Netherlands

ENROOT

CLIMATE SENSITIVE
VALUE CHAIN ANALYSIS

Private Sector Promotion Project Value Chain Analysis

Acknowledgement statement

This publication is part of the "Private Sector Promotion for the Agriculture Sector in Upper Egypt" project. The project is implemented by Enroot Development in collaboration with the universities of Aswan, Assiut, South Valley, Luxor, and Sohag, with funding from the Embassy of the Netherlands in Egypt.

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Abbreviations

APAC	**Asia Pacific**
CSO	**Civil Society Organizations**
EC	**European Commission**
ETRS	**Ethical Trade and Responsible Sourcing**
F2F	**Food to Farm**
FAO	**Food and Agriculture Organization**
FGDs	**Focus Group Discussions**
GRASP	**GLOBALG.A.P. Risk Assessment on Social Practice**
IDIs	**In-depth Interviews**
ILO	**International Labor Organization**
MEA	**Middle East and Africa**
MRLs	**Maximum Residue Levels**
MSD	**Market System Approach**
RASFF	**Rapid Alert System for Food and Feed**
SPS	**Sanitary and Phytosanitary Measures**
UNDP	**United Nations Development Programme**
UNECE	**United Nations Economic Commission for Europe**
WB	**World Bank**
WHO	**World Health Organization**
WTO	**World Trade Organization**

ABOUT ENROOT

Enroot is a social business set up to develop disruptive models that empower communities with untapped potential, particularly youth and women, across the MENA region and Africa. It was established in 2018 with a mission to address the root causes of development challenges and to capitalize on youth innovation. We design and execute socio-economic development projects as well as conduct research aimed at promoting inclusive, participatory, and sustainable economic development.

1 About Clime Up!

1. About Private Sector Promotion for the Agriculture Sector in Upper Egypt

The Private Sector Promotion for the Agriculture Sector in Upper Egypt, implemented by Enroot and funded by the Embassy of the Netherlands, aims to enhance climate resilience and water smart agriculture in Upper Egypt. The project follows a private sector promotion approach in upscaling the quality of agricultural products and enhancing accessibility to international markets. Through the promotion of the private sector and the integration of civil society organizations (CSOs), the project's theory of change envisions the enhancement of the technical skills and market accessibility of both the businesses and the farmers. The adoption of climate-smart practices by farmers, sustained by the CSOs and incentivized by their integration of the private sector companies enhances the sector's resilience and adaptability to climate hazards and risks.

As such the Clime Up! project objectives are articulated as follows:

- Enhancing market access and financial resources for agribusiness enterprises.
- Improving the socioeconomic living standards of smallholder farmers in Upper Egypt.
- Strengthening market Linkages and accessibility to the international markets, with a special emphasis on the European Union.
- Fostering climate resilience of the agriculture sector in Upper Egypt.

The project focus areas are as follows:

LOCATIONS

ASSIUT
SOHAG
QENA
LUXOR
ASWAN

CROPS

ONIONS
POMEGRANATES
HIBISCUS
FENNEL
HENNA
PUMPKIN
LOOFAH

2 Objective of the Value Chain Analysis

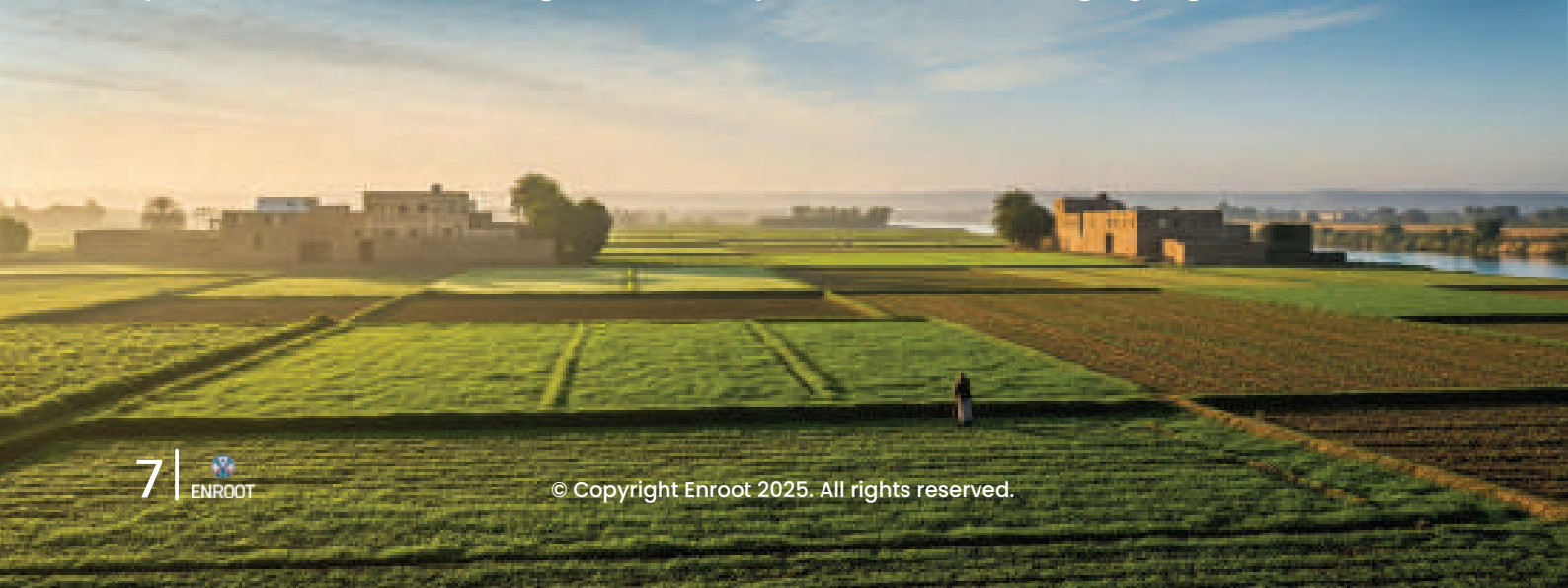
2. Objective of the Value Chain Analysis

In line with the project's objectives and interventions, a Climate-Sensitive Value Chain Analysis study was conducted, with the aim of developing an understanding of the agricultural value chains in Upper Egypt. The study identifies the prevailing challenges and bottlenecks of the agricultural value chains, the areas of interventions and untapped potential. The study presents a needs assessment of the selected value chains in Upper Egypt. The study highlights the status quo of the agriculture sector, that stems from the implications of climate change.

Leveraging this, the report capitalizes on the pressing challenges in presenting a set of designed interventions and recommendations with the aim of fostering the climate resilience and water smart agriculture in Upper Egypt.

The specific objectives of the value chain analysis are outlined below:

- Provide a detailed flow of the value chains selected.
- Map out all relevant actors across each value chain starting from the input suppliers,farmers, traders and up to producers and exporters as well as the surrounding ecosystem.
- Present the prevailing challenges and bottlenecks throughout the value chain stages.
- Highlight climate related risks, affecting the agriculture in Upper Egypt and the selected value chains.
- Identify the role of women, and the challenges they face within each crop and value chain phase
- Assess the compliance of the agricultural produce with the European quality standards and requirements.
- Identify the market linkages between producers/farmers and the various end markets.
- Deign a set of evidence-based solutions to curb the prevailing predominant challenges and empower women engaging in the sector.



3 Adopted Methodology

3. Adopted Methodology

The presented study followed a mixed research methods approach. The research approach,triangulating both qualitative and quantitative research methods, was crucial in capturing the key insights and figures governing the agriculture sector in the studied governorates. The mixed methods approach was also essential in highlighting the stakeholders and actors' perceptions and insights, leveraging the analyses concluded from the quantitative research component.

3.1 Research Approach

The study utilized a Market System Development approach (MSD) in examining and understanding the linkages between the value chain actors among themselves and their interactions with the surrounding ecosystem.

As defined by the International Labor Organization (ILO), the market systems development approach (MSD)

// emerged out of experiences and lessons learnt from development practice. The approach identifies and addresses root causes of poorly functioning markets that are constraining people living in poverty or preventing other disadvantaged groups, such as youth and women from participating in and benefiting from inclusive market growth //[1].

The MSD approach was adopted due to its focus on identifying and addressing the underlying causes of poorly functioning markets, highlighting the main obstacles and challenges as a key step in providing evidence-based solutions and interventions. The following figure depicts the key steps and milestones followed in developing this study.

Figure 1 : Fieldwork Process

[1] Skoog, G., and Ripely, M. (2022). A market systems approach to skills development. International Labor Organization. https://webapps.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---ifp_seed/documents/publication/wcms_851264.pdf

3.2 Value Chain Selection

DESK RESEARCH

For the selection of the value chains to be studied, the team conducted a thorough mapping and screening of all value chains in Upper Egypt, utilizing secondary sources of data. The team conducted desk research using websites and online publications including the Food Agriculture Organization (FAO), the World Bank (WB) and USAID databases in addition to as Trade map, ITC tools, FAO Database, UNECE Standards, newspaper articles, and journal articles.

LONGLISTING AND SHORTLISTING

Following the mapping phase, the team developed longlisting and shortlisting criteria, consisting of a list of potential crops to assess in terms of relevance to the project objectives, through using a weighted scoring matrix.
(See annexed 2 ,1 and 3 for the longlist criteria, scoring matrix, and weights).

VALIDATION WORKSHOP

Having shortlisted a number of value chains, a validation workshop was conducted. The workshop brought together key sectoral experts and market players to capture their insights into the shortlisted value chains, by scoring the shortlisted crops.
(See annex 4 for the scoring matrix) (see Annex 5 for the selection report).

FINAL SELECTION

The team carried out an internal selection workshop to consolidate the main findings and conduct the final value chain selection, emphasizing the prominent crops per governorate. The following table presents the selected value chains in each governorate.

THE FOLLOWING TABLE PRESENTS THE SELECTED VALUE CHAINS IN EACH GOVERNORATE.

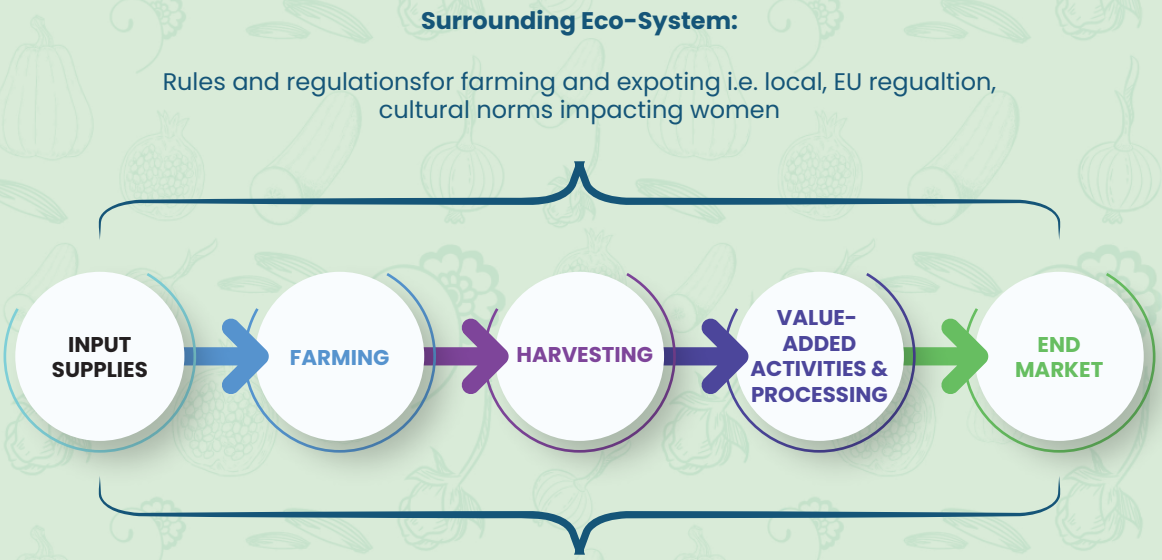
ASSIUT	 POMEGRANATES	 FENNEL
SOHAG	 ONION	 LOOFAH
QENA	 FENNEL	 PUMPKIN
LUXOR	 HIBISCUS	 PUMPKIN
ASWAN	 HIBISCUS	 HENNA

3.3 Fieldwork Preparation

The fieldwork preparation phase undertook two main tracks, as followed in the adopted mixed methods approach: qualitative and quantitative research methods. The fieldwork preparation phase entailed the identification of the main stakeholders, designing the data collection and sample split as well as the data collection methods across both tracks.

The research team initially conducted desk research to identify key actors, relevant EU regulations, and insights on the selected crops and their market performance. This foundational information informed the design of the sample split matrix and data collection tools and methods. The identified stakeholders mainly lie across the value chain stages, as depicted in the figure below. Accordingly, the design of the sample split for both qualitative and quantitative data sources, capitalized on integrating representatives of each phase into the data collection process.

Figure 2 : Value chain Analysis Roadmap



3.3.1 Data Collection Tools Design

Following the identification of the stakeholders to be integrated in the data collection process, a set of data collection tools were developed and customized according to each category of the stakeholders. The designed tools included:

- Semi structured discussion guides for qualitative research, categorized by the interviewed actors namely, farmers, civil society organizations and agricultural cooperatives, traders, processing Facilities and exporters (See annex 11-6 for discussion guides).
- Surveys and questionnaires for quantitative research for each of the actors namely, input suppliers, farmers, traders, preparation hubs, and exporters (See annex 12 for the full survey).

3.3.2 Sample Split

a. Qualitative Research

A total of **48** total In-depth Interviews (IDIs) and **11** total focus group discussions (FGDs) were conducted to gather context specific information on each crop and governorate. Discussion guides were created for each actor for the IDIs.
IDIs were used to capture detailed insights and perceptions from key actors, addressing gaps and providing a more comprehensive understanding of the selected value chains. FGDs, on the other hand, were utilized to foster group discussions as a means of data verification of the information gathered in the IDIs and survey. FGD were used to explore common themes and issues across the value chain, such as climate and gender related challenges. One discussion guide was created, with a focus on climate and gender thematic areas. The FGDs were mainly made of **8-4** participants per group, and the participants were mainly farmers and traders. Most of the FGDs were made up of women only participants or mixed gender participants.

The following table presents the sample splits of the IDIs and FGDs conducted per governorate:

	IDIs	FGDs
Assiut	7	3
Aswan	10	2
Luxor	10	1
Sohag	10	3
Qena	11	2
Totals	48	11

Table 2 : Sample Split of each IDI & FGD conducted per governorate

The following table identifies the actors that were interviewed. This sample split was applied for all 5 governorates. With some governorates exceeding the sample split.

Farmers	Traders	CSOs/ Cooperatives	Preparation Hubs	Exporters	Totals
2 Numbe of IDIs	2 Numbe of IDIs	2 Numbe of IDIs	1 Numbe of IDIs	1 Numbe of IDIs	48 Numbe of IDIs

Table 3 : Number of IDIs per Actor

b. Quantitative Research

he final number of surveys used after data cleaning is 769. The surveys primarily consisted of multiple choice and close-ended questions, with minimal open-ended questions. The surveys were conducted in-person and filled in digitally to help ensure immediate quality check and tabulation. This phase was crucial in order to understand the magnitude of the observed patterns and trends across the agriculture sector across the governorates.
Utilizing Enroots expertise and desk research; the sample split was designed to ensure the crop weights reflected what can be found each governorate. The design of the sample split encompassed a weighted approach to cater for several factors. Not all crops included the same number of IDIs, FGDs and surveys.

This is attributed to the following factors:

- Each governorate is known for a certain crop as highlighted in the value chain selection. This governorate receives the highest weight for that crop.
- The demand for the crop in local and international markets was a key factor. Onions, fennel and pumpkin have the highest demand in both local and international markets, and thus they are more available compared to henna and Loofah which are less demanded.
- While all five actors are available in all governorates, their availability and importance are not equal. Aswan has the highest weight of farmers and processing facilities due to its prominence there, while Luxor has the highest weight in traders and intermediaries.

The following 2 tables present the survey sample split based on each actor per governorate as well as the crop.

Governorate/Actors	Exporters	Facilities	Traders	Farmers	Input Suppliers
Assiut	6	9	20	88	18
Aswan	4	22	19	115	5
Luxor	7	2	62	89	20
Sohag	1	7	29	78	16
Qena	N/A	12	26	90	24
Totals	18	52	156	460	83

Table 3: Sample Split for each Actors per Governorate

Governorate/Crop	Onion	Fennel	Pomegranate	Pumpkin	Loofah	Hibiscus	Henna	Total
Assiut	15	33	90	1	2	N/A	N/A	141
Aswan	18	23	N/A	N/A	1	51	72	165
Luxor	21	N/A	N/A	110	N/A	49	N/A	180
Sohag	73	N/A	11	N/A	47	N/A	N/A	131
Qena	22	91	N/A	33	N/A	6	N/A	152
Totals	149	147	101	144	50	106	72	769

Table 4: Sample Split for each crop per Governorates

3.3.3 Capacity Building Sessions

In preparation for the fieldwork and data collection, a series of capacity building sessions were conducted in order to ensure the team is well equipped with the necessary knowledge of climate change aspects and concepts.
A two-day workshop was conducted for Enroot team by a climate change expert in August 2024. This workshop's objective was to familiarize Enroot's team with how to conduct a climate risk assessment. The workshop entailed risk assessment methodologies, data collection portals and means of data analysis.
Furthermore, Enroot conducted a -3day training session from December 3 to 2024 ,5, in Sohag, Egypt for the field researchers and data collectors. All field researchers and coordinators were invited to participate in this comprehensive training, which served to introduce the data collection tools and the fieldwork implementation plan for the value chain analysis. During the training, all roles, responsibilities, and operations related to the fieldwork phase were clearly defined and explained to ensure smooth execution.

The following team structure was introduced: The following figure presents the team structure of field researchers and field coordinators across the governorates.

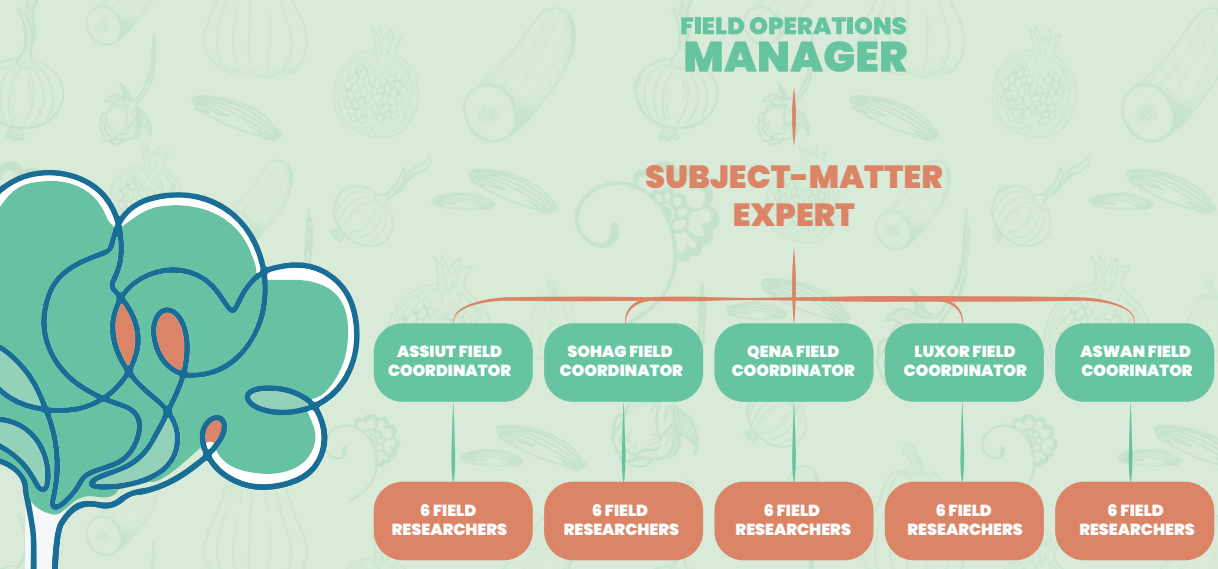


FIGURE 3 : FIELD TEAM STRUCTURE

Field coordinators and researchers played a crucial role in reviewing and validating the designed sample split, ensuring alignment with the research plan. The training was delivered through informative sessions and interactive activities designed to thoroughly prepare participants for their fieldwork tasks.

3.3.4 Pre-test Stage

A pre-test was conducted to validate the survey and test the data collection tool. During this phase, field researchers carried out in-person surveys and provided feedback on the set questions and the required amendments. Field validation was overseen and shadowed by field coordinators, to ensure all questions were filled accurately, while data was entered and tabulated for review. Based on the feedback and validated findings, the survey was amended, finalized, and circulated.

3.4 Fieldwork and Data Collection

Data collection, both qualitative and quantitative, took place over four weeks from December 2024 ,6, to January 2025 ,6, with field officers and coordinators working in parallel across the five governorates. The field operations manager was responsible for ensuring the smooth and efficient operation of the entire fieldwork process. Governorate coordinators, on the other hand, were responsible for the validation of the data quality, completion of the data collection, and facilitating the accessibility of the field researchers to the relevant targeted actors. IDIs and FGDs were conducted, in line with the in-person surveys, to probe on the presented research findings in the surveys and allow for a more detailed understanding of the challenges faced in the selected value chains. The data was collected and tabulated immediately to allow for real-time processing, with desk and field validation occurring throughout the process. Enroot Team was responsible for ensuring effective implementation of the fieldwork and monitoring the data collection process, through ensuring the following:

- Completion of the sample split, and monitoring the daily fieldwork, as part of the desk validation process. In instances where the data entered was weak, or had too many gaps, the entry was disregarded and replaced by a new survey interview.
- Adherence and feasibility of the field work plan to the contextual analysis of the sector in each governorate. In instances where some sample units were not reflective to the prevailing crops of the governorate, rearrangements of the sample split were carried out accordingly.
- Identification of any gaps in the data collected and directing the field researchers to take the needed corrective measures.

3.5 Enroot Research Standards and Ethical Considerations

The research methodology of Enroot was designed to adopt a set of general ethical considerations and standards which include the following:

- Respondents are oriented to the study objectives and scope. Their participation is voluntary.
- Respondents' written or verbal consent is obtained in for audio and video recordings.
- Only the research team responsible for collecting the data and managing the study has access to the personal information of the respondents. If the data is shared with other parties, the team informs the respondents and receives their consent first.
- All stages of the data collection and analysis processes are documented appropriately to ensure the transparency of the research and protection of the respondents' privacy.

3.6 Data analysis

The surveys were analyzed using Power BI. A rigorous process of data cleaning and validation occurred by experts and Enroots team. This process included a rigorous data cleaning process, to ensure the quality and accuracy of all the final data collected, after it was validated on the field. The data cleaning phase ensured that there were no duplicated surveys, blank questions and ensured that the data entered is correct. After the data went through a data warehouse phase where it was converted to a more centralized structured format for all the 769 surveys entered. This enables the data to be then analyzed through Power BI and turned into visuals.

The transcription of the conducted interviews was analyzed using a content grid, covering the main themes of the value chain analysis. The content grid is a data analysis tool divided into coded thematic areas that in which the finding of the findings of the IDIs and FGDs are integrated in. The team conducted an internal data analysis workshop to study and analyze the main obtained findings, and link together all major themes of the study to come up with the following findings, recommendations and interventions.

4 Agriculture Sector in Upper Egypt

4. Agriculture Sector in Upper Egypt

4.1 Value Chain Analysis Overview

The agriculture sector is fundamental to the Egyptian economy. Around 55 % of Egyptians depend on agriculture for their jobs and livelihoods. The sector employs 21.6 % of workers in the country and accounts for about 12 % of the GDP[2]. Additionally, the combined export value of the seven chosen crops reached 566.5$ million in 2023[3]. This represents approximately %6.5 of the country's overall agricultural export earnings.

The agriculture sector in upper Egypt is deeply interconnected. All crops mostly share the same actors, as well as the same challenges throughout the value chains. The interviews conducted revealed that value chains are not confined to a single geographic region. For example, farming and harvesting activities may take place in a certain governorate Upper Egypt, while processing and end-market activities can be centralized in Great Cairo or another governorate in Upper Egypt.

2 USAID. Agriculture. USAID, 2022, https://www.usaid.gov/sites/default/files/05-2022/EG-Ag_Sector_EN_2022.pdf.
3 Source: ITC – Trade Map

The following summarizes the key challenges found in each phase of the value chain :

FIGURE 4 : VALUE CHAIN ANALYSIS ROADMAP AND COMMON CHALLENGES

4.1.1 Pre - Farming

The pre-farming phase mostly consists of preparing the input supplies such as the seeds, fertilizers, and pesticides needed for farming as well as preparing the land for the new agricultural season.

Accessibility of high quality and licensed input supplies is a major obstacle.
Input supply outlets are not the most trusted by the farmers, a reputation that is shared across Upper Egypt. Unlike agricultural cooperatives, the outlets' prices are not fixed, they are affected by the market fluctuation due to factors such as supply and demand. Furthermore, since there are no fixed prices, many farmers reported that they think the outlet also increases the price higher than its market rate. The interviews conducted and discussions highlighted the farmers' perception of input suppliers' control over the market prices, which they have to abide by due to the lack of other alternatives and resources. The input supply outlets also give some limited agricultural guidance as a marketing technique for their products, enabling them to recommend these products. Yet several farmers reported that these products rarely work. The outlet owner's advice is usually biased and focused on selling the product rather than addressing the farmers' issues.

The rapidly increasing prices of input supplies are one of the largest common challenges.
This is due to a myriad of reasons. Climate change has become a pressing challenge that increases the demand for input supplies, including fertilizers, pesticides and more resilient seeds, which in turn has increased its prices. Pesticides and fertilizers have become a necessity to ensure minimal waste and crop quality.

45 % of the farmers surveyed revealed that they use preventive spraying of pesticides and fertilizers as an adaptation approach for the implications of climate change. – Survey with farmers

The lack of accurate agriculture guidance provided for the farmers is a key challenge.
Most farmers do not have enough training or experience in choosing the input supplies needed to ensure the quality of their yield. The Central Administration of Extension and the Environment was established to be one of the main bodies responsible for providing in-field extension services, but by the mid1990-'s the units responsibilities and resources decreased, and it's role was left up to the private sector and cooperatives.[4] Due to lack of organization and resources both the private sector and the cooperatives don't have enough resources or incentives to give accurate extension services, at the same scale as the government used to, and has heavily impacted the sector.

CSOs and cooperatives play a significant role in offering in-field extension service to the agriculture sector. However, cooperatives have become unable to provide systematic guidance due to the limited capacities, resources and poor activation of their roles. For instance, an average of two officers can be found per cooperative in Esna

4.1.2 Farming and Harvesting

Most farmers rely on traditional farming techniques, which heavily affect the quality and quantity of their yield.
Farmers are initially hesitant to change their preferred methods to a more advanced technique. This is also accompanied by some structural issues such as the growing cost of energy and lack of sufficient infrastructure that allow for the use of modern techniques such as drip irrigation.

In the same vein, the prevailing climate hazards and risks were found to increase the crop waste rates across the different value chains. Coping with agro-waste as an implication of climate change is one of the key challenges faced by farmers.
Farmers have become complacent about crop waste. Many see it as inevitable and so there are no efforts put to mitigate it. Especially since some of the farmers who attempt to mitigate the risk by using pesticides or fertilizers, don't have the training or guidance to choose the right interventions. Despite the growing rate of crop loss, farmers don't know what to do with the waste and mainly burn it. Although some recycling activities have slowly started to be adopted within the region.

Almost one quarter of the farmers surveyed reported that they either throw , burn or bury the generated waste of their yield. – Survey with farmers

4 Mai Mahmoud et al., An Agricultural Policy Review of Egypt: First Steps Towards a New Strategy Washington, DC: International Food Policy Research Institute, 2018, https://www.researchgate.net/publication/327051377_An_agricultural_policy_review_of_Egypt_First_steps_toward s_a_new_strategy

Furthermore, Due to land fragmentation most of the lands are well below 10 acres, making it hard to establish economies of scale. Most farmers don't utilize all their land at once, as a mean of decreasing the cost of production. Also, most of the grown crops are primarily directed for personal /household use rather than for trading.

The lack of access to market information and market trends is another challenge.

Farmers depend on the last season's market trends, alongside the "word of mouth", to decide what to grow. Market fluctuations therefore become a significant issue. Hibiscus and onions for instance are examples of plants and crops based on their market performance in the previous season.

Since the relationship between the farmers and traders is mostly informal, not in the form of contract farming, market prices are found to be highly fluctuating and not unified.
When the farmers come to sell the crops, the price and demand tend to decrease. Most of the farmers take their money upfront after the crops are planted and sold, many don't take a deposit or installments. This gives avenues for traders to promise to buy crops by the end of the season and don't come. The farmers don't have enough money at the beginning of the season to buy all the input supplies. Small villages also face issues with traders, especially since they mainly deal with 4-3 traders per crop. Which allows the traders to monopolize the price of the crops.
Farmers end up having to sell the crops for much less than they expected, and barley break even. This is especially the case when farmers don't have access to the storage facilities, so they are often eager to sell the crops for whatever price, so they don't have to deal with the ruined/defected crops.

Contract farming is not very common and is usually temporary.
his practice is more prevalent with crops such as fennel, onions, and pomegranates, especially when these crops are exported or sent to processing hubs. Some companies and processing facilities that require specific pesticide and seed standards and so they contact the farmers directly. These companies also provide farmers with necessary input supplies and training. However, it is important to note that this practice is not widespread, and contracts typically last for only one year. There is no guarantee that these contracts will be renewed.

4.1.3 Processing

Post-harvesting and processing activities in Upper Egypt across the different value chains are considerably minimal. Farmers engage in minimal post-harvesting activities, such as drying, sorting and packaging before selling them in bags, cartons or boxes. The absence of value-added processing represents an untapped economic opportunity. In cases where such facilities exist, it is often traders—not farmers—who sell the crops to these facilities, limiting direct market access for farmers. Crops are transported to processing facilities, usually delivered using tricycles, which are not equipped for the crop preservation and can lead to waste.

The sustainability of the processing facilities and post harvesting activities is a key challenge. Most processing facilities in Upper Egypt were predominantly donated as a part of an international development project. Some of these facilities are no longer operational.

4.1.4 End Market

Most farmers rely on traders to reach market centers, except for a few who sell directly within their village or the local markets in the administration center. There are few small and medium enterprises based in Upper Egypt that aim at exporting the agricultural product to international markets.
Traders transport crops to larger markets, often in the governorate's main city/capital or Cairo. In most value chains, the crops pass through several intermediary traders (i.e., 2–4), until they reach bigger local markets such as in Cairo. This exasperates the market price of the crop, since each intermediary trader creates for themselves a profit. Since traders typically bear transportation costs, which are considered high, cross-governorate sales are limited and usually occur through these intermediary traders.

4.2 Surrounding Ecosystem

The surrounding ecosystem in the value chain refers to the external and supporting factors in place to influence the overall function of the value chains. This ecosystem determines the constraints and opportunities that agriculture value chains have access to. This includes access to markets, and strategies to create more efficient and inclusive organization methods. This section focuses on the rules and regulations that impact the agriculture sector and the crops access to markets. The section also focuses on the cultural traditions and norms that impact the role of women and their inclusion in the value chain. The section also highlights the key implications of climate change and climate hazards.

4.2.1 Rules and regulations

Input Suppliers licensing

The agriculture law in Egypt no. 53 for the year 1966[5] regulates all aspects of the agricultural sector, including standards and rules for agricultural inputs. It also outlines the certification requirements for crop protection products. The investment law no. 72 for year 2017 and companies law no. 159 for the year 1981[6] regulate the procedures of registering companies in Egypt. The law introduces the different legal forms of companies in addition to the offered incentives for business owners.

Processing Facilities regulations

Processing facilities follow the main laws governing processing activities in the agricultural sector. These include :

- Registration and obtaining the licenses needed from the National Food Safety Authority
- Quality management systems as set by the National Food Safety Authority and international markets standards[7].
- labor rights as set by the Egyptian labor law[8]
- Contract farming models as introduced by the Ministry of Agriculture and Land Reclamation[9].

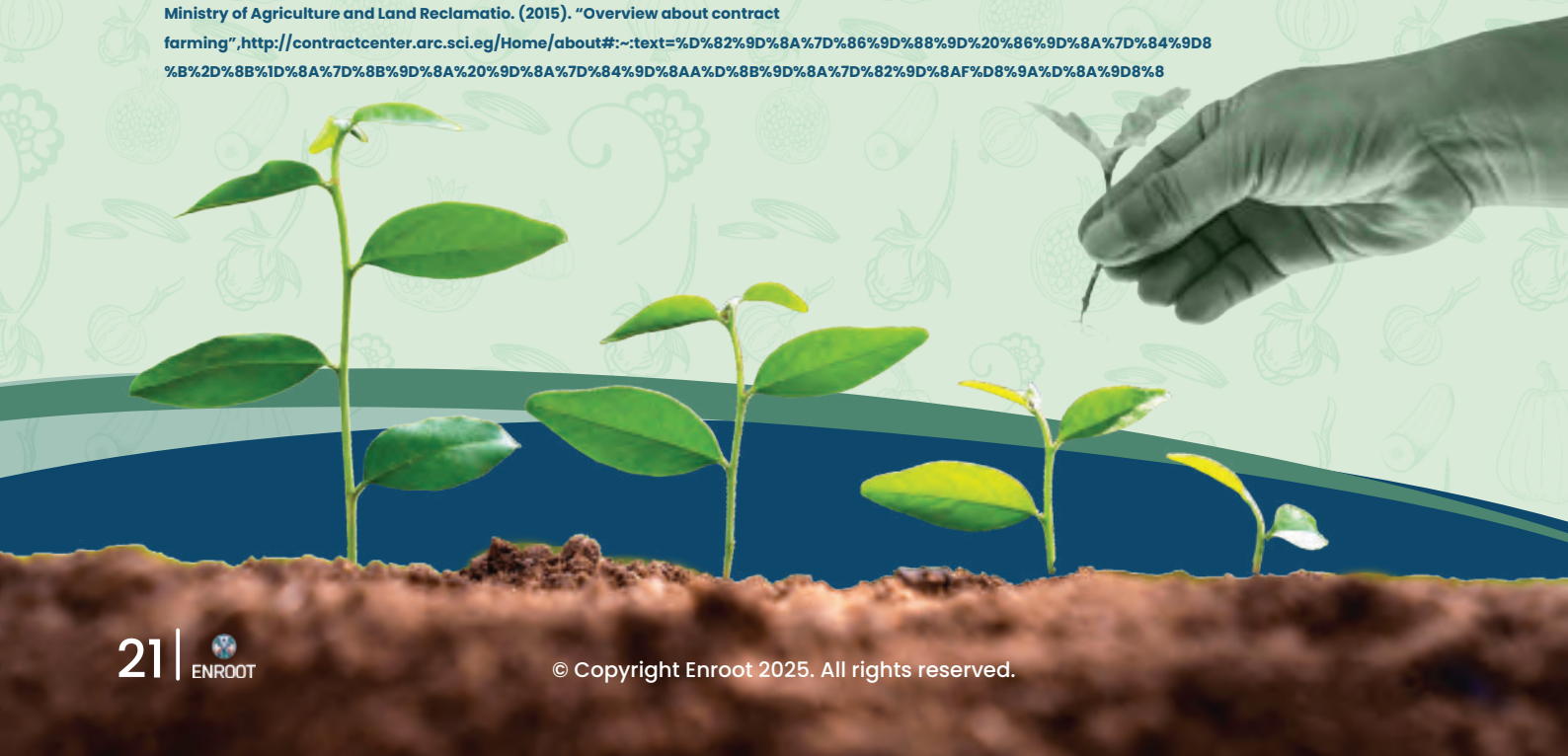
5 Ministry of Agriculture and Land Reclamation, (1966), "Law no. 53 for the year 1966", https://moa.gov.eg/media/fill1ubq/egy153081.pdf

6 General Authority of Investment and Free Zones, "Establishing companies/institutions",https://www.gafi.gov.eg/Arabic/eServices/Pages/eservices-guide.aspx

7 National Food Safety Authority. (2022). "Decree no. 16 for the year 2022".

8 Labor law no.12 for the year 2003 introduces the provided rights and responsibilities of laborers and employees in the different types of institutions. Ministry of Manpower. (2003). "Law no.12 for the year 2003", https://www.manpower.gov.eg/PDF/WorkLow/law2003.pdf

9 Law no. 14 for the year 2015 introduces the concept of contract farming and its implementation mechanism with the Egyptian agricultural ecosystem. Ministry of Agriculture and Land Reclamatio. (2015). "Overview about contract farming",http://contractcenter.arc.sci.eg/Home/about#:~:text=%D%82%9D%8A%7D%86%9D%88%9D%20%86%9D%8A%7D%84%9D8%B%2D%8B%1D%8A%7D%8B%9D%8A%20%9D%8A%7D%84%9D%8AA%D%8B%9D%8A%7D%82%9D%8AF%D8%9A%D8%A%9D8%8



Quality Standards regulations

The produced yield should meet general food safety standards and regulations. However, the lack of an enforcement system for the National Food Safety Authority's[10]regulations has led to poor agricultural practices and the misuse of crop protection products. Most quality standards that are adopted are for export purposes and thus follow the importing countries' requirements. The crops that don't meet international standards are usually sold in local markets, according to the traders interviewed.

International Trade Regulations

International trade of agriculture products is governed by several regulations to ensure food safety and product quality. The World Trade Organization (WTO) is the main governing body that sets most of this regulation, although most countries and regions have their own standards. The European Union, for instance, implies strict regulations and import standards. It aims to reduce greenhouse gas emissions by 55 % by 2030. As part of its goal to achieve climate neutrality by 2050, they will achieve this through rigid import regulations

Two key strategies will drive this transition: the European Green Deal and the Farm to Fork (F2F) Strategy.

The Green Deal introduces stricter agricultural trade policies, including promoting sustainable value chains, mandatory due diligence, and higher sustainability standards for imports. The F2F Strategy focuses on making Europe's food system more sustainable by controlling greenhouse gas emissions from pesticides, synthetic fertilizers, and soil nutrients. It also emphasizes environmental assessments for pesticide imports and addresses issues like deforestation, forced labor, and animal welfare.

According to the 'Application of EU health and environmental standards to imported agricultural and agri-food products'[11], most food trade discussions in the WTO occur in the Sanitary and Phytosanitary Measures (SPS) Committee, with the EU hoping to include sustainability issues and establish a work program within the committee. The EU will support programmes of capacity building to strengthen sanitary and phytosanitary systems of agricultural exports in third countries. This is to support the transition towards sustainable food systems.

10 National Food Safety Authority. (2022). "Decree no. 16 for the year 2022". C%20%D8%9A%D%82%9D%88%9D%20%85%9D%8B%9D%84%9D89%9,%D%8B%4D%8B%1D%83%9D%8A%20%9D%8AA%D%8A%3D%85%9D8%9A%D%86%9D8%8C%20%D%88%9D%87%9D%8B%0D%8A%20%7D%8B%9D%84%9D%20%89%9D%8BA%D%8B%1D8%A%7D%8B1

11 European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards a Strong and Sustainable EU Algae Sector. 15 May 2022, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0226.

There are three main elements that regulate the most agriculture products: the phytosanitary health of the produce, the food safety regulations, the ownership of certificates to ensure the quality of the produce, and the packaging and labeling requirements. There are several other standards that are crop specific that will be explored in later sections, but this section highlights the important regulations that can be applied universally on all crops.

In agriculture, contaminants are unwanted substances that affect soil, water, crops, and livestock, posing risks to food safety and the environment. These include chemical contaminants like pesticide residues, heavy metals, and excess fertilizers; biological contaminants such as bacteria, viruses, and mold toxins; physical contaminants like plastic debris and soil particles; and water contaminants from industrial waste or excessive salinity.

Regulation (EC) No 396/2005[12] sets maximum residue levels (MRLs) of pesticides in or on food and feed of plant origin. An MRL is the highest level of pesticide residue that is legally tolerated in or on food products when pesticides are used. If a product contains more pesticide residues than allowed, it will be taken off the European market.
Food safety is essential in the European market. That is why European buyers usually ask for certain certifications. According to the Standards Map.[13] There are more than 30 certificates in front of Egyptian exporters should be certified with as much as they can in order to facilitate their entry to the European markets. A common certification program for good agricultural practices is GLOBALG.A.P[14]. Buyers in Europe will often request this certificate, especially those that supply to supermarkets. For these buyers, it has become a minimum requirement.

Other certificates include:

- GLOBALG.A.P. Risk Assessment on Social Practice (GRASP)[15]: covers the certification of the whole agricultural production process of the product from before the plant is in the ground (origin and propagation material control points) or from when the animal enters the production process to non-processed product (no processing, manufacturing or slaughtering is covered, except for the first level in Aquaculture). Only products included in the GLOBALG.A.P. product list, published on the GLOBALG.A.P. website, can be registered for certification.

12 European Union. Regulation (EC) No 2005/396 on Maximum Residue Levels of Pesticides, https://eur lex.europa.eu/legal-content/EN/TXT/?uri=CELEX3%A02005R20240226-0396
13 "Standards Map," Standards Map, International Trade Centre, https://standardsmap.org/
14 "GlobalG.A.P.," GlobalG.A.P, https://www.globalgap.org/
15 "Overview," Standards Map, International Trade Centre, GLOBALG.A.P. Risk Assessment on Social Practice (GRASP)15:

- BRCGS Ethical Trade and Responsible Sourcing (ETRS)[16]: It's made up o a Global Standard and a separate ETRS Risk Assessment. The Standard's requirements span six principles, giving sites a framework on which they can build their own ethical trade and responsible sourcing management system.
- Phytosanitary certificate – for proper inspected on quarantine pests, regulated non quarantine pests, and practically free from other pests. In line with the plant health requirements of the EU, (Required)
- Certificate of Origin (GSP certificate) and Certificate of Origin (Required)[17]
- Carbon-credit certificates- waste management, where companies buy carbon credit allowing them to emit certain amounts of greenhouse gasses. Bought from Seekem (Recommended)
- Organic certifications QAI, Quality Assurance for produce that is marketed as organic only.

Packaging and labeling requirements according to UNECE standards ensure that produce is properly protected to avoid damage.
The packaging materials must be clean and of high quality, preventing both external and internal harm to the product. Non-toxic ink or glue should be used for trade specifications, and labels or stickers should not leave visible residue or cause skin defects when removed. Additionally, produce must be free from foreign matters. Each package must display specific information, including the packer/exporter's name and address (or a code recognized by national authorities), the nature of the produce (e.g., crop name or mixture of varieties), the origin (country and possibly region), and commercial specifications such as class, size, weight, or number of units.

4.2.2 Role of Women

Women integration in the agricultural sector is a key factor across the selected value chains. Women are mainly engaged in the harvesting and post harvesting activities across the different crops, such as drying, sorting, and grinding. This stems from their prevailing delicate and careful skills in handling the produce. It should be noted that, as primary caregivers, women are either engaged in agricultural family business, rendering their work unpaid or their wages remain significantly lower than men's, earning 1.5 times less, according to the conducted discussions.

Women's integration in the agricultural value chain differs from one governorate to another. This is based on the traditions that are prevalent in the region. The difference of the role of women in each governorate will be further explored based on their role in each of the selected crops below.

16 "Overview of Standards Map." Standards Map, International Trade Centre, 2024, https://standardsmap.org/en/factsheet/2099/overview?origin=Egypt&destination=Europe&products=Vegetables

17 United Nations Industrial Development Organization. Exporting to the EU: A Guide for Developing Country Exporters. 11 Feb. 2021sticides, https://eur

4.2.3 Implications of Climate Change

Climate change poses significant challenges to agriculture in Upper Egypt, with projections indicating notable declines in crop yields. By 2050, food crop yields are expected to decrease by over 10 % due to heat stress, water scarcity, and increased soil salinity. Specific crops such as maize, oilseeds, sugar crops, and various fruits and vegetables are anticipated to experience the most substantial reductions. IFPRI,8 2021. The climate change analysis conducted as part of the study entailed developing a risk assessment matrix to better understand the consequences of climate hazards and extreme weather events on Upper Egypt's agricultural sector.

Aswan was identified as the most affected by heat waves, high temperatures, temperature variability, and drought, all classified as high to very high risk, as shown in the matrix below.
Biological hazards pose a very high risk in Assiut and Sohag and a high risk in Qena and Luxor, while Aswan faces a medium risk. Cold wave frost is a major concern in Assiut and Sohag, falling in very high and high-risk zones, respectively. Soil salinity is the least significant risk, categorized as very low across all governorates.

Hazard	Assiut	Sohag	Qena	Luxor	Aswan
Heat Waves	Medium	Medium	High	Medium	Very High
High Temperature	Medium	Medium	High	Medium	Very High
Temperature variability	Low	Medium	High	Medium	Very High
Storms (including sand and dust storms)	Low	High	Very Low	Low	Low
Flash Floods	Very Low	Very Low	Medium	Medium	Medium
Heavy Precipitation	Very Low	Very Low	Low	Very Low	Medium
Drought	Low	Medium	Medium	Medium	High
Cold Wave Frost	Very High	High	Low	Low	Very Low
Biological Hazards (Agricultural Pests)	Very High	Very High	High	High	Medium
Soil Salinity	Very Low	Very Low	Very Low	Very Low	Very Low

Table 3: Climate Hazards Risk Matrix per Governorate

Climate Change's impact on Crop Yields and Export Revenues

Climate change is exerting growing pressure on Upper Egypt's agricultural exports, with consequences rippling through both local economies and the national trade balance.

Rising temperatures, erratic water supplies, and soil degradation have led to lower crop yields, meaning there is simply less produce available for export. Strong export crops such as pomegranates, which are cultivated extensively in Upper Egypt, are particularly affected. According to a report by the Food and Agriculture Organization, climate stress has already contributed to declining yields in several key agricultural areas across Egypt[18]. The resulting reduction in production volume directly cuts into Egypt's agricultural export earnings, a critical source of foreign currency. Especially given that agriculture accounts for around 11 % of Egypt's total export revenues. [19]

A critical impact of climate change lies in the deterioration of produce quality. Climate stress causes visible defects, irregular ripening, and smaller fruit sizes. All of which compromise the high-quality standards demanded by key export markets. According to a statement by the Ministry of Trade, Europe rejected 128 agricultural and food shipments in 2021, primarily due to quality issues linked to climate variability[20]. The majority of rejections came from the Netherlands with a rejection of 33 shipments, followed by Germany with a rejection of 25 shipments, and Italy and Slovenia with 13 rejected shipments.

Facing harsher growing conditions, many farmers in Upper Egypt are beginning to shift toward more heat and drought tolerant crops such as dates, cactus, and moringa. While this adaptation strategy aligns with recommendations from the UNDP for climate-resilient agriculture, it presents its own challenges[21]. While Egypt ranks 8th among the world's top date exporters and is the largest global producer, its export volume remains relatively low compared to its total production[22]. Of the 1.73 million tons of dates produced, only 53 thousand tons are exported, meaning just %3 of Egypt's date production reaches international markets. New crops often lack established export channels and recognition in global markets, requiring time and investment to develop demand abroad. Consequently, there could be a temporary reduction in overall agricultural export from upper Egypt during this transition phase.

18 Food and Agriculture Organization (FAO), Climate Change and Agricultural Productivity in Egypt, 2021. https://openknowledge.fao.org/server/api/core/bitstreams/8327142e-4035 2479-ad718396257-46db3/content

19 Source: ITC – Trade Map

20 Ministry of Trade Statement, source: https://www.elwatannews.com/news/details/5918836

21 Source: SCALA Program Highlights Report 2022 https://www.adaptation-undp.org/scala resources-programme-highlights-report2022-

22 Source: ITC- Trade Map

Beyond individual farmers and exporters, the broader economic fabric of Upper Egypt is also under strain.

Agriculture remains a major employer in the region, and the declining exports threaten to drive rural poverty, increase youth migration to urban areas, and destabilize allied industries. The cumulative effect places additional pressure on Egypt's economy, alreadyworking to stabilize its foreign exchange reserves amid external financial shocks.

At the same time, the cost of agricultural production in Upper Egypt has been rising sharply.
Farmers are being forced to invest more to combat the impact of climate change. Investment in water infrastructure, such as deeper wells and advanced irrigation systems, has become crucial. Furthermore, investment in pesticides and plant protection measures are necessary, seeing as new pests and diseases become more prevalent. Protecting crops from heat damage also requires new expenditures on shade nets, cooling technologies, and cold storage facilities.

These added costs drive up the final price of Egyptian produce, making it less competitive internationally. Egypt's agricultural exports face increasing price sensitivity, especially in European and Gulf markets. Buyers are quick to shift to alternative suppliers like Spain, Morocco, and South Africa.

The longer-term threat to Egypt's agricultural export sector is reputational.
The loss of premium quality not only affects short-term earnings but also risks gradually eroding Egypt's reputation as a reliable supplier of high-standard fruits and vegetables. Egypt has spent decades building its brand as a consistent supplier of fresh, high-quality produce. However, climate-induced inconsistencies in supply and quality, if left unaddressed, could significantly tarnish this reputation. Maintaining Egypt's position in competitive global agricultural markets will depend on how effectively and quickly it can adapt to the new climate reality.

5 Value Chain Analysis in Upper Egypt

5. Value Chain Analysis in Upper Egypt

This section provides an in-depth analysis of the selected agricultural value chains in Upper Egypt, highlighting their structure, challenges, and opportunities. It explores the role of various key actors, with a focus on the climate impact and women's contribution.

5.1 Hibiscus

Picture 1 Hibiscus Plant

Source: https://artpictures.club

5.1.1 Overview

Hibiscus is the third most grown crop in Aswan. 12 The farming of hibiscus is concentrated in Edfo, Kom Ombo, and Abu Simbel, with 4,000 acres planted dedicated to it, particularly in Wadi El-Naqra. Edfo is known for producing the best quality hibiscus. Luxor, especially Esna, is another key production area, with 40 % of the governorate's farmland dedicated to cultivation. Esna's farmers, influenced by ongoing agricultural projects, are more exposed to new techniques according to several IDIs conducted with CSO representatives. Drip irrigation in the reclaimed land in Luxor has also allowed for greater crop diversity, including vegetables.

Hibiscus is typically planted at the end of May and takes around six months to mature, allowing for its harvest from November Until January. From 2020 to 2023, the planting date shifted from around a month from the 1st of May to the 10th of June, as farmers adjust to find optimal temperatures for maximizing yield. The Sudanese hibiscus (Saudany) is the most common variety used since it is considered the highest quality and maintains consistency.

Planted end of May Harvested in December to January

The Sudanese hibiscus (Saudany) variety is the most popular

Grown in Aswan, Luxor & Qena

The following figures show the productivity rate per Luxor Aswan and Qena, according to the obtained average from the farmers' survey. It is observed that Luxor governorate accommodates the highest productivity rate among the three governorates, with a 77 tons per feddan.

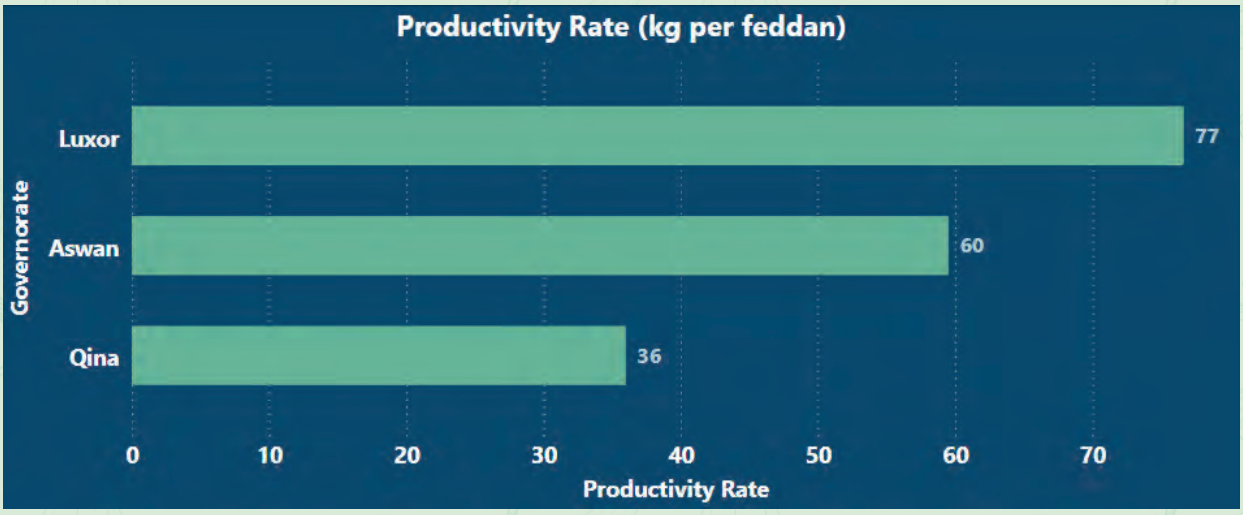


FIGURE 5 : PRODUCTIVITY RATE PER GOVERNORATE

The following roadmap of all important phases of the hibiscus value chain

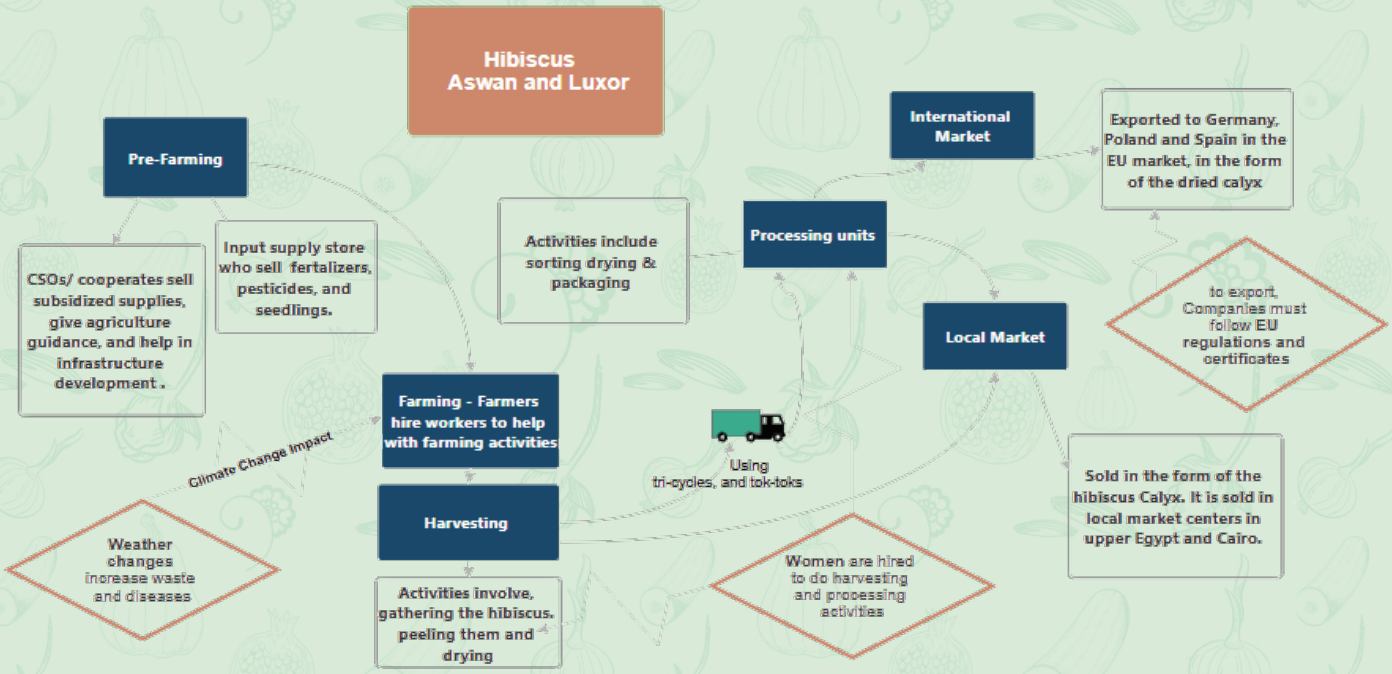


FIGURE 6 : HIBISCUS VALUE CHAIN ROADMAP

5.1.2 Input Supplies

Hibiscus cultivation requires several key input supplies, including seeds, fertilizers, labor, machinery, and pesticides. Each feddan needs **8–15 kilos of seeds**, costing 60 Egyptian pounds per kilo, though many farmers save seeds from previous seasons. Fertilization involves applying **nitrogen** and **potassium** twice—once during land preparation and again 30 days after planting—while **magnesium, zinc, and iron** are sprayed on the leaves after 50 days. Each feddan requires three sacks of fertilizers, with subsidized options costing 250 Egyptian pounds per sack, though limited availability forces farmers to buy additional sacks at 1,000 Egyptian pounds each.

Land preparation costs have risen, covering plowing and seeding. In Aswan some farmers use modern farming techniques such as laser leveling, which renting costs from 500–700 Egyptian pounds per hour. Laser leveling is when farmers used laser to guide their land leveling to ensure the uniformity of the field. This greatly helps in water distribution, reducing water use and is shown to increase the yield. Maintaining a feddan costs around **1,100–1,200** Egyptian pounds, factoring in labor, diesel, oil, and machinery, with tractors rented for 1,000 Egyptian pounds per feddan and diesel barrels costing 300–350 Egyptian pounds. Labor is another significant expense, as workers earn 100–180 Egyptian pounds for three hours of work, and 200 for a full day of work. This has increased from previous years and many farmers regard this as too high of a wage.

Weeding and pruning require multiple workers, with daily wages averaging 200 Egyptian pounds. Pesticides for general use cost about 200 Egyptian pounds per feddan, while specific pesticides for wilting range from 800–1,000 Egyptian pounds. In total, hibiscus farming costs can reach 20,000 Egyptian pounds per feddan. The following figure compares the input supply costs (EGP Million) between the governorates of Aswan, Luxor and Qena:

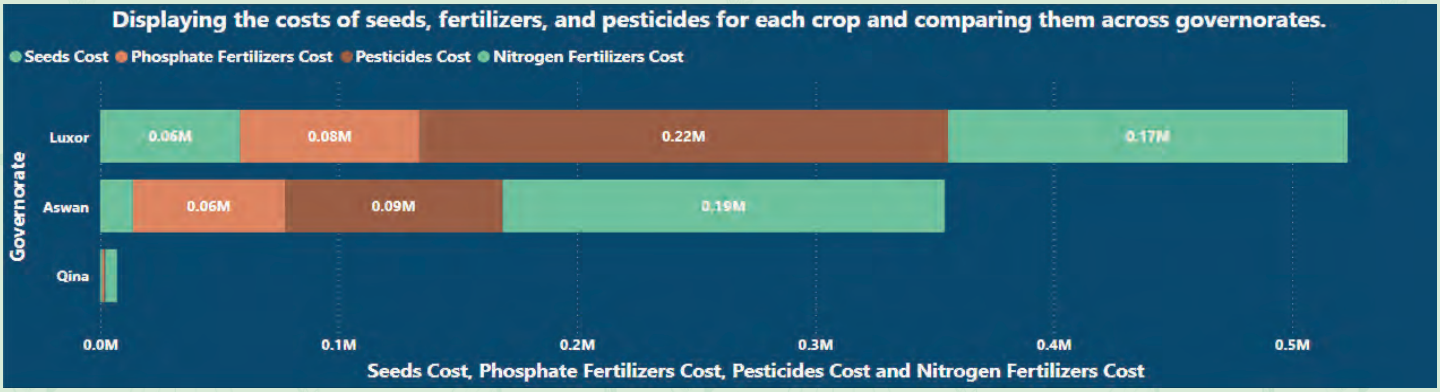


FIGURE 7 INPUT SUPPLY COSTS PER GOVERNORATE

5.1.3 Farming and Cultivation

The land is plowed with two furrows, then it is leveled and smoothed. Afterward, it is marked into rows at a rate of 12 lines per two furrows. The seeds are then planted on one ridge of the row, usually the eastern or western ridge, depending on the direction of the rows. The planting distance is 30 cm between each hole, and 3 to 4 seeds are placed in each hole. Once the seeds have germinated, the plants are thinned down to one per hole. In the case of transplanting seedlings, the land is irrigated first, and then the seedlings are planted in the upper third of the row, with water present. Irrigation is carried out 3 to 5 days after planting.[23]Continuous cultivation of hibiscus depletes soil nutrients, making crop rotation essential for sustainability. Regular but light watering is essential to prevent dehydration in hibiscus plants. However, farmers in Aswan and Luxor face significant irrigation challenges. In Wadi Al-Saayda, irrigation is irregular due to reliance on five interconnected pumping stations, originally designed for modern systems like drip and sprinkler irrigation. Despite this, many farmers continue using outdated methods such as movable pipes and hoses, which have deteriorated over time.

23 Karkadah (Hibiscus sabdariffa) Production." VERCON: Virtual Extension and Research Communication Network, http://www.vercon.sci.eg/indexUI/uploaded/Karkadahproduction978/karkadahproduction.htm.

Traditional flood irrigation remains common in Aswan, but low land leveling often causes flooding, prompting the implementation of a drainage system to address the issue. In Luxor, most farmers also rely on flood irrigation and lack awareness of proper water management practices. Additionally, farmers need guidance on optimal irrigation schedules, particularly on whether to irrigate during the day or at night. Implementing modern irrigation systems is crucial to addressing climate-related challenges such as frost and extreme heat, ensuring sustainable water use and improved crop productivity.nd Qena:

5.1.4 Impact of Climate Change

Both Luxor and Aswan face similar temperatures and so they are affected by the same climate change impacts. The biggest issue is due to sudden weather changes, particularly extreme heat and cold, which have significantly impacted the hibiscus yields. Especially during the growth and flowering phases. It also leads to an increase in diseases and pests. The extreme heat causes sunburn and drying in hibiscus, forcing some farmers to burn failed crops and replant them. Especially since Luxor and Aswan have faced record high heats in the past year. Hibiscus is a sensitive but resilient crop; while it initially suffers due to the high temperatures, it mostly recovers when conditions improve.

Increasing irrigation during high temperatures and shifting planting schedules are some of the solutions to mitigate crop loss. However, most farmers lack the experience and knowledge to do so without impacting the plant. Especially since overwatering hibiscus will lead to its loss, and delaying its plant too long can decrease the yield. Furthermore, soil degradation is also a significant problem faced due to desertification and loss of fertility due to unsustainable farming practices, such as the use of high quantities of chemical fertilizers.

Crop Loss and Disease Issues

This year, many hibiscus crops were severely affected by diseases such as powdery mildew (Marad El Bayada), which causes crops to be destroyed within 10–12 days of infection. Unfortunately, there are no effective pesticides known to the farmers to combat this disease. Farmers attempted various pest control methods, including washing the crops before applying pesticides, but the results were inconsistent. They also tried using mineral oil before flowering, which showed some promise, and spraying vinegar, but it also had no effect. Different herbicides and different pesticide companies such as Bermuda, were also tested for combating powdery mildew but none proved effective. Common pests in the region also include scale insects (Hashara Kishreya), but it is less of an issue compared to the powdery mildew.

29 % of the hibiscus surveyed farmers responded "Decreased Temperature " when asked about what highly affects the crop, in comparison with 71 % of the farmers who responded "Increased Temperature" for the same question

The lack of awareness among the farmers was highly notable in regard to the implications and aspects of climate change on their yield.
Furthermore, there is a lack of collaborative pest control efforts among farmers, which contributes to the ongoing issue. Which is often linked to the condition of the land itself and requires pesticide treatments under the supervision of agricultural engineers to prevent crop damage.

In Luxor, farmers face similar challenges, particularly with army worms (Doud el Hashad), which affect up to 80 % of the crops. Other pest-related issues include Mealybugs, worms, root rooting, and bacterial wilt. Men typically handle most agricultural tasks, women play a crucial role in reminding men to spray pesticides and alerting them to weather changes, making it vital for them to be well-informed about agricultural issues.

The following figure shows the leading waste causes.

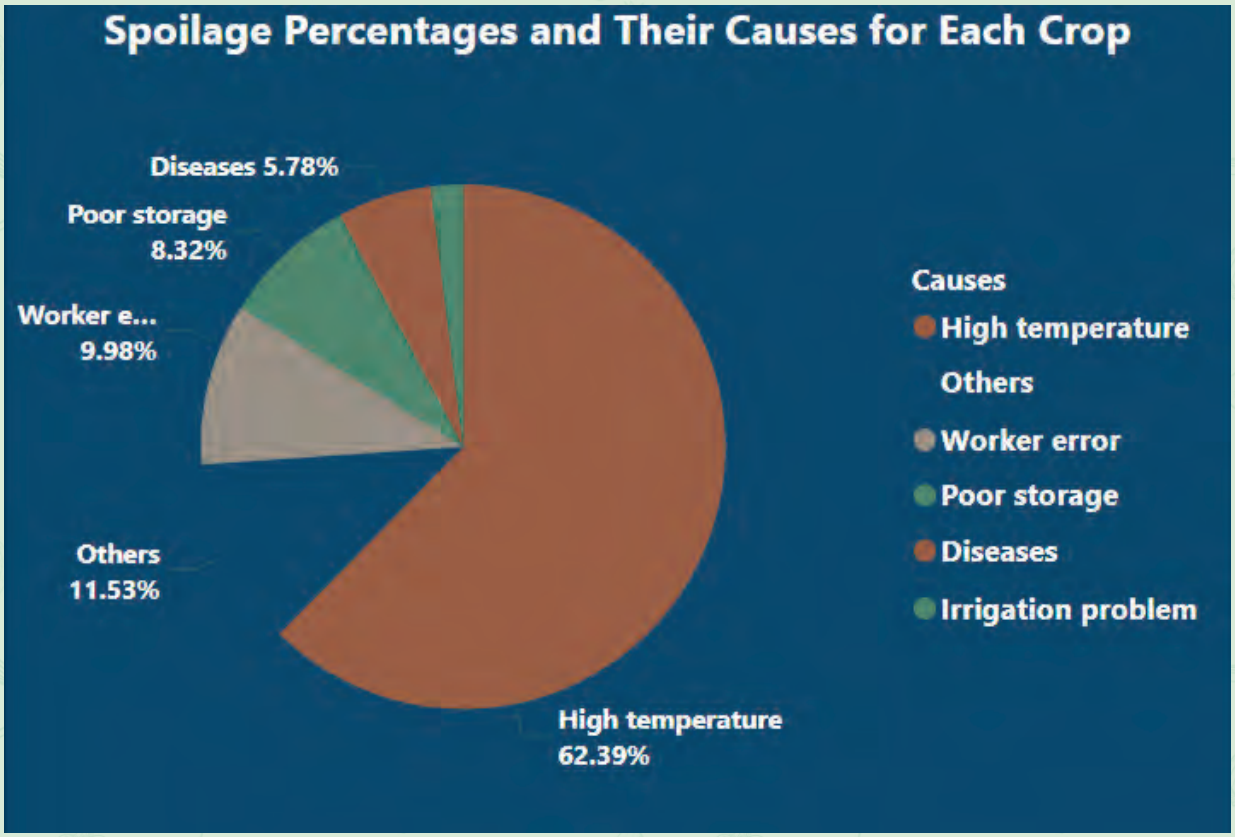


FIGURE 8 : LEADING HIBISCUS WASTE CAUSE BY PERCENTAGE

5.1.5 Harvesting and Post-harvesting

The farmers manually harvest the hibiscus from the trees. This process is highly labor intensive. The collected plants are then either sent to processing units or sent to women, who then separate the calyxes from the flower, and dry them. This process is done manually and can lead to crop losses if any of the hibiscus bulbs are crushed. The role of women and men in harvesting is, based on the size of the land, and if male workers are hired. Women have a more active role in Aswan relative to Luxor, but in both cases, women are more active in hibiscus processing.

5.1.6 Processing

The hibiscus is mostly sold as calyxes while other parts of the plant are used for animal feed. After harvesting, crops are sent to workers (mostly women) to separate the calyx. The women of the village gather in someone's house to sit a peel the hibiscus. It is done by two methods.

Picture 2 Women Peeling Hibiscus. Source Taken from the field

The method requires the breaking of the plant by hand, or by using a sharp tool to peel the calyx ensuring it remains intact. The second method requires skilled work and therefore it is sold at a higher rate. After peeling the calyx is left to dry the hibiscus on racks (often on rooftops).

Production hubs are not common, but they do exist in some cities. An IDI was conducted with a representative from **the Mahba Factory**, holding a Global GAP certificate, sources hibiscus from Aswan, Esna, and Luxor, working directly with farmers without the involvement of traders or middlemen. Only farmers who sell directly to production hubs receive training in best practices to meet export requirements, such as proper drying methods to prevent moisture retention, ensuring the plant's color remains unchanged, and maintaining hygiene by washing hands before handling crops.

The factory maintains strict quality control, and works on processing the hibiscus, and discarding the stems. Most of the processing work is focused on sorting, peeling the hibiscus

and packaging them. Approximately 5 % of the plant is wasted, often due to improper drying techniques such as overcrowding on drying racks. Once dried, the hibiscus undergoes a second round of sorting before being packaged and stored until it can be transported to Cairo for further distribution and exports.

Storage is a critical phase, as improper conditions can spoil the crop. Hibiscus must be stored in a moisture-free environment, at least half a meter away from walls and ceilings, and with a metal fence placed half a meter from the wall to allow for inspections. In both Aswan and Luxor, low humidity helps maintain the quality of the hibiscus. However, improper storage or drying can lead to a loss of 180-200 kilos of product, as humidity must be eliminated during drying to ensure the crop remains fit for human consumption.

5.1.7 End Market

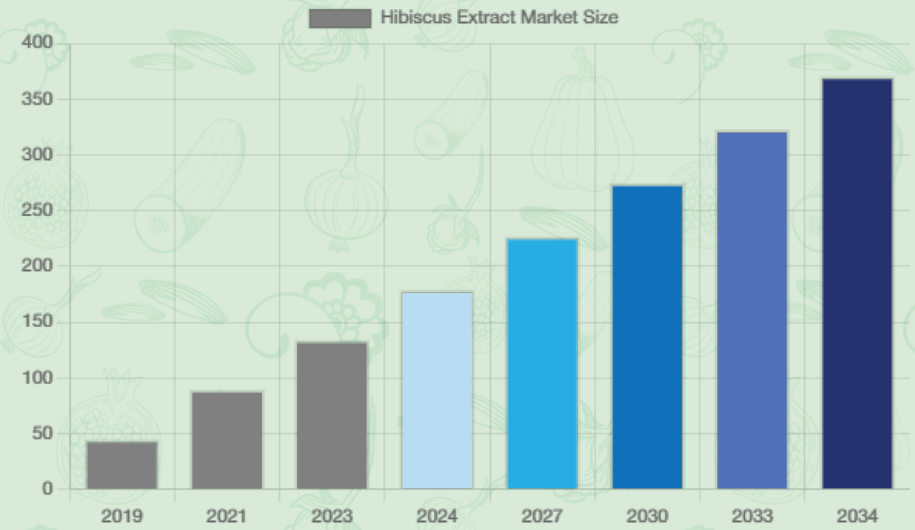
Local Market

In Aswan, hibiscus remains a key crop, but local market-access is challenging to most farmers. Previously, farmers traveled to Edfo to sell their crops, but a new market in Omar Ibn El-Aas village in Edfo, has improved local sales. Prices have dropped significantly, with one acre of hibiscus was sold in 2024 for 5,000–6,000 Egyptian pounds compared to 20,000–25,000 Egyptian pounds sold in 2023. The market was highly saturated in 2024, since most farmers choose to farm hibiscus due to its market performance in 2023, which lead to the oversupply of hibiscus. This has reduced profitability, forcing farmers to cut cultivation. Despite increased production, farmers now earn just 200 Egyptian pounds per kilo.

International Markets

Egypt ranks as the 4th largest exporter of "Plants, parts of plants, incl. seeds and fruits, used primarily in perfumery, in pharmacy or for insecticidal, fungicidal or similar purposes, fresh, chilled, frozen or dried, whether or not cut, crushed or powdered (excl. ginseng roots, coca leaf, poppy straw, ephedra and bark of African cherry)", which includes hibiscus. In 2023 Egypt exported **189,643,000$** equating to 24,666 Tons. Although this is less than exported in 2022, which was 29,294 tons worth **192,410,000$**.
In 2023, the EU imported 8,680 tons from Egypt, equating to 28 % of Egypt's total Plants, parts of plants, exports. With Germany, Poland than Spain being the biggest three plant and parts of plants importers.

FIGURE 9: HIBISCUS MARKET SIZE



SOURCE: GLOBAL INSIGHTS SERVICES

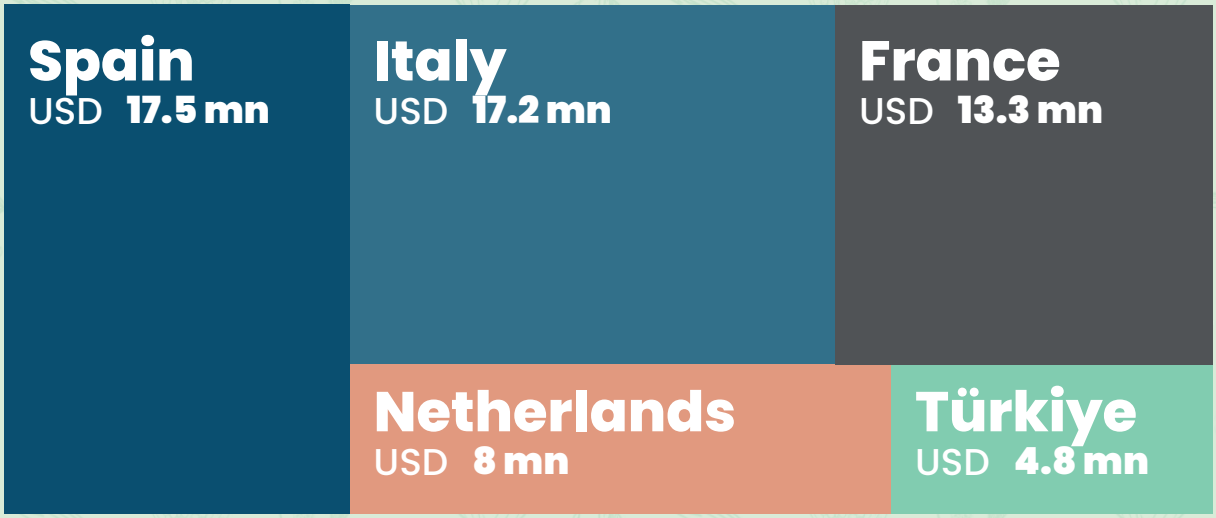
Hibiscus has many uses, but it is especially known for its pharmaceutical, food and beverage and cosmetic industries. In 2024 the global hibiscus market is valued at 150$ million in, and it is expected to grow to 270$ million by 2034 as shown in the following diagram.[24] With the growing trends leaning towards natural and organic products, hibiscus meets many of consumers demands, when it comes to its health benefits[25].
Hibiscus extract, recognized for its antioxidant and anti-inflammatory properties, explains its popularity when it comes to its use as teas, an alternative to flavor and food coloring, juice, and hair cosmetics[26]. Hibiscus is also known for its conditioning and exfoliating properties, allowing for its use in most hair products such as shampoos, conditioners and hair masks, face masks, scrubs and cleansers.

The Asia Pacific and Middle East and North Africa had previously dominated the hibiscus market due to the traditional uses of hibiscus as herbal medicine and beverages[27]. Currently the market has expanded to the United States and Europe which now hold the largest hibiscus market share, with the United States, Germany and France being holding the largest markets.
Hibiscus is mainly utilized in cosmetic and pharmaceutical uses, especially when it comes to tablets and health products. While consumers in Europe and North Africa now have some preliminary knowledge of the health benefits of hibiscus, there needs to be more marketing

24 Global Insight Services, Hibiscus Flower Powder Market Analysis and Forecast to 2033, Global Insight Services, 2024, https://www.globalinsightservices.com/reports/hibiscus-extract-market/
25 Global Insight Services, Hibiscus Flower Powder Market Analysis and Forecast to 2033, Global Insight Services, 2024 https://www.globalinsightservices.com/reports/hibiscus-flower-powder-market/
26 Mordor Intelligence, Hibiscus Extract Market Report, Mordor Intelligence, 2024, https://www.mordorintelligence.com/industry-reports/hibiscus-extract-market
27 Global Insight Services, Hibiscus Flower Powder Market Analysis and Forecast to 2033, Global Insight Services, 2024, https://www.globalinsightservices.com/reports/hibiscus-extract-market/

efforts to meet the full expansion potential of the market. Egypt has a large export opportunity to meet the new demand, especially with the EU region[28].

FIGURE 10: MARKETS RANKED BY TOTAL EXPORT POTENTIAL IN THE COMING 5 YEARS FOR EGYPT'S EXPORTS OF HIBISCUS



SOURCE EUROMED

To meet these market demands, compliance with organic certification, food safety regulations and supply chain transparency is crucial to meet the growing demands for organic products. Quality control also remains a pressing challenge, especially when it comes to meeting the EUs import regulations

5.1.8 Role of women

In hibiscus farming, women are responsible for about 60 % of the work—extracting calyx and seeds for the next season's planting, according to most farmers. This role provides women with employment opportunities, as they are paid directly for peeling the harvested hibiscus. They are also engaged in additional tasks, such as tying bundles and transporting sacks, which incur processing costs of 20-30 Egyptian pounds per bundle. Although women in different governorates have different roles.

28 Market Information Overview: Export from Egypt to France." Euromed Trade Helpdesk, https://euromed.tradehelpdesk.org/en/export-121190-from-eg-to-fr/market-information/overview.

Differences Across Governorates

Women's involvement in hibiscus farming varies across regions. In **Aswan**, specifically in Edfo, where much of the production takes place, there is greater awareness and training, leading to a more active role for women. In Wadi El-Saayda, women are significant contributors to sorting crops for quality and packaging, as well as peeling the hibiscus calyx, which increases the price from 180-140 Egyptian pounds. In Wadi El-Naqra, women have participated in specialized training, earning carbon credit certificates. While initial training sessions faced challenges due to social reluctance, awareness has grown, leading to improved participation. Women are also actively involved in spreading awareness about modern farming practices, including dripirrigation and the use of solar energy in farming.

However, women's involvement is more limited in **Luxor** due to cultural and traditional norms. Most women work there for the extra income but do not prefer to do so, according to the IDIs. Women in Luxor also face restrictions with working with men outside their families. This social constraint often limits their participation in activities such as collecting crops from nurseries, where mainly men work there, and so they cannot interact with them. In these cases, women rely on farmers and traders to utilize their services through personal networks.

Additionally, women in Luxor tend to have a less active role in farming compared to other regions like Sohag, Minya, and Edfo, where their involvement is more significant. Cultural norms discourage women from working directly in the field, as it is seen as a negative reflection on their fathers and husbands, implying they cannot provide for their families.

5.1.9 Areas of Interventions

Farmers' Knowledge & Training Needs:

- Farmers rely on their expertise and traditional practices.
- Limited awareness of good agricultural practices, proper pest control, and modern irrigation.
- Practical, field-based training from agricultural experts and agronomists is needed.
- Knowledge-sharing among farmers should be enhanced.

Soil Health & Crop Diversification:

- Hibiscus depletes soil nutrients, making crop diversification essential.
- Farmers are encouraged to adopt crop rotation but lack training in alternative crops like fennel and onions.
- Intercropping is recommended and already practiced, enhancing plant symbiosis and resilience.
- Crop rotation should be integrated with intercropping to reduce pest build-up.

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Sustainable Farming Practices:

- Use of organic compost and biochar helps retain moisture and reduce reliance on chemical fertilizers.
- Mulching with organic or inorganic materials conserves moisture, suppresses weeds, and improves soil health.
- Organic soil management enhances soil fertility and water conservation.

Women's Involvement & Training Needs:

- Women play a crucial role in agriculture and seek pest management training, especially for hibiscus diseases.
- Capacity-building programs for women are essential to strengthen their role in the agricultural value chain.

Market Access & Value Chain Integration:

- Farmers hesitate to invest without market stability.
- Currently, hibiscus sales rely on local traders, with minimal exports.
- Improved market access and marketing support are needed to increase profitability.
- Strengthening value chain linkages can help farmers sell directly to processing units or export companies.

5.2 Henna

Picture 3 Fennel Plant

Source: https://www.kew.org

5.2.1 Overview

There are 2000 Acres producing henna in Aswan. Aswan produces most of the henna that is used for exports. The annual yield per acre ranges from 2 to 5 tons of henna, with older plants tending to yield more. An acre produces about 800–750 kg of dried leaves. It also yields approximately 5 tons of thin branches and 2 tons of dried roots. Henna is planted and harvested twice per year. The first time it is planted in July and harvested in September. The second time it is planted in November and harvested in March, but the winter season produces a lower yield.

1 st harvest planted end of July Harvested in September. 2nd Harvest is planted in November and harvested in March

One variety

Grown in Aswan

Henna is mainly sold in two forms, the branches are used to make benches and umbrellas for tourist areas and fruit cages, and the leaves which are the main final product, are ground for use in various products not just the henna die powder. Any waste is used for animal feed. The following is a roadmap of all of the important phases of the Henna value chain

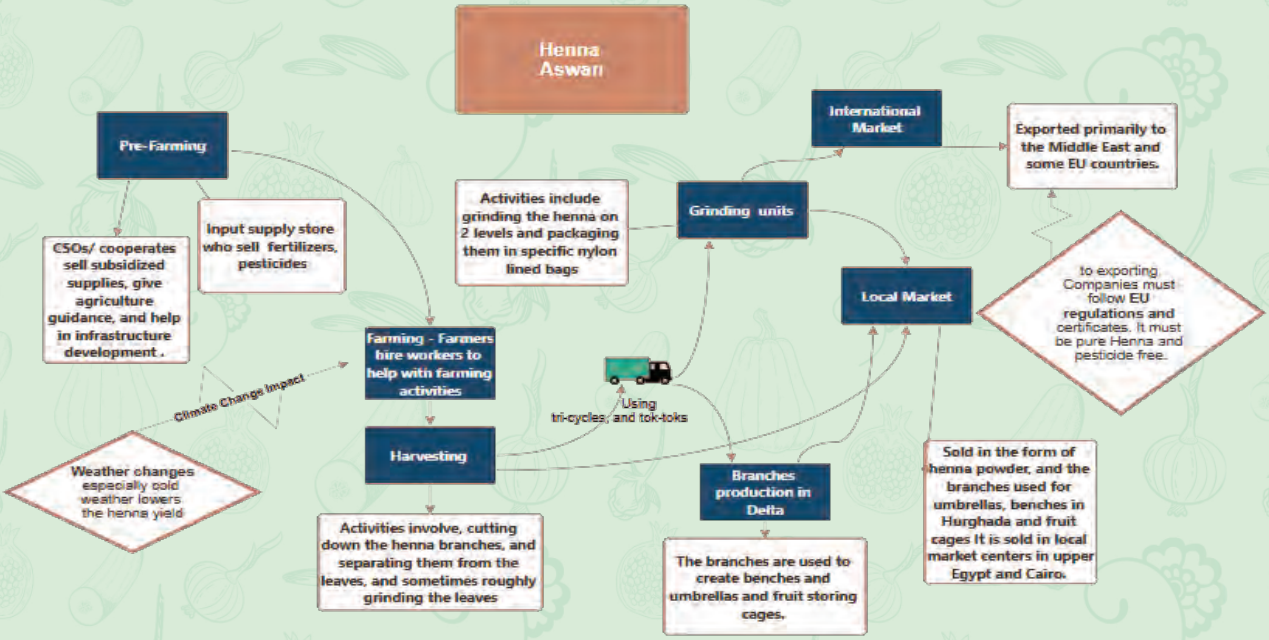


FIGURE 11 : HENNA VALUE CHAIN ROADMAP

5.2.2 Input Supplies

The cost of pesticides and input supplies has risen sharply, with prices now exceeding 1,000 Egyptian pounds per kilogram. Especially since there is a shortage of most supplies used in henna farming. The henna trees can last for several years and are typically propagated through cuttings rather than seeds, as farmers preserve mature plants and take cuttings annually, and trade with one another.

Farmers typically use an average of 4 to 7 bags of fertilizer per acre, with cooperatives subsidizing 2 bags at 265 Egyptian pounds per bag. The remaining bags are purchased at significantly higher prices of 900 to 950 Egyptian pounds per bag. Henna cultivation specifically requires **Nitrate** and **Potassium**, with farmers applying approximately 3 bags per acre. Additionally, they use 5 to 7 bags of **Super Phosphate**, each costing between 330 and 340 Egyptian pounds, as illustrated in the figure below. Although pesticides are occasionally used to control weeds, their usage is not widespread, as traders prefer henna with minimal pesticide application.

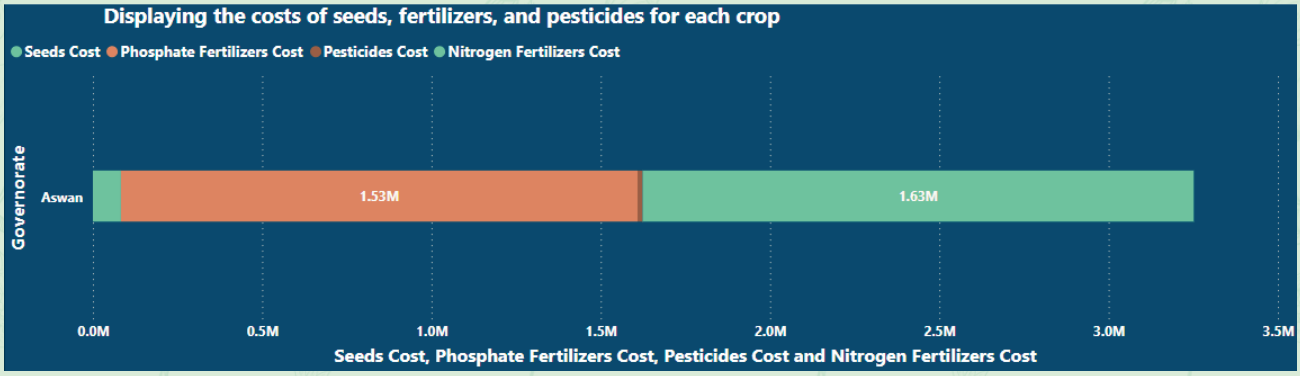


FIGURE 12 : HENNA INPUT SUPPLIES USE AND COSTS (IN MILLION)

5.2.3 Farming and Cultivation

Plowing and land preparation for henna cultivation typically involve hiring a tractor at a cost of 1,200 Egyptian pounds per feddan, which covers plowing, leveling, and row-making. Henna thrives in partially shaded areas and should be protected from strong winds.

After thorough plowing and leveling, the land is divided into beds where henna cuttings are planted at intervals of 70 cm by 50 cm. Approximately 20 workers are hired to help in the planting phase, each earning 180 Egyptian pounds per day, in addition to food and transportation expenses. Weeding is more labor-intensive, needing around 50 workers.

Henna irrigation requires substantial amounts of water and well-draining soil to thrive. The henna tree is also vulnerable to aphids. In case of infestation, farmers tend to spray the trees with water and soap solutions to help eliminate insects, as an alternative to pesticides. Pruning is also recommended if pests are detected.

5.2.4 Impact of Climate Change

In recent years climate variations have become more severe. This includes shifts in heat and humidity, which have had a noticeable impact on crop performance. Cold weather also significantly slows plant growth, while sudden temperature changes contribute to lower yields and leaf loss, possibly due to disease in older plants. The impact of weather on waste is considerable, as sudden climatic changes and diseases lead to premature leaf drops. To mitigate crop losses, farmers often resort to early harvesting strategies.

Henna is also a drought sensitive crop, which heavily impacts the henna yield and quality. The issues with Aswan's difficulty in accessing water have significantly impacted henna production. Worker error is also a large reason for henna waste. There are limited waste management processes. Ruined leaves are often eitherdiscarded, planted over, or used for animal feed as seen in the figure.

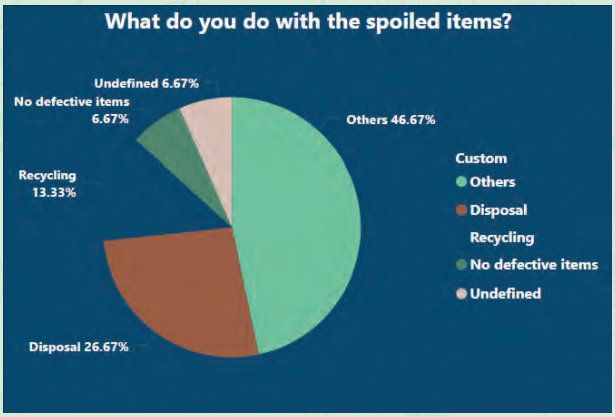


FIGURE 13 : HENNA WASTE RECYCLING METHODS

5.2.5 Harvesting and Post-harvesting

It is best for the henna to remain planted for the longest time. Seeing as the longer the henna plants remain in the ground, the darker the dye they produce. During the harvesting process, stems are separated from the leaves, which are then dried for 10 days in a shaded area. The leaves are flipped daily to ensure even drying, while the stems are cleaned, bundled, and dried in an upright position.

After drying, some farmers grind the leaves before selling it to traders, with men often called upon to assist with the grinding process. While other farmers sell the dried leaves as is. Proper storage is crucial, as exposure to sunlight can cause the henna to turn red.

Trading Dynamics

The farmer-trader relationship in the area is characterized by a lack of formal contracts, leading to potential exploitation. With only 3-4 traders controlling wholesale pricing, farmers often struggle to secure fair deals.

Farmers are generally pai 10-15 days after crop collection, but delays are common. According to the FGDs conducted, several farmers reported issues where the traders fail to pay on time, and in other cases they don't collect the henna at all despite agreeing to do so.

Although traders cover transportation costs, farmers are responsible for the workers involved hospitality expenses. Most traders need to collect around 100 tons of henna before sending it to grinding units.

5.2.6 Processing

There are not many henna processing units in the region, with one prominent unit serving areas such as Edfo, Wady El Nqra, and Wady El Saayda., and another is found in El Radasseya. This unit in Edfo requires a minimum of 100 tons of henna for grinding and operates only two grinder units. Processing units face numerous challenges, particularly related to outdated grinding machines, as many lack the resources needed for upgrades.

The grinding process occurs in two stages: first, the henna leaves are coarsely ground to a rough consistency. Then, the product undergoes further refinement using finer sieves to produce a smooth powder. After grinding, the henna is spread on the ground, and fans are utilized to prevent it from turning red.

For packaging, traders use 25 kg bags with a nylon inner lining and a plastic outer bag, ensuring the henna remains pure and uncontaminated. Quality control is a critical aspect of the process, as traders demand that only pure henna be sold.

5.2.7 Final Market

Local Market

The entire henna plant is utilized, with branches repurposed to create benches for tourist areas, often processed in the delta region. The leaves are ground not only for henna powder but also for animal feed and other products. In the past, export contracts existed between the grinding units and companies in Germany, Saudi Arabia, and Qatar. These contracts required strict oversight of the farming process to ensure pesticide-free production, but the low production rate and the fluctuating demand impacted the renewability of these contracts.

The grinding unit reported that 100 tons were produced in 2023 but in 2024 only 80 tons were processed, with much remaining unsold. Previously, henna products were sold in cities like Sohag, Aswan, Luxor, Qena, and Cairo, but sales in Cairo have stalled. Currently, most henna production is directed toward local markets, where demand remains low. The price of henna has also declined from 40,000 Egyptian pounds per ton to 35,000 Egyptian pounds. Despite this downturn, henna farming is expected to continue into the next season.

International Markets

In 2020 Egypt exported 22,256,000$ equating to 1,081 tons of “Beauty or make-up preparations and preparations for the care of the skin (other than medicaments), incl. sunscreen or suntan preparations (excl. medicaments, lip and eye make-up preparations, manicure or pedicure preparations and make-up or skin care powders, incl. baby powders” (Beauty or make-up preparations),

which includes henna. The largest importers in 2020 were Saudi Arabia, United Arab Emirates, Kuwait, Sudan and Yemen. In the EU market Germany is the largest European exporter, and 16th worldwide. Sudan was reported to be the highest henna importer, but the war has affecting total sales by decreasing it by 70-80 % according to several IDIs with henna traders.

Despite Egypt's oversupply of henna, in 2020 Egypt imported 37,543,000$ or 1,549 tons of Beauty or make-up preparations. The main exporters were France, Germany, Poland, the United States, and the United Arab Emirates.

Egypt's primary competitors are India, Pakistan, Morocco, and Tunisia face higher demand. India, employs modern techniques that increase yield and support commercialization, especially given the high demand for henna in mehndi designs.

Market Trends and Export Potential

The henna market has experienced some significant growth since 2021 and is expected to grow further in the upcoming years[29]. Henna is well known for its hair benefits and ability to be used as an alternative to harsh chemical hair dyes allow it to be part of new shift towards organic and natural cosmetics[30]. The shift towards e-commerce has also played a significant role in attracting new consumers especially in Europe and the United States. This was prevalent during the covid19- quarantine in 2020, were most consumers ended up buying henna through e-commerce platforms to dye their hair themselves[31]. Despite the role of e-commerce platforms, physical stores also are still important to most customers, who believe they can trust more in-person stores so they can inspect the henna powder before buying it. Egypt has a large opportunity to be part of the growing henna market, especially in accessing the following markets.[32]

29 Global Insight Services, Hibiscus Flower Powder Market Analysis and Forecast to 2033, Global Insight Services, 2024, https://www.globalinsightservices.com/reports/hibiscus-extract-market/

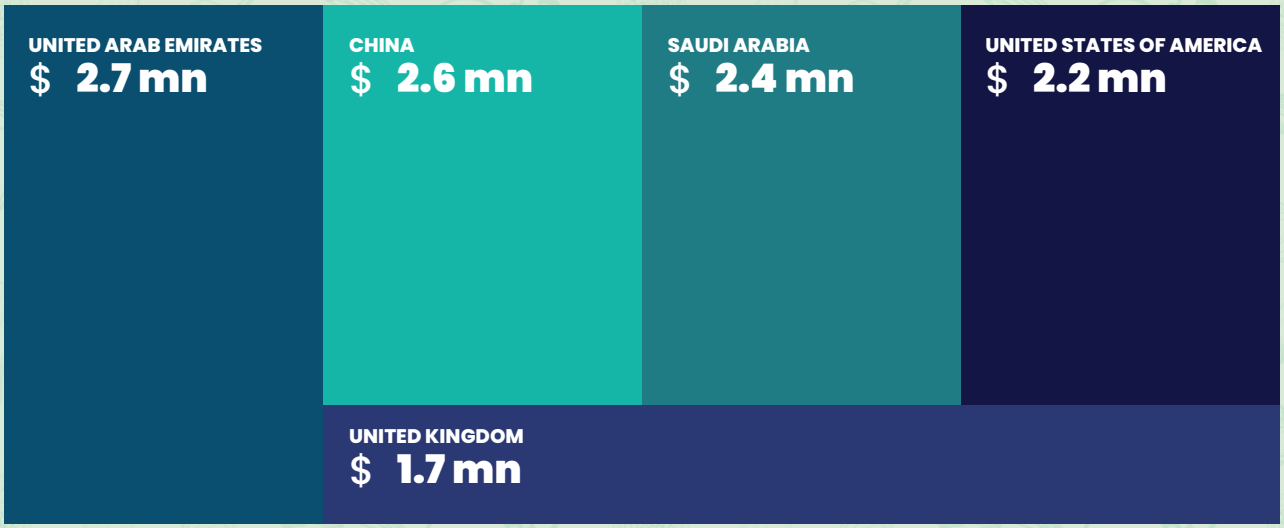
30 Global Insight Services, Hibiscus Flower Powder Market Analysis and Forecast to 2033, Global Insight Services, 2024 https://www.globalinsightservices.com/reports/hibiscus-flower-powder-market/

31 Mordor Intelligence, Hibiscus Extract Market Report, Mordor Intelligence, 2024, https://www.mordorintelligence.com/industry-reports/hibiscus-extract-market

32 Global Insight Services, Hibiscus Flower Powder Market Analysis and Forecast to 2033, Global Insight Services, 2024, https://www.globalinsightservices.com/reports/hibiscus-extract-market/

FIGURE 14 : HENNA MARKET GAPS

FIGURE 15 : HENNA EXPORT POTENTIAL MARKETS



SOURCE: GLOBAL TRADE HELP DESK

The henna quality is one of the most important competitive edges, since it highly impacts the performance of the dye. All stages of the value chain can impact on the quality of the henna if

regulations are not closely followed. The quality of the input supplies can impact the yield and residues found in the final product. The farming phase is critical to ensure the henna doesn't get burned from the sun. The processing phase is the most crucial, since it ensures that the henna is ground to the preferred size and ensures that there are no impurities or other leaves mixed into the powder. The packaging of the henna must be airtight to ensure no moister is trapped in. The final transportation and storage of the henna powder to final market is also important, since henna doesn't have the longest shelf life. The henna value chain must be optimized to ensure all phases are stable and produce the best quality of henna to enable its market performance.

Import regulations are also quite rigid when it comes to henna trade. The minimum use of pesticides is a must. Most EU markets have strict pre-shipment inspection to ensure the quality of the henna powder. Furthermore, organic certification also highly impacts its success in the market.

5.2.8 Role of Women

Women's role is extremely limited in henna cultivation. While there are some very limited instances were women help their husbands in the farming process, it is not as prominent as in other crops such as hibiscus and pomegranate farming. Henna harvesting and farming can be very labor intensive, and most male workers are usually recruited for help. Therefore, women in Aswan don't usually work with men who are not their relatives.

5.2.9 Areas of Interventions

Climate Change & Agricultural Training Needs:

- Farmers struggle to adapt to climate change due to a lack of training.
- Export markets require pesticide-free henna, but climate change makes this challenging.
- Farmers need support in soil moisture conservation, pesticide use, and modern irrigation.
- Practical, field-based training from agricultural engineers is essential to bridge knowledge gaps.

Market Access & Value Chain Linkages:

- Declining export demand and weak local demand make selling henna difficult.
- Trade monopoly limits competition and makes the henna's price fluctuate.
- Limited number of processing units, many of which operate with outdated machinery.
- Grinding units need upgrading to improve the quality of henna.
- Weak linkages between farmers and final grinding units.
- Farmers should sell henna through CSOs and cooperatives to ensure wholesale transactions.

5.3 Onions

Picture 4 Onion Plant

Source https://www.envo-dan.com

5.3.1 Overview

1 st harvest planted end of August September harvested in April -May. 2nd Harvest is planted in November and harvested in March

Most Common varieties are Seventy (Sabaini) – Ninety (Tisaini)

Grown in Sohag but can be found in Assiut, Qena, Luxor & Aswan

According to CAPMAS data, between 2021 and 2022, Egypt produced 3,624,000 tons of onions, with an average yield of 15.09 tons per feddan across 240,184 feddans of cultivated land. Specifically, Sohag contributed significantly to national production, with 323,525 tons harvested over 17,560 feddans in 2021/22, slightly down from 330,545 tons in 2020/21. Other
major producing governorates include Assiut, which produced 116,186 tons in 2020/21, followed by Qena, Luxor, and Aswan.

Insights from the primary research reveals that one feddan in Sohag yields approximately 15–17 tons, aligning with secondary research that suggests average yields of 15 to 20 tons per acre.

In Sohag, onion farming is primarily concentrated in the southern areas, including Akhmeem, Dar El Salam, Balina, Gerga, and Al-Asirat. The planting season typically begins in mid-August or later, with cultivation taking place in April – May. The Sabaini (-70day type) onions are preferred for their better storage capabilities and longer shelf life compared to Tisaini (-90day) verity which does not tolerate high temperatures well. The following is a roadmap of all important phases in the onions value chain:

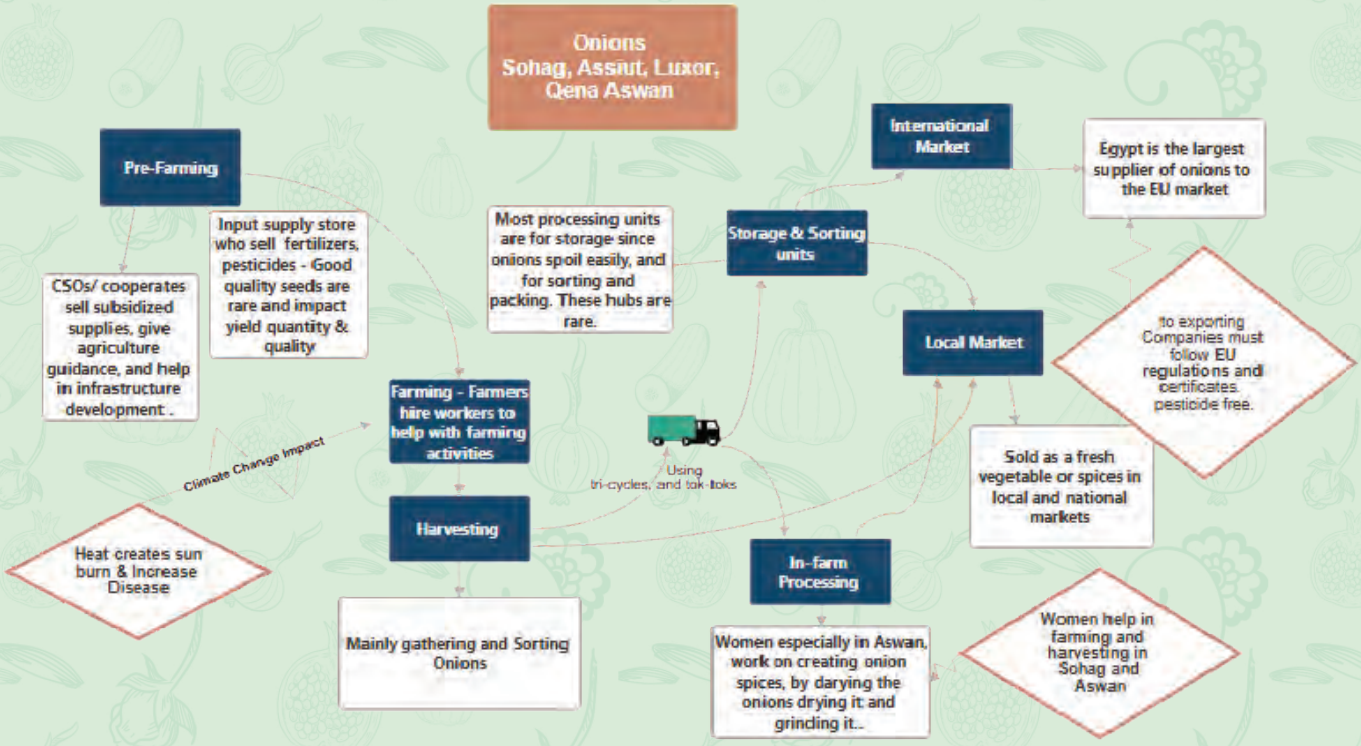


FIGURE 16 : ONION VALUE CHAIN ROADMAP

5.3.2 Input Supplies

Onion farmers require input supplies such as nitrogen and potassium fertilizers, as well as high-quality seeds to ensure healthy crop yields. However, access to these inputs remains a significant challenge, particularly in Sohag, where high initial farming costs—including seeds, fertilizers, and machinery rental—create financial strain.

Seed quality remains a consistent challenge, as some farmers report that they receive lowquality or counterfeit seeds. Poor-quality seeds often result in low yields, and seedlings may lead to root rot, as many farmers reported in Sohag. Furthermore, some onion varieties have been created to be more climate resilient, yet their availability in the market is quite limited in Sohag. Climate resistant seeds must be geographically specific, since variables like climate soil and water salinity might impact the yield. Therefore, Climate reliant seeds in Sohag are not widely available now, but it is a good long-term solution. While some farmers obtain seeds from relatives or local markets, others collaborate with CSOs that occasionally provide seeds and pesticides.

Fertilization practices begin with root stimulators and fungal treatments, followed by the application of potassium sulfate (50 kg per acre) in stages, starting from two months after planting until 20 days before harvest. Farmers also apply ammonium nitrate (350–300 kg peracre) in phases throughout the growing cycle to support bulb formation. Additionally, pesticides advised by input supply outlets are usually overpriced and ineffective chemicals, leading to further losses.

Rising input costs, exacerbated by climate change, have increased expenses related to fertilizers, pesticides, and irrigation. Farmer reported in the IDIs and FGDS, that they only cultivate a small portion of their lands, not the entirety of it to save costs, and to try to diversify their crop cultivation.

Furthermore, electricity costs have pushed farmers to rely on manual irrigation instead of electric pumps. The growing cost of labor, at approximately 250 Egyptian pounds per day in Sohag, without meals, also limits hiring, prompting farmers to seek modern machinery to reduce manual labor dependency. Qena's daily labor costs are approximately 150 Egyptian pounds, while lower than Sohag, it is also higher than last year's prices.

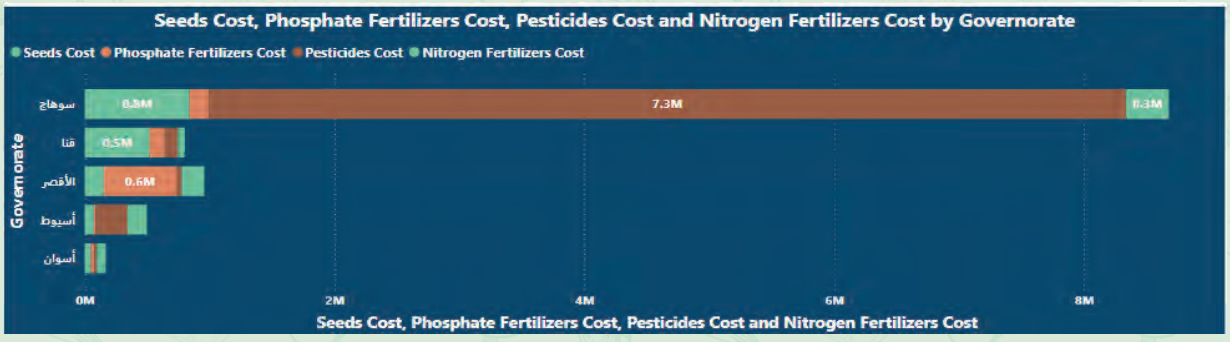


FIGURE 17 : INPUT SUPPLIES USED PER GOVERNORATE

5.3.3 Farming and Cultivation

Effective land preparation and planting techniques are critical for successful onion cultivation.To prevent white rot, onions should not be cultivated in the same field for consecutive years. Plowing is also crucial but costly, it has become increasingly expensive in Sohag, with tractor rental and diesel prices rising from 40 to 60 Egyptian pounds in Sohag. Farmers must ensure the land is properly leveled before planting, as this directly impacts water distribution and crop growth.

Irrigation is typically scheduled 2-1 times per week, depending on soil type and weather conditions. Small irrigation plots (typically 3x3 plots) are employed to enhance efficiency, and frequent watering is critical for seed germination. Higher temperatures necessitate increased irrigation to maintain soil moisture

Farmers adhere to strict planting schedules, as deviations—whether early or late—can
negatively affect crop productivity. Proper irrigation and chemical application schedules are vital to avoid cross-contamination between pesticides and fertilizers. However, many farmers, particularly in Qena and Luxor, lack the necessary training to implement these practices effectively. Irrigation challenges are exacerbated by the high costs of electricity and solarpowered drip systems, causing many farmers to revert to traditional flood irrigation methods.

Water quality also plays a significant role. Many farmers in Sohag have commented on the increase of water salinity which is damaging to the growing onions. plant establishment. Farmers must also be careful of humidity during the irrigation, as it can harm crop health. Irrigation is ideally performed at dawn to take advantage of optimal temperatures. During the early stages of growth, soil moisture must be maintained to support rooting and Effective pest and weed management are essential to maintain healthy crops. Weeds can significantly reduce crop yield, sometimes by up to 50 %. Pests, which have become more prevalent in recent years, require increased pesticide use compared to the past. Diseases suchas purple blotch pose a significant threat; if left untreated, they can devastate entire crops. Farmers must remain vigilant and adopt integrated pest management strategies to minimize losses.

5.3.4 Impact of Climate Change

Onion farmers face significant climate-related challenges that impact yields and productivity.
High temperatures delay planting, lowering quality, and extreme heat disrupts crop
establishment. Fluctuating temperatures, droughts, and humidity create unfavorable growing conditions, while increased fly infestations add to management difficulties. Sunburn also damaged last year's crop despite pesticide use, while rising weed prevalence has increased costs.

Some farmers have turned to digital solutions for knowledge-sharing, using WhatsApp groups to exchange instructional videos on land preparation, seed selection, sowing, and irrigation techniques. However, these informal methods are not widely adopted across all farming communities. Sudden temperature shifts in Luxor and Aswan, including frost followed by warmth, disrupt planting schedules and crop development. While greenhouses could offer a controlled environment to mitigate weather impacts, their high construction costs remain a barrier.

In Luxor, farmers struggle with inconsistent yields, often uncertain why crops thrive in some seasons but fail in others. They adhere to strict planting schedules, as any deviation—either early or late—leads to poor harvests. However, unpredictable weather conditions often force delays, further reducing productivity. The region also faces inadequate drainage systems, worsening water management issues. Similarly, in Qena, farmers face uncertainty about fluctuating yields despite following strict planting schedules, with any shift in planting time negatively affecting production.

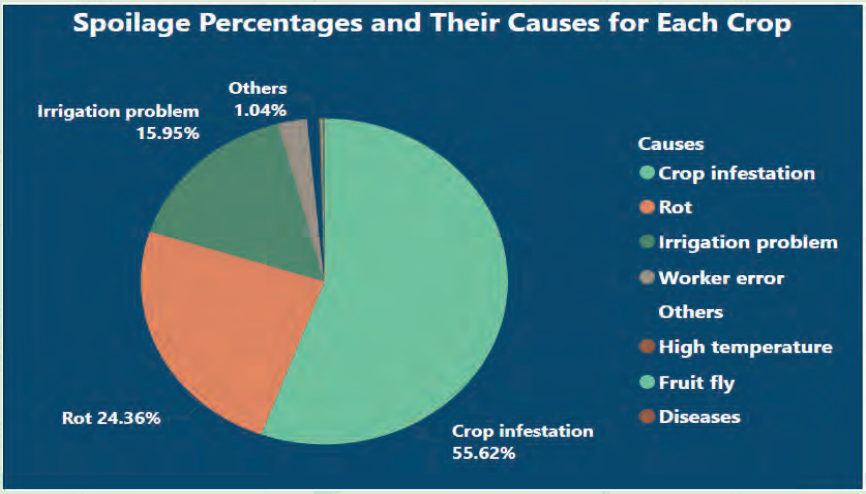


FIGURE 18 : WASTE PERCENTAGE PER CAUSE

Crop Loss & Disease Issues

Farmers often face significant crop losses, frequently discarding spoiled produce due to various challenges in the cultivation process.
Approximately 10–15 % of the onion harvest is wasted because of inadequate cleaning and weeding practices. Additionally, purple blotch disease remains a serious issue; if not treated promptly, it can destroy entire fields. Pests have also become more aggressive, requiring greater intervention to protect crops. The excessive use of water also contributes to further losses, as overwatering can lead to crop rot.
While some farmers attempt to repurpose spoiled onions as animal feed, there is a notable lack of proper waste management solutions.
In Luxor, up to one-third of the crops are spoiled and discarded in the mountain areas, largely due to disease, low crop immunity, and the adverse effects of climate change. In contrast, farmers in Sohag tend to adopt more sustainable practices by recycling agricultural waste for uses such as animal feed. However, in Qena and Luxor, it is more common for spoiled crops to be discarded entirely, highlighting regional differences in waste management practices.

The following figure showcases the onion waste per governorate:

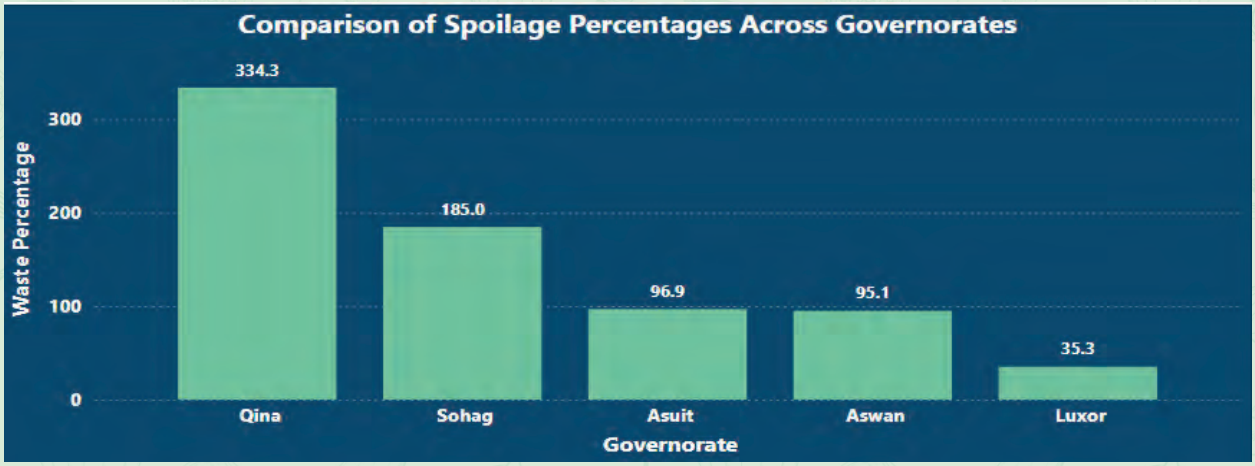


FIGURE 19 : ONIONS WASTE PERCENTAGE PER GOVERNORATE

5.3.5 Harvesting & Post-harvesting

Onions take 5-6 months to mature after transplanting, with a key indicator of maturity being the lodging (bending) of about 50 % of the plants. Harvesting too early results in green bulbs with thick necks, which are more susceptible to fungal diseases. Once mature, onions are pulled out and arranged in rows for curing, a drying process where they are stacked upright for about two weeks until fully dry. Proper drying is essential to avoid overcrowding on drying racks and to ensure onions are stored in a suitable location to prevent moisture retention and rotting.

Packaging also plays a critical role in maintaining quality. Onions should be packed correctly in plastic bags or boxes to reduce spoilage risks. Proper storage is vital to prevent the onions from rotting. After drying, the onions are sorted according to specific requirements. Farmers usually handle the sorting process themselves, selling most of the produce to traders.

5.3.6 Processing

Local markets generally do not require onions to meet international standards for local use but expect them to be of good quality. They require it to be medium-sized, oval-shaped, and free from defects, diseases, and black mold. The Sabaini variety is particularly favored dueto its ability to produce larger, well-shaped onions and avoiding thin or small ones. Market demand heavily depends on the quality and size of the onions, which are typically packed in 50 kg bags.

Picture 5 Onion FGD in Sohag Source Taken from the field

Post-harvest processing and handling practices vary by region. In Aswan, farmers process onions into powder (spices), which are sold locally. This also includes activities much as grating onions instead of cutting them to prevent damage before drying them on racks. This is typically done by women in Aswan, were they gather in their homes, and are hired by farmers to do so.

Sorting is essential, with a preference for white or pink onions over deep red ones for spice production. While each farm or company manages its own packing and sorting, the lack of centralized processing hubs in most governorates increases costs, particularly for specific storage techniques required to maintain onion quality.

In Luxor, proper storage is critical to prevent onions from rotting, necessitating shaded storage away from direct sunlight. Workers cut and pack onions from the farms directly into trucks to store them temporarily before transport. Farmers handle most of the sorting and drying processes themselves, but maintaining uniform onion sizes to meet market demand remains a significant challenge.

Sohag faces challenges in transportation and storage, with onions often getting damaged if not handled properly, leading to financial losses. Like in Aswan, each farm or company manages its own packing and sorting without centralized facilities. The lack of developed postharvest operations, particularly for sorting and packaging, contributes to significant losses, especially for perishable crops such as tomatoes. Traders in Sohag sort onions for different markets, exporting high-quality produce while selling lower-quality onions locally or at major markets like Obour Market.

Trading Dynamics

In Sohag, farmers typically sell their crops to traders, often connecting with them through the internet or via neighbors. Some traders act as middlemen, were they sell to several other middlemen trades until the onions reach their end market. Before purchasing, traders visit the fields to assess crop quality; fields with weeds receive lower offers, while clean fields fetch better rates.

Traders generally benefit the most from these dynamics, as farmers, lacking access to storage units or unable to afford rental prices, are forced to sell quickly before crops spoil. Storage facilities, particularly freezers for export purposes, also drive-up prices. Some traders operate on a contract basis, negotiating a fixed price with farmers and paying a deposit, protecting both parties from market fluctuations. Farmers often sell directly to small wholesale traders, who then sell to larger wholesalers or export crops to countries with port access.

The sorted onions are then transported to a weighing station for an official weight certificate, which the farmer receives. Payment is either immediate or within an agreed timeframe (typically 10–15 days). In Sohag, trading activities are mostly local, with red onions sourced from northern regions like Minya and white and yellow onions from Sohag. Some traders buy directly from farm owners acting as intermediaries and work across multiple governorates, but high transportation costs can erode profits.

5.3.7 Final Market

Local Market

Market pricing and trade dynamics in the region are highly volatile, with prices fluctuating weekly. Last year (2024), onion prices spiked for one week but then dropped for the next two, causing losses for farmers who uprooted early. Onions are source all throughout upper Egypt, each governorate selling locally in their own government, or transporting the onions for national use.

International Markets

In 2023, "Fresh or chilled onions and shallots" ranked 8th among Egypt's top agricultural exports, accounting for 2.4 % of total agricultural exports. The export volume reached (242 thousand tons), valued at (206.8$ million).

Egypt is the largest supplier of onions to the European markets, which import more than half of Egypt's total onions' exports. Its exports to Europe rise and fall a lot. Egypt's exports peaked in 244) 2019 thousand tons), after which they dropped significantly in the period from 2020 to 2022. This was followed by strong growth in 2023, reaching a volume of (187 thousand tons).

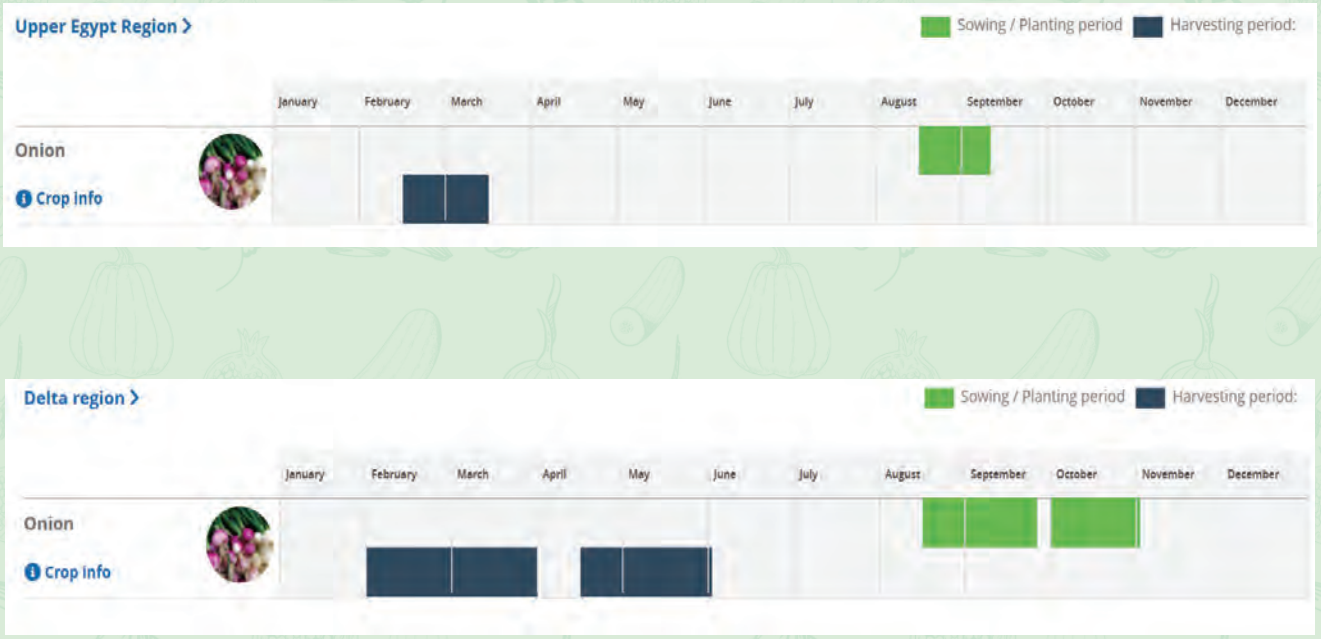
In 2023, The Netherlands was the top destination receiving a volume reached (38.3 thousand tons) representing a share of 15.8 % from Egypt's total onion exports, followed by The United Kingdom, Italy, and Germany with shares of 14.4 %, 6.0 %, and 5.5 % respectively.

Onions have different sowing and harvesting seasons in different agricultural areas. According to FAO Crop Calendar, Onions are being sowed in upper Egypt region from mid-August to midSeptember [34], while the harvesting period starts from mid-February and continues till midMarch.

34 Food and Agriculture Organization (FAO). Crop Calendar: Egypt – Onions. FAO, https://cropcalendar.apps.fao.org/#/home?id=EG&crops=0247

When checking the onion calendar in "Delta" region, we can see that the planting period starts from the second half of August and continues until the start of November, while the harvesting period commences in early February and continues until the start of June.

FIGURE 20 : ONION CULTIVATIONS



Source FAO Crop Colander

The table below highlights the peak seasons for Egyptian onion exports to EU markets from 2018 to 2020, broken down by quarter. It is evident that Q2 stands out as the peak season for Egyptian onion exports compared with other seasons. According to East Fruit, Cheap onions from Egypt usually flood to Europe [35] starting from April each year.
Based on the sowing and harvesting calendar and the export seasonality map, onions from the Delta region account for majority of exports, surpassing those from Upper Egypt.

35 EastFruit. Cheap Onions from Egypt Are to Flood Europe in the Coming Days. EastFruit, 2024, eastfruit.com/en/news/cheap-onions-from-egypt-are-to-flood-europe-in-the-coming-days/.

The following table represents Egypt's Exports per Quarter from 2019-2023:

:

TABLE 4 : EGYPT'S EXPORTS OF ONIONS PER QUARTER

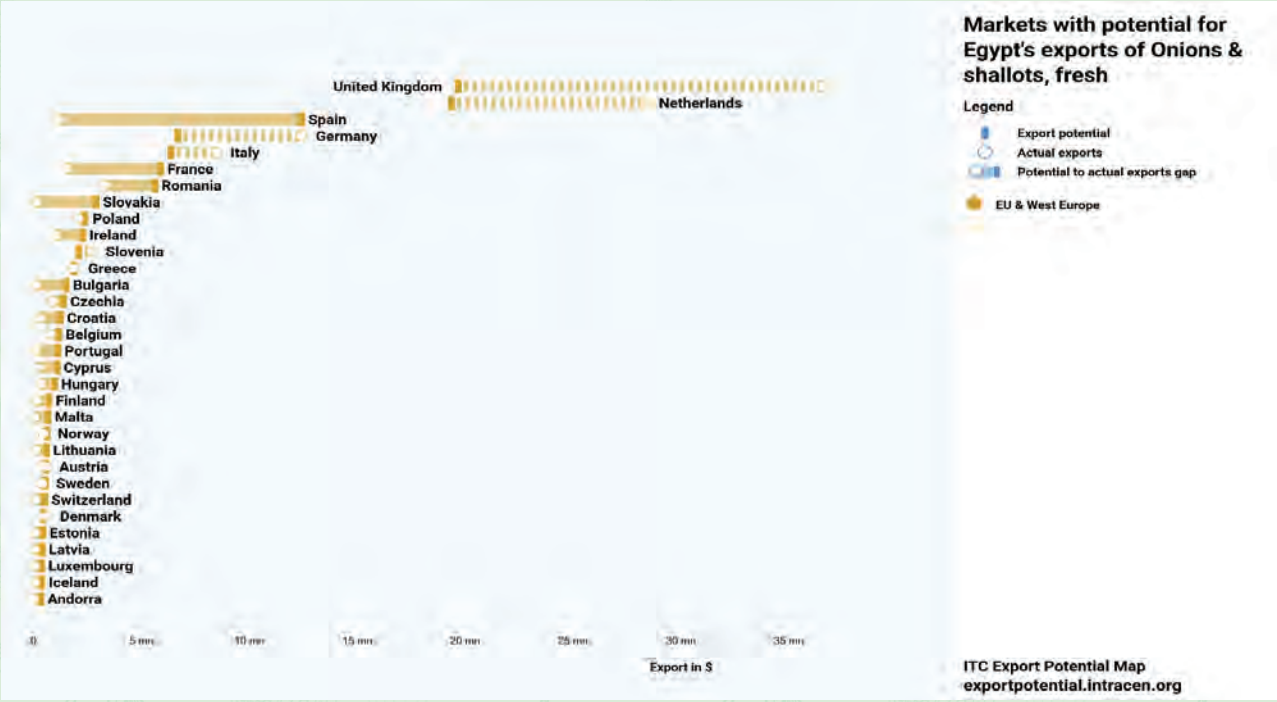
Importers	Exported value in 2019-Q1	Exported value in 2019-Q2	Exported value in 2019-Q3	Exported value in 2019-Q4	Exported value in 2020 -Q1	Exported value in 2020 -Q2	Exported value in 2020 -Q3	Exported value in 2020 -Q4
European Union Aggregation	12422	76190	1542	11688	21791	25085	611	18515
United Kingdom	2141	18904	812	5637	9967	12510	185	9699
Germany	539	621	0	3353	4673	389	23	4627
Netherlands	2906	34357	426	1747	3712	9870	206	2089
Italy	1228	7848	36	303	945	1075	9	811
Slovenia	436	2003	8	82	119	485	0	553

Source: Trade Maps[36]

36 "Trade Statistics for Product 0703 – Egypt." Trade Map, International Trade Centre, https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm=7%1c7%818c7%c7%c7%c7%0703c7%c7%c7%4c7%1c7%1c7%2c7%2c7%1c7%2c7%1c7%1c1.

The Untapped Opportunity for Egyptian Onions Exports to EU Markets

FIGURE 21 : ONION EXPORT POTENTIAL



Source Export Potential Map[37]

Although the United Kingdom, the Netherlands, and Germany have a highly competitive onion import market with limited room for new suppliers, there are still significant untapped opportunities for Egyptian onion exports in the EU, particularly in Spain, France, Romania, and Slovakia.

Onion Quality Requirements There are mandatory requirements that cover food safety and quality, that need to be considered when exporting onions to the EU. These include legal rules (such as control of contaminants and pesticide residues), quality requirements, and packaging and labelling requirements.

37 Export Potential Map – Gap Chart." International Trade Centre, https://exportpotential.intracen.org/en/exporters/gapchart?toMarker=j&market=818&fromMarker=i&whatMarker=k&what=071220.

According to (EU) 2023/915 (CELEX 32023R0915) [38], Onions cannot be placed on the market, or used as raw materials or ingredients in foods, if they contain a contaminant in a quantity higher than the maximum level.

For bulb vegetables, which include onions, contaminants mainly concern heavy metals such as lead and cadmium. The following maximum levels of contaminants are allowed in onions:

- Cadmium: 0.030 mg/kg (the maximum level applies to the wet weight, and after washing and separating the edible part)
- Lead: 0.10 mg/kg (the maximum level applies to the wet weight, and after washing and separating the edible part)
- Control of pesticide residues in plant

The EU Pesticides database provides information on the MRLs for all pesticide residues that apply to onions. For onions, there are three relevant product groups that you should consider:

Products that do not comply with European food legislation are reported through the Rapid Alert System for Food and Feed (RASFF).[39] This tool allows food safety authorities to quickly exchange information on health risks associated with the food and to take immediate action to prevent the risk. For onions, most reports are related to pesticide residues. Overly high levels of pesticide residues were mostly found in spring onions, and a few in shallots. A few examples of reports of overly high levels of pesticide residues include:

- Chlorpyrifos in spring onions (MRL is 0.01 mg/kg)
- Lufenuron in spring onions (MRL is 0.01 mg/kg)
- Carbofuran in spring onions (MRL is 0.002 mg/kg)
- Dodine in spring onions (MRL is 0.01 mg/kg)
- Fluazifop-P in spring onions (MRL is 0.01 mg/kg)
- Acetamiprid in spring onions (MRL is 0.001 mg/kg)
- Ethylene oxide in ground onions and shallots (0.02 mg/kg)
- Iprodione in shallots (MRL is 0.01 mg/kg)

Finally, in some European countries (for example, the Netherlands and Germany), buyers use stricter MRLs than set out in European legislation. Because of this, always check with your potential buyer to see if there are additional MRL requirements.

38 European Union. Regulation (EU) 0915/2023. EUR-Lex, 2023, eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32023R0915:EN:NOT.

39 European Commission. Rapid Alert System for Food and Feed (RASFF). European Commission, 2025, ec.europa.eu/food/safety/rasff_en.

Onions exported to Europe have to comply with the general quality standards in the European market. There are multiple aspects that determine the quality of onions. These are set out in the product standards for onions, such as the UNECE standard for onions[40] and the UNECE standard for shallots. Below, we give an example of the quality standard for onions.

As a minimum requirement, onions in all classes must be intact, free from flaws, defects or decay and cleanliness, for example. More minimum requirements can be read via the standards mentioned above.

The UNECE standards define two classes for onions: Class I and Class II. For fresh consumption, European buyers mostly require Class I standard. Class I onions should be firm, solid and practically free of root tufts (for onions harvested before complete maturity, root tufts are allowed). Slight defects are allowed; however, they should not affect the general appearance of the produce, the quality, the storage quality and presentation in the package. Slight defects that are allowed include:

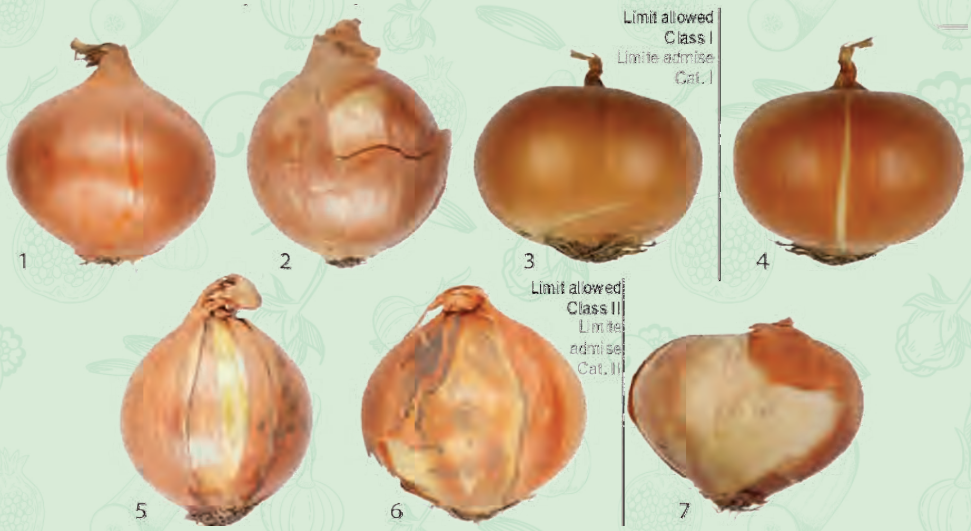
- a slight defect in shape.
- slight defects in coloring
- light staining covering not more than one fifth of the bulb's surface.
- Superficial cracks in and partial absence of the outer skin, provided the flesh is protected.
- Slight glassiness does not exceed the outer fleshy ring.

90 % of a batch should meet the Class I requirements. This means that up to 10 % of the onions in the batch are allowed to deviate from Class I requirements. 9 % of the batch is allowed to meet Class II quality. No more than 1 % of the batch may consist of onions that neither satisfy the Class II quality nor the minimum requirements, or of produce affected by decay. Within this 1 % tolerance, the externally visible shoot growth may not exceed 1 cm in length.

40 United Nations Economic Commission for Europe (UNECE). Onions – UNECE Standard FFV2023) 25-). UNECE, 2023, unece.org/sites/default/files/12-2023/FFV25-_Onions_2023_e.pdf.

The below figure shows onions classification according to the level of Cracks of the skin:

FIGURE 22 : ONIONS CLASSIFICATIONS



Onions Oignons	Class I. Cat. I.	Class II. Cat II.	Out of Grade Non conforme	Notes
Cracks of the skin **Fissures de la de la pellicule supèrieur**	**1, 2, 3**	**4, 5, 6**	**7**	

Source OECD[41]

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. the use of materials, particularly of paper or stamps bearing trade specifications, is allowed provided the printing or labeling has been done with non–toxic ink or glue

Onions exports came to different types of packaging: starting from Mesh bags, and Small net bags, to Trays, and Paper bags. [42]

41 OECD Review of Agricultural Policies: Egypt 2010. OECD Publishing, 2010, https://doi.org/-9789264175082/10.1787en-fr.

42 Organisation for Economic Co-operation and Development (OECD). Onions. OECD, 2012, https://www.oecd.org/en/publications/onions_-9789264175082en-fr.html

Below are examples of accepted packaging:

FIGURE 23 : ONION PACKAGING

Source OECD

5.3.8 Role of Women

In Sohag, women primarily handle household duties and childcare but are also active in the farming process when possible. They assist with land work, tend to animals, and are heavily involved in onion farming, including harvesting and sometimes spraying pesticides. Some have also started producing compost and onion-sub products like spices.

In Qena, men typically own larger agricultural plots, dedicating around one acre to onions and hibiscus, while fennel is grown on smaller plots. Women usually cultivate much smaller areas, approximately a Kirat or two, primarily for personal use rather than for profit purposes. Women in Luxor on the other hand, don't work at all in the Onion cultivation. This is due to their traditions.

5.3.9 Areas of Interventions

Training & Skill Development:

- Farmers, especially women, are eager to learn new agricultural techniques to enhance productivity and crop quality.
- Need guidance on crop spoilage prevention, input selection, and disease management.
- Training in seed preparation, particularly in seedling nurseries, is crucial for high quality onion crops.
- Farmers require better skills in distinguishing between good and bad onions to minimize losses and improve market value.
- Additional training in pest management is necessary.

Soil & Crop Management:

- Onion roots in Luxor are prone to early infection and hollowing, requiring improved management practices.
- Farmers would benefit from soil analysis services.
- Promotion of low-input farming systems can help reduce production costs.
- Infrastructure and technological support are critical for improved productivity.

Infrastructure & Technological Support:

- Establishing local sorting and processing facilities can reduce transportation costs and improve efficiency.
- Many farmers are interested in renewable energy solutions, such as solar panels, but high installation costs are a barrier.
- Climate-controlled storage is essential to maintaining onion quality.
- Storage units must have proper air circulation, insulation, and equipment for monitoring temperature and humidity.

5.4 Pomegranates

Picture 6 pomegranates plant

Source: https://guildfordgardencentre.com.

5.4.1 Overview

Planted in August and harvested in October-November

El Manfaloty is the most popular variety & followed by the Wonderful, and R118 types

Grown mainly in Assiut, but can be found in Luxor Aswan Qena & Sohag

Pomegranate production in Egypt reach 995,477 tons in 2021/22. Assiut alone produced 186,447 tons that year. Assiut is known for its pomegranate production, due to the suitability of its soil. Pomegranates are also plant in Sohag, Qena, Luxor and Aswan, but at a much lowerrate. With

Sohag being the second highest pomegranate producer at 440 tons in 2021/ 22 , and Aswan being the smallest producer at 16 tons.[43]
On average, pomegranate farms produce between 11 and 22 tons per acre, but yield varies based on tree age—trees younger than seven years produce 6-8 tons per acre. The most favored variety is El Manfaloty. The harvesting season spans from August to early November.

The following is a roadmap of all important phases of the pomegranates value chain:

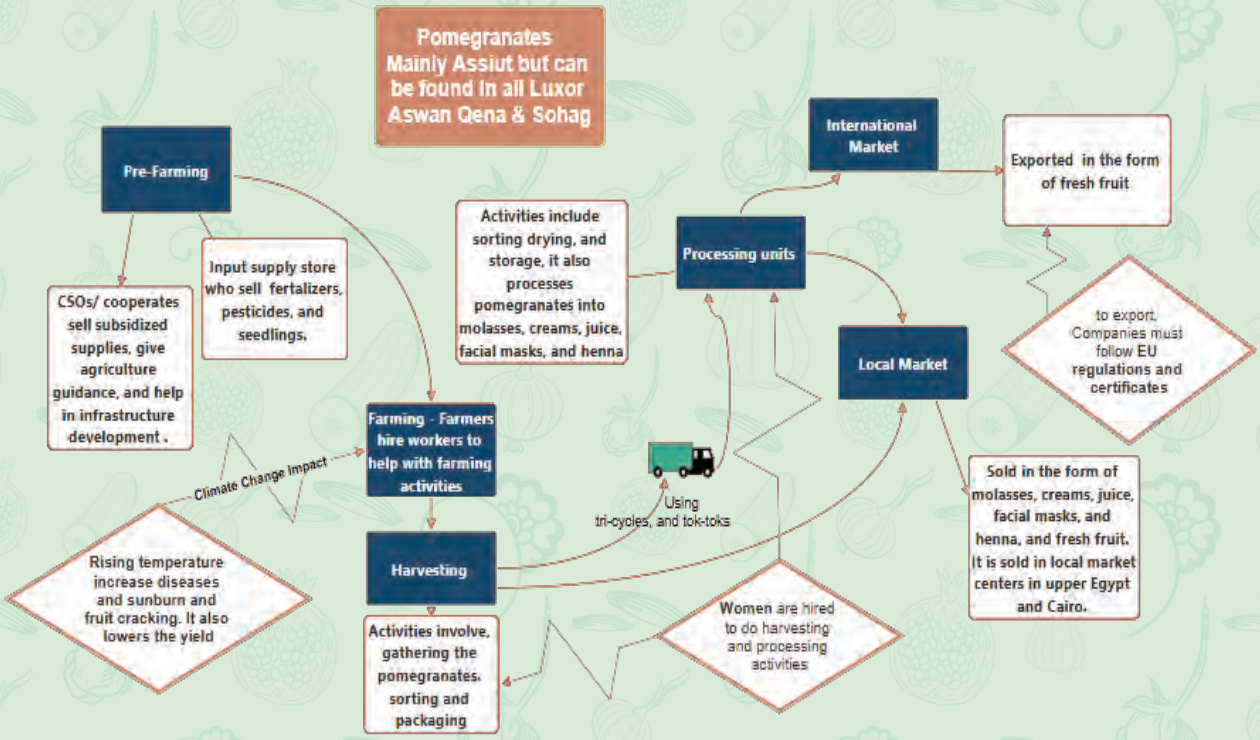


FIGURE 24 : POMEGRANATE VALUE CHAIN ROADMAP

5.4.2 Input Supplies

All seedlings are distributed locally from CSOs. Pesticide spraying is an essential practice in pomegranate cultivation, typically carried out four to six times per season. Each spraying cycle takes approximately three days to complete, with an average of four sprays costing between 15,000-20,000 Egyptian pounds.

In terms of fertilization, one acre requires around four bags of chemical fertilizers, costing an average of 1,100 Egyptian pounds. Additionally, 10 tons of fertilizer are applied per acre to ensure

43 Central Agency for Public Mobilization and Statistics (CAPMAS). Annual Bulletin of Statistical Crop Area and Plant Production 2024 ,22/2021,

optimal growth. Farmers also use two tons of phosphorus fertilizer and five bags of potassium fertilizer to enhance soil fertility and improve fruit quality.

The following is input supply costs (EGP Millions) per governorate:

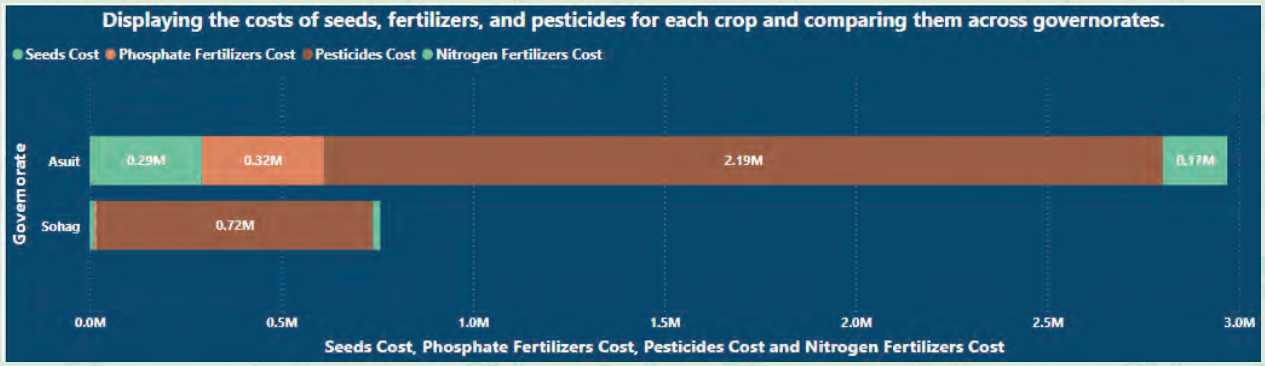


FIGURE 25 : POMEGRANATE INPUT SUPPLY COSTS PER GOVERNORATE

5.4.3 Farming and Cultivation

rrigation is a critical aspect of pomegranate farming, with land being irrigated 12 times. This process is carried out using either a gas-powered motor or a petrol-powered irrigation machine, which costs approximately 200-300 Egyptian pounds per use. Irrigation is best done early in the morning or at night when temperatures are lower. Irrigation challenges have also intensified as extreme heat affects water availability, exacerbating fruit cracking. Consequently, some farmers are delaying harvesting to as late as December to mitigate risks.

Pruning and weeding is quite important to maintain the health of the plant and is usually performed twice a year. Pruning should also be delayed until the fruit turns red to minimize sun damage, and pesticide spraying should be avoided on windy days to prevent drift and inefficiency. However, most farmers in Assiut have reduced pruning to only once a season, after receiving technical advice. Reducing pruning helps protect the fruit from sun damage.

Each season, farmers typically hire about 10 laborers. However, labor costs have risen, with wages increasing from 200 Egyptian pounds. last year to 250 Egyptian pounds this year, with many farmers have expressed further complicates their ability to maintain the farms.

5.4.4 Impact of Climate Change

Pomegranate farming faces several climate-related challenges, particularly due to climate change and pest infestations. Worm infestations have become a recurring issue, while this year's climate conditions are notably worse than the previous year. Rising temperatures contribute to fruit cracking, sunburn, and overall yield reduction, resulting in smaller fruits that

traders often refuse to purchase. Both summer and winter temperature extremes are increasingly affecting fruit size and overall productivity. Additionally, unidentified plant diseases pose a serious threat. Severely diseased soil may become unusable, necessitating thorough analysis before cultivation. In many cases farmers are not aware of what causes the waste, and how to combat it.

To combat these issues, farmers have adopted several preventive measures. This includes covering the pomegranate to protect it from excessive sunlight , coordinating pesticide spraying efforts, irrigating at night, and rotating pesticides. Proper pesticide timing has become crucial, and fast-decomposing pesticides with short residual times are now in high demand. Farmers also need to ensure that they don't spray pesticides on windy days.

Adjustments to irrigation and planting schedules based on weather patterns are essential, and alternative cooling methods beyond traditional fans are being explored.

The extreme heat during July and August severely damages crops, leading to seed degradation and lower fruit quality.

Pomegranates are sensitive to water shortages, and irrigation management is crucial.

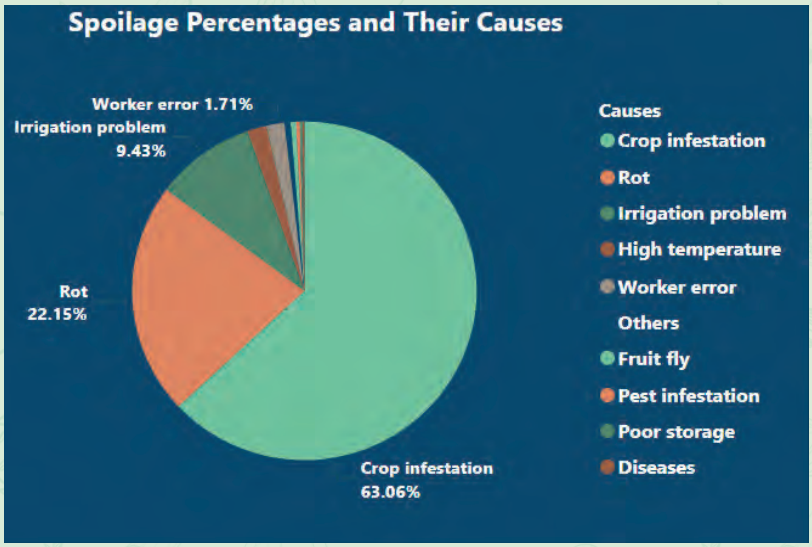


FIGURE 26 : POMEGRANATE WASTE CAUSES AND THEIR PERCENTAGE

Crop Loss & Disease Issues

Waste management has also become a pressing concern, with climate change leading to increased crop waste— approximately 10 % of the yield is damaged and given away. In the past in Assiut, farmers discarded ruined crops in rivers, causing pollution and fly infestations. However, CSO training has helped reduce this practice by promoting recycling and alternative waste management strategies.

Some waste is now sold to refrigeration companies, which handle transportation, while other waste is packaged and sold in local markets. Damaged crops are sold at 7 Egyptian pounds a kilo or packaged in cartons each containing 6–7 kg, which are sold for approximately 40 Egyptian pounds per box. Some waste is still discarded entirely and repurposed for animal feed and compost.

Women also play a key role in ensuring that the entire crop is used efficiently, particularly in waste management and recycling efforts. They are more likely to follow waste disposal guidelines, especially concerning hazardous waste like pesticide containers. In the past, some families used these containers to store sugar, but awareness programs have helped them understand the associated dangers.

5.4.5 Harvesting & Post-harvesting

The farmer is responsible for collecting the harvest, and at times sorting the pomegranates based on size and quality and packaging it for the market. This process typically takes around ten days and is carried out with the help of five workers or family members. Most farmers are well informed about sorting standards, especially in Assiut where they have farmed pomegranates for years and have been repeatedly informed on its export standards.

If market prices are low, farmers have the flexibility to delay harvesting by a week or more. This adaptability allows them to optimize the farmers' earnings compared to other crops such hibiscus and fennel, that must be harvested shortly after they ripen.

Trading Dynamics

Wholesale traders mostly do not sell to middlemen; instead, they take their produce directly to the marketplace. Payment practices vary—some traders pay in installments rather than upfront, while traders who pay upfront sometimes secure multi-year agreements with farmers. Furthermore, pomegranate farmers in Assiut have access to freezers and often store crops in there before selling them, which ensures better pricing. In other cases, farmers sell directly to the refrigeration units, at a price
of 11–12 Egyptian pounds per kilo.

There are no formal contracts between farmers and traders in most governorates; agreements are based on trust. The results of these trade agreements are inconsistent, with some farmers finding no issue when dealing with traders, and other traders do not follow their word. To facilitate fair trade, farmers expressed the need for contacts with clear deposits and security clauses. Most farmers, especially outside of Assiut now prefer to sell directly to the local markets for better price transparency

In instances where small holding farmers fail to sell the produce, women take the initiative, negotiating directly with traders and selling the crops themselves to afford household necessities such as clothing for their families.

Regarding transportation, most traders primarily pay the transportation costs. They use tuk tuks and tricycles, as they are cost-effective. Traders typically cover transportation costs, with tricycle drivers being paid around 300 Egyptian pounds for 4–5 trips.

Pomegranates face strict quality control, and many are rejected due to drying out, discoloration, or insufficient color vibrancy. Export standards require fruit to be red, sweet, and free from sunburn marks, as any sun-damaged pomegranates are immediately rejected. Additionally, traders often refuse exports with high pesticide residue. As a result, many of these rejected crops are sold in local markets.

5.4.6 Processing

The **Badr Organization** in Assiut, has established a pomegranate processing unit through donor support and landowner partnerships, allowing them to function effectively. The production hubs also operate on solar energy and continuously upgrade its facilities to meet safety standards and acquire modern equipment.

The organization works directly with farmers, sourcing crops from them without relying on external traders. There pomegranates are processed into various value-added products such as molasses, creams, juice, facial masks, and henna from the pomegranate peel. Additionally, all parts of the fruit are used, including waste materials, which are repurposed for animal feed, primarily for local use. This various value-added activity creates additional job opportunities, particularly for women, who are often employed in peeling, drying and processing activities. Even the pomegranate leaves and peels are dried and sold for its use in the cosmetics and pharmaceutical industries.

5.4.7 Final Market

Local Market

The Badr Organization plays a key role in promoting pomegranate byproducts by selling final products to companies and organizing exhibitions both locally in Upper Egypt and Cairo. Locally, high-quality pomegranates sell for 100–150 Egyptian pounds per box.
Production hubs serve as the direct link between farmers and exporters, ensuring a streamlined supply chain. Exporters exclusively purchase fresh fruit, while byproducts such as molasses, juice, and dried peels are sold in local markets.

Export Requirements and Challenges

The highest importers of "Fresh tamarinds, cashew apples, jackfruit, lychees, sapodillo plums, passion fruit, carambola, pitahaya and other edible fruit..." from Egypt in 2023, are Iraq, Syria, Libya, Russia, and Saudi Arabia. The total exported value in 2023 was 144,562,000$ or 54,103 tons. which is much higher, Egypt only imported -701,000$ or -187tons in 2023. The quantity exported has been steadily increasing in the past 5 years from 73,090,000$ in 2019.

Market Trends and Export Potential

Pomegranates are a growing market, expected to exceed 350$ million by 2032. Their versatility extends beyond the food and beverage sectors to include cosmetics and pharmaceuticals. In particular, the skincare industry has increasingly incorporated pomegranates into anti-aging products due to their high concentration of polyphenols, which help protect the skin from free radical damage[44].

Among the various forms of pomegranates, pomegranate concentrate is the highest selling, widely used in beverages, medical syrups, and juice production. Additionally, the rising consumer preference for organic products has led to increased demand for organic pomegranates. Egypt has a significant opportunity to capitalize on this expanding market, particularly in accessing key global markets[45].

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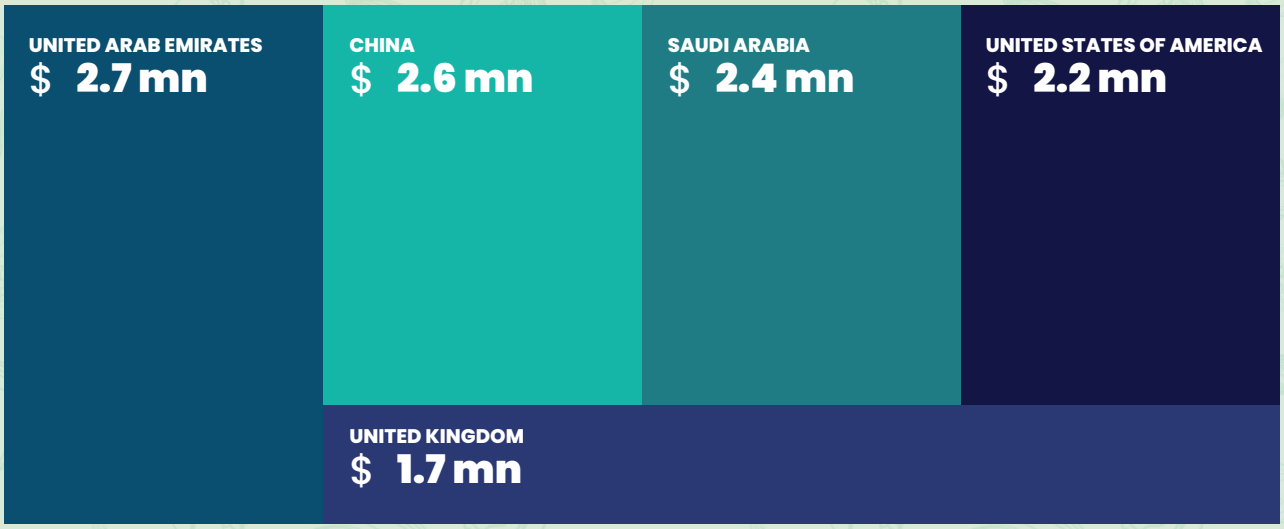
44 Market Research Intellect. Pomegranate Market Flourishes: Boosting Demand in Chemicals and Material Applications. Market Research Intellect, 2024, www.marketresearchintellect.com/blog/pomegranate-market flourishes-boosting-demand-in-chemicals-and-material-applications/.

45 "Market Overview: Export from Egypt to the Netherlands." Global Trade Helpdesk, https://globaltradehelpdesk.org/en/export-081090-from-eg-to-nl/market-overview.

FIGURE 27 : MARKETS RANKED BY TOTAL POMEGRANATE EXPORTS POTENTIAL IN THE COMING 5 YEARS FOR EGYPT



SOURCE: GLOBAL TRADE HELP DESK

Pomegranate Quality Requirements

Pesticide MRLs are strictly followed by the EU, and it is generally crucial for international trade[46].

Below are some of the common pesticides and their MRLs:

Pesticide	MRL	Year of Adoption	Symbol
Bifenthrin	0.5 mg/Kg		
Chlorantraniliprole	0.4 mg/Kg	2014	
Cyantraniliprole	0.01 mg/Kg	2016	(*)
Cyprodinil	5 mg/Kg	2019	Po
Fludioxonil	3 mg/Kg	2019	Po
Flumioxazin	0.02 mg/Kg	2016	(*)

TABLE 5 : POMEGRANATE MRLS

46 "Codex Pesticide Residues in Food – Commodity Details." FAO/WHO Codex Alimentarius, Food and Agriculture Organization (FAO), https://www.fao.org/fao-whocodexalimentarius/codex-texts/dbs/pestres/commodities-detail/en/?c_id=373.

Imidacloprid	1 mg/Kg	2009	
Saflufenacil	0.01 mg/Kg	2017	(*)

(*): AT OR ABOUT THE LIMIT OF DETERMINATION.

PO: THE MRL ACCOMMODATES POST-HARVEST TREATMENT OF THE COMMODITY.

SOURCE FAO CODEX ALIMENTARIUS

The UNECE standard for pomegranates[47] classifies pomegranates into three classes: Extra class, Class I and Class II. All classes should meet the general requirements such as remaining whole, intact, free from flaws, defects or decay and cleanliness from foreign matters.

Pomegranates must have minimal defects of the crown, and free from any internal or external damage.

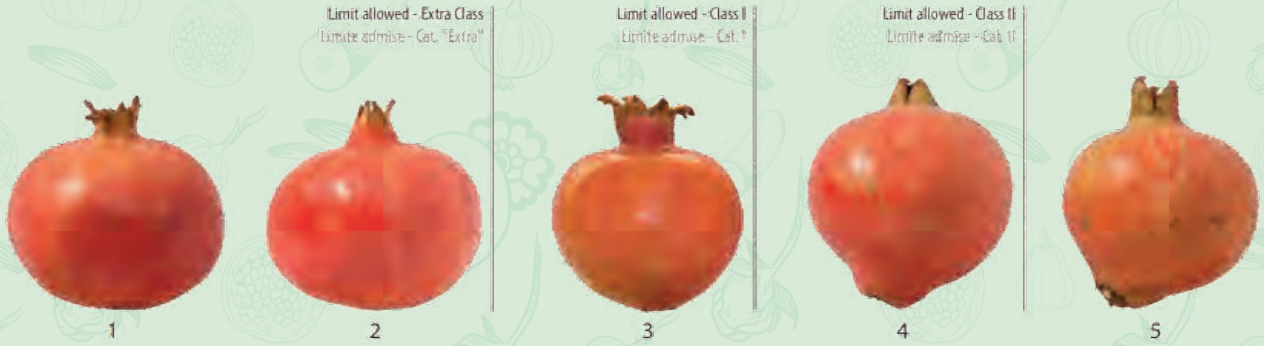
The Extra class must be free from defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package. A total tolerance of 5 per cent, by number or weight, of pomegranates not satisfying the requirements of the class but meeting those of Class I is allowed, and 0.5 % not satisfying class II standards. Class I can have a slight defect in shape, coloring, the skin can slightly be cracked, and the crow dry. A 10 % of total tolerance by number or weight is allowed, as long as they meet the standards of class II, and 1 % not meet Class II standards. Class II is what doesn't meet with Class I but meets the minimum requirements. Class II doesn't have to meet the sizing provisions either. A total tolerance of 10 % is allowed with only 2 % affected by decay[48].

47 United Nations Economic Commission for Europe (UNECE). Pomegranates: UNECE Standard FFV64-. UNECE, 2023, unece.org/sites/default/files/12-2023/FFV64-_Pomegranates_2023_e.pdf.

48 "Pomegranate." OECD Publishing, https://www.oecd.org/en/publications/pomegranate_-9789264206700en-fr.html.

The following are examples of the acceptable pomegranate classifications based on their shapes:

FIGURE 28 : EXAMPLE OF POMEGRANATE CLASSES SOURCE



Pomegranate Grenade	Extra Class Cat. Extra	Class I Cat. I	Class II Cat. II	Not allowed Exclu	Notes
Defect in shape Défaut de forme	1, 2	3	4	5	

SOURCE OECD

FIGURE 30 : POMEGRANATE SIZE CODE BY DIAMETER

A. For fruit sized by diameter

Size code		*Diameter (mm)*
1	A	≥ 81
2	B	71–80
3	C	61–70
4	D	51–60
5	E	40–50

SOURCE UNECE

FIGURE 29 : POMEGRANATE SIZE GUIDE BY WEIGHT

B. For fruit sized by weight

Size code		*Weight (g)*
1	A	≥ 501
2	B	401–500
3	C	301–400
4	D	201–300
5	E	≤ 200

SOURCE UNECE

In all classes, if sizing is applicable, a tolerance of up to 10 percent by number or weight is permitted for pomegranates that do not meet the specified sizing requirements. Each package must maintain uniformity, containing only pomegranates of the same origin, variety, quality, and size, where applicable. However, sales packages may include mixtures of different varieties

with varying colors and sizes, as long as they are consistent in quality and, for each variety included, their origin is clearly maintained.[49]

The packing also has strict requirements. They must be packaged in a way to protect the produce during transportation. The packaging must be clean and of good quality to ensure no damage occurs. It also must be clearly labeled.

The following are examples of acceptable packaging:

FIGURE 31 : EXAMPLES OF ACCEPTABLE PACKING

SOURCE: OECED

5.4.8 Role of Women

Women participate in farming tasks, including handling irrigation hoses, pruning, weeding, and assisting their husbands with fertilization. However, due to traditional norms, women are unable to work in the fields when male workers are hired for farming tasks. Women mainly contributing in the harvesting, sorting, and post-harvest processes such as drying pomegranate peels, which consists of the majority of their tasks.

Most farmers and CSO workers agree that women handle around %50 of the post-harvest workload. Their responsibilities include sorting, collecting, and packaging crops before they are sent to traders. Over time, agricultural training programs have helped improve their skills in sorting and quality assessment. Initially, training sessions targeted at women were difficult to implement, but as female participation in farming has increased in Assiut, such training has become more common. Farmers in Assiut often prefer hiring women for harvesting due to their patience, diligence, and lower labor and hospitality costs compared to men.

49 Organization for Economic Co-operation and Development (OECD). Pomegranate. OECD, 2014, www.oecd.org/en/publications/pomegranate_-9789264206700en-fr.html.

5.4.9 Areas of Intervention

Crop Selection & Misconceptions:

- Some farmers in Assiut consider switching to bananas or mangoes, mistakenly believing they have lower costs.
- This reflects a lack of knowledge about alternative crops and the impact of climate change on land maintenance costs.
- Many farmers aim to expand pomegranate cultivation but often ignore expert advice without financial incentives.

Training & Capacity Building:

- Women have requested training in sorting, harvesting, and processing, based on IDI findings.
- Farmers need better technical knowledge on planting schedules, pesticide use, and climate adaptation.

Water & Climate Adaptation Strategies:

- Emphasis should be placed on adopting drip irrigation for efficient water management.
- Switching to climate-resilient pomegranate seeds can help mitigate climate change impacts.
- Seed selection must be based on the local climate and soil conditions, as not all varieties yield the same results.

5.5 Fennel

Picture 7 Fennel Plant

Source https://utgardens.tennessee.edu

5.5.1 Overview

Planted in October - November and harvested in May

Available in two types: Sweet Fennel and Bitter Fennel

Grown in mainly in Qena and Assiut and can be found in Aswan and Sohag

According to FAO statistics, Egypt harvested 33,518 hectares (82,824 acres) of anise, badian, coriander, cumin, caraway, fennel, and juniper berries in 2022, an increase from 32,507 acres in 2021.

The country's yield per hectare for these crops was 877.4 kg/ha, with total production reaching 29,408 tons. Fennel is mainly cultivated in Qena, Assiut, Sohag, and Aswan, with many farmers preferring it due to its profitable market value. Production varies between 800–500 tons per acres.

The following is a roadmap of all important phases of the pomegranates value chain:

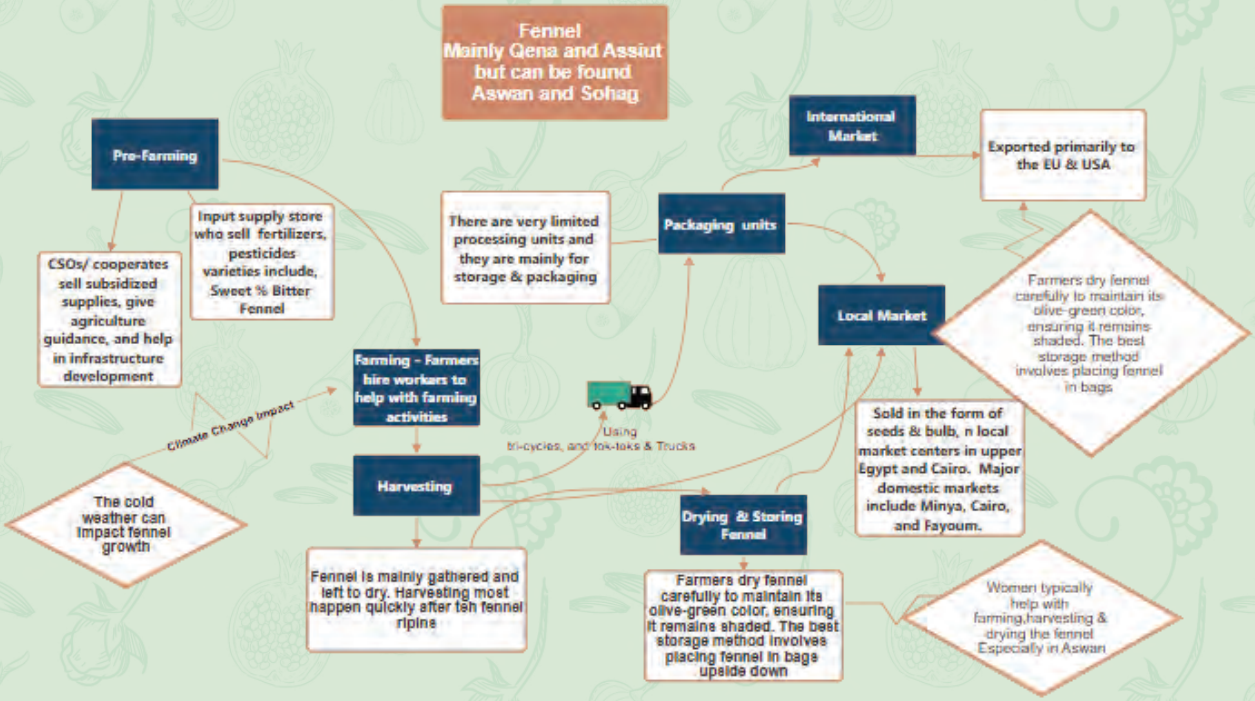


FIGURE 32 : FENNEL VALUE CHAIN ROADMAP

5.5.2 Input Supplies

Farmers have reported challenges in accessing essential agricultural inputs, including fertilizers. Despite making payments for fertilizers last year in Qena, many did not receive their supplies, causing disruptions in their farming operations. For seeds, farmers typically rely on exchanges with other farmers rather than purchasing from the outlets. Pesticides, however, are usually bought from local outlets. The following is the input supplies used and their costs:

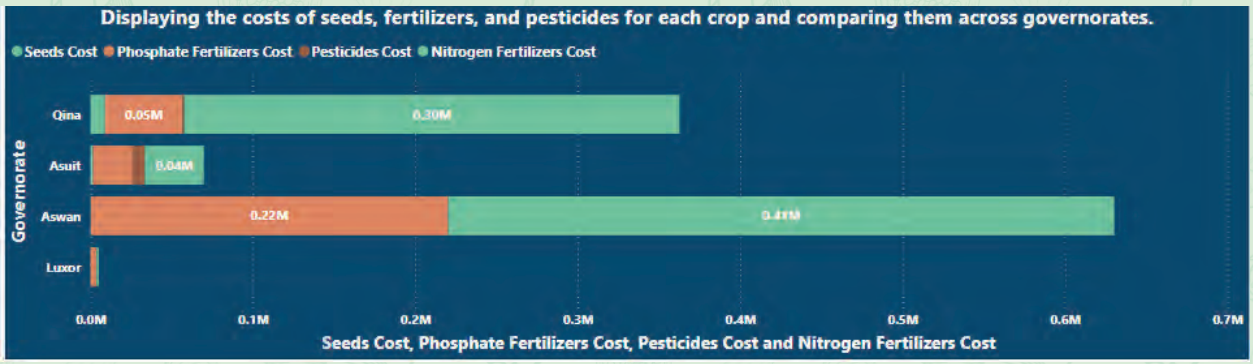


FIGURE 33 : FENNEL INPUT SUPPLIES COSTS (EGP MILLIONS) & USE PER GOVERNORATE

5.5.3 Farming and Cultivation

Farmers prepare and plow the land before planting, using either furrow irrigation or drip irrigation methods. However, due to limited water availability were they typically access water one day per week—furrow irrigation remains the more common practice. Most farmers in Qena usually share the water source amongst themselves, with groups of six taking turns to irrigate their fields on designated days, as noted in focus group discussions in Qena. Irrigation relies on well water, with some farmers in Qena adopting modern solar-powered irrigation systems.

Picture 8 : FGD Women in Qena Source: Taken from the field

5.5.4 Impact of Climate Change

The flowering stage is particularly vulnerable to sudden temperature fluctuations, especially shifts from cold to hot conditions, which negatively impact crop development. The temperature rise in general heavily impacts the yield of fennel. Preventing cold-related damage remains a challenge, as does managing increased weed growth and root rot. Excessive sun exposure can cause crops to turn yellow, rendering them unsellable.

Crop Loss & Disease Issues

Farmers face various crop diseases and pests, including worms, Aphids, Army worms and powdery mildew. Weed growth has increased significantly, leading to a higher reliance on pesticides. Farmers typically use crop waste for compost, minimizing losses and enhancing soil fertility. However, pesticide residue remains a major concern, affecting marketability compliance with and export standards. On average, farmers report that approximately 10 % of their crops go to waste.

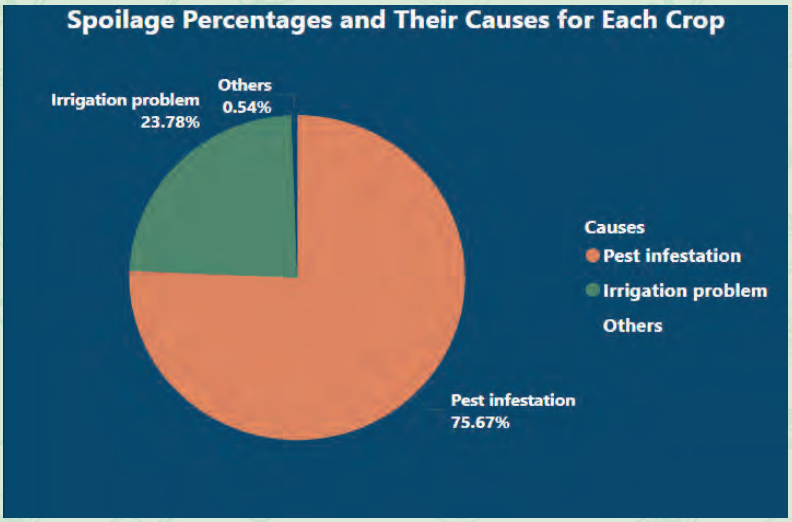


FIGURE 34 : FENNEL WASTE PERCENTAGE CAUSE

5.5.5 Harvesting & Post-harvesting

Harvesting must be done promptly, as delays cause the fennel to dry out, lose weight, and turn white due to sun exposure. Stalks are usually ready for harvest between 5 and 7 months after planting. Seed heads should be collected promptly before they shatter. The seed heads are ready to harvest when they turn brown in color. The harvesting period typically lasts between 3 to 10 days. Farmers hire workers for post-harvest tasks, usually employing 3–4 people.

5.5.6 Processing

There are very limited processing activities that are done with fennels. Mostly farmers sort and dry fennel, ensuring they meet export standards. Fennel must be stored away from sunlight to prevent weight loss, as prolonged storage can cause a decrease from 53 kg to 50 kg due to drying.

Farmers dry fennel carefully to maintain its olive-green color, ensuring it remains shaded. The best storage method involves placing fennel in bags (shewal) and storing it upside down, so the seeds are protected from sunlight. The fennel can be stored in the farm for a few weeks only. However, long-term storage challenges persist, affecting crop preservation and quality.

Sorting is conducted at the farm level, as there are no dedicated sorting stations. Additionally, farmers harvest seeds for the next planting season. In Aswan, particularly in Wadi El Nqra, crops undergo two levels of manual sorting before packaging.

Trading Dynamics
Farmers with financial stability store their crops and sell them when prices increase, while others sell immediately after harvest. Although some farmers collaborate with companies, the most common practice is selling directly to traders, who also manage transportation. Crops are distributed locally through multiple traders, with smaller traders passing them on to larger buyers. Occasionally, farmers partner with companies like Giza for Seeds & Herbs, which supply pesticides. However, farmers believe that traders and input supply shops take the largest share of the profit. There is a growing need for better market access and a dedicated sorting facility, as many farmers struggle to sell their crops, with some still holding onto last year's yield.

5.5.7 Final Market

Local Market
While some crops are exported, the majority are sold in the local market, where demand remains high. Major domestic markets include Minya, Cairo, and Fayoum. This year, fennel prices started at 35 Egyptian pounds per kilo and later increased to 50 LE per kilo, whereas last year, prices ranged between 40–58 Egyptian pounds per kilo for farmers.

International Market
Fennel exports are facilitated through partnerships with companies such as Giza for Seeds & Herbs. Globally, India is the largest fennel producer, with Syria, Egypt, Turkey, Germany, Spain, and Pakistan also serving as key exporters. The biggest importers include Vietnam, followed by Algeria, Germany, and the USA. In 2018, Germany imported approximately 13,000 tons of spices, primarily from Egypt and China.

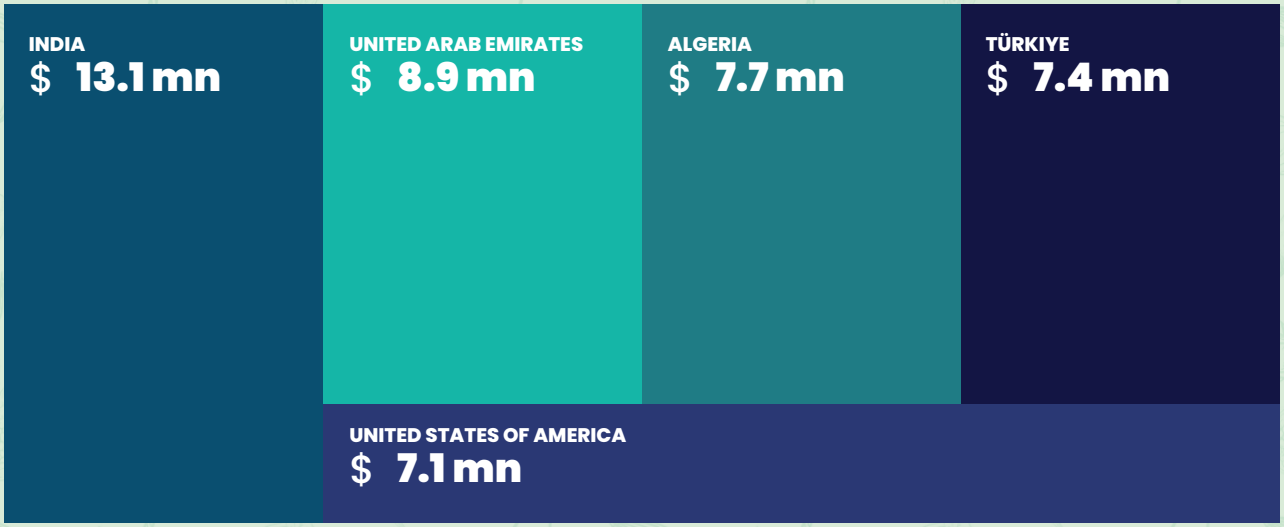
In 2023, Egypt's exports of fennel (grouped with anise, badian, and similar seeds) reached 7.2$ million, with a total volume of 209 tons. Within the EU, Germany is the primary destination, where fennel is mainly used for medicinal purposes. The Netherlands also imported 149,000$ worth of juniper berries and fennel seeds, either crushed or ground.

fennel is mainly used for medicinal purposes. The Netherlands also imported 149,000$ worth of juniper berries and fennel seeds, either crushed or ground.

Market Trends and Export Potential

The fennel seeds market is expected to continue growing in the upcoming years due to its versatile nature. It is used in several sectors including food, pharmaceuticals and cosmetics industries. Fennel is well known for its digestive and anti-inflammatory properties, which reach the health-conscious consumers who follow trends such as using natural and organic products[50]. There are several countries and untapped markets Egypt has the potential to expand to as illustrated below[51].

FIGURE 35 : FENNEL MARKETS RANKED BY TOTAL EXPORT POTENTIAL IN THE COMING 5 YEARS FOR EGYPT.



SOURCE GLOBAL TRADE HELP DESK

Fennel Quality Standards

Like most plants, fennels production must comply with the decreed MRLs, or they will be rejected at inspection. The Fennel pesticides MRLS based on the Codex Alimentarius[52], are the following:

50 Market Research Intellect. Global Fennel Seed Powder Market Report. Market Research Intellect, 2025, www.marketresearchintellect.com/product/global-fennel-seed-powder-market/.

51 "Market Overview: Export from Egypt to the Netherlands." Global Trade Helpdesk, https://globaltradehelpdesk.org/en/export-090961-from-eg-to-nl/market-overview.

52 Codex Pesticide Residues in Food – Commodity Details." FAO/WHO Codex Alimentarius, Food and Agriculture Organization (FAO), https://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/commodities detail/en/?c_id=737.

Pesticide	MRL	Year of Adoption
Dithiocarbamates	0.1 mg/Kg	2015
Phorate	0.1 mg/Kg	2016
Profenofos	0.1 mg/Kg	2016
Triazophos	0.1 mg/Kg	2016

TABLE 6 : FENNEL PESTICIDE MRLS

The UNECE standard for Fennel must meet specific minimum standards to be considered suitable for export[53]. It should be intact, except for trimmed roots and leaves, and must be free from pests, disease, frost damage, abnormal moisture, or any foreign odors or tastes. The product must be firm, fresh in appearance, and adequately developed. Additionally, the roots must be cut close to the bulb, and leafy ribs must not exceed 7 cm in length. These requirements ensure that fennel maintains its quality throughout transportation and storage.

The standard categorizes fennel into two classes based on quality. **Class I** includes high quality fennel with a uniform shape, compact and fleshy outer ribs, and a clean white appearance. Slight defects, such as minor bruising or small healed cracks, are permitted as long as they do not affect the fennel's overall presentation. **Class II** includes fennel that meets the minimum quality standards but may have some minor imperfections, such as small or healed injuries (up to 3 cm) or green patches covering up to one-third of the bulb. Fennel in all classes must be packed uniformly, ensuring all items in a package are of the same origin, variety, quality, and size.

Fennel is classified by size, determined by the maximum diameter of the equatorial section. The minimum acceptable diameter is 60 mm, with a size variation of no more than 20 mm within a package. Miniature fennel is exempt from these size restrictions. Quality and size tolerances allow up to 10 % of fennel in each package to fall below the indicated classification standards, provided they still meet minimum quality requirements.

5.5.8 Role of Women

Women are often not given a formal role in farming, as hiring workers is generally preferred, particularly in Qena. However, a minority of women participate in agricultural work to reduce labor costs and ensure a stable income at the end of the season. With labor wages rising to approximately 120 Egyptian pounds per day in 2024 in Qena, some families rely on women's

53 United Nations Economic Commission for Europe (UNECE). Fennel Standards. UNECE, 2025, unece.org/trade/documents/02/1969/standards/fennel.

contributions. Women are primarily involved in the harvesting phase, accounting for about 50 % of sorting, harvesting, and drying activities.

5.5.9 Areas of Intervention

Training & Skill Development:

- Farmers, including women in Aswan, want to learn more about cultivating and drying fennel.
- Women have some experience in drying and sorting other crops but seek to refine their skills and diversify.
- Introducing solar-powered drying units can improve efficiency in fennel drying.

Market Opportunities & Export Challenges:

- Farmers see fennel as a promising market due to its export potential.
- However, many lack knowledge of export regulations and requirements.
- Most fennel exports occur through contract farming, where companies provide farmers with pesticides and support.
- Strengthening value chain linkages, especially between farmers and companies, is crucial.

Processing & Storage Limitations:

- The lack of processing facilities in the fennel value chain is a major challenge.
- Existing facilities are mostly company-owned and located near Cairo or port cities, which limit small holder farmers' access.
- Current fennel storage methods are inefficient and contribute to waste, highlighting the need for improvements.

5.6 Pumpkin

Picture 9 : Pumpkin Plant

Source https://pixabay.com/

5.6.1 Overview

Planted during September- mid October and harvested from mid November until mid-February

Local and International Varieties Such as Musquee de Provence and Sultan's Turban Pumpkin

Grown in Luxor, Aswan and Qena

Pumpkin production in Egypt has shown growth in recent years, with significant contributions from key agricultural regions. According to CAPMAS, in the 2020/21 season, Egypt produced 4,000 tons of pumpkins across 353 acres, with a yield of 12.28 tons per acres. The highest production was recorded in Qena (2,966 tons over 209 acre), followed by Luxor (799 tons over 81 acre). In 2021/22, total production increased to 5,000 tons, though the yield declined to 9.12 tons per acre across a larger cultivated area of 562 acres.

FAO statistics for 2022 indicate that the total harvested area for pumpkins, squash, and gourds in Egypt was 8,241 hectares, with a yield of 21,355.7 kg per hectare, leading to a total production of 175,989 tons. Major farming regions include Luxor, Aswan, and Qena, where planting occurs between mid-February and March, with harvesting taking place from September to October.
Some of the cultivated varieties in Luxor are Musquee de Provence and Sultan's Turban pumpkins, with yields reaching up to 1,200 fruits per acre for large varieties and approximately two fruits per plant for medium varieties.

The following is a roadmap of all important phases of the fennel value chain:

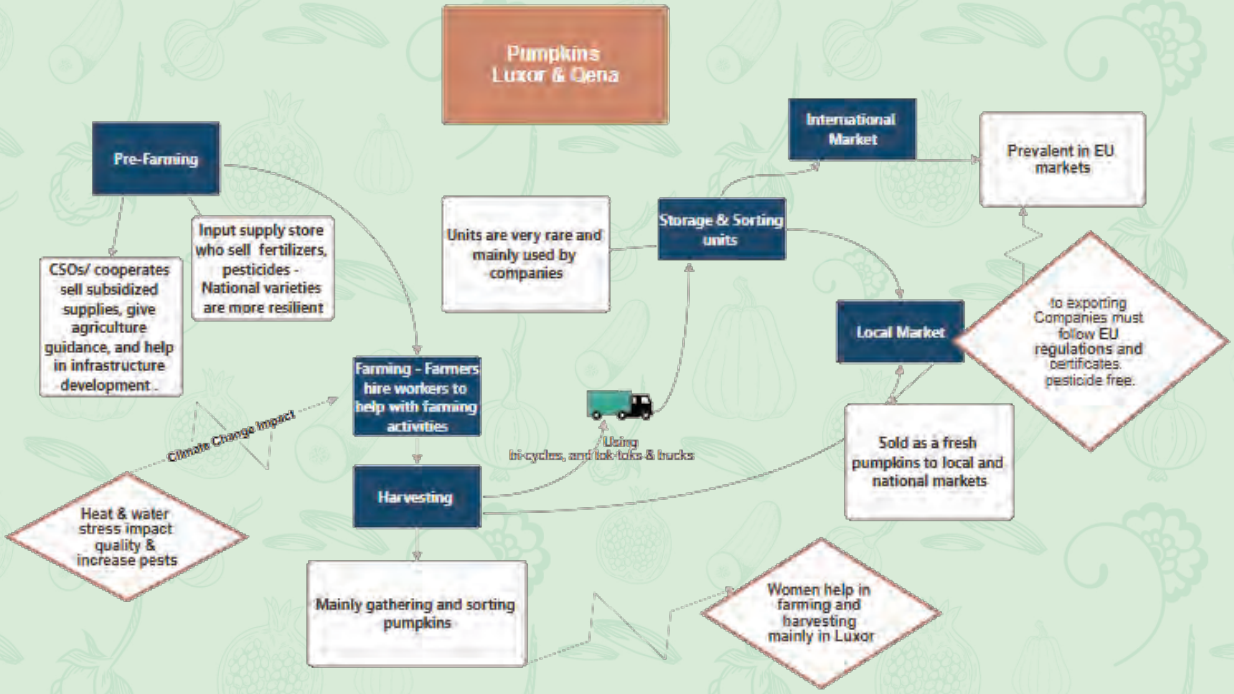


FIGURE 36 : PUMPKIN VALUE CHAIN ROADMAP

5.6.2 Input Supplies

There are several local and international varieties of pumpkin although international pumpkin varieties have spread in Egypt in the past few years due to producing large yields. Foreign agricultural companies such as Rotam, Bayer, Seminis, US Agriseeds, and Betaseed are some of the most popular seed suppliers in Egypt. Despite this trend, a study was conducted in 2022/23 concluding that it is crucial to maintain the use of national pumpkin varieties. The introduction of non-native seed varieties, despite their promise of higher yields, threatens the unique genetic traits that enable local pumpkins to thrive. The loss of these traits could reduce climate resilience, ultimately weakening pumpkin farming practices in Egypt[54].

Other input supplies include the use of:

- 25 kg of superphosphate
- A total of 75 kg of urea

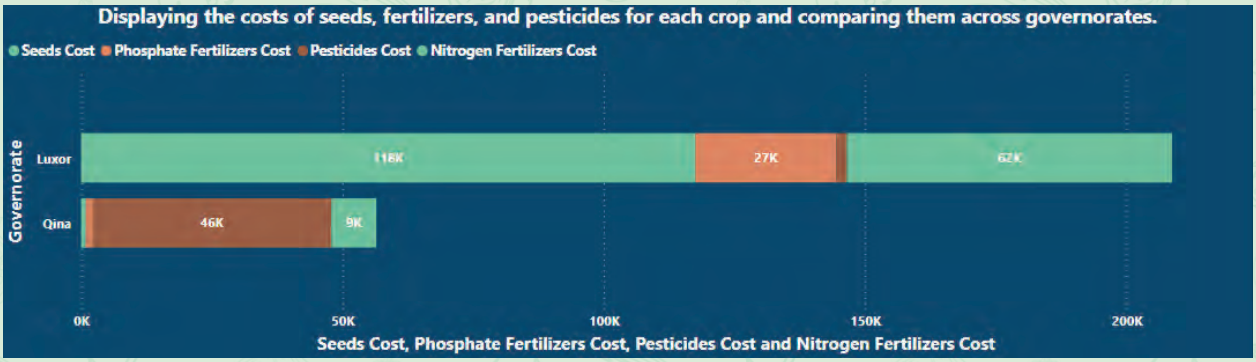


FIGURE 37 : PUMPKIN INPUT SUPPLIES PER GOVERNORATE

5.6.3 Farming and Cultivation

According to the IDIs and Pumpkin Cultivation manual, the farming process is quite straightforward. The land should be plowed twice and leveled after each plowing. Raised beds, approximately 2 meters wide, are formed, irrigated, and allowed to dry before planting. The crop thrives in sandy, well-drained soil. Seeds are sown at a rate of 5–3 per hole on the northern side of the raised bed, with a spacing of 50 cm between holes. Each feddan requires approximately 1.5 to 2 kilograms of seeds. Gentle watering is necessary to moisten the soil around the seeds.

After three weeks, thinning is required, leaving 2–1 plants per hole. Fertilization is applied in two stages, and irrigation is needed every 10–7 days, depending on soil conditions, weather, and plant size. Light weeding of the beds is essential. Due to high insect susceptibility, regular

54 EastFruit. Preserving Egypt's Pumpkin Heritage: A Path to Sustainable Agriculture. EastFruit, 2025, eastfruit.com/en/news/preserving-egypts-pumpkin-heritage-a-path-to-sustainable-agriculture/.

spraying is required for pest control. The crop requires full access to sunlight and ample space, as it can grow up to 30–20 feet long. Irrigation is resumed immediately after thinning to support growth.
Pumpkins require nutrient-rich soil, and fertilizers are applied in two stages[55]. The first application consists of 25 kg of superphosphate before land leveling, followed by 50 kg of urea three weeks after planting. The second application of 25 kg of urea occurs one month later, aligning with the fruit-setting stage. Irrigation is essential, with watering scheduled every 7 to 10 days based on soil type, weather conditions, and plant growth stage.

Other input supplies include the use of:

- 25 kg of superphosphate
- A total of 75 kg of urea

5.6.4 Impact of Climate Change

Climate change has a high impact on pumpkin cultivation due to the impact of high heat and water management. The increase in heat found especially in Luxor and Qena does not only directly affect the pumpkin yield and quality, but it also increases pest activity.

Crop Loss & Disease Issues
Common pests affecting pumpkin crops include the African cucurbit beetle, aphids, and whiteflies. Control measures include hand-picking in small areas and spraying Malathion 57 % at recommended intervals. Aphids, which peak during winter, slow plant growth by feeding on sap.

PICTURE 10: RUINED PUMPKINS IN QENA SOURCE: TAKEN IN THE FIELD

55 Monofeya Governorate. زراعة القرع العسلي [Pumpkin Cultivation]. Monofeya Governorate, 2019.

5.6.5 Harvesting & Post Harvesting

Pumpkins reach maturity within **90–120 days**, depending on the variety, planting time, and soil conditions. Signs of maturity include fully grown fruit with hardened skin that is difficult to scratch. During harvest, pumpkins are picked with their stems attached to prevent damage and reduce the risk of rot.

5.6.6 Processing

There are little to no processing activities that involve pumpkins. They are mainly sold as fruits, at most farmers sort and package them while harvesting.

Trading Dynamics
According to secondary research, traders typically engage in contract farming with private companies. These companies provide farmers with technical and informational support in exchange for a reliable crop supply, creating a structured system that benefits both parties.

5.6.7 Final Market

Egypt exported a total of 2,854,000$ or 2,292 tons of “Fresh or chilled pumpkins, squash and gourds "Cucurbita spp” in 2023. The EU is one of the biggest importers of Pumpkin with Italy, the Neatherlands and the United Kingdoms being the largest 3 importers of pumpkin from Egypt.

Most of Pumpkin Exports occur during Quarter 1 and Quarter 2 of the year[56]. But based on the pumpkin cultivation sessons, the Delta region is more known to harvest pumpkins during quarter oen and two.[57] This indicates that most pumpkin exports are sourced from the delta region. Although Pumpkin are also harvested in the first quarter in Upper Egypt, which indicates some of the pumkins can be sourced from there.

56 “Trade Statistics for Product 070993 – Egypt.” Trade Map, International Trade Centre, https://www.trademap.org/Country_SelCountry_MQ_TS.aspx?nvpm=7%1c7%818c7%c7%c7%c7%070993c7%c7%c7%6c7%1c7%1c7%2c7%2c7%2c7%1c7%1c1.

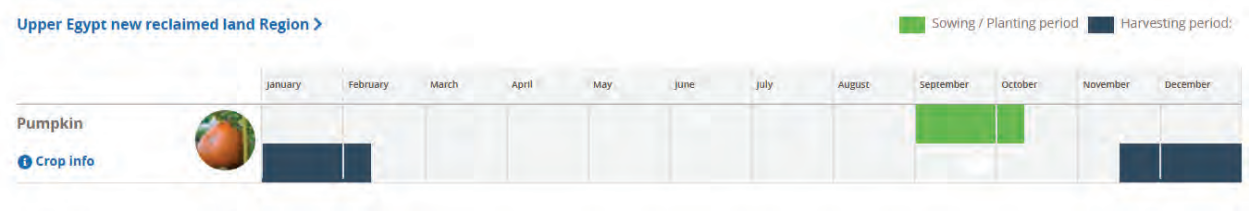
57 “Crop Calendar – Egypt.” Food and Agriculture Organization (FAO), https://cropcalendar.apps.fao.org/#/home?id=EG&crops=0285.

TABLE 7 : EGYPT'S EXPORTS PER QUARTER

Importers	Exported value in 2019-Q1	Exported value in 2019-Q2	Exported value in 2019-Q3	Exported value in 2019-Q4	Exported value in 2020-Q1	Exported value in 2020-Q2	Exported value in 2020-Q3	Exported value in 2020-Q4
World	117	406	0	0	238	649	29	52
European Union (EU 28) Aggregation	112	396	0	0	237	648	0	31
Netherlands	65	25	0	0	52	90	0	30
Sweden	0	0	0	0	1	0	0	1
Austria	0	0	0	0	0	0	0	0
Cyprus	7	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0
Germany	1	0	0	0	0	0	0	0
Italy	38	360	0	0	163	518	0	0
Poland	0	11	0	0	0	0	0	0
Portugal	0	0	0	0	18	20	0	0
United Kingdom	1	0	0	0	3	20	0	0

Source Trade Maps

FIGURE 38 : PUMPKIN CULTIVATION IN UPPER EGYPT SESSIONS SOURCE



*Upper Egypt new reclaimed land include: Assiut, Sohag, Qena, Luxor and Aswan

FIGURE 39 : PUMPKIN CULTIVATION IN EGYPT SOURCE

Source FAO Crop Calendar

*The Delta Region includes the old reclaimed soil which is South Tahrir (Menofia), North and ElBostan Tahrir (Behiara), Gable Asfer (Kalubia), Abu Kbir (Sharqiea), Kassasein and Abu sultan (Ismaeilia) and the new reclaimed soil including Khtatba, Sadaat, Wadi ElNetron (Menofia), Nubaria (Behiara), Salehia (Ismaeilia).

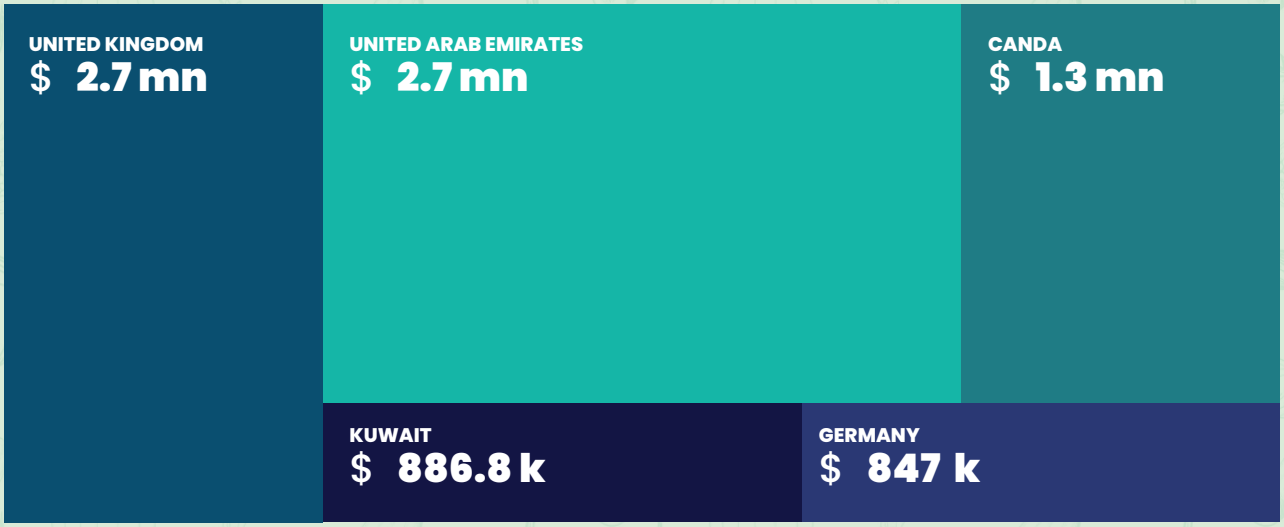
Market Trend and Export Potential

Increasing demand for pumpkins is driven by their nutritional benefits (rich in vitamins A, C, and E), their role in plant-based diets, and expanding use in food, beverages, and health products. Pumpkin puree and dried pumpkin are widely used in bakery products, soups, and baby food, while pumpkin seed oil is gaining popularity for its health benefits. The rising trend of organic and functional foods is further fueling market expansion.[58]

With pumpkins becoming a key ingredient in various food and beverage applications, global production increased from 22.26 million metric tons in 2019 to 22.81 million metric tons in 2022. The demand for convenient, nutritious, and seasonal products continues to drive growth in the fresh pumpkin market.

The Asia-Pacific region dominates both production and consumption, with China as the largest producer, followed by India, Russia, and Ukraine. India and China also lead in pumpkin exports, catering to growing demand in Europe and North America.The United States is a top importer, primarily sourced from Mexico, Canada, Costa Rica, and the Dominican Republic[59].

FIGURE 40 : MARKETS RANKED BY TOTAL EXPORT POTENTIAL IN THE COMING 5 YEARS FOR EGYPT'S EXPORTS OF PUMPKINS



SOURCE GLOBAL TRADE HELP DESK

5.6.8 Role of Women

While women in Luxor and Qena are less commonly involved in farming, women are relatively found working in Luxor more in the farming process. where they work for wages to support their

58 Mordor Intelligence. Fresh Pumpkin Market Report. Mordor Intelligence, 2025, www.mordorintelligence.com/industry-reports/fresh-pumpkin-market.

59 "Market Overview: Export from Egypt to the Netherlands." Global Trade Helpdesk, https://globaltradehelpdesk.org/en/export-070993-from-eg-to-nl/market-overview.

families. In Luxor women perform multiple tasks based on managerial instructions, including land preparation, pumpkin cultivation drip irrigation, plant thinning, weed removal, and harvesting and sorting directly on the farm.

Women face several challenges in farming. The large size of pumpkins makes harvesting difficult, and exposure to pesticides can cause health risks, with strong scents affecting their lungs, as women in Luxor reported during their FGD. Many experiences allergic reactions and skin rashes due to pollen contact during thinning.

5.6.9 Areas of Intervention

Training & Skill Development:

- Farmers, especially women, strongly prefer training in export requirements for pumpkins.
- Interest in cultivating different pumpkin varieties to combat climate change.
- Guidance needed on adapting to climate change impacts on pumpkin cultivation.
- Training in pesticide handling and safety regulations is essential.

Climate-Resilient Strategies:

- Climate-resilient pumpkin varieties can help mitigate climate change impacts but must be carefully selected to maintain yield.
- Aphids can be managed using Malathion 57 % or Anthio 25 %, applied at specific intervals.
- Whiteflies, which are present year-round and reduce plant vigor, can be controlled using the same methods as aphids.

Sustainable Farming Practices:

- Integrating agroforestry by planting shade trees can help mitigate climate impacts.
- Using cover crops helps prevent soil erosion and retain moisture, improving soil health.

5.7 Loofah

Picture 11 : Loofah Plant

Source www. quintadosouriques.com

5.7.1 Overview

Planted in January - February and harvested and is harvested in August

One Variety

Grown in Sohag - (Bani Harb and Nagaa Abou Khors)

In the 2020/21 season, Loofah production reached 28,000 Koz, with a yield of 7.4 tons per feddan across a total cultivated area of 3,796 feddans. Sohag alone contributed 45 tons, cultivating 9 feddans. However, in 2021/22, production significantly declined to 6,000 Koz, with a reduced yield of 4.94 tons per feddan over an area of 1,159 feddans. During this period, Sohag produced 42,000 Koz, covering 7 feddans. Loofah is typically planted between mid-Marchand April and harvested in December.

The following is a roadmap of all important phases of the Loofah value chain:

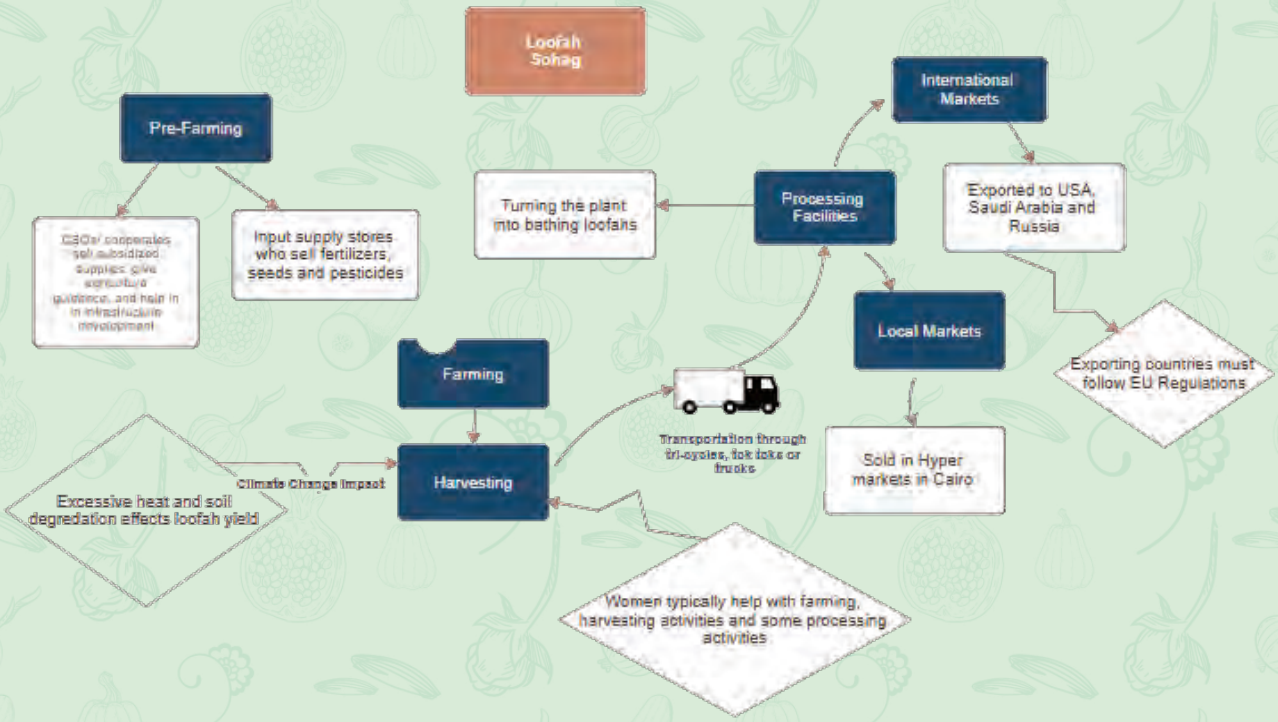


FIGURE 41: LOOFAH VALUE CHAIN ROADMAP

5.7.2 Input Supplies

Farmers obtain input supplies from local outlets, with two to three shops available in the village. However, the availability of supplies remains a challenge. Farmers often rely on specific brands of seeds, pesticides, and other inputs, but when they return to purchase the same products, they are frequently unavailable. The alternative products recommended by storekeepers are often of lower quality, impacting crop productivity and overall farming efficiency.

Typically, the following fertilizers are added to the soil before planting:

- 150 kg of superphosphate
- 75 kg of agricultural sulfur during soil preparation with organic fertilizer
- 15 m^3 of animal manure or compost, to be applied as a broadcast fertilizer directly before plowing the land.

5.7.3 Farming and Cultivation

Loofah requires a long growing season, which can last up to 7 months, from March-April to December. Although if the temperature is too high it is recommended that planting should be delayed. Seedlings or seeds are planted directly next to the trellis posts on which the plants will climb. The planting distances vary (4×4 or 4×5 or 4×6 or 3×6 or 3×5), depending on soil type and the trellis support model (spacing between the posts in the frame). It is preferred to plant on raised beds, and the soil is watered immediately after planting.

Raising the structure higher improves airflow, preventing excess moisture buildup. The trellis is typically constructed from wood and wire to minimize frequent replacements, as metal structures tend to trap heat. Proper pruning and thinning are essential to ensure adequate sunlight exposure and prevent overcrowding, which can hinder air circulation and plant health. Multiple plants are planted per hole, whether seedlings or seeds, to ensure that all holes are filled. Once the seedlings germinate successfully, **the strongest plants are selected as follows:**

- The strongest plant in each hole is selected, and the remaining plants are removed.
- All side shoots are removed from the selected plant to strengthen the stem until it reaches the top of the trellis, then the remaining branches are left.
- The plant's position on the trellis must be adjusted to ensure even growth, especially as new vegetative branches emerge.
- The plant's position should be adjusted from time to time.
- It is recommended to ensure that sunlight reaches the area beneath the trellis and to prevent overcrowding of vegetation by removing old leaves or non-fruiting branches, which ensures the best quality and quantity of the crop.

Irrigation is critical in loofah planting, since it heavily impacts the health and quality of the plant. Irrigation should be done early in the morning or late in the day. The plant should also be watered when 50 % of the soil moisture is absorbed. However, there are many factors that influence the plant's irrigation needs and the interval between irrigation. The plant age and vegetative growth affects the amount water the loofa needs. The older the plant is the more water it requires. The root spread and depth and the soil type also impact on the amount of water the plant needs.

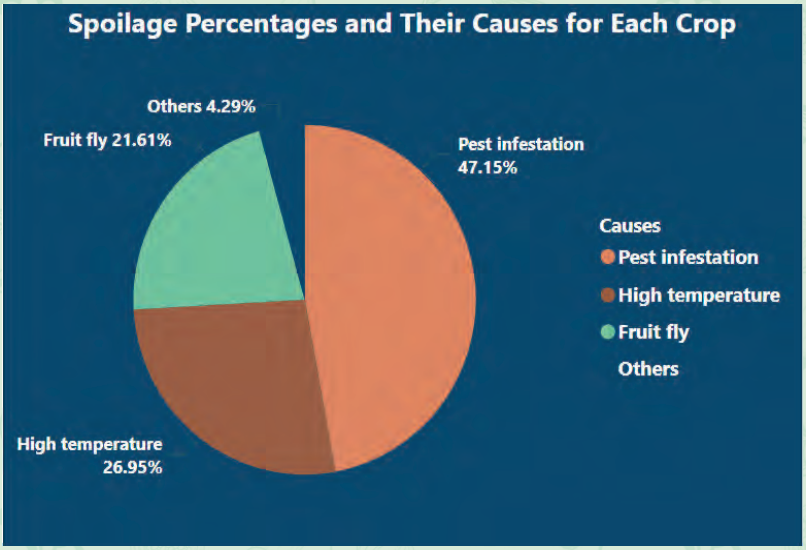
It is recommended to apply small amounts of fertilizers at frequent intervals to support plant growth and optimize nutrient use. During critical periods, such as high or low temperatures, foliar fertilization with essential nutrients can help. High-quality compost should be used, and applications should be made during cooler times of the day or at night.

5.7.4 Impact of Climate Change

Climate change has significantly impacted production. Excessive heat has ruined crops, forcing farmers to use them as animal feed. High temperatures also affect planting and working hours, making it difficult to work throughout the day. The yield and quality of loofah have declined in the past 3–4 years, possibly due to rising temperatures. Soil degradation is also a common issue impacting the Loofah plants, due to desertification and loss of fertility due to unsustainable farming practices.

Crop Loss & Disease Issues

Additionally, new pests, including worms (Doudat el Hasad) and other unidentified species, have emerged, further threatening production. The biggest disease threat is red spiders, while fruit flies are prevalent from August to October, necessitating constant pesticide spraying. The following figure showcases the leading causes of loofah waste.



5.7.5 Harvesting & Post-harvesting

The crop is collected in batches when signs of ripeness appear on the ears, such as the color change from dark green to light green and the slight appearance of yellow. Weight can also indicate ripeness, as mature ears noticeably weigh less than immature ones.
The ears are collected by cutting them from the stalk with garden shears and placed in curing bins for 3 to 7 days, depending on the temperature, to remove the skin and mucous substance.

5.7.6 Processing

After the harvest is sorted based on size, the biggest is more valuable, but there is a focus on ensuring most loofah is uniform, the ears are transported to factories and processing units for further value-added activities.

The loofah is sorted based on the following defects:

- Small-sized ears, which can be avoided by selecting seeds from reputable farms and choosing large ears for seed collection in the following year, with attention to proper agricultural practices.
- Loose fibers: The crop should be harvested at the right time, as early harvesting leads to fiber breakdown in the curing bins, while late harvesting weakens the fibers.
- Dark ears: This is caused by handling the ears before they are fully ripe, which cracks the hard shell and allows fungus to grow in these spots, affecting the entire ear. Also, improper timing of harvest can cause this problem. After harvesting, the ears should be immediately cured and sun-dried for a long time to ensure they remain white.
- Ears with holes due to fruit fly and pest infestations, and ears with incomplete fibers due to blossom end rot, as will be explained later.

There are minimal processing facilities in Sohag near the villages that produce loofah as a bathing tool, but other facilities are in Cairo. There are several uses for the loofah which make It a high potential plant. Most of the processing facilities work on creating bathing tools out of the loofah, but there are many other uses such as:

- It is used as filling for car seats and furniture.
- It is used as a filter for water or oils.
- It is currently used as an insulating material for sound, shock, and temperature.
- All parts of the plant (stem, leaves, fruits, and seeds) are used for medical and cosmetic purposes, which may be explained by the presence of glucosides and saponins in the plant.

5.7.7 Final Market

Local Market

Loofah from Upper Egypt follows a structured supply chain, with some being transported to a factory in Cairo in October for processing. Prices vary between 2.5 % to 10 %, depending on quality and market demand. Exports from Alexandria are more accessible due to the port's proximity, and the product is more recognized in that region. However, production rates remain similar across different governorates. Loofah from Upper Egypt is coarser and more durable,making it longer lasting compared to other varieties. While some of the crop is sold in local markets in Sohag, a portion is also distributed to Qena, Assiut, and Aswan. However, exports from Sohag remained minimal. The final bathing tool is then transported from Sohag to the hyper markets for national markets.

International Market

Basketwork, wickerwork and other articles, made directly to shape from vegetable plaiting materials or made up from goods of vegetable plaiting materials of heading 4601, and articles of loofah (excl. of bamboo and rattan; wallcoverings of heading 4814; twine, cord and rope; footwear and headgear and parts thereof; vehicles and vehicle superstructures; goods of chapter 94, e.g. furniture, lighting fixtures) Egypt exported 1,870,000$ or 191 tons. Largest 3 importers are the United States, Saudia Arabia and Russia in 2023.

Market trends and export potential

Loofahs are widely used shower accessories designed for cleaning and exfoliating the skin. Natural loofahs are commonly derived from the gourd family of cucumbers, while others are made from sea sponges or dried coral due to their spongy consistency. Loofahs help create a lather when used with soap, making them effective for both cleansing and stimulating blood circulation during showers.

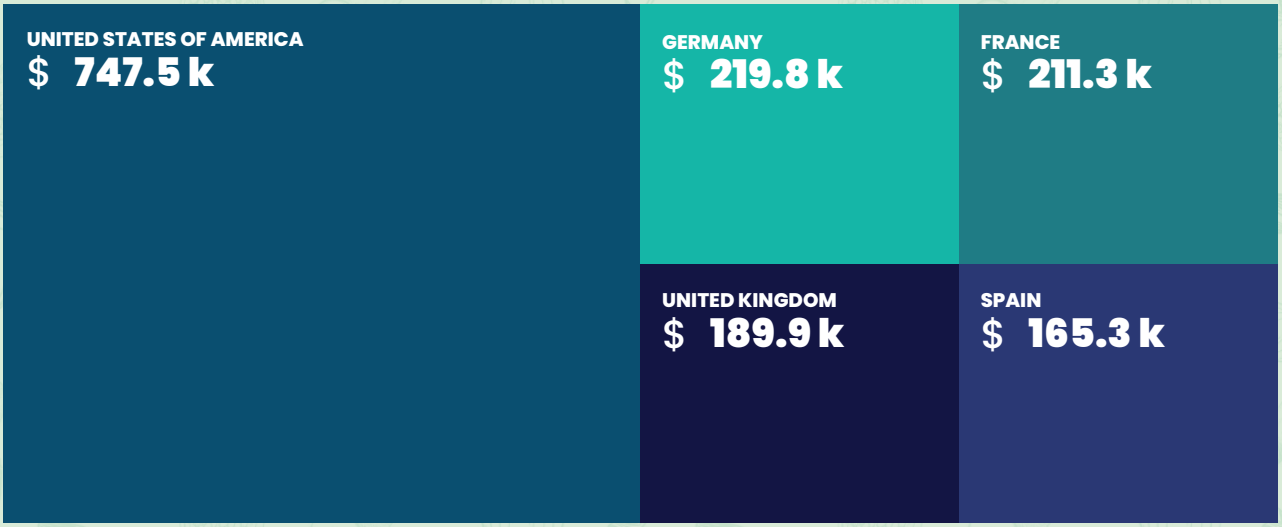
The growing awareness of personal hygiene and skincare has driven the global demand for loofahs. Rising pollution levels and increased outdoor activities have made skin exfoliation a necessity, encouraging consumers to invest in shower accessories. Additionally, initiatives by organizations such as the World Health Organization (WHO) and various governments promoting health and hygiene have contributed to market growth. Manufacturers are also focusing on product innovation, further boosting the loofah industry worldwide.

The global loofah market is expected to experience significant growth through 2031, with detailed analyses highlighting market segmentation by type and distribution channel. Loofahs are categorized into those with handles and those without. The distribution channels include supermarkets and hypermarkets, specialty stores, online retail, and other outlets. With an increasing demand for skincare products, loofahs are anticipated to gain a larger market presence.

Market analysis covers five key regions: North America, Europe, Asia-Pacific (APAC), the Middle East and Africa (MEA), and South America. The report further breaks down market trends and opportunities within 18 countries, offering insights into regional demand and supply factors. An

evaluation of political, economic, social, and technological influences affecting the loofah market provides a comprehensive understanding of its future prospects[60].

FIGURE 43 FIGURE 36 : MARKETS RANKED BY TOTAL EXPORT POTENTIAL IN THE COMING 5 YEARS FOR EGYPT'S EXPORTS OF LOOFAH



SOURCE GLOBAL TRADE HELP DESK

Leading companies in the loofah market are engaging in both organic and inorganic growth strategies, including product launches, patents, acquisitions, and partnerships. These efforts have expanded their customer base and strengthened their market presence. As demand for loofahs continues to rise, companies are expected to capitalize on emerging opportunities, making the market increasingly competitive. The report includes profiles of major industry players, detailing their financial performance, product offerings, and strategic developments over the past five years.[61]

5.7.8 Role of Women

Women play a role in loofah farming, often assisting their husbands in various agricultural tasks. Women actively participate in 20–25 % of all farming stages, except for the curing process. In factories, young women make up the majority of the workforce, contributing significantly to processing and production.

60 "Market Overview: Export from Egypt to the Netherlands." Global Trade Helpdesk, https://globaltradehelpdesk.org/en/export-460219-from-eg-to-nl/market-overview.

61 The Insight Partners. Loofah Market Report. The Insight Partners, 2024, www.theinsightpartners.com/reports/loofah-market.

5.7.9 Areas of Intervention

Farmer Training & Skill Development:

- Proper training in Loofah cultivation is essential for sustainability.
- Farmers need guidance on pesticide handling and managing heat exposure to maintain productivity.

Soil & Crop Management:

- Using shade nets and organic fertilization practices can help sustain Loofah production.
- Applying organic compost and biochar improves soil moisture retention and reduces chemical fertilizer use.

Agroforestry & Sustainability Practices:

- Integrating shade trees like moringa helps regulate temperature and protect crops.
- Cover crops prevent soil erosion and retain moisture , improving field productivity.

Market Expansion & Environmental Benefits:

- Promoting Loofah-based eco-products (e.g., sponges, biodegradable materials) can open new market opportunities.

6 Key Takeaways

6. Key Takeaways

This section highlights the key takeaways for each crop in a comparative manner, with a focus on the key thematic areas: climate impact and women's role in the value chain.

6.1 Value Chain Process

Farming process

Farming and cultivation processes are mainly similar across all 7 crops. The variances rely in the adopted fertilization programs and pest control mechanisms. Some crops are long lasting like henna and pomegranates where their trees can remain for longer than 7 years. Other crops require different farming techniques such as loofah which require trellis posts or raised bed. All farmers face challenges in accessing input supplies, receiving knowledge and expertise in how to manage water schedules, pesticide and fertilizer use, climate mitigation strategies and
disease identification.

Processing

Processing activities for most crops remain limited, with minimal value-added steps. Onions,pumpkins, and fennel primarily require drying and storage, often following specific refrigeration standards. The exception is onions, which undergo additional processing by being dried and ground into a spice. Drying is typically conducted on farms or in women's homes, with fennel, hibiscus, and onions commonly dried on racks before being packaged for transportation. Additionally, hibiscus is peeled either manually or by using a peeling tool.
In contrast, henna and pomegranates require more extensive processing, typically carried out in specialized facilities. Henna undergoes a two-phase grinding process using machines. Pomegranates, on the other hand, are fried and processed into various products, including pomegranate molasses, face masks, and henna-based products. Most crops are exported as raw produce and have strict packaging requirements.

6.2 Climate Vulnerabilities & Adaption Strategies

Climate Change has a direct impact on all the selected crops especially in the farming phase. While the five upper Egypt governorates have similar climates, they are impacting differently as previously seen in table 1. Furthermore, each crop is also impacted differently by the climate hazards as seen in the table below:

	Crop						
Hazard	Pomegranate	Hibiscus	Onion	Henna	Pumpkin	Luffa	Fennel
Heat Waves	High	High	High	High	High	Medium	High
High Temperature	High	High	High	High	High	Medium	Very High
Temperature variability	Very High	High	Very High	High	High	Medium	High
Storms (including sand and dust storms)	High	High	High	High	High	Medium	High
Flash Floods	High	High	High	High	High	High	High
Heavy Precipitation	Medium	Medium	High	Medium	Medium	Medium	Medium
Drought	Medium	Medium	Medium	Low	Medium	Medium	Medium
Cold Wave Frost	High	High	Very High	High	Very High	Medium	High
Soil Salinity	Very Low	Low	Low	Low	Low	Medium	Low

Table 8 : Climate risk assessment per crop.

6.3 Role of Women

In recent years, women's role in the agricultural value chain has expanded significantly. Although, the extent of their involvement varies across governorates and crops. Traditionally, women have been responsible for household and childcare duties. However, in the past years, more women have been supporting their husbands in the fields.

In crops such as hibiscus, pomegranates, and loofah, women have taken on an increasing share of harvesting and post-harvesting activities, for which they receive wages. This contrasts with other forms of unpaid labor that women typically perform to support their husbands.Despite the expansion of their roles in agriculture, women continue to bear full responsibility for household duties alongside their fieldwork.

In Luxor and Qena, cultural traditions limit women's participation in agriculture. Many women do not work alongside men who are not their relatives, restricting their opportunities in the field. However, economic pressures have led to increased participation of women in agricultural

7 Areas of Intervention

7. Areas of Intervention

The following section identifies the areas of intervention needed to impact on the efficiency of the value chains. The interventions are divided into crop specific interventions, cross-cutting interventions throughout the value chain.

7.1 General Interventions

There are several structural interventions that can be addressed across the entire value chain. These are long-term interventions that require time and resources to be implemented.

Make extension services more accessible
To improve agricultural productivity and sustainability, it is essential to strengthen extension services by providing comprehensive support to farmers. This includes assistance in pest and disease identification, soil analysis, and tailored recommendations for pesticide and fertilizer use based on specific local conditions. Establishing more field schools can offer hands-on training, equipping farmers with practical skills to address challenges effectively.

Create linkages across the value chain phases
Fostering stronger linkages among value chain actors is crucial for improving market access and efficiency. CSOs should help in facilitating connections between farmers, suppliers, processors, and exporters while ensuring they are well-informed about export requirements and quality assurance standards. By implementing these measures, farmers can enhance productivity, reduce losses, and access higher-value markets, ultimately contributing to a more resilient agricultural sector.

Work on infrastructure Development
Infrastructure development is required to further enhance the value chains. Processing, storage, and packaging facilities need to be better equipped. Many existing facilities require modernization with advanced equipment to improve productivity, reduce post-harvest losses, and meet quality standards for local and export markets.

Additionally, accessibility to these facilities remains a challenge, particularly for farmers in remote areas. Establishing well-equipped processing hubs within each governorate can minimize transportation barriers and ensure farmers have timely access to essential services.
Expanding cold storage and improving logistics networks will further strengthen the value chain, reduce waste, and enhance market opportunities for agricultural products. Furthermore, better transportation methods need to be adapted since local transportation remains to be a challenge.

Promote women Integration throughout the value chain phases

Women play a large role in farming, yet their contributions are often overlooked and undervalued. Despite performing tasks similar to male farmers, their work is typically categorized as family support rather than recognized as essential agricultural labor. To promote gender equality in agriculture, it is vital to formally acknowledge and integrate women's roles within the sector.

This includes providing women with equal access to training, resources, and financial opportunities while ensuring they receive fair wages for their labor. Encouraging their participation in decision-making and leadership positions within farming communities will further enhance productivity and strengthen the agricultural workforce.

Integrate digital interventions through out the value chain phases

Digital solutions should be incorporated across various phases of the agricultural value chain to enhance efficiency and market access. Key strategies include developing digital platforms to connect farmers with traders, processing facilities and end market, and agricultural service providers.

Despite existing challenges, some farmers have already begun using digital tools for knowledge-sharing. WhatsApp groups, for instance, serve as informal networks where farmers exchange instructional videos on land preparation, seed selection, sowing, and irrigation. However, the adoption of such methods remains limited. Expanding structured digital learning initiatives and providing targeted training can ensure broader accessibility, empowering farmers with the skills and resources needed to leverage technology effectively.

The following are the general interventions across all selected value chains:

Areas of Intervention	Strategies
Agriculture Extensive Support	• Provide pest and disease identification, soil analysis services, context specific pesticides and fertilizer advice. • Set up field schools for practical hands-on training. • Connect the value chain actors with one another. • informing actors on export requirements and quality assurance.
Value Chain Linkages	• Create linkages between farmers and processing facilities and exporting companies. • Connect farmers directly with the end market. • Connect farmers and traders with better transportation methods.
Infrastructure Development	• Upgrade equipment used in processing facilities • Use climate sensitive storage units • Connect actors with facilities outside of their respective governorates for better local market access
Women Integration	• Integrate women's work more thoroughly across • Work on a better division of labor for women.
Digital Solutions	• Introduce digital market access. • Create platforms to connect farmers with traders and/or processing facilities. • Connect farmers with agriculture services through digital platforms.

Table 9 : General Interventions

7.2 Crop Specific Interventions

The Crop specific interventions mainly focus on challenges and mitigation strategies needed per crop. Most of these interventions are focused on adapting climate mitigation strategies and smart agriculture practices. Smart Agriculture techniques enhance the productivity, efficiency and resilience of crops, by optimizing the resources available to the farmer. The adoption strategies include:

Choosing climate-resilient seeds & varieties

The climate resilient varieties chosen should focus on:

- Adapting drought- and heat-tolerant cultivars.
- Using local landraces adapted to Upper Egypt's climate.

Creating an efficient water management schedule

Good water management practices include:

- Expanding drip irrigation and subsurface irrigation networks.
- Promoting rainwater harvesting and soil moisture conservation.
- Using drought-resistant rootstocks for fruit trees like pomegranate.

Implementing practices to preserve soil health

Preserving soil health can be done by:

- Applying organic compost and biochar & mulch to retain moisture.
- Reducing chemical fertilizers to prevent soil degradation.
- Practicing crop rotation especially in onion with hibiscus planting, to maintain soil fertility.

Implementing agroforestry and shade management strategies

Examples of agroforestry include:

- Integrating shade trees such as moringa around crop fields.
- Using cover crops to prevent soil erosion and retain moisture.

Improving storage and processing units

This can be done by:

- Introducing solar drying units for hibiscus, fennel, and henna to reduce losses.
- Using climate-controlled storage for onions and pomegranates.
- Implementing cold storage solutions powered by renewable energy.

The following table shows each crops key vulnerabilities and their adaptation strategies:

Table 10 Climate vulnerability per crop and their adaptation strategies

Crop	Vulnerabilities	Adaptation Strategies
Pomegranate	• Heat stress • Water shortage	• Use drought-resistant varieties • Improve irrigation methods
Hibiscus	• Heat stress • Water shortage • Soil degradation • Temperature fluctuation	• Preserve soil health • Integrate Intercropping & crop rotation practices
Onion	• Temperature fluctuation • Pest infestation. • Heat stress	• Use climate-controlled storage • improve pest control methods

		• Adopt soil management strategies including inter-cropping
Henna	• Drought-sensitive crops • Heat and humidity stress	• Use drip irrigation • Apply moisture conservation methods
Pumpkin	• Heat stress. • water stress	• Use drought-tolerant varieties • Adapt agroforestry practices
Loofah	• Soil degradation • extreme heat	• Adapt agroforestry practices • Use organic fertilization & compost
Fennel	• Temperature fluctuations • water stress	• Plant fennel early • Improve storage units

7.3 Value Chain Phase Specific Interventions

Some phases of the value chain require specific interventions that can be done in the short to medium term. Ost of these interventions focus on capacity building.

Pre-farming

Choosing the right input supplies is crucial for improving agricultural productivity. The appropriate use of pesticides and fertilizers significantly impacts crop yields, but excessive pesticide application can lead to resistance. Therefore, technical supervision and proper training for farmers are necessary to ensure the correct quantities are used effectively. Additionally, many farmers lack awareness of crop waste mitigation, often considering it inevitable. Some attempt to address the issue through pesticide and fertilizer application but lack the necessary training to select the most suitable interventions.

Expanding access to high-quality, climate-adapted and good quality seeds should be prioritized. Many farmers receive low-quality or counterfeit seeds, leading to poor yields and plant diseases such as root rot, as reported in Sohag. Although the farmers don't have the expertise to effectively choose the seeds, they only see the result. While climate-resilient onion varieties have been developed, their availability remains limited in the region. Pumkin resilient varieties are also important but choosing the right variety and picking between local and international varieties have become an issue. The effectiveness of climate-resistant seeds depends on factors such as climate, soil conditions, and water salinity, making geographicspecific solutions essential.

Farming

Guidance on optimal irrigation schedules is also essential, particularly in addressing climaterelated challenges such as frost and extreme heat. Farmers need to understand whether to irrigate during the day or night to maximize water efficiency and crop health. The implementation of modern irrigation systems can play a key role in sustainable water use and improving productivity. Additionally, a lack of collaborative pest control efforts among farmers further threatens crop yields and must be addressed through coordinated strategies.

Proper irrigation and chemical application schedules are vital to prevent cross-contamination between pesticides and fertilizers. However, many farmers, particularly in Qena and Luxor, lack the training to implement these practices effectively. Training programs should be introduced to enhance their understanding and ensure safe agricultural practices.

Climate Mitigation Methods

To enhance resilience against climate change, farmers should adopt soil conservation techniques, intercropping, agroforestry, and climate-resilient seed varieties. These practices can help maintain soil health, improve water retention, and increase productivity under changing environmental conditions. Additionally, promoting drought-resistant crops will ensure more stable yields despite rising temperatures and irregular rainfall patterns.

Community-led climate mitigation initiatives should be encouraged, fostering collaboration among farmers to share knowledge, resources, and best practices. Establishing cooperative networks can help implement sustainable farming techniques at a larger scale while providing support in times of climate-related challenges. Greater engagement between farmers, agricultural experts, and policymakers will also be essential in developing long-term climate adaptation strategies.

Processing

Improving drying, grinding, sorting, peeling, packaging, and storage methods can enhance

product quality and marketability. Additionally, promoting value-added activities such as jammaking, spice production, and handicrafts like basket weaving can create new income opportunities for farmers and rural communities. Most workers need better capacity building on how to adapt these techniques.

End Market

Farmers need real-time market data to avoid oversupply and price drops. Digital market information systems can help them make informed crop choices, rather than relying on last year's crops performance. Furthermore, more digital access to markets should be introduced to help create better linkages.

The following are the value chain phase-specific interventions:

Table 11 Phase Specific Interventions

Key Areas of Intervention	Strategies
Pre-Farming and Farming Practices	• Use good quality input supplies, and seed selection. • Provide capacity building in pesticide use, waste management and recycling methods, pest handling, and making compost. • Provide capacity building in using modern faring techniques such as drip irrigation, integrating solar power and using sensors
Climate Change Mitigating Methods	• Provide capacity building in soil conservation techniques, intercropping and agroforestry practices. • Promote the use of drought and climate resilient seed varieties • Allow for community collaboration to implement climate mitigation methods and knowledge sharing.
Value-added Activities	• Provide capacity building in practices such as drying, grinding and peeling. • Provide capacity building in activities such as jams and spices making, baskets weaving…etc. • Inform actors on storing and packaging international and local standards. • Provide better packing materials to meet international and local standards.
End Market	• Equip farmers with a better understanding of the market, to ensure there is no oversupply. • Connect farmers and processing facilities to the end market.

8 Annex

8. Annex

The following Annexes are related to the Value Chain Selection Process

Annex 1 – Long List criteria

#	Criteria for Longlisting Sectors
1	The value chain is predominant in terms of one or more of the following points: - The value chain absorbs labor - The value chain has a considerable share in total governorate production - The value chain has several industrial establishments
3	The sector is not exclusively publicly owned
4	The sector does not contradict government directions
5	The sector is not characterized by inhumane working conditions

Annex 2 – Long List scoring matrix

Sector	Longlist Selection Criteria			
	The sector is predominant in terms of absorbing labor and/or contribution to the governorate economy	**The sector is not exclusively publicly owned**	**The sector does not contradict government directions**	**The sector is not characterized by inhumane working conditions**
Pomegranates	1.	1.	1.	1.
Wheat	1.		1.	1.
Mangoes	1.	1.	1.	1.
Grapes	1.	1.	1.	1.

Peppers		1.	1.	1.
MAPs	1.	1.	1.	1.
Sugar Canes	1.		1.	1.
Dates	1.	1.	1.	1.
Bananas	1.	1.	1.	1.
Tomatoes	1.	1.	1.	1.
Onion		1.	1.	1.
Citrus	1.	1.	2.	3.

Annex 3 – Weights and rationale for the selection criteria

Sample Selection Criteria	Sample Weights (percentage)		Rationale
Availability of climate and water - smart solutions	35 %	Major	The selected criteria have the largest weight because (a) they are the most criteria that serve the objectives of the project and (b) they directly reflect the potential of the value chain to contribute to women and youth employment and entrepreneurship
Availability of employment opportunities for women and second-generation farmers	25 %	Major-Minor	The selected criteria have the second largest weight because (a) they directly serve the objectives of the assignment and (b) they indirectly reflect the potential of the sector to contribute to women and youth employment and entrepreneurship
Availability of entrepreneurship opportunities for women and youth	25 %		
			The selected criteria have the least weight because (a) the indirectly serve the objectives of the assignment and (b) they partially reflect
Availability of opportunities for digitalization	15 %	Minor	the potential of the sector to contribute to women and youth employment and entrepreneurship

Annex 4 – Scoring of shortlist selection criteria

VC	Selection Criteria				
	Availability of climate and water- smart solutions	Employment opportunities	Entrepreneurship opportunities	Digitalization	**Weighted Score**
Pomegranate	3	3	2	3	2.75
Dates	3	3	3	2	2.85
Bananas	1	2	2	3	1.8
Tomatoes	3	2	2	2	2.35
Mangoes	3	2	2	2	2.35
	1	2	2	2	1.65
Citrus	1	2	2	2	1.65
MAPs	3	3	3	2	2.85

Annex 5 – Selection Report

Value Chain Selection - Private Sector Promotion - 30.5.24

Annex 6 - Discussion Guide for Farmers

دليل المناقشة - مزارعين.pdf

Annex 7 – Discussion Guide for Traderst

دليل المناقشة - التجار.pdf

Annex 8 – Discussion Guide for CSOs

دليل المناقشة - الجهات الرسمية.pdf

Annex 9 – Discussion Guide for Processing Unites

دليل المناقشة - وحدات التجهيز الاولي.pdf

Annex 10 – Discussion Guide for Exporters

دليل المناقشة-المصدرين.pdf

Annex 11 - Discussion Guide for FGDs

دليل المناقشة - مجموعة تركيز - السيدات.pdf

Annex 12 – Survey

PSP Surveys - Dec. 10.docx

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