This study is conducted by **GIZ Egypt**, on behalf of the German Government through the Agriculture Innovation Project (AIP) and in cooperation with the Ministry of Agriculture and Land Reclamation It has been prepared by Enroot Consultancy in May 2020.

About the Agricultural Innovation Project

The Egyptian-German Agricultural Innovation Project (AIP) is a bilateral technical cooperation program implemented by Gesellschaft für Internationale Zusammenarbeit (GIZ) with the primary aim of increasing the income of small-holder farmers in Egypt using agricultural innovation and agribusiness promotion. In line with that, the project focuses on supporting value chains of high-value using a market-oriented approach.

For more information about the project:
https://www.giz.de/en/worldwide/92509.html

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List of Acronyms

AIP	Agricultural Innovation Project
EU	European Union
FGD	Focus Group Discussion
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GIZ	Gesellschaft für Internationale Zusammenarbeit
IZ	Industrial Zone
IDI	In-depth Interview
MALR	Ministry of Agriculture and Land Reclamation
MAP	Medicinal and Aromatic Plants
MSA	Market System Analysis
NFSA	National Food Safety Authority
NGO	Non-governmental Organization
OHS	Occupational Health & Safety
PPE	Personal Protective Equipment
PPP	Public Private Partnership
UAE	United Arab Emirates
UE	Upper Egypt
UK	The United Kingdom
USA	The United States of America
USD	US-Dollar

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Executive Summary

Background and Approach

The Egyptian-German Agricultural Innovation Project (AIP) is a bilateral technical cooperation program implemented by Gesellschaft für Internationale Zusammenarbeit (GIZ) with the primary aim of increasing the income of small-holder farmers in Egypt using agricultural innovation and agribusiness promotion. In line with that, the project focuses on supporting value chains of high-value using a market-oriented approach. Accordingly, a research methodology was tailored and applied to identify the value chains that have the highest market growth potential, benefit smallholder farmers, have a relatively high female participation, have the potential to benefit from the introduction of innovative practices, and have the ability to stimulate change.

The identification and the selection process of the value chains involved both qualitative and quantitative analysis. The research focused on obtaining an in-depth understanding of the agribusiness market setup and potential in Upper Egypt and carried out the following activities: 1. Defined goals and target groups; 2. Set criteria for the identification, selection, and exclusion of value chains; 3. Conducted a rapid assessment based on which scores were awarded; 4. Developed a comparison matrix based upon which the crops and governorates were selected in consultation with the GIZ team.

This process resulted in the selection of the following value chains:

- Medicinal and Aromatic Plants (MAPs) (Chamomile, Fennel, Basil, Marjoram)
- Pepper (Green and chilli peppers)
- Onion and Garlic (Green and dry)

The governorates were chosen based on the concentration level of the selected crops. Accordingly, Beni Suef and Minya were chosen as the primary geographical focus. However, interventions, may also extend to other geographical areas where downstream activities in the value chain are taking place.

Following the selection of the value chains and the governorates, an in-depth value chain analysis has been conducted using a Market System Approach (MSA). This included analysing the main activities of the selected value chains in addition to their supporting functions and the rules and regulations affecting them. Opportunities, key constraints, and the underlying causes of poor performance were identified and thoroughly analysed.

Finally, evidence-based interventions were recommended that address key constraints and opportunities.

Overview of the Value Chains

THE MEDICINAL AND AROMATIC PLANTS (MAP) VALUE CHAIN

Despite its small contribution to Egypt's total cultivated area (1%), the MAP sector is of high priority to the Government and development actors.[1] [2] The MAPs sector has high export potential, it relies on small-scale farmers and holds good capacity for value addition. Upper Egypt includes 92% of Egypt's MAP production and 50% of that is concentrated in Beni-Suef and Minya.

Most of the MAPs production is geared towards exporting, with 80% of the production

exported to European, American, and far eastern markets. Of the MAPs products, coriander seeds cater the highest to the domestic market in addition to other seeds that are sold in small quantities as spices or teas.

Egypt produced 133,000 tons in 2018, 80% of which were exports for 173.83 million USD. [3] [4] The main importers were Brazil, UK, Germany, USA, Spain, South Korea, Netherlands,

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[1] Sustainable Agricultural Development Strategy Towards 2030 (MALR)

[2] Considered in programs and projects of different development partners including FAO, IFAD, UNIDO, AFDP, UNDP among others

[3] CAPMAS

[4] TRADEMAP

France, Canada, and Poland. It is estimated that Egypt's MAPs sector has an untapped exports potential of 85.4 million USD, mainly to Germany and the USA.[5]

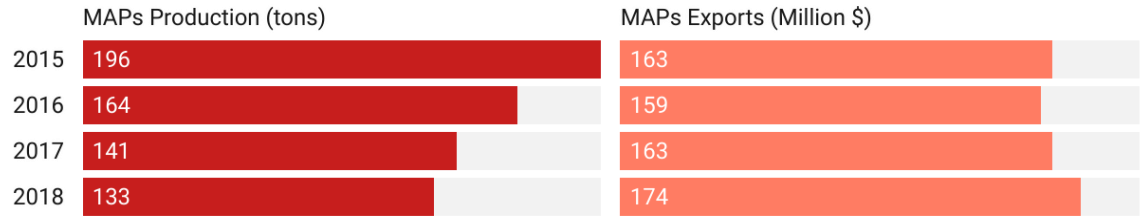


Figure 1 MAP's Production Quantity & Exports Value (in tons & million USD) (CAPMAS)

In the MAPs value chain, most of the transactions are done by local traders who collect the produce from small growers (usually fragmented plots with an average area below 1 Feddan). For herbs and spices, the traders usually conduct drying, basic cleaning and screening, separate the products according to quality and sell them to processors (majority in greater Cairo, Alex, East and West Delta, and Fayoum). Processors perform sifting, cutting, purification, grading, packaging (of dried herbs and spices), and refining and blending (of raw essential oils). All processors are formally registered factories that, mostly, export the products in bulk. Few processors sell consumer packed products to the local market (loose or packed spices and tea bags and small quantities of loose or packed essential oils). There are 235 exporters registered at the Agricultural Export Council, a small number (about 40) of which own processing facilities and operate a sustainable business.[6] [7] Other exporters and/or brokers that do not own processing facilities handle smaller-sized transactions, usually of lower quality products, procured directly from the traders. Lack of quality control over the latter, causes some of the products to be rejected by export markets and consequently harm the reputation of the whole sector.

The main actors of the MAPs value chain and their interlinkages are illustrated in the above figure. Forward and backward integration take place between the different market actors. Large-scale processors perform backward integration using modern mechanization when farming large plots on reclaimed land. However, they still procure most of their supply from the stream of traders/small-scale farmers since the varieties grown require manual picking and handling.

The value chain assessment identified four MAP crops as having the highest potential. These are Chamomile, Marjoram, Basil, and Fennel. Based on the research, these four crops presented the highest potential in terms of international market demand, value addition, women employment, and need for innovation. It is worth noting that the focus on

[5] ibid

[6] Agricultural Export Council

[7] ibid

these four crops in the study does not imply an exclusion of the remaining crops from the scope of the AIP project. The findings of the study are also relevant for all crops in the MAPs value chain. The key findings are summarized below.

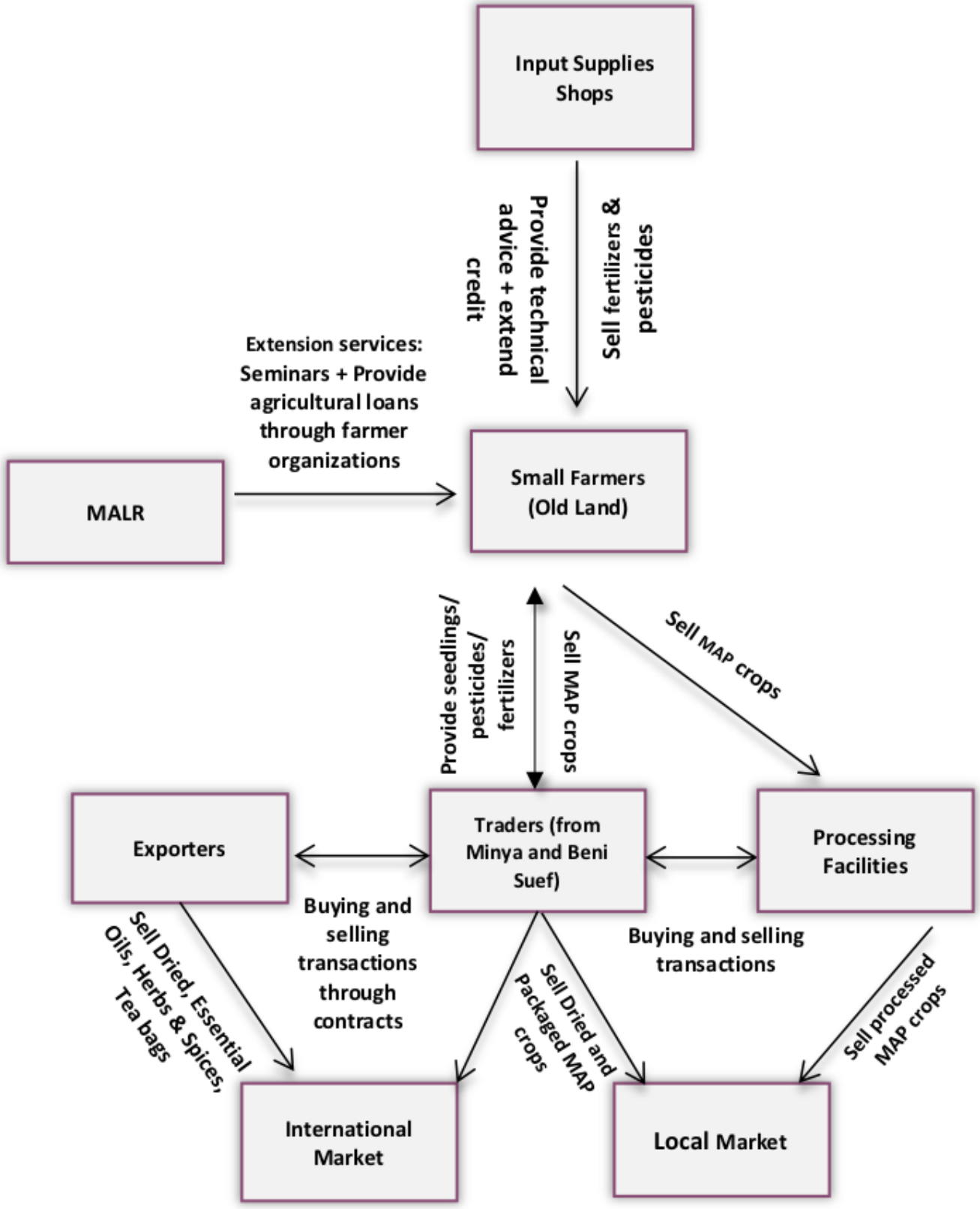

Input Supplies Shops
Provide technical advice + extend credit
Sell fertilizers & pesticides
Extension services: Seminars + Provide agricultural loans through farmer organizations
MALR
Small Farmers (Old Land)
Provide seedlings/ pesticides/ fertilizers
Sell MAP crops
Sell MAP crops
Exporters
Traders (from Minya and Beni Suef)
Processing Facilities
Buying and selling transactions through contracts
Buying and selling transactions
Sell Dried, Essential Oils, Herbs & Spices, Tea bags
Sell Dried and Packaged MAP crops
Sell processed MAP crops
International Market
Local Market

Figure 2 Business and Market Interlinkages

THE PEPPER VALUE CHAIN

Egypt has been producing 650,000 -750,000 tons of fresh pepper. [8] Most of the production is consumed locally. The exports of fresh pepper ranges between 5,000 to 7,000 tons annually, reaching its peak in 2016 with an export of 17,000 tons valued at 7.5 million USD. [9] This is a negligible ratio compared to the global trade of fresh peppers, which is between 5 to 6 million tons. Egypt also exports around 600 to 700 tons of dried and/or crushed chili pepper for a value of 1-1.2 million USD (of 4-5 million tons traded globally). This amount of dried pepper is extracted from 5,000 tons of fresh pepper. Egypt also exports pickled peppers (either alone or as mixed pickles) but its amount cannot be precisely estimated as it is calculated together as part of all pickled vegetables. Market experts believe the amount of exported pickled peppers to be relatively negligible compared to fresh ones.

