group.

On the other hand, in North Kordofan state, and due to lack of electricity in rural areas, the farmers requested the ministry to install the equipment at the ministry's premises in EIObied under the following arrangements:

A joint committee between farmers and the ministry is formulated to oversee the operational and maintenance of the equipment. Farmers targeted by the project will be provided priority in using this equipment, then other farmers will be served. The fees will be set by the joint committee at an attractive rate.

Outcome 2: Export opportunities for Sudanese sesame-seed improved by complying with SPS measures and other international food safety standards

Output 2.1: Improved quality and hygiene conditions in the supply chain

This output aimed at conducting baseline survey of sesame quality and establishing a national network of sesame producers and marketing operators. Moreover, a GAP and quality manuals were planned to be prepared, as well as national training programme was planned to be implemented. Simultaneously, it aimed at developing traceability along the value chain. The following activities were implemented to achieve the above-mentioned objectives:

Activity 2.1.1 Baseline survey of product quality and hazards

Members of the Technical Expert Group visited North Kordofan and Al Gadaref from 21-27 September 2019 to conduct a survey in order to assess the gaps in SPS measures and controls along the entire sesame value chain. The group met 200 farmers from all major parts of the state and collected data and information and prepared a Comprehensive Diagnostic Report (see Annex 10) for the project implementation.

Activity 2.1.2 Establish a national network of sesame producer and marketing operators

The Chamber of Commerce was supposed to lead the national network to ensure the sustainability and continuous functioning of the network. However, given the pending election of Chamber of Commerce's president after restructuring of the Chamber of Commerce, there was a lack of leadership and the decision of the organization to support and lead the process was pending. UNIDO local project team following up with the Chamber for this issue. To move forward the implementation of this activity, UNIDO collected and prepare a Directory List of sesame VC actors (see Annex 11) to facilitate

the establishment of the national network when the Chamber of Commerce was functioning well. The networking conference was discussed between UNIDO and the Chamber of Commerce, but it was not able to be established because of the lack of leadership of the Chamber and the COVID-related restrictions.

Activity 2.1.3 Prepare and pilot GAP and quality manuals, training materials

The eight guides on the following topics were prepared in English and Arabic (see Annex 12) in collaboration with FAO. All key national counterparts were engaged and consulted in the process, especially ARC. The guides introduce a systematic approach to quality assurance along the value chain and promote good practices to reduce risks. Local experts including government officials and extension officers also provided inputs to help understand the local situation such as prevailing pests, use of pesticide or herbicide, and production techniques.

- GAP-IPM
- Post Harvest
- Transportation
- SOPs for product flow in pack house
- SOPs on extraction
- Traceability
- Market compliance
- B2B Linkages

The guides were used to train extension officers as trainers under Activity 2.1.4 jointly with FAO and ARC. Accordingly, the guides were used and disseminated as the main training manual for the implementation of the National Training Programme in the two states under Activity 2.1.4 and are expected to be used all over the country for the improvement of the quality of sesame in a long term. A short video (see Annex 13) was produced in Arabic language for promoting the use of guides.

Activity 2.1.4 Identify and train trainers and implement national training programme

11 (5 women and 6 males) ToTs from SSMO, MoAF, MoT and Chamber of Commerce, and 6 (2 women and 4 males) TOTs (3 from North Kordofan and 3 from Al Qadarif) from Al Qadarif Research Center and North Kordofan Agriculture Services Centers were trained on the implementation of the national training programme. As a result, 3 ToTs based in North Kordofan and 3 ToTs based in Al Qadarif implemented the National Training Programme by conducting 30 training sessions for 200 (96 female and 104 male) farmers and 50 post-harvest handlers. The implementation of the National Training Programme was in collaboration with the MoPER in North Kordofan and MoPER in Al Qadarif which have been supporting the identification of trainees due to COVID-related travel restrictions. The national training programme and the guides were handed over to the federal and state government for their further implementation of the National Training Programme in all over the country.

Activity 2.1.5 Develop traceability along the value chain

An international expert on quality infrastructure and value chain development was tasked to develop traceability along the value chain. The international expert prepared the guide with illustrations on traceability as part of the guides developed under the activity 2.1.3. UNIDO organized a training session for 16 (6 female and 10 male) value chain actors to train them on the implementation of the traceability system in January 2022.

Output 2.2: Strengthened SPS measures

This output aimed at reviewing the legal measures setting out requirements for food safety and quality for plant health and management of associated agro-chemicals (such as pesticides) to prevent the export of non-compliant products. In relation to this, the following activities were implemented to achieve the objective of this output:

Activity 2.2.1 Review and amend legal basis for SPS measures (sanitary conditions, pesticide management)

Within this activity, six workshops (Annex 14) were organized for 15 (12 females and 3 males) participants from the MoAF, MoI, MoT, MoH, SSMO, Gaily for Export Promotion in July 2019, with the aim of helping create a map on legal measures, identification of institutional framework and gaps, and concrete proposals for amendment of relevant measures. Furthermore, four workshops (see Annex 15) on SPS agreement and enquiry point, SPS risk analysis along the entire value chain were organized for 19 (13 females and 5 males) participants from the MoAF, MoH, MoAR, ARC and SSMO in March 2021.

Based on the above awareness raising on international framework and good practice and based on a request from the plant health protection authority, the project conducted a review of plant health legislations and prepared the review report (see Annex 16) which identified gaps and developed recommendations against relevant international standards and agreements to support policy makers in improving the plant health protection legal system. A workshop was organized for various officials from the plant protect authority within MOAF and other authorities to brief them about the key findings and recommendations. The review report was finalized and submitted to the Government.

Activity 2.2.2 Design and implement strengthened export control system (farm level controls, approved exporters)

Based on the review of the current export control system in Sudan, the project developed a proposal to strengthen the export control system for the sesame products (applicable to other food products) aiming to streamline and process and improve communication/coordination among different authorities and QI service providers which provide supporting service in enforcement.

The proposal was submitted to the TEG for their consideration and guidance in implementation. Consultation meetings with TEG were organized to identify the leading authority in piloting the export control system but due to changes of high-level officials, the project could not obtain the government support in this field. The complicity of the controls conducted by various authorities have resulted in weak commitment and decision on implementing the export control for the benefit of the private sector should be made by higher-level in the government (inter-ministerial coordination or even the Office of Prime Minister). UNIDO prepared and finalized the proposed export control system (see Annex 17) with recommendations in a step-by-step approach, to facilitate the establishment of the export control system.

Activity 2.2.3 Training of inspectors (SSMO, QCEDU) responsible for export control and certification

Within this activity 11 (5 females and 6 males) TOTs were trained on topics related to ISO 17020:2012 and on its requirements, management system audit, internal audit records, accreditation and inspections in February 2021 (see Annex 18). Afterwards, 5 ToTs (4 females and 1 male) were selected from 11 ToTs with the purpose to train inspectors. The 5 TOTs were appointed by SSMO, Quality Control & Export Development Administration and Plant Protection Directorate with the commitment to disseminate the knowledge to inspectors.

The 5 TOTs were further trained on inspection conditions in the supply chain and certifications to be able to assess SPS compliance for export in October 2021 and February 2022. As part of the training, the 5 ToTs visited warehouses for the practical assessment.

Output 2.3: Improved laboratory testing, inspection and certification assessment capacity and procedures

This output aimed at strengthening the testing services provided by the quality institutions by upgrading laboratory capabilities and equipment to provide chemical testing for food safety that is required to comply with international markets. In order to achieve the objectives of this output the following activities were implemented:

Activity 2.3.1: The capacity for testing and analysis related to the SPS conditions for the export of sesame will be assessed, gaps will be identified and a strategy and action plans for filling the gap will be formulated. This will take into account the cost benefit analysis of different testing strategies (in-house capacity versus purchase from external laboratories) and the comparative advantages of different laboratories.

Within this activity, a strategy and action plan for filling the gap and laboratory viable plan were developed as part of the technical report (Annex 19). Based on the assessment, SSMO was selected to be supported by the project and it was endorsed by the Steering Committee.

To upgrade the capacity of SSMO for testing sesame products, consultation with SSMO was organized to assess needed parameters and finally, aflatoxin testing was identified for support by the project and the following support was provided by the project:

- A nitrogen evaporation system, spare parts for the existing equipment such as autosample and filaments, as well as chemicals were purchased and provided
- Assistance in the development of the validation plan and review of other required documents for aflatoxin testing and data generation towards international accreditation
- Capacity building trainings for 7 (3 females and 4 males) SSMO officials on the maintenance of the HPLC system, and validation and verification of analytical methods.

The project also aimed at enhancing the capacities of other laboratories for disseminating the knowledge as much as possible although SSMO was the main beneficiary. In this regard, four training sessions (Annex 20) were conducted for 11 (9 women and 2 males) officials from MoAF, MoH, SSMO, ARC and Sudanese Accreditation Council. The training sessions covered the following topics:

- Setting up the laboratory management system in accordance with ISO/IEC 17025;
- Conducting tests for sesame seeds products;
- TOT on ISO/IEC 17020 - Conformity assessment;
- Certification.

Activity 2.3.2: Upgrade standards development process

The national Sudanese standards for sesame (SDS116:2015) and edible sesame oil (SDS047:2016) had been reviewed by the international expert on Food Chemistry and Quality Testing and it was found that the two standards mainly provide the physical specifications while for contamination, they refer to the Sudanese standard for oil seeds contamination (e.g. pesticide, mycotoxin, and heavy metals) (SDS5933:2018) and other international and national standards. The above findings was

communicated to the standards body and it was decided that there was no need to revise the two standards.

Output 2.4: Economic activities of sesame-seed industry enterprises improved by enhancing development of new business linkages in the international market

This output aimed at improving public-private cooperation, networking and market linkages along the sesame-seed value chain, especially with trading partners of value-added market.

Within this output it was planned to invite potential buyers to Sudan with the aim to introduce the Sudanese sesame seeds and strengthen business networking between Sudanese exporters and importers. However, due to COVID-19 related restrictions the missions had to be dropped; therefore, the activity 2.4.1 (Organize a buyer's mission for importers of value added markets (EU, Japan, US, Korea, etc.) to visit Sudan.), and activity 2.4.2 (Organize a business networking event between trained and coached Sudanese sesame-seeds post-harvest handlers (including exporters) and potential buyers visiting Sudan) were merged to B2B event which took place in January 2022 (see Annex 21).

Despite the challenges caused by the COVID-19 and the lack of leadership of the Chamber of Commerce, the project worked together with some leading exporting companies in Sudan and successfully organized a virtual B2B event titled "Promoting Trade of Sesame Products between Sudan and International Market" for 24 Sudanese exporters of sesame products, to facilitate their business linkages with 27 international buyers from Japan, South Korea, China, Italy and Middle East through one-to-one bilateral business meetings.

The event was in close collaboration with the Japan External Trade Organization (JETRO) and the China Chamber of Commerce of Import & Export of Foodstuffs, Native Produce & Animal By-Products (CFNA), as well as UNIDO's Investment and Technology Promotion Offices (ITPO) in Japan, South Korea, Italy and Germany, to promote Sudanese exports to those pivotal international markets of sesame products. Moreover, representatives from MoAF, MoT, MoI and foreign and international organizations presented key issues pertaining to sesame production and quality compliance and their efforts to ensure business sustainability and streamline quality trade flows into international market.

The event was highly appreciated by the government, international organizations and the private sector since the content and presentations were informative and could contribute in trust building and sharing experiences among exporters and importers.

5 CROSS-CUTTING ISSUES

5.1 Gender

The project provided equal opportunities for women and men in the implementation of its activities and fully met the target of 30% of women inclusion. For example, the project managed to engage 10 women out of 30 extension officers and lead farmers, who were involved in the ToT trainings and on the delivery of the capacity building activities to the selected farmers. Also, the 400 farmers who were directly engaged with the project include 160 women, hence exceeding the target. In addition, the project has successfully involved the youth, who constitute more than 50% of all categories of the project beneficiaries.

5.2 Environmental aspects

By providing trainings on GAP, this project enhanced better understanding of a sustainable environment. Environmental sustainability is one of the key pillars of GAP, along with economic viability, social acceptability, and food safety and quality. Adoption of GAP helped to promote sustainable agriculture and contributed in meeting national and international environment and social development objectives.

Through GAP and IPM trainings, farmers are expected to foster no contamination of water and soils, rational handling of agro-chemicals, and concern about biodiversity. In addition, the project used research data from ARC on organic pesticides and fertilizers, and encouraged farmers of using them when and if applicable.

6 SUSTAINABILITY

The project involved local extension officers and lead farmers, who were in direct contact with local farmers, and built their capacity on GAP and SPS measures. The presence of the extension officers at village level, as well as the trainings provided to lead farmers, is expected to contribute to the sustainability of the project as both categories are capacitated with the knowledge that they could disseminate to wider number of farmers beyond the project direct beneficiaries.

The benefits that the beneficiary farmers have gained from the project in terms of improved production (see Annex 22.1 and 22.2), improved relations with research and extension officers, and the established links with the private sector and microfinance institutions is expected to encourage the farmers to adopt the practices introduced by the project.

The manuals and booklets produced by the project and distributed to the targeted extension officers and farmers, have been also distributed to extension officers in other sesame producing areas in Sudan, beyond the target geographic areas by the project, hence disseminating the knowledge generated by the project to wider users in the sector. Moreover, the manuals and guides can be updated by the government when needs arises, therefore, they will serve as sustainable and long-term knowledge for all sesame seeds stakeholders.

7 FINANCIAL OVERVIEW

	STDF (USD)	In-kind contribution	TOTAL
Total project budget (US\$)	808,026 (excl. support cost 904,989 incl. support cost)	376,200	1,281,189
Total amount received (US\$)	904,989	47,800	952,789
Total expenditure (US\$)	836,707	47,800	884,507
Unspent funds (US\$) from total budget	68,282	328,400	396,682

MoAF contributed approximately 15% of the total in-kind contribution as professional staff time, and for use of meeting rooms.

8 OVERALL ASSESSMENT OF RESULTS

The performance of the project has been satisfactory since the project delivered the planned outputs by the end of the extended project close-out period. The project has been less effective in achieving higher level results, due to a number of external challenges as well as the lack of adequate financial and human resources. The following external factors affected project implementation: political

instability and civil unrest, COVID-19 work and travel restrictions, high turnover among government personnel due to the political changes, the worsening macro-economic conditions in Sudan and continued inflation which decreased farmers' ability to implement the GAP and SPS measures recommended by the project.

9 LESSONS LEARNED

The project had a limited capacity of resources, while it was designed to develop and enable transformative changes for the entire sector. There are many factors affecting the ability of Sudan to assure quality of sesame products and gain access to value-added markets. The 'Theory of Change' approach could help conduct a mapping and assessment on the key factors and key actors and define priority interventions which could enable transformative changes.

Quality assurance along value chain requires effective coordination and communication among different VC stakeholders. To ensure sustainability of project results, emphasis should be put on active engagement and involvement of key drivers of change. In the case of the sesame seed project, these drivers include: MoA and its departments like PPD & NSA; the MoT&I, SSMO, Chamber of Commerce – i.e., the private sector (Farmers/Growers association; and Association of Sesame exporters).

Institutional cooperation with sector associations is key to generate and expand project results and enable sustainable changes through pilot activities such as the B2B event. The establishment and implementation of an effective traceability system requires participation of the private sector especially the exporters. An "exporters to farmers" approach should be adopted to motivate all actors along the VC to jointly implement the system.

Close engagement by the Government is key to realize reforms, while the government can also help approach various regional and international organizations, donors to mobilize resources, develop synergies and cooperation in order to move forward and build the achievements of the pilot project.

Moreover, the provision of inputs to adopt and support the implementation of the good practices such as certified seeds, GAP and utilization of modern sesame cleaning and extraction machines is crucial for further improvement and promotion of quality seeds.

Development of practical guides and their dissemination have been welcomed by various public and private stakeholders. Trainings for extension officers at state or sub-state level on new concepts, international knowledge, and good practices is vital for knowledge transfer and skills development at farmer level which is the start of the value chain. Application of Farmers Field Schools with engagement of research and extension is efficient and effective approach for bridging the knowledge gap among small farmers. In addition, the FFS approach contributes to extension of knowledge beyond direct project beneficiaries.

10 RECOMMENDATIONS AND FOLLOW-UP ACTION

It was especially difficult to implement the activities related to export control and traceability systems due to lack of leadership and understanding of the systems which were newly introduced by the project. However, based on achievements made under the project the recommendations would be to support Sudan in establishing export control and traceability systems based on foundations established under the project. Moreover, it is recommended to continue enhancing farmers capacity in the fields of GAP and market compliance.

Below are the follow-up actions:

- Activities implemented with farmers in this project are limited to trainings. In order to enable farmers to implement the full agricultural package for sesame growing, it is recommended to include budget for support activities such as land preparation, mechanical harvesting, and provision of storage facilities. This recommendation is made because sesame is mainly grown by small scale farmers, who have limited access to finance and agricultural services;
- Implement the National Training Programme all over the country;
- Improve finance and crop insurance instruments for small farmers;
- Strengthen linkages between farmers associations and traders/exporters through for example contract farming arrangements.

11 ANNEXES

1. ANNEX 1 – 1.1, 1.12 Baseline survey
 2. ANNEX 2- Farmers list
 3. ANNEX 3- Extension officers list
 4. ANNEX 4- Inception meeting and workshops
 5. ANNEX 5 – Training report (FAO Dr.Amir Abduulahi Yousif Malik)
 6. ANNEX 6 – Facilitators' Training Course on GAP and FFS of Sesame Crop
 7. ANNEX 7 - 7.1, 7.2, 7.3 Trainings delivered in 2020
 8. ANNEX 8 – FAO's expert mission report
 9. ANNEX 9 – 9.1, 9.2 Season long training
 10. ANNEX 10 – Comprehensive Diagnostic Report
 11. ANNEX 11 – Directory List
 12. ANNEX 12 – Eight Guides
 13. ANNEX 13 – Project video
 14. ANNEX 14 – Six SPS workshops
 15. ANNEX 15 – Four SPS workshops
 16. ANNEX 16 – Technical Report: Review of the Compliance of Plant Health Legislations of Sudan with International SPS Standards and Agreements
 17. ANNEX 17 – Export Control/Inspection System
 18. ANNEX 18 – Training on 17020 and SPS
 19. ANNEX 19 – Strategy and action plan for filling the gap
 20. ANNEX 20 – Training for laboratories
 21. ANNEX 21 – Promoting Trade of Sesame Products between Sudan and International Market
 22. ANNEX 22 - 22.1, 22.2 Farmers' production data
 23. ANNEX 23 - Financial report
 24. Logical framework
 25. Contact list
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Output / Activity	Indicator / Target:	Actual performance: (% complete)	Comments (results and challenges faced)
Outcome 1 Implementation agency: FAO+MOAF	At least 2 farmer cooperatives are developed at target states which consist of at least 30% women and 50% youth.		
Output 1.1: Support the development of farmer cooperatives in targeted two states to develop baseline for horizontal cooperation among farmers.	Indicator 1: At least 2 farmer cooperatives are developed at target states which consist of at least 30% women and 50% youth.	100%	Six farmers associations were trained, three in each of the target states. Same associations will be provided with practical training on SPS compliance through Farmer Field Schools in the next growing season. Total number to selected farmers was 200. Out of this number 64 were women. The percentage of youth within total farmers was greater than 50%.
Activity 1.1.1: Organize farmer cooperatives taking enhancing gender equality and youth employment into consideration. Select trainers for leading the cooperatives on strengthening their capacity.	Target 1: 2 communities / farmer cooperatives organized	100%	Activity completed. Farmers were selected and organized. Trainers were selected from extension officers (20, 10 in each state, total 14 male and 6 females) and lead farmers (10, 5 in each state, total 6 males and 4 females).
Activity 1.1.2: Conduct inception workshops for farmers in the target states of North Kordofan and Al Qatari, in partnership with local authorities and sector associations.	Target 1: 2 communities / farmer cooperatives organized	100%	Activity completed. Two workshops were conducted for selected farmers in the targeted states.
Output 1.2: Sesame-seed growers strengthen their capacity to implement GAP and develop better understanding of international standards.	Target 1: Capacity of 200 sesame growing farmers strengthened through training and adaptation of GAP and international standards.		
Activity 1.2.1: Develop training materials and training curricula on adapting GAP for sesame-seed farmers.	1 training manuals and curricula prepared	100%	Completed.
Activity 1.2.2: Conduct Training of Trainers (ToT) and expert capacity-building training programme to build the technical and outreach capacities of sector associations	10 workshops conducted 30 trainers/facilitators trained	100%	Completed

and/or advisors to provide advice to farmers in the area of GAP, compliance with SPS measures.			
Activity 1.2.3: Organize practical training on GAP implementation and monitoring, compliance with SPS measures for farmers and sector associations in the target states of North Kordofan and Al Qadarif.	(4 workshops conducted 200 sesame-seed growers trained 200 training packages distributed	100%	Completed
Outcome 2 Implementation agency: UNIDO+MOAF	Number of new markets accessed Number of testing, certification and inspection operations demonstrating compliance with requirements in export markets		
Output 2.1 Export opportunities for Sudanese sesame-seed improved by complying with SPS measures and other international food safety standards.			
Activity 2.1.1 Baseline survey of product quality and hazards	The quality and safety issues impacting on the sector assessed	100%	A comprehensive diagnostic report was prepared as part of the technical report. In addition, two missions of 16 government officials were organized to conduct surveys on sesame seeds technologies used and their relationship to GAP practices, assessment of crop markets and sesame stores.
Activity 2.1.2 Establish national network of sesame producer and marketing operators	A national network of producer and marketing organizers strengthened	60%	The Chamber of Commerce could not establish the national network due to an election of a president and restructuring during the implementation of the project. However, UNIDO prepared a directory list to contribute in the establishment of the national network between producers/farmers and exporters.
Activity 2.1.3 Prepare and pilot GAP and quality manuals, training materials etc.	A range of guides to best practices in the production and marketing of sesame	100%	Guides were prepared in English and Arabic.
Activity 2.1.4 Identify and train trainers and implement national training programme	Future trainers from farmers' associations, Chambers of Commerce, Ministry of Agriculture and Irrigation QCEDU and Plant Protection Department, etc. identified and trained.	100%	A two day workshop was organized under this activity in December 2019. Training sessions for 6 master trainers, 3 from Al Qadarif and 3 from North Kordofan took place in October 2020 and June 2021, and 200 farmers and 50 post-harvest handlers were trained by the master

			trainers in North Kordofan and Al Qadarif.
Activity 2.1.5 Develop traceability along the value chain (traceability manual)	Training materials on traceability prepared and training on traceability conducted	100%	A paper-based traceability system was prepared as part of the guides to ensure that transactions between buyers and sellers are recorded, and that batches are identifiable and distinguished from each other. Moreover, a coaching event on traceability for 17 participants from exporters and extension officers were organized in January 2022.
Output 2.2 Strengthened SPS measures			
Activity 2.2.1 Review and amend legal basis for SPS measures (sanitary conditions, pesticide management)	Legal measures setting out requirements for food safety and quality, for plant health and management of associated agro-chemicals (such as pesticides) reviewed and gaps and dysfunctional aspects identified.	100%	10 workshops were organized on SPS measures for quality institutions with the aim to raise awareness on international framework and good practices. Moreover, based on the request of the plant health protection authority, the project conducted a review of plant health legislations and prepared the report. The report defined gaps and recommendations for relevant international standards and agreements to support policy makers in the improvement of the plant health protection legal system.
Activity 2.2.2 Design and implement strengthened export control system (farm level controls, approved exporters)	Design of the scheme, integrating requirements at each level of the export supply chain to provide the guarantees developed.	85%	A proposal of the Export Control System was prepared and submitted to the government. It was not possible to implement the proposed Export Control System due to a lack of leadership in the government.
Activity 2.2.3 Training of inspectors (SSMO, QCEDU) responsible for export control and certification	The staff of the competent authorities responsible for implementation of the export approval system (from the MOAF QCEDU and SSMO) trained in the operation of the system.	50%	11 TOTs from quality institutions were trained on topics related to ISO 17020:2012 and on its requirements, management system audit, internal audit records, accreditation and inspections. Afterwards, 5 ToTs were selected from 11 ToTs with the purpose to train inspectors. The 5 TOTs were appointed by SSMO, Quality Control & Export Development Administration and Plant Protection Directorate with the commitment to disseminate the knowledge to inspectors. The 5 TOTs were further trained on inspection conditions in the

			supply chain and certifications to be able to assess SPS compliance for export in October 2021 and February 2022. As part of the training, the 5 ToTs visited warehouses for the practical assessment.
Output 2.3 Improved laboratory testing, inspection and certification assessment capacity and procedures			
Activity 2.3.1 The capacity for testing, certification and inspection services will be assessed, the needs for supporting quality at all levels of the value chain will be identified, proposals for filling any gap will be made	<p>Gaps in testing, inspection and certification identified and agreed by testing and calibration laboratories, certification and inspection bodies</p> <p>Laboratories to be supported and strengthened through procurement of equipment and training selected and agreed upon</p> <p>Selected laboratories publish their quality manuals and participate in proficiency testing programmes</p> <p>Mock assessments of selected labs against ISO/IEC 17025 show decreasing non-conformities</p> <p>Selected laboratories prepared for accreditation for relevant scopes</p> <p>Number of training activities held</p> <p>Number of tests on sesame increases by 20% every year as from second year of project implementation</p>	<p>90%</p> <p>Chemicals, devices</p>	<p>A strategy and action plan for filling the gap was developed as part of the technical report.</p> <p>The training sessions on ISO 17025 /17020, as well as in the area of certification and tests for sesame seeds products were conducted in 2019. In addition, the UNIDO expert on Food Chemistry and Quality Testing recommended that the SSMO is the most capable lab to perform tests yielding in adequate results. Therefore, SSMO was endorsed to be supported by the project by the Steering Committee. In this regard, UNIDO purchased equipment and chemicals for SSMO. Moreover, a validation plan and workplan towards accreditation were prepared. However, it was not possible to obtain the accreditation due to existing open payments to TUNAC and replacement of the new HPLC, which was not operational until the end of the project. UNIDO organized a training titled "Validation and verification of analytical methods" for SSMO staff, in order to support the functioning of HPLC in November 2022.</p>
Activity 2.3.2 The national Sudanese standards for Sesame (SDS116:2009) and Sesame Oil (SDS0047:2009) will be reviewed following testing of these products to determine whether product characteristics specified in the current standards are	<p>SSMO technical committee work programme includes revision work items</p> <p>Technical committee discusses work items</p>	<p>100%</p>	<p>The standards have been reviewed by the international expert and a meeting was held with the technical committee. UNIDO advised the technical committee to keep the current standards because there is no needs required at the moment and it was agreed with the technical committee.</p>

applicable.			
Output 2.4 Economic activities of sesame-seed industry enterprises improved by enhancing development of new business linkages in the international market.	1 buyer's mission conducted with at least 12 potential buyers who are from value added markets, or sells to value added markets. At least 50% of the post- harvest handlers who participated in the event receive order/letter of intent from buyers or business partners.	50%	This activity could not be organized due to COVID-related restrictions. However, UNIDO linked 27 potential international buyers with 24 Sudanese sesame exporters during the B2B event which was organized in January 2022.
Activity 2.4.1 Organize a buyer's mission for importers of value added markets (EU, Japan, US, Korea, etc.) to visit Sudan.	1 buyer's mission organized in cooperation with UNIDO/counterpart (002) 12 potential buyers invited	50%	Due to COVID-related restrictions this activity was adjusted to an online B2B event, and 27 potential buyers linked with Sudanese sesame seeds exporters.
Activity 2.4.2 Organize a business networking event between trained and coached Sudanese sesame-seeds post-harvest handlers (including exporters) and potential buyers visiting Sudan.	1 business networking event organized 50 post-harvest handlers and exporters participate	50%	The networking event was organized as part of the B2B event with participation of 24 Sudanese exporters and 27 international buyers.



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