While the share of exports-to-production is still relatively limited, the existence of a global market gap shows that Egypt has strong prospects to expand its share of exports in the global market. This can be achieved by developing the pepper value chain, including the drying of chili peppers and the pickling of high-end varieties demanded by the global market. The recent production and export trends of fresh pepper are presented in the figure below.

[8] FAOSTAT
[9] TRADEMAP

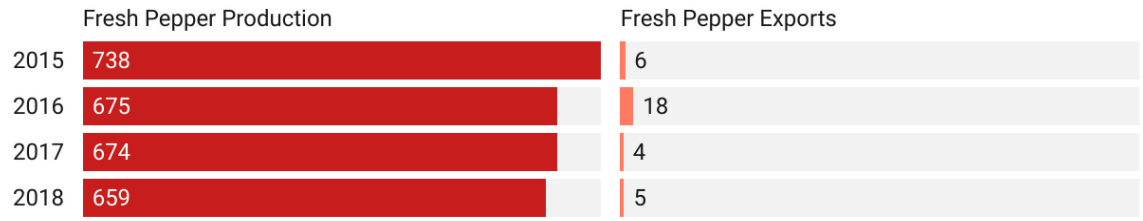


Figure 3 Egypt's production and exports of fresh pepper (in tons)

The main importers of fresh pepper are Libya, Saudi Arabia, Hungary, Russia, Italy, and Lebanon. The main importers of dried chili pepper are Tunisia, Libya, Pakistan, Morocco, Algeria, Jordan, and Turkey.

In Egypt, small-scale farmers source their inputs from nearby shops that also provide some technical guidance on how to use chemicals and pesticides. Information regarding new varieties is mostly obtained from nurseries. Farmers report that they are sometimes sold poor quality pepper seedlings.

Most of the produced fresh pepper is sold to collectors and traders in the vicinity of their production area. Sometimes they are sent to traders at wholesale markets, who then supply them to retail markets or to pickling processors.

Farmers sometimes sell all or part of their produce directly to small processors nearby. These small processing units (usually producing pickled peppers or mixed vegetable pickles including peppers) are informal and produce poor quality products, which is why the majority of processed peppers in Minya and Beni Suef are of low quality. These units do not conform to the minimum food safety and hygiene measures neither do they follow occupational health and safety.

Meanwhile, pepper contract farming is usually done by medium or large-scale processing facilities that pickle high-end varieties for export or for high-end local shops or restaurants. Farmer organizations or lead farmers in the area arrange these contractual agreements between the small farmers and the large-scale facilities. In this model, farmers receive the seedlings and some of the inputs on a credit basis by the contracting buyer who also provides technical assistance and quality control.

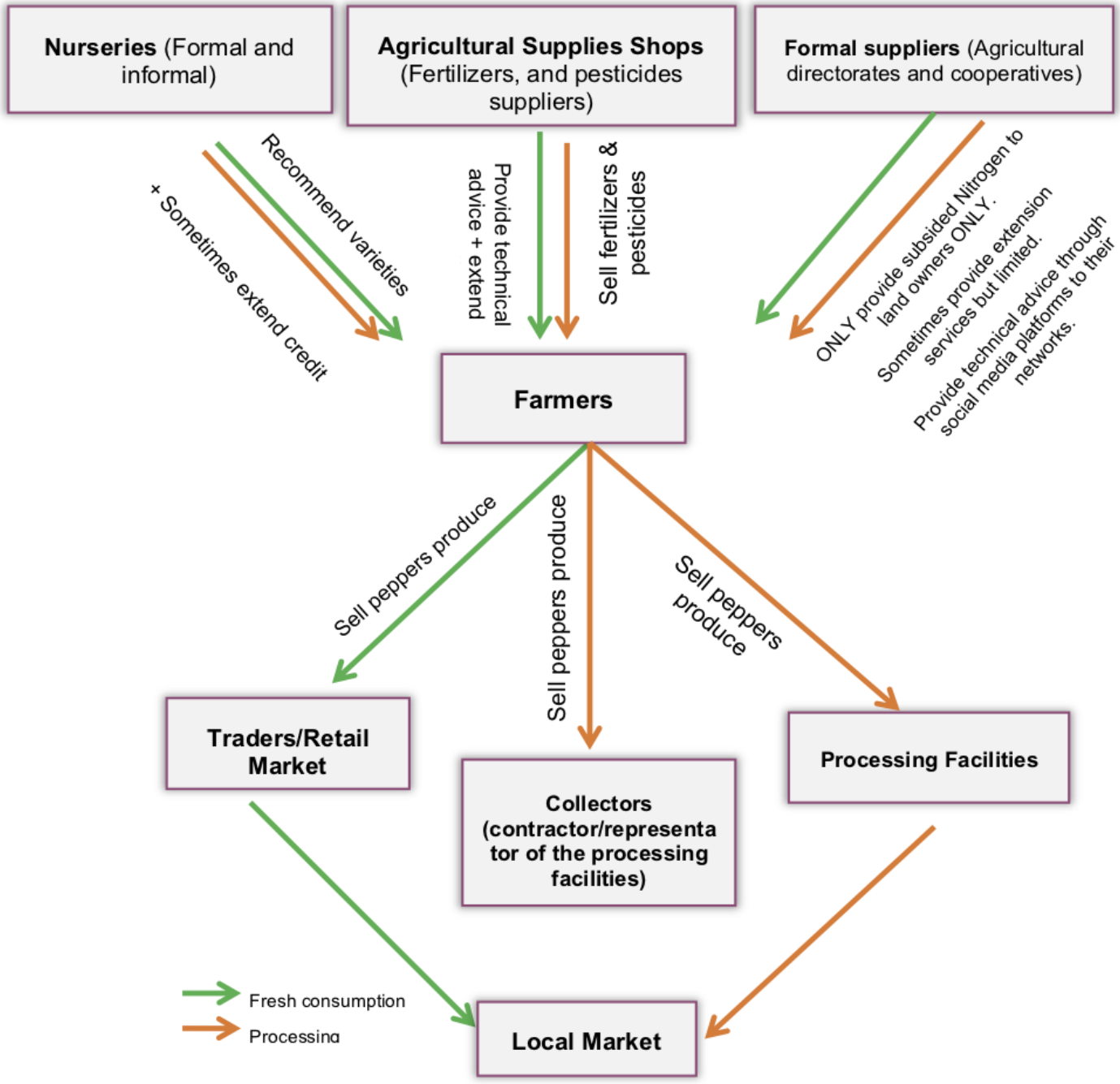


Figure 4 Pepper Business and Market Interlinkages outside Contract Farming

THE ONION AND GARLIC VALUE CHAIN

Onion

In Egypt, onion is a crop that is cultivated in winter. It is mainly concentrated in Upper Egypt, which has about 31.5% of the country's onion production. Of Upper Egypt's total production, 25.4% is grown in Sohag (9.1%), Beni Suef (6.2%), Fayoum (5.6%), and Minya (4.5%).

Considered one of Egypt's most important export crops, onion is prioritized as the third highest after oranges and potatoes. The country's production of onion is around 3 million tons per year, as illustrated in the below figure. Egypt exported 825 thousand tons of fresh onion in 2019 for 244 million USD and 12 thousand tons of dried onion (8.1% of the global exports of dried onion) for about 30 million USD. It was ranked the third highest global exporter that year, after India (118 million USD) and the United States (79 million USD).

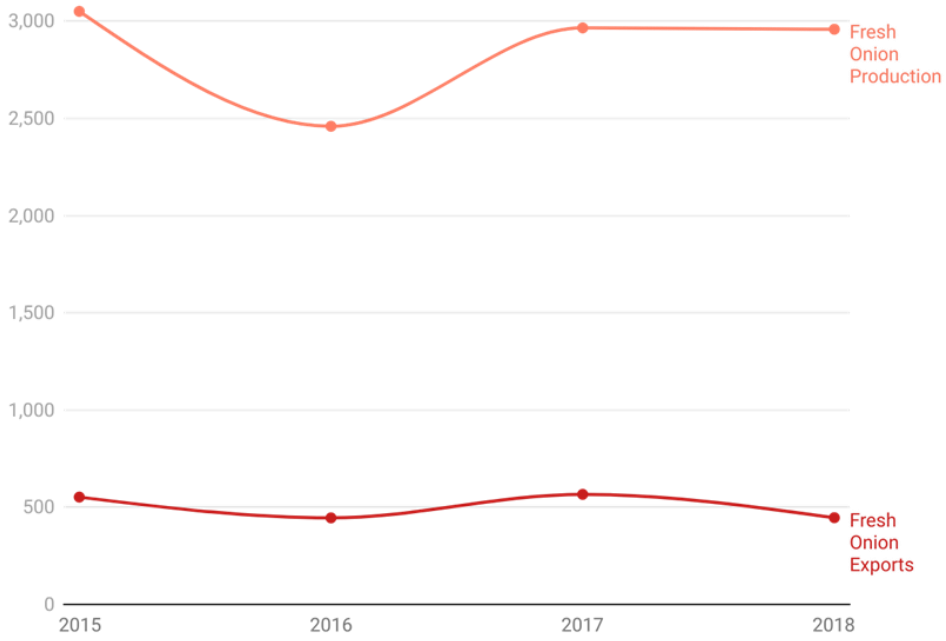


Figure 5 Egypt's Production and Exports of Fresh Onion (in 1000 tons)

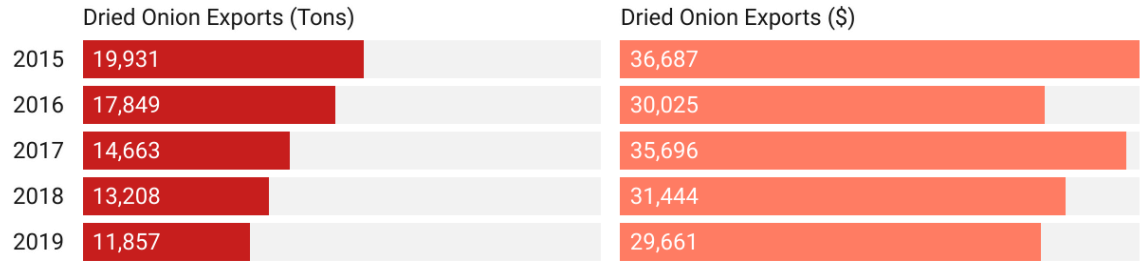


Figure 5 Egypt's Exports of Dried Onion in 1000 tons (left) & 1000 USD (right)

Main importing countries of fresh onion are Saudi Arabia, India, the Netherlands, Turkey, Russia, the UK, and the UAE, while main importing countries for dried onion are the Netherlands, Germany, Japan, the USA, and Croatia.

It is worth noting that the 12 thousand tons of exported dried onion are produced from an estimated total amount of about 100,000 tons, which is the amount of onion directed to the processing stream of drying. An additional portion of dried onion is sold locally as an ingredient to food processing factories (processed meat, soup preparations and flavours), which is around 10% of the exported amount.[10] Another stream of fresh onion is directed for processing as onion pickles or mixed pickles and is estimated to be less than 2% of total fresh production.[11]

[10] Estimation by Food Sector Experts from local market knowledge

[11] ibid

Garlic

In Egypt, three main varieties of garlic are cultivated, the indigenous/Baladi garlic, the

SEDS 41-42 (an originally Chinese variety) and the Spanish garlic. Seed breeding of different garlic varieties began in the 1980s, introducing the SEDS 41-42 cross section variety. Like onion, garlic is a winter crop. Upper Egypt contributes to about 68.8% of garlic production in Egypt, and 55% of this quantity is concentrated in Beni Suef and Minya.

The country's annual production of garlic is about 300,000 tons, as shown in the below figure. Egypt was ranked as the 6th largest garlic exporter, after China, Spain, Argentina, and the UAE. It exported 36,400 tons in 2019 for 28.5 million USD. Moreover, the increasing global demand on garlic raises Egypt's prospects to expand its global market share. The main importing countries from Egypt are China, Russia, Jordan, Poland, Turkey, Brazil, Lebanon, and Palestine.

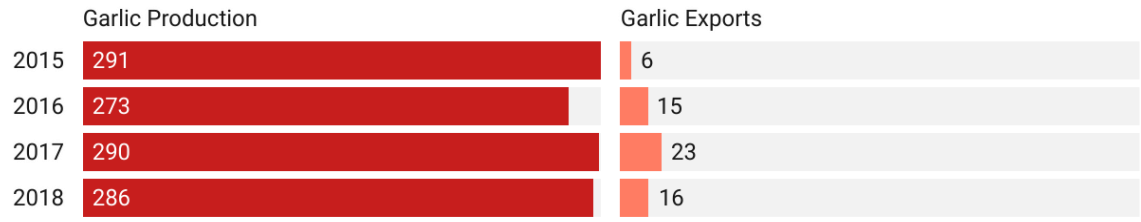


Figure 6 Egypt's Production (left) and Exports (right) of Garlic (in tons)

It is also worth noting that Egypt imports garlic from China. The volume of imports increased from 2,500 tons in 2014 to 9,000 tons in 2018. This imported garlic is usually well packaged and has good usage and edible specifications (easy peal and a relatively good flavour). On the other hand, the Egyptian garlic excels in flavour but lacks proper

post-harvest preparation and final consumer packaging. Although the amounts of garlic imported is small compared to total local production, it can still be decreased if more effort is exerted in improving post-harvest activities and packaging.

Countries that can be good candidates for Egypt's untapped potential for fresh garlic export are Italy, Indonesia, and the UAE. Meanwhile, countries with the highest potential of becoming trade partners, in terms of export value, are Indonesia, the UAE, and the USA, where the potential is worth 6 to 7 million USD.

The interlinkages between the actors involved in the onion and garlic value chains are summarized in the below diagram. Most of the produce is sold upon production to traders in nearby collection points and some are sold to traders at wholesale markets. With few exceptions (e.g., farmer groups contracted by onion drying processors), these traders are usually the main link to new market channels, whether for local retail, fresh exports, or processing. Most of fresh garlic is planted using locally produced seeds that are of lower quality.

Farmers contracted by onion drying factories use seeds provided by the factories, which produce onions with a higher solid content and other specifications suitable for drying. Research has shown that onion drying factories are interested to expand on the contract farming model, however, they are hindered by the poor capacity and organization of farmer organizations. Most of the large-scale onion drying processors started, as an alternative, to contract large farms in reclaimed land or to move backwards in the supply chain and establish and manage their own large-scale farms in the desert to secure part of their supply. There is room for expanding contractual farming of onion and garlic by improving the performance of the farmer organizations and establishing a viable business model.

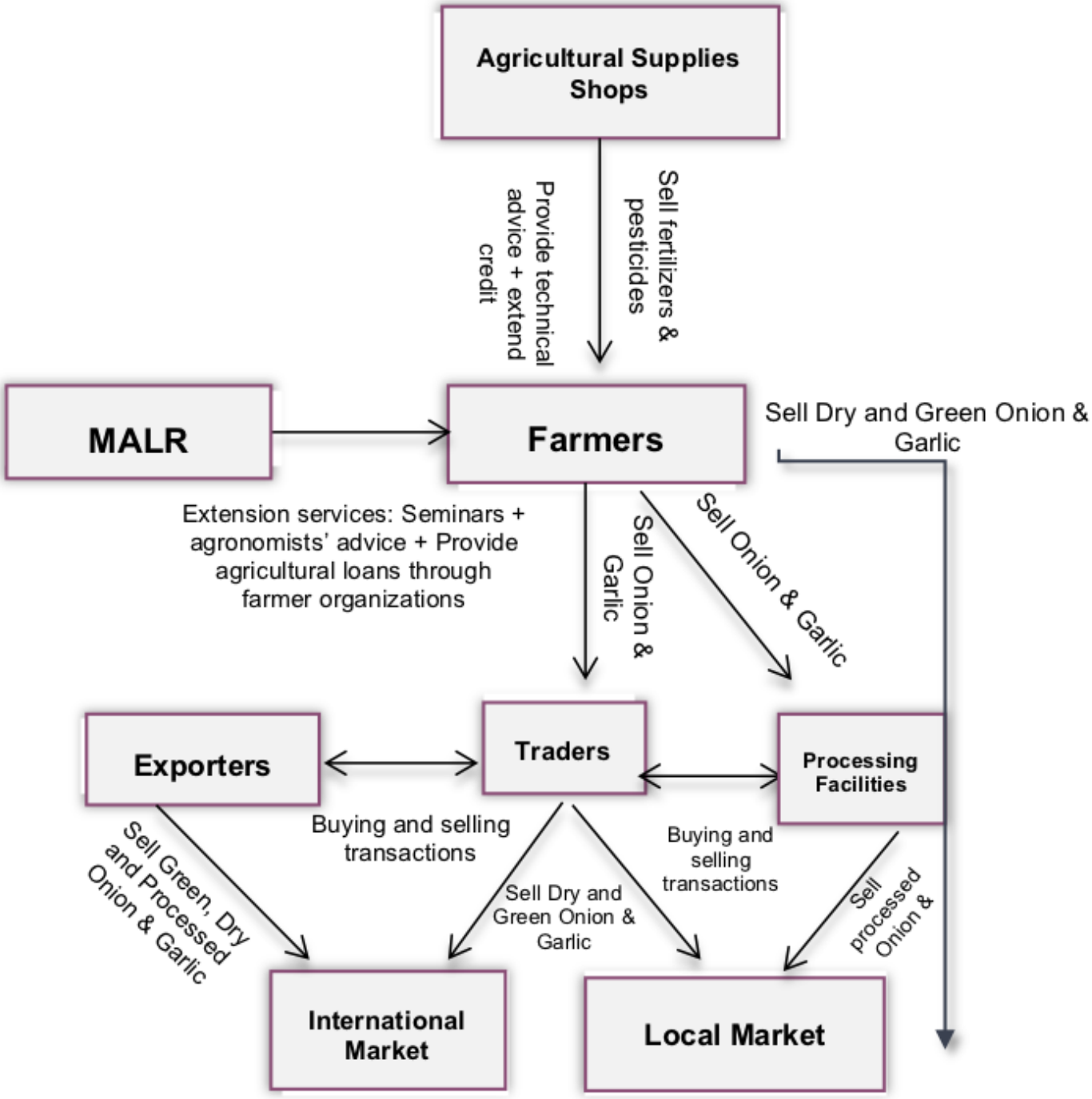

Agricultural Supplies Shops
Provide technical advice + extend credit
Sell fertilizers & pesticides
MALR
Farmers
Sell Dry and Green Onion & Garlic
Extension services: Seminars + agronomists' advice + Provide agricultural loans through farmer organizations
Sell Onion & Garlic
Sell Onion & Garlic
Exporters
Traders
Processing Facilities
Buying and selling transactions
Buying and selling transactions
Sell Green, Dry and Processed Onion & Garlic
Sell Dry and Green Onion & Garlic
Sell processed Onion &
International Market
Local Market

Figure 7 Business and market linkages of garlic & onion

Main Findings

FARMING MODELS

The maturity of the value chain differs greatly depending on the farming model under which the crop is cultivated. The conducted fieldwork identified that the MAPs VC is relatively mature compared to the onion, garlic, and pepper VCs. Still, within each VC, there are different farming models with different maturity levels. For example, the peppers market has three different farming models, namely independent farming, contract farming, and a fully integrated business model. The first is the least developed amongst them, followed by contract farming and then the business model established by large-scale processors/exporters. While the latter does not require extensive interventions, the first and second do. Interventions tailored for contract farming should be adapted to the existing business models. For example, the models for MAPs will be strongly based on existing traders and consolidators, while for garlic and onion the farmers organization would play a greater role. Lastly, for pepper the processors and exporters are the main actors in leading the process.

POTENTIAL FOR EXPORTING

The study shows that all the selected crops have potential to further expand their exports market. Nonetheless, any expansion requires further improvements throughout the value chain to attain better quality products. For example, while the volume of medicinal plants currently exported by Egypt for use in the perfumery and pharmaceutical industry reached 94.1 million USD, there is potential for it to reach 165.5 million USD. [12] This shows that there is an untapped potential of 85.4 million USD. The USA and Germany are the countries with highest export potential. Onion (fresh and dried) has an untapped exports potential of around 40 million USD and Garlic a 2 million USD. However, this potential to increase exports remains limited by the low exports trade performance of Egyptian fresh and dried peppers. Improvements are, thus, required in the pepper VC.

POOR PRACTICES

The most widespread poor practices identified in cultivation and post-harvest include:

- The use of broken or off-quality seeds which result in lower quality and productivity. This causes income losses especially to small farmers.

[12] TRADEMAP

- The excessive use of unregistered/unrecommended pesticides and fertilizers, lowering quality and productivity. These pesticides often fails to combat pests and, therefore, add costs.

- Reliance on the flood irrigation system, which results in lower quality and productivity. For example, it increases pests and diseases affecting the crops.

- The adoption of poor post-harvest practices. For example, the infrastructure required for medicinal and aromatic plants as well as for onion and garlic, is poor or lacking. Unprotected open-air drying is commonly used, which subjects the products to external pollutants and contaminants, decreasing profit. Poor post-harvesting preparation and packaging hinders selling to high-end consumer markets, which are alternatively supplied by imports from China.

POOR PROCESSING PRACTICES.

For instance, peppers are processed in informal processing units that lack food safety and hygiene standards, which makes the products unqualified for exporting. access to knowledge

Given the compromised public extension services, some technical assistance and advice is offered to growers and processors by a variety of knowledge agents that do not always provide accurate information. The assistance is usually provided by lead farmers, farmer organizations, input suppliers, traders, and contracted buyers. One of the problems mentioned by farmers is that input suppliers sometimes provide inaccurate information. More ‘adequate’ technical support and advice is required.

ACCESS TO MARKET

There is an evident disconnection between the farmers and the market, with the exception of a limited number of farmers working under contract farming or as part of fully integrated business models. The farmers growing the crop rely only on information from knowledge agents. Their decision to grow a certain crop or variety is solely dependent on the availability of seeds/seedlings provided by the supplier. By understanding the different farming models and building on existing more mature models, knowledge exchange will qualify the framers to improve their existing model.

Willingness to innovate

There is an evident willingness from the side of farmers and of processors to adjust the current practices and replace them with more improved and innovative ones. This reflects a high level of awareness of the key constraints identified within the value chains. These include the need for solutions to address cross-contamination in small MAP plots, low-cost solutions to address poor post-harvest practices at MAP open-air sun-drying, introducing

food-safety and hygiene practices to pepper pre-processing, introducing solutions for post-harvest pest control when curing the onion, matching supply and demand in onion and garlic by providing market information and introducing effective contract farming models, and introducing effective contract farming models across all value chains.

Considering the above findings, the recommended interventions for each value chain are summarized in the following section.

Recommended Interventions

MEDICINAL AND AROMATIC PLANTS

- Build the capacity of knowledge and extension agents (public and private) and improve their tools. This can be done by conducting basic as well as advanced training on good agricultural practices for knowledge agents, establishing demonstration fields to introduce innovative practices, conducting advanced training and study tours for excelling knowledge agents, and supporting networking and exchange between knowledge agents while engaging universities and technical schools in the process. The project should then support the dissemination of knowledge to small holder farmers by conducting field visits to the extension/demonstration fields and disseminating extension material to farmer groups via different channels, including social media.
- Introduce innovative solutions for organic farming in small plots. Evidently, small farmers are unable to fulfil organic production requirements due to cross-contamination challenges. It is recommended to develop economically viable solutions that address this problem. The project can provide incubation and business development support and seed funds and disseminate knowledge about successful solutions on a wide scale.
- Enhance post-harvest practises and develop cost-effective solutions and business models. This could be accomplished by providing competition funds and grants for the establishment and improvement of post-harvest facilities in accordance with the best hygiene and food safety principles. In addition, it could also be done by enhancing the capabilities of farmer organisations and traders with respect to the safe handling of products, by providing business development services to farmer organisations on the management of post-harvest facilities based on a viable business model, and by increasing awareness of enabling working environments. This should be followed by organising field visits to demonstrate and promote enhanced post-harvest facilities, as well as creating and disseminating knowledge materials to a larger group of farmer organisations and traders.

PEPPER

- Build the capacity of the knowledge and extension agents (public and private) and improve their tools. It is recommended to follow the same approach introduced above in the MAP value chain section.
- Introduce innovative and improved practices for post-harvest preparations and processing activities by conducting advanced capacity building programs for preparation and processing units. It can include basic and advanced trainings on food safety and hygiene for workers in small preparation and processing units. Moreover, it can involve supporting demonstration units to help them introduce improved practices via study visits and practical trainings at the units.
- Introduce and pilot an integrated business model for contract farming and group farming of pepper in the selected region. Improvements can be made through assessing existing business models and promoting successful ones. Special attention should be directed towards the fully integrated models, where processing varieties can be made available by contracting processors/exporters or by certified input suppliers, and where technical assistance is secured by the contracting firm (or through other competent sources) and involves quality control throughout the process and on final products. This requires, also, raising awareness of farmers and buyers on the benefits of contract farming.

ONION AND GARLIC

- Introduce innovative and improved agricultural practices, including post-harvest activities. This would follow the same approach as the one introduced above in the sections on the MAPs and pepper value chains. Special attention should be given to handling post-harvest pests during the curing of onion.
- Introduce innovative and improved preparation (pre-processing) practices with a focus on food safety and hygiene. This may be done by conducting basic and advanced practical trainings on food safety at model preparation and pre-processing units. A selected number of units for onion peeling and for the preparation of green garlic may be upgraded in collaboration with their owners to adhere to high food safety and hygiene practices and to be used as demonstration facilities. Further training activities for workers could be organized at their workplaces. Occupational health and safety should be considered as a topic that should be included in the trainings that will be provided.
- Introduce and pilot an integrated business model for contract farming and group farming of onion and garlic in the selected region. It is recommended for onion and garlic VCs to base the model on farmer organizations since they have large cultivation areas in the same proximity where cooperatives can actively play the role of consolidator, among other functions. The model uses serval pilots and can be transferred and upscaled during the following seasons.

Introduction

Egypt's agricultural sector contributed to 11.23 percent of gross domestic product (GDP) in 2018, accounting for 18 percent of all employment opportunities and 45 percent of women employment. In Upper Egypt, 55 percent of employment is agriculture related.[13] Moreover, the country's agricultural exports have been increasing during the past years, as shown by the figures below. However, land fragmentation among small landowners (of 1-3 feddans), who are responsible for nearly 90 percent of horticulture output (i.e., fruit and vegetable) in Egypt, continues to severely impede agricultural development.

Meanwhile, horticulture production contributes significantly to the national economy, with horticulture crops contributing for nearly 36% of total agricultural GDP, yet it only accounts for 13% of the country's total cultivated land.

Horticulture crops, medicinal and aromatic plants and palm dates have high concentrations in Upper Egypt, despite the area still being dominated by traditional field crops (i.e., wheat, corn, rice, cotton, etc.). Developing the production of these crops will increase the revenues of local producers, contributing to the overall local economic development of Upper Egypt.

Value chain activities are constrained by various issues that have systematic negative effects on the incomes of small holder farmers. This includes land fragmentation. Farmers with small plots are unable to implement economies of scale, making production costs higher. Land fragmentation also complicates the introduction of innovative and efficient farming, harvesting and, post-harvesting tools and marketing activities, hindering productivity and lowering profit. In addition, it limits the bargaining power of farmers.

This problem is further exacerbated by having farmer organisations that are weak and with a limited ability to lead collective marketing and selling. Farmer organisations have also had little success in systematically delivering sustainable extensions, market information and Business Development Services.

Moreover, poor post-harvest practices and limited access to markets, are other major problems facing those working in the horticulture sector and, in addition, are also a cause of food waste.

[13] https://www.theglobaleconomy.com/Egypt/share_of_agriculture/

AIP Project Objective

To address the above-mentioned challenges, GIZ introduced the Agricultural Innovation Project (AIP). The main objective of the project is to sustain and increase the income of smallholder farmers In Upper Egypt, through the adoption of agricultural innovation. The AIP objectives include:

1. Increasing the income of small-scale agriculture.
2. Promoting agribusiness in Upper Egypt though technological innovation (targeting sustainability).
3. Consolidating marketing abilities and the diversification of sales channels.

The project is especially focused on promoting innovation throughout the agricultural cycle (i.e., farming, harvesting, post-harvesting, processing, and marketing) to increase the yield and income of farmers while contributing to the sustainability of food, agriculture, and health systems.

Scope of the Study

This study was conducted to provide a holistic understanding of the value chains targeted by the AIP project, to guide the innovative interventions that will be applied for the benefit of small-scale farmers and improve their income opportunities. The study presents a thorough description of the VCs and provides analysis to identify their opportunities and constraints. It has been undertaken with the purpose of acting as a reference to the project when implementing interventions that serve project beneficiaries and the overall development of the targeted VCs.

Three VCs have been chosen to be the focus of the AIP project, namely the MAPs, Pepper and Onion and Garlic. These three VCs were selected based on an earlier study which had identified a set of criteria based upon which they were scored and compared and then selected in consultation with the AIP project team. The two governorates in which the production of these three VCs is concentrated, namely Minya and Beni Suef, were then selected to be the geographical focus of the project.

The study used a Market System Approach which provides an in-depth examination of the value chains to ensure that the project's recommended interventions will be effective and sustainable and will not only address the symptoms but also their underlying causes. This approach also covers the rules and regulations guiding the VCs, in addition to the supporting functions affecting them.

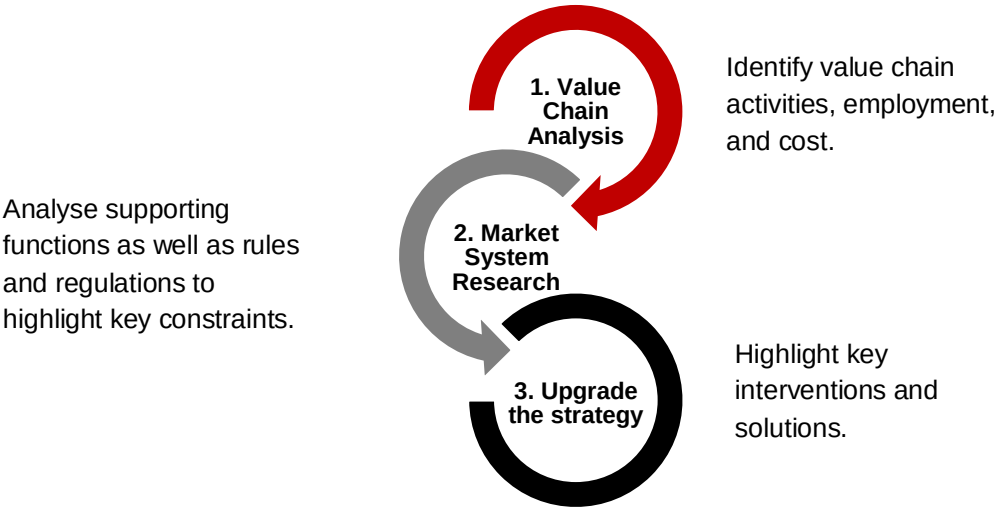
The study concludes with recommendations for better achieving the project's goals.

Methodology

Market System Approach (MSA) was used to analyse the selected VCs.[14] When analysing value chains, the MSA takes into account the supporting functions as well as the surrounding rules and regulations. This provides a comprehensive approach to identifying the primary limitations affecting a given business (as well as their underlying causes) and prospective possibilities. Based on the MSA findings, a set of recommendations were developed with the purpose of aiding the project.

This study relied on a variety of secondary and primary sources. A desk review of statistical data sources was carried out. CAPMAS (website and statistical bulletins), GOIEC (national exports and imports data), and MALR (bulletins of agricultural statistics) were among the national sources used. TRADEMAP for international trade data, FAOSTAT for agricultural production and export statistics, and the World Bank were used as international data sources. In addition to prior studies and reports generated by Enroot, other secondary sources included published and unpublished papers on agricultural value chains prepared by development partners and other development initiatives (FAO, IFAD, UNIDO, AFDB, UNDP, and others).

Primary sources comprised information gathered from 36 in-depth interviews and 15 focus group discussions with farmers, traders, processors, preparation facilities, local farmer



organisations, and cooperatives in August 2020.

Figure 8: Value Chain Analysis Methodology

[14] The MSA approach is developed by Beam Exchange to address the underlying causes of why markets often fail to meet the needs of the underprivileged people.

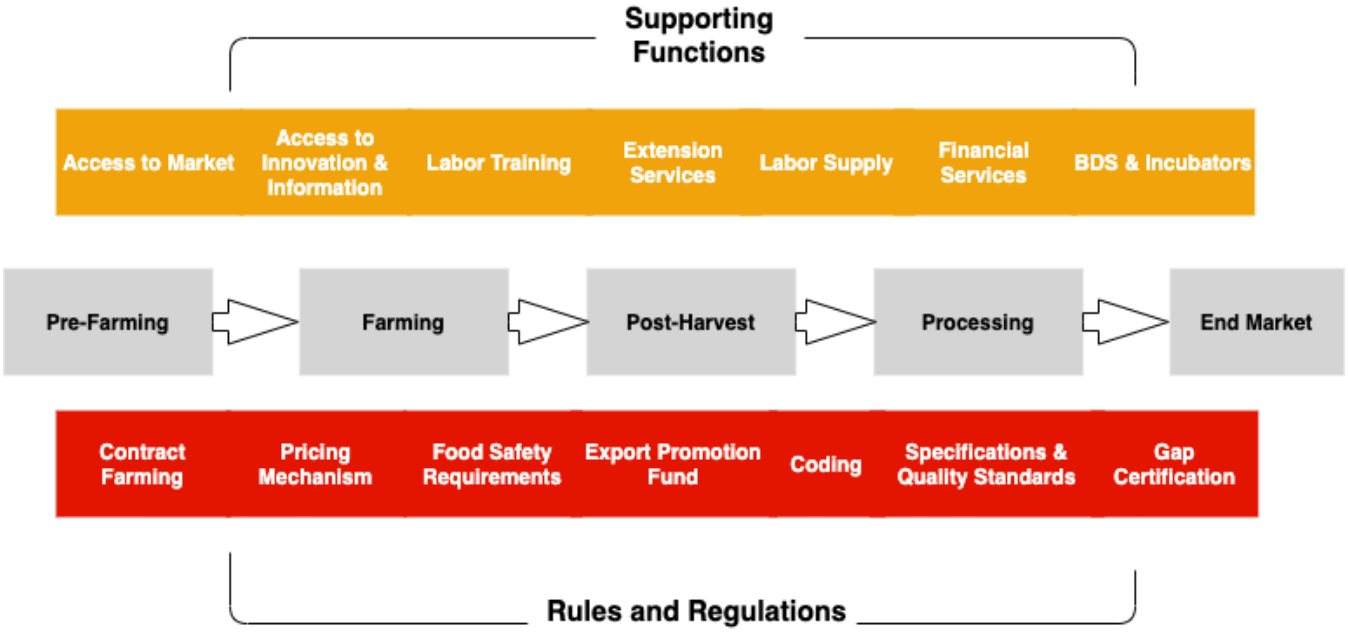


Figure 9:The Market System Analysis

The Medicinal and Aromatic Plants (MAPs) Value Chain

Overview

Despite its small contribution to Egypt's total cultivated area (1%), the MAPs sector is of high priority to the Government and relevant development stakeholders.[15] [16] This is due to the fact that MAPs products are mostly produced for export, and the sector has the potential to boost its exports even further. In addition, the sector is heavily reliant on small-scale farmers and has a very high potential for value addition.

Egypt cultivated a total of 98,570 feddans of MAP in 2017, yielding 518,050 tonnes.[17] The MAP sector exports 80% of its production to European, American and Far Eastern markets. The only MAPs product that is highly produced for domestic consumption is coriander (also partially imported). Other MAPs products are sold to the local market in small quantities, either as spices or teas.

[15] Sustainable Agricultural Development Strategy Towards 2030 (MALR)

[16] Considered in programs and projects of different development partners including FAO, IFAD, UNIDO, AFDP, UNDP among others

[17] CAPMAS (Annual Bulletin of Statistical Crop Area and Plan Production 2016/2017)

Egypt's MAPs products are in high demand worldwide because they come in a wide range of varieties and because the country's environmental conditions allow them to develop rich in aroma and oil concentration. MAPs products (dry MAPs or essential oil extracts) are in high demand as ingredients in the pharmaceutical, food, perfumery, and cosmetic industries. As fresh herbs, several MAPs products are also in high demand.

MAPs products are divided into three categories: flowers, leaves, and seeds. They can be traded fresh or processed.

Upper Egypt holds 92% of MAPs production in Egypt, where 50% is concentrated in Beni Suef and Minya. The distribution of the MAPs cultivated areas in Upper Egypt is detailed in the table below. The final processing of MAPs products rarely take place in the same location where it is produced. Processing mainly takes place in Greater Cairo, Alexandria, East and West Delta and Fayoum.

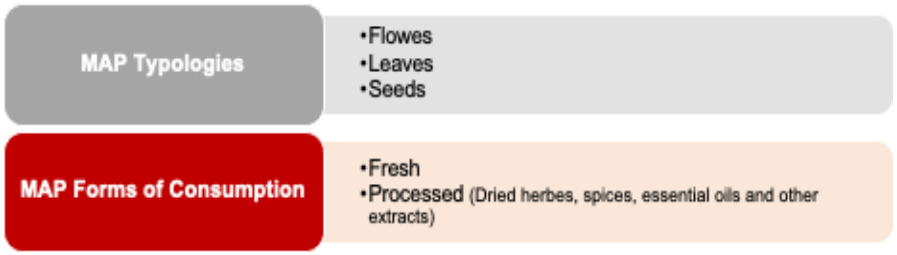


Figure 10: MAPs Typologies and Forms of Consumption

Governorate	*Cultivated Area (in Feddan)*	*Quantity Produced (in Tons)*	*%[1] Share of National production*	*Crop Value (in 1000 EGP)*
Beni Suef	16058	238,485	46.04	2,290,879

Minya	15408	24,638	4.76	236,671
Fayoum	23048	102,132	19.71	981,076
Assiut	8599	80,242	15.49	770,802
Qena	1273	1,764	0.34	16,944
Aswan	10369	27,755	5.36	266,613
Luxor	6196	2,630	0.51	25,263
New Valley	1151	2,340	0.45	22,477
Egypt	98570	518,050	-	1,015,097

Table 1 Distribution of MAP Crops in UE

It is worth noting that the MAPs VC in Beni Suef is more mature than in Minya. Post-harvest facilities for drying or sieving, small processing units for oil extractions, and formal processing facilities are found more in Beni Suef compared to Minya.

MAPs Exports

On average, at least 80% of the total production of Egyptian MAPs is exported. The remaining 20% goes to local consumption, either directly to consumers or to pharmaceutical companies.[18] Egypt is considered among the main exporters of a variety of MAPs crops. During Q1-2020, Egypt exports of medicinal and aromatic plants reached 20 million USD, as shown in the figure below. [19]

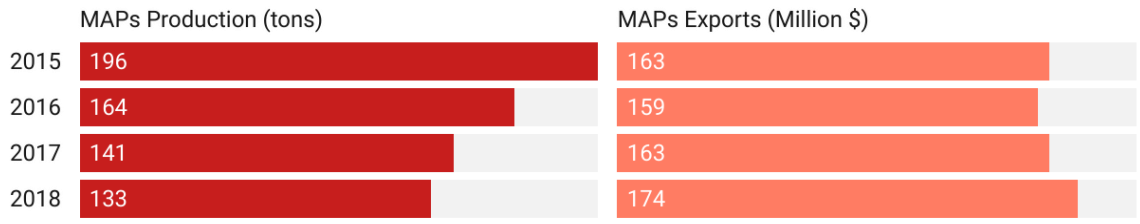


Figure 11: MAPs Production Quantity & Exports Value (in tons & million USD) (CAPMAS)

[18] https://alborsaanews.com/2016/12/12/942461

[19] https://dailynewsegypt.com/2020/04/22/egypt-exports-20m-worth-of-medicinal-aromatic-plants-herbs-in-1q2020/

According to TRADEMAP, Egypt exported 87.5 million USD worth of fresh and dried medicinal and aromatic plants used in the production of perfume, pharmacy, soap, and pesticides in 2018. Germany, the United States, Spain, South Korea, the Netherlands, and France are the top importers, as seen in the graph below. This suggests that the majority of Egyptian exports are directed to the European Union (EU), where they are subject to the stringent EU regulatory criteria.[20]

It should be noted that this figure excludes fresh and dried plants utilised by the food industry or consumed directly as fresh and dry herbs or spices. It also does not include essential oils. It is also worth noting that Egypt sells dried medicinal herbs and raw essential oils in bulk to consolidators/processors, who further purify and blend the products before selling them to various industries, including the perfume and food industries, according to their specifications. Due to their limited scale and financial capacities, Egyptian processors have yet to perform these higher value-addition stages (doing further purification and blending according to the various specifications of the different sectors).

Egypt's total trade in medicinal herbs reached 94.1 million USD in 2018. The major importing countries are the US and Germany. As for spices, Egypt's total trade is 7.1 million USD, where the major importing countries are the US, the UK, and Germany. One of the compelling challenges is that there is no "ease of trade" with countries who exhibit high demand for spices or medicinal herbs.

The majority of the MAPs and essential oil exports are carried out by formal, large- and medium-scale, companies who have processing facilities and post-harvest activities that meet export standards. However, some of these companies act as brokers or intermediaries and lack sustainability.

The MAPs VC's Potential for Growth

The MAPs sector has high potential to expand. The volume of medicinal plants sold solely for use in the perfumery and the pharmaceutical industries reached 94.1 million USD, while Egypt's export market has the potential to reach 165.5 million USD. The MAPs VC has, therefore, an untapped potential of 85.4 million USD.

Germany and the US are the countries with the highest export shares. However, the US market is considerably saturated with total current exports reaching 23.04 million USD, despite the potential being only 20 million USD. The figure below shows the trade partners with highest untapped potential, with France, Spain, UK and Saudi Arabia being the highest.

[20]https://oec.world/en/profile/country/egy

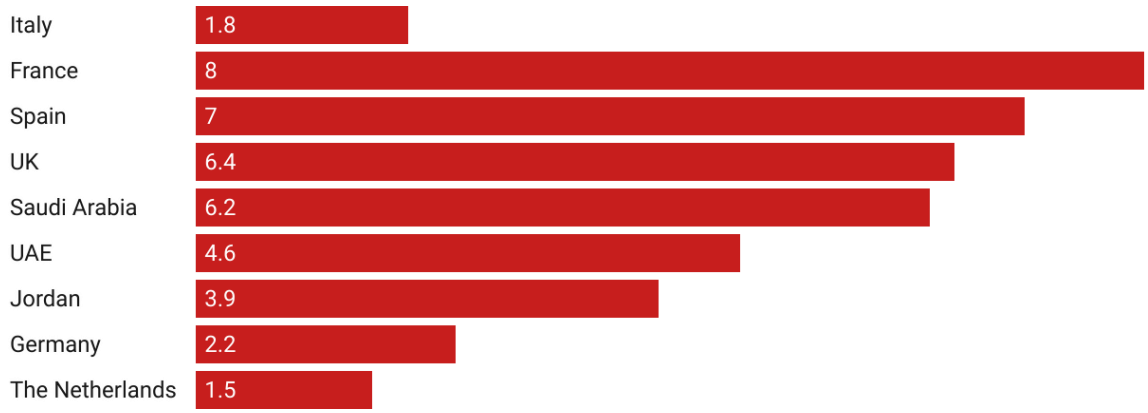


Figure 12: Value of Untapped Exports of Egyptian MAPs (in million USD)

Egypt cultivates the three types of medicinal and aromatic plants, namely leaves, seeds and flowers. They include basil, coriander, cumin, caraway, chamomile, marjoram, fennel, calendula, parsley, celery, lemongrass, cumin, black cumin, thyme, mint, peppermint, guava leaves, henna, and hibiscus among others. Egypt is one of the top exporters of Fennel and the third producer (after Mexico and Argentina) of Chamomile, with 14,000 tons produced in 2018. The below table shows the main crops cultivated in Beni Suef and Minya by type.

CATEGORY	CROP
FLOWER	Chamomile
LEAVES	Mint, Pepper Mint, Marjoram, Basil, Parsley, Dill, Geranium Delmaticum, Coriander, Caraway and Celery
SEEDS	Fennel, Cumin Seed, Black Nigella and Anise

Table 2 MAPs Crops by Category

This study focused mainly on the production process of chamomile, marjoram, basil, and fennel, giving particular attention to their primary production steps. Based on primary and secondary research, these four crops present the highest potential in terms of international market demand, value addition, women employment, and need for innovation. This, however, does not mean that the other MAPs crops were excluded from the scope of the AIP project. Actors working in the MAPs value chain usually work in the production of a large variety of crops, not just one, especially during the post-harvesting and processing stages. Therefore, the value chain analysis will be conducted for all MAPs products, yet specific primary production features will be presented separately in the following section, with a focus on geographical concentration and primary production details.

Market Overview of the Selected MAPs Crops

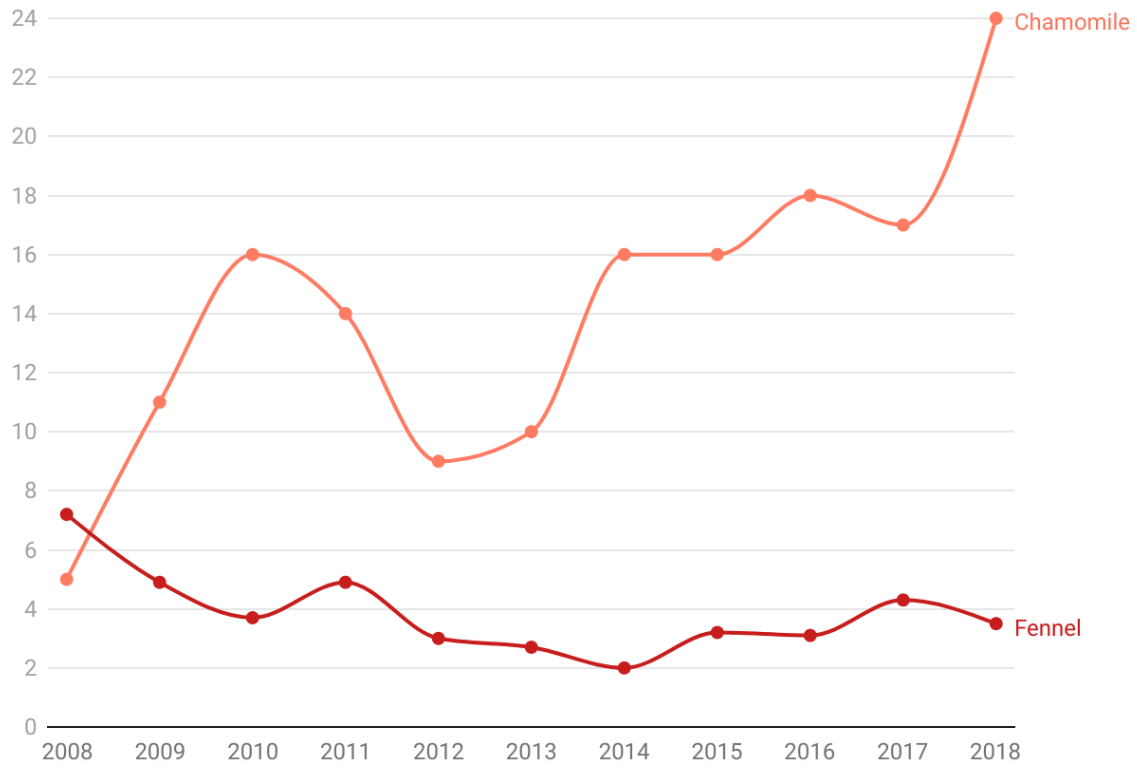


Figure 13: Chamomile & Fennel Exports Value 2008-2018 (in million USD) (GOEIC)

Egypt remains the third highest producer of chamomile, despite its trade having suffered over the past 10 years from the country's economic and political instability. Chamomile exports halved in the period between (2008-2018) reaching 3.49 million USD. Fennel is an annual winter crop, classified as a seed. In the last ten years, the value of fennel exports has more than quadrupled. This has also resulted in a tripling of total production output over the last five years, from 2,000 tonnes in 2014 to 6,000 tonnes, according to CAPMAS.

Basil is among the internationally demanded crops, with total Egyptian exports reaching 12.25 million USD in 2018. The produce has experienced an increase in demand since the hit it took in 2014, restoring its position and exceeding its 2009 average export price, which was 10.61 million USD.

Marjoram is a perennial herbal crop that is mainly produced for export. Between 2016 and 2018 Egypt exported a total of 3208.3 tons, with the highest quantity sold to Poland

(24.4%), followed by Germany (19.04%), then the United States (14.7%).[21] However, marjoram production and exports have been highly unstable, exhibiting significant fluctuations.

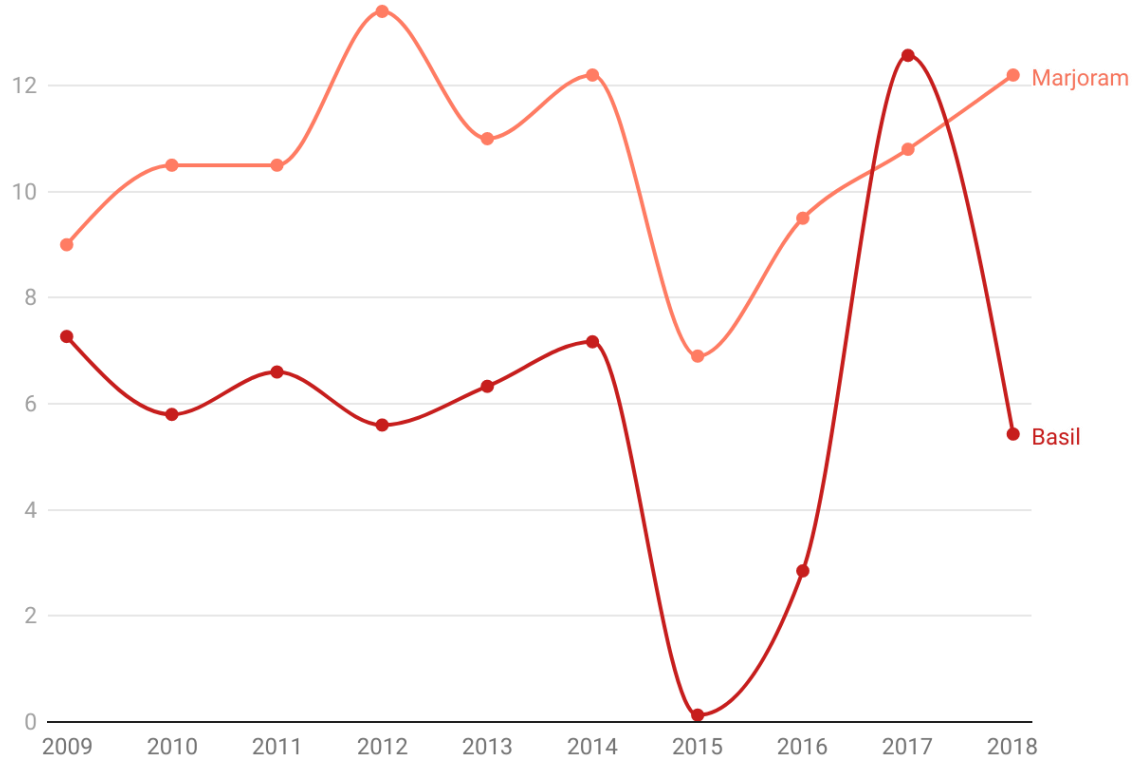


Figure 14: Marjoram & Basil Exports Value 2008 - 2018 (in million USD) (GOEIC)

Geographical Distribution of the Selected MAPs Crops

CHAMOMILE

Egypt cultivates four varieties of Matricaria Chamomile, also known as German Chamomile, scientifically known as Bona, Lutea, Bode gold and Goral. In 2015-2016, Egypt cultivated a total of 12,661 feddans, of which 2,593 feddans were cultivated in Beni Suef, and produced a total of 11,714 tons.

[21] http://www.curresweb.com/csi/csi/2020/csi.2020.9.2.28.pdf

Although chamomile cultivation is more concentrated in Fayoum, with a total of 9,873 feddans, Beni Suef has a comparative advantage. This is shown by that almost 1,000 feddans are cultivated in the new land, indicating higher potential for organic cultivation. In recent years, the chamomile cultivated areas in Beni Suef dropped with more than half. In 2019-2020, chamomile cultivated areas made up only 1,140 feddans, mainly concentrated in Ahnasya, Beba, Semsta, Fashn, with Beba, as demonstrated in the figure below. West Saft Rasheena village in Beba cultivates almost 100-150 feddan, which makes almost 10% of total chamomile cultivation.[22]

FENNEL

Fennel is cultivated in four governorates in Upper Egypt, these are Fayoum, Minya, Assiut and Qena. According to the 2015-2016 figures, fennel cultivated areas make 316 feddans with a total production of 197 tons per year. These cultivated areas include both new lands (180 feddans) and old lands (136 feddans). In 2018, the cultivated old land in Minya declined to 112 Feddans, concentrated mainly in the Beni-Mazar and Maghagha districts. Meanwhile, the new lands have massively increased to 2,350 feddans, mainly in west Samalout.

However, official figures underestimate the area of cultivated old land. During the study's field visits, an NGO in Minya mentioned that they alone own and supervise 50 Feddans of fennel, concentrated in Village 8 in the Samalout District of Minya. In addition, other primary informants in Tala Village in Minya stated that in their village there is an average of 70-80 feddans. This is in addition to 500 Feddans in Village 2, Samalout District, that are registered under the cooperative.

Fennel is a relatively labour-intensive crop, particularly in its post-harvest stage. What makes it even more labour intensive is that small farmers own fragmented land, and cannot attain economies of scale, which makes it cheaper for them to do the work manually and depend more on labour than on capital.

MARJORAM

According to a 2015-2016 MALR survey, the area of marjoram cultivated land is 3,594 feddans, including old and new land. More than 2/3 of the cultivated area is concentrated in Minya, with a total of 2,618 feddans. Based on the Minya MALR unit survey for 2019-2020, there is a total of 2,218 feddans in Minya, with 2,050 feddans concentrated in Samalout.

[22] Data provided by the agricultural directorate of Beni Suef.

BASIL

There are two types of basil, they are the French and the Baladi (Local). Basil is a summer crop that is mainly cultivated for export. Its cultivation is highly concentrated in Beni-Suef, which has a total of 3,247 feddans distributed over 6 districts, shown in the figure below. In addition, the Samalout district of Minya also has a total of 700 feddans.

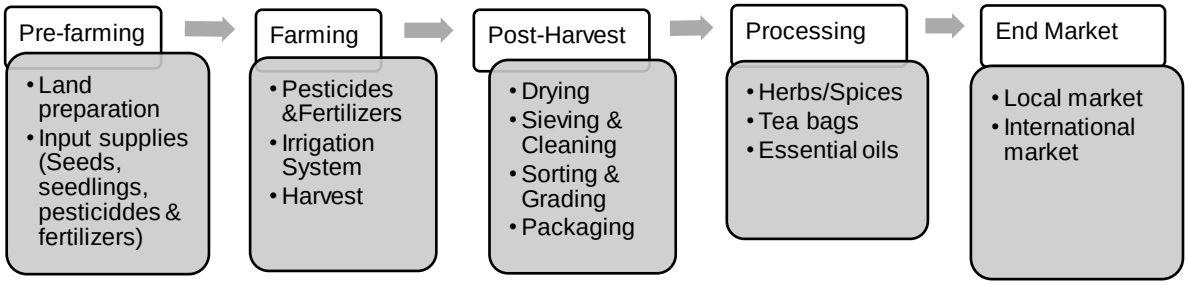
Basil cultivation relies on seedling. One feddan of basil cultivation requires 300-400 grams of seeds that are planted on half a carat. Fertilizers provided by cooperatives for the cultivation of basil is less than what is needed. This gap is compensated for by sourcing from private input suppliers. However, the quality of inputs provided by private suppliers is not regulated which is a major problem facing farmers.

Analysis of the MAPs Value Chain

The Vale Chain analysis in this section uses the Market System Approach. According to the findings, the VCs of MAPs products slightly vary depending on the crop or its type. For example, the value chains of seed-based MAPs products do not have a pre-farming stage, and flower-based MAPs value chains do not necessarily need processing like herb-based ones. The baseline state of each of the value chain activities in the selected governorates is mapped in this section and analysed in detail.

PRE-FARMING & FARMING

Input supplies for the pre-farming and farming phases include seeds, seedlings, pesticides, and fertilizers. The chain/market dynamics between these supplies differ depending on the cultivation model applied. In contract farming, contracting buyers (processors or traders) provide the seedlings. Buyers also provide farmers with technical advice on the management of pesticides and fertilizers and harvest techniques. Therefore, contracted farmers are well informed about the most suitable irrigation systems for the crops they are cultivating



On the other hand, independent farmers buy the seedlings from nurseries and get their fertilizers from cooperatives at a subsidized/lower cost, although the share they get from the cooperatives is usually less than needed. Pesticides are only available from private suppliers that are not mandated to provide technical assistance. As a result, independent

Figure 15 The MAPs Value Chain Activities

farmers are often not up to date on the most adequate irrigation systems for the crops they are cultivating, as they primarily rely on knowledge from their private input suppliers who do not always provide accurate information.

POST-HARVEST

The activities in this stage differ according to how the MAPs product will be later used. If the crops will be used as herbs, spices, or tea, the first post-harvest step is drying. There are two techniques for drying, manual (sun-dried) and mechanical. The choice of drying technique depends on the unit conducting the activity, whether it is micro/informal or formal. The drying stage aims to enhance the shelf life of the product while preserving its quality.

After drying comes threshing (in case of seeds and leaves) and sieving. Sieving has 3 functions, to clean the product from pollutants, dust, or impurities and to sort and grade based on the shape/form (for flowers), colour and size (for leaves) or size and colour (for seeds). No official data is available on drying facilities in Egypt. However, according to primary sources, there are about 60-80 drying facilities in Beni Suef, Assiut, Minya and Fayoum in addition to the drying activities conducted by some farmers in their fields.

The step after sieving is packaging. Packaging is the final step in the post-harvest stage, and it varies based on the crop category. Flowers are packed in solid boxes to ensure their shape and form is preserved. Leaves and seeds are packed in bags. These bags should be made from thick material that is difficult to tear in order to preserve the product and protect it from being polluted.

PROCESSING

Processors perform sifting, cutting, purification, grading and packaging (for dried herbs and spices) and refining and blending (for raw essential oils). All processors are formally registered factories, the majority of which export their products in bulk. Few processors sell directly to the consumer market. The MAPs VC has three main industries, these are herbs and spices, teas and essential oils.

Herbs and spices and essential oils are also used as main elements in other industries. Herbs and spices are used in the food industry, including in processed meats, sauces and dried soups and broths. Essential oils are used in the pharmaceutical, perfumes, cosmetics, soap, and detergent industries. The cultivation model used affects the quality of the MAPs product. In the contract farming model, the buyer might reject the crop if it does not meet the required standards. However, this quality check is absent in the independent farmers' model.

a. **Herbs and spices** are packaged in the factory, where the factory repeats the sieving process to ensure absence of any impurities that could have polluted the product from mishandling during packaging in the post-harvest stage. Depending on the client's request, herbs/seeds are then either packaged in small containers or small plastic bags for export to consumer markets or in big thick bags to be exported in bulk. Another value addition includes grounding seeds like cumin or refining dried leaves like parsley. It could also include combining different products together to make spice mixes.
b. **Essential oils** are extracted in Egypt using three different methods, these are cold pressing, steam distillation and organic solvent. The most used is steam distillation, which produces raw essential oil. This oil is then purchased by essential oil exporting factories that conduct multiple refinement and fractionation processes to get the physical and chemical specifications requested by the client.[23]
c. **Tea** is packaged following the post-harvest stage in small tea bags that are packed in a box, each containing a set number of tea bags.

"The share of local market in my sales ranges between 10%-30% and are all streamed to companies mainly working on tea bags (Herbs & Spices Factory, Beni Suef).

"US is an attractive market for me, as they have different variations in their demand, they don't just ask for niche or organic, they accept conventional (with approved pesticide rates), and given their size they have different market segments which makes them more likely to order different grades that are not necessarily the highest quality" (Herbs, Spices & Oil Factory, Beni Sueif, Aug 2020).

END MARKET

MAPs crops cater to both, international (80%) and local (20%) markets, with international markets considered of higher priority since they garner higher profit and provide a stream of foreign currency. There are 235 exporters registered at the Agricultural Export Council, a small number of which (about 40) own processing facilities and operate a sustainable

[23] According to the conducted fieldwork, there are around 100 distillation units in Beni Suef. Yet, there are no official data capturing precise numbers of the latter.

business. [24] [25] Other exporters and brokers, most of which do not own processing facilities, handle small size transactions of lower quality products procured directly from the traders. Due to lack of quality control on the latter transactions, these products face many rejections in export markets and harm the reputation of the sector as a whole.

In the local market, most of the transactions are done by local traders who collect the produce from small farmers.[26] With herbs and spices, the traders usually conduct the drying, basic cleaning and screening operations, separate the products according to quality and sell them to processors.[27] These same small traders sometimes also sell to bigger formalized companies/factories that then carry out a value-adding activity and export the product. This value addition can be simple, such as re-packaging, or advanced, using the product as a component in perfumes or medicine.

[24] Agricultural Export Council

[25] ibid

[26] Usually, fragmented plots with an average area below 1 Feddan.

[27] Majority in greater Cairo, Alex, East and West Delta, and Fayoum.

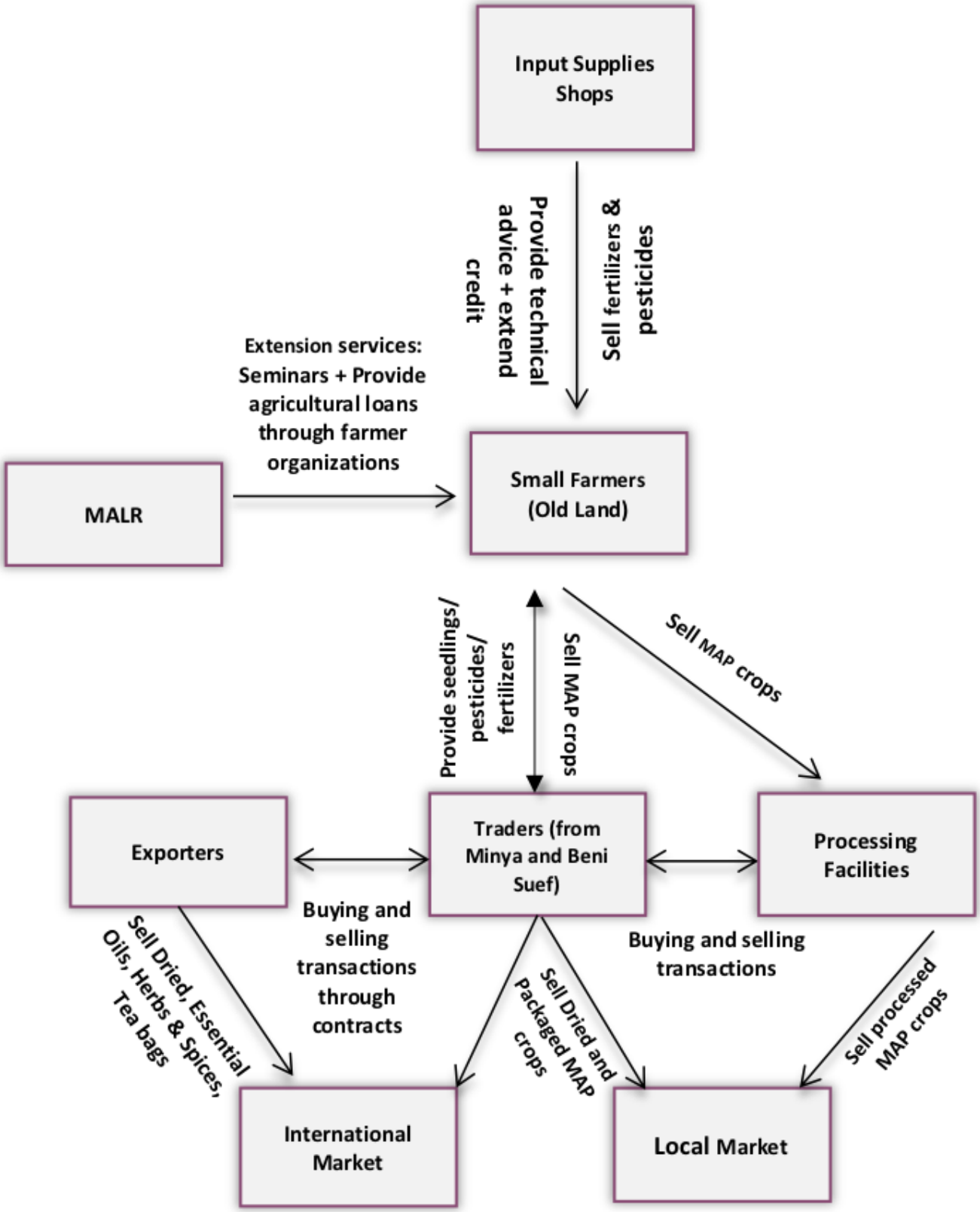

Input Supplies Shops
Provide technical advice + extend credit
Sell fertilizers & pesticides
Extension services: Seminars + Provide agricultural loans through farmer organizations
MALR
Small Farmers (Old Land)
Provide seedlings/ pesticides/ fertilizers
Sell MAP crops
Sell MAP crops
Exporters
Traders (from Minya and Beni Suef)
Processing Facilities
Buying and selling transactions through contracts
Buying and selling transactions
Sell Dried, Essential Oils, Herbs & Spices, Tea bags
Sell Dried and Packaged MAP crops
Sell processed MAP crops
International Market
Local Market

Figure 16 Business and Market Interlinkages

The main value chain actors and their linkages, explained in detail above, are further illustrated in the above figure. Some forward and backward integrations happen. In some linkages, mainly large-scale ones, processors perform backward integration when farming large plots using modern mechanization. However, they procure most of their supply from a stream of traders/small-scale farmers to obtain varieties that require manual picking and handling.

COST ANALYSIS

Cost Analysis in EGP	Chamomile	Fennel	Marjoram	Basil
Rent Value / Feddan / cycle (EGP)	4000-6000	4000-6000	25,000-30,000	5000-6000
Cycle duration	6 Months	6 Months	3 Years	6 Months
Cost of natural drying and pre-processing (EGP/ton dried product)	2000	1000	2000	2000
Cost of packaging materials (EGP/ ton dried product)	2000	40	150	150
Harvest (EGP/ ton dried product)	30,000	1000	2,000	2,000
Agricultural treatment (Hoeing) (EGP/feddan / cycle)	1,000	1,000	6,000	1,000
Irrigation (EGP/feddan / cycle)	1,500	1,500	9,000	2,500
Fertilizers (EGP/feddan / cycle)	2,000	1,500	18,000	6,000
Pesticides (EGP/feddan / cycle)	1,000	1,000	6,000	2,000
Cultivation- Seeds/seedling (EGP/feddan / cycle)	500	100	750	500

Labour for seed/seedling planting (EGP/feddan / cycle)	1,000	500	1,250	1,000
Organic matter(compost) (EGP/feddan / cycle)	1,000	1,000	2,000	1000
Soil Preparation (EGP/feddan / cycle)	1000	1000	1000	1000

Table 3 Cost Analysis of Selected MAPs Crops

EMPLOYMENT

		CHAMOMILE	FENNEL	MARJORAM	BASIL
EMPLOYMENT	Males	25%	70 %	50%	50%
	Females	75%	30 %	50%	50%
COST OF LABOUR	Males	80 LE / Man-day			
(MAN-DAY) **5-6 HOURS**	Females	60 LE /Man-day			

Table 4 Employment by Gender & Pay for Selected MAPs Crops

SUPPORTING FUNCTIONS

The MAPs sector requires different supporting functions and services. These functions aid farmers and processors in promoting their businesses and increasing their income.

Access to Market

Farmers have access to the market only via the traders. Farmers are, therefore, rarely aware of market developments and needs, especially if they are not contracted farmers.

Post-harvest facilities access international markets via formalized export companies or registered traders. Processors and manufacturers require support, whether individual or institutional, to facilitate their access to the market. Such support includes selling missions organized by manufacturers targeting new clients and new countries, like pitching. Trade fairs are also organized by Agriculture & Food export councils to provide processors with better market access.

Access to Innovation & Information

Small farmers use seeds and pesticides. They do not use machinery since they own land that is too small for economy of scale. Their access to information is limited to that which they attain from traders/processors or their input suppliers.

For manufacturers, innovation is market driven. Some machineries and technologies, such as metal detectors and Sortex, have been used upon the request of clients.

Labour Supply

Farmers rely on family members or neighbours around them for labour supply. They depend on a system of paid peership, particularly during harvest, in which farmers rotate lands to collect the harvest and get paid per day. In Minya, however, labour contractors are more prevalent.

In the post-harvest stage, labour supply is usually provided directly by the surrounding villages. In this stage, there is both permanent and seasonal labour. Distillation units reported having 15 fixed workers (all men) and drying facilities reported having 15 permanent workers and at least 15 seasonal workers, with seasonal workers being mostly female.

Manufacturers obtain their labour supply via a labour contractor, especially manufacturers located in industrial zones. Manufacturing units are located relatively far away from the villages and the contractor is always someone who is trusted by the families to transport their younger members to the work location.

Labour Skills & Training

Labour training is mainly required in the harvest, post-harvest, and processing stages. In the three stages the training occurs on the job. Labour needed by the MAPs sector requires a different set of skills for each stage. Farming and crop management operations require some knowledge and experience, at least at the supervisor's level while the execution is done by manual, mostly, unskilled labour. Harvesting, which is mostly done by women, requires some training, especially on the handpicking of flowers such as chamomile.

Technical staff in manufacturing operations require knowledge about the physical and chemical characteristics of the products, quality control and assurance, and good manufacturing and hygiene practices. Their job training focuses mainly on handling, hygiene maintenance and operating machinery. In addition, in units that are equipped with

machinery, the training includes occupational and safety standards. Workers with high educational levels are easily trained on hygiene maintenance. From all the processors interviewed in this study, only one mentioned providing fixed employees with a soft skills training and said that this training was provided mainly to employees who deal with clients. The cost average of labour training is around a one week's wage. In contract farming, the training of harvesting labourers is coordinated by the trader or processor.

Extension Services

Technical assistance is formally provided by agronomists from the Ministry of Agriculture and Land Reclamation via cooperatives. However, MALR agronomists are few and not enough to cover demand. In contract farming, processors or facility units provide technical assistance to the farmers by hiring private agronomists, and accordingly ensure adherence to the required/requested requirements. On the other hand, independent farmers resort to input suppliers or traders to provide them with technical assistance on an informal basis.

Access to Finance

The only loans available to farmers are those that are given by traders or processors who also provide additional financial services that include the provision of input supplies and technical services. These services are then deducted from the final price when the selling is being finalized. Agriculture cooperatives have the capacity to provide financial services. However, none of the interviewed farmers, whether in Beni Suef or Minya, reported having used them. Agriculture cooperatives also provide farmers with an inventory certificate of their agriculture area to be used as a supporting document when applying for loans.

RULES AND REGULATIONS GUIDING THE MAPS SECTOR

The MAPs sector adheres to the same laws and regulations of the agriculture and manufacturing sectors. These include contract farming, exports promotion, food safety authority requirements.

Specifications & Standards

MAPs products are not coded by GEOIC, which means that they have no local standards or specifications. Specifications are, therefore, requested and controlled by the clients. Clients provide detailed physical and chemical specifications of the products they request, including their rates of pesticides. To ensure specifications are met, both processors and clients conduct lab scans to ensure chemical characteristics comply with the requested standards.

Organic Certificates

Manufacturers and exporters of organic products require certificates. Small farmers cannot obtain such certificates because of their land size. Processors that abide by the

requirements of organic products usually rely on sourcing organic from large farms or from their own farms that are cultivated over new lands. There are other certificates like ISO 22 000 and BRC for Processors and GAP for farmers. However, small farmers are also unable to attain the GAP certificate.

Pricing Mechanism

Small farmers can rarely control prices, and sometimes accept rates that barely cover cost. This is partially because their crop selection is not demand-driven, except in cases of contract farming.

For post-harvest facilities and processors, prices depend on the specifications required by the client and the production cost. When the standards and specifications are not met, price deductions/penalties are imposed by the client.

Prices are negotiable and high competition as well as lack of experience from the side of new market sellers push prices to rates lower than the market price.

Licensing of Input Supply Shops

Official input suppliers must be licensed and certified to ensure they are adequately informed, and that their supplies are regulated and monitored by the supply police in coordination with the MALR. There are many input suppliers who are not licensed and are not certified to provide technical assistance, yet they remain more attractive to small farmers because they allow credit payments (post-paid/extended credit).

Challenges

The farming of MAPs crops faces different challenges that impact the quality of the produce and makes it difficult to meet the required specifications and standards requested by clients. This in turn results in a high product rejection rate, which adversely affects the income of farmers. This section details the key challenges that if addressed will enhance the productivity of the MAPs VCs and their performance, and, in turn, increase the income of farmers. The underlying causes of these challenges will also be identified and their impact on the business analysed.

CHALLENGE 1

Challenge: Lack of access to adequate technical information and extension services

Underlying causes:

1. The MALR's lack of adequate resources to sufficiently provide its extension services, including insufficient human resources as well as insufficient modes of transportation that allow for extension advisors to easily access farmers with the required frequency.
2. Uncertified input suppliers who provide farmers with inaccurate technical information.
3. The farmers' limited access to the end market and their consequent lack of knowledge of market needs. This is the case even with contract farming because it is often facilitated by middlemen.

Impact on Business:

1. Farmers' unawareness of actual market needs results in their decision being price-driven rather than demand-driven. This in turn causes price fluctuations due to excessive cultivation and, therefore, causes an over-supply.
2. Malpractices in the application of pesticides and in combating pest infection results in the excessive use of pesticides that go above the tolerated standards, which in turn causes the products to face higher rejection rates.

> "Post-harvest hygiene mishandling is the most challenging stage of the MAP VC since it can result in the loss of quality that was preserved during the early stage."
>
> ***Chairman of MAP export committee—Agriculture Export Council***

> "The mishandling of the crops drying can result in the chemical characteristics of the crop to change. For instance, excessive drying of marjoram results in lower oil concentration."
>
> ***Marjoram Trader—Minya***

CHALLENGE 2

Challenge: The inability of small farmers to meet the requirements of organic production

Underlying causes:

1. The concentration of cultivation in old lands, where the soil is already contaminated with various residuals and the water supply is mixed with drainage water, which is also contaminated with the residuals used by other farmers.
2. Absence of appropriate borders between farmers, which results in the contamination of the produce from pesticides of neighbouring farms. Although this can be overcome by the isolation of the affected border areas, the fact that some areas do not exceed four Carats (i.e., less than 800 m2) does not always allow for that.
3. Lack of access to affordable organic pesticides from trusted sources.

Impact on Business:

1. Higher rejection rates of organic produce from traders or manufacturers.
2. Inability to sell the produce for higher prices, as it does not meet the standards.
3. Losing the high-end markets that offer higher prices and have a higher demand.

> "I rely on sourcing organic produce from farmers in the new land as they don't suffer from the cultivation challenges of the old."
>
> ***Land Processor—Minya***

> "The rejection rate can reach 60% for marjoram organic produce. This results in only 40% going to exports market and the rejected amount to local market."
>
> ***Marjoram Trader—Minya***

CHALLENGE 3

Challenge: Malpractices in post-harvest handling

Underlying causes:

1. Insufficient awareness of hygiene practices and standards.
2. Poor infrastructure for the drying activities and the prevalence of unprotected open-air drying that subjects the produce to external pollutants and contaminants.
3. Usage of low-quality packaging material, where low quality (contaminated second hand) plastic bags are used, contaminating the product with solid pollutants and plastic particles.

Impact on Business:

1. High impurities and pollutants affect the produce.
2. Loss in produce quality and inability to meet the specifications of export markets.
3. Lowering the grade/category of the produce causing higher rejection rate.
4. Inability to sell the produce for higher prices for failure to meet standards

> "At my factory, despite having contracts through traders, the rejection rate of the produce could reach 50% at the post-harvest facility gate."
>
> ***Large MAP Manufacturer—6 October***

> "Farmers are not aware of the market dynamics. If price is high this year, the cultivated area will increase next year, which drops the prices because of excessive supply. This in turn results in shortage of supply the year after as farmers become afraid of law prices."
>
> ***MALR unit—Beni Suef***

Recommended Interventions

The following interventions were developed to address the key challenges and constraints detailed above, by tackling their underlying causes. They also aim to capitalise on existing opportunities, including the high untapped export potential of the MAPs sector, the national policies on water efficiency and on expansion of high-value crops and agriculture digitization, in addition to the willingness of value chain actors to collaborate to develop the sector. The below tables detail each intervention separately and highlight suggested key activities, sub-key activities, and potential partners.

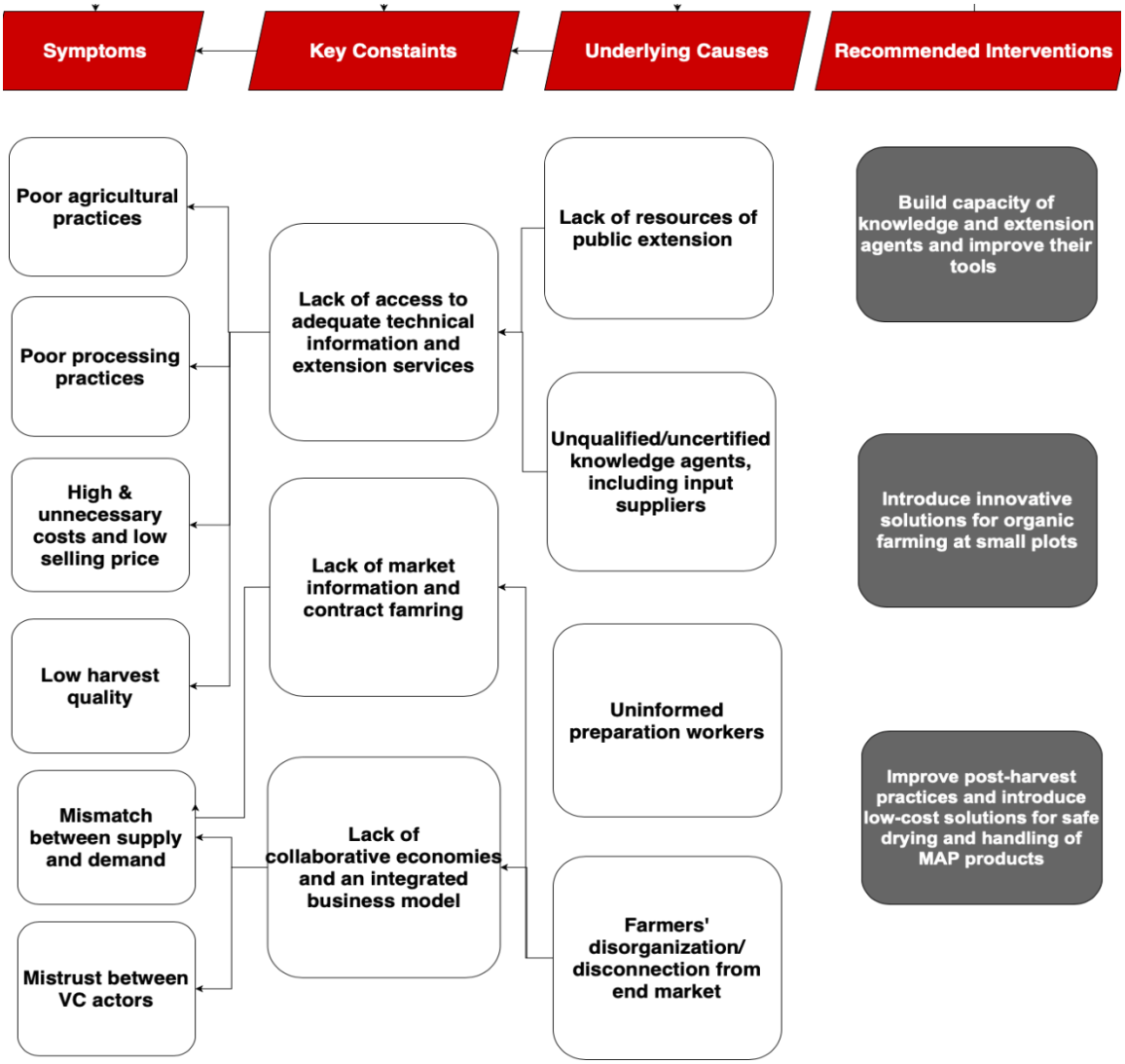


Figure 17 MAP key constraints, their symptoms and underlying causes and recommended interventions.

Build Knowledge Capacity and Improve Extension Services and Tools		
Expected Outcome: **Small-holder farmers have adequate access to sustainable and reliable extension information**		**Indicators:** **Number and type of extension agents with improved knowledge and access to information sources** **Level of satisfaction of farmers with extension support provided by enabled agents**
Key Activity	**Sub-activities**	**Potential Partners**
Conduct an advanced capacity building program to knowledge agents: **- Extension workers** **- Lead farmers** **- Input suppliers** **- Private advisors**	- Conduct basic and advanced trainings on good agricultural practices targeting knowledge agents. - Establish demonstration fields to introduce innovative practices with special consideration to integrated pest management, varieties and fertigation and irrigation. - Conduct advanced trainings and study tours for excelling knowledge agents (to advanced farms and to facilities of processors and exporters) to understand quality requirements and value chain steps. - Support networking and exchange between knowledge agents. - Engage university technical staff and teachers from agricultural technical schools in Minya and Beni Suef in the process.	**Technical Experts and the AIP team –** To design the capacity building program **Private Sector Buyers –** To inform the training content especially regarding market requirements MALR (Department of Extension Services and Central Administration for Extension under the Agricultural Research Center and the Agricultural Extension Centres at the District Level in Beni Suef and Minya) To participate in identifying the pool of knowledge agents and to participate in the trainings. **Farmer organizations –** To disseminate the knowledge products.
Disseminate information and knowledge to growers	- Conduct field visits to the extension/demonstration fields and invite growers in each area. - Disseminate extension material to reach farmer groups.	Beni Suef and Minya Universities (Faculty of Agriculture) and Agricultural Technical Schools in Beni Suef and Minya.

	- Create social media (and other communication) channels to reach growers. - Support the MALR to update its extension material and digitize its delivery, working with MALR central/governorate/district units using with interactive interfaces, including mobile applications to reach knowledge agents and farmers.	

Table 5 First Recommended Intervention

Introduce Innovative Solutions for Organic Farming in Small Plots		
Expected Outcome: **Small scale MAPs farmers adopt new effective solutions to control cross-contamination in compliance with organic and clean farming requirements**		**Indicators:** **Number and type of solutions introduced** **Number of farmers adopting new solutions and avoiding cross-contamination**
Key Activity	Sub-activities	Potential Partners
Conduct an innovation cycle to develop solutions for organic farming addressing cross-contamination challenges	- Design an entrepreneurship competition for economically viable solutions (products and services) addressing the cross-contamination challenges (e.g., using physical barriers at the borders, the collective application of pesticides by certified operators, spraying protective layers) - Launch a competition, including a full-fledged entrepreneurship cycle, in collaboration with relevant entrepreneurship and incubation centres and Universities in Beni Suef, Minya, Fayoum, and Assiut (Governorates with high concentration of MAPs) as well as with other relevant centres in Cairo. - Provide incubation support, including technical assistance provision, business development services and seed funds to selected entrepreneurs and help them bring solutions to the “proof of concept” phase, design viable business models and create pilots in the targeted areas.	**Universities and Research Institutions -** To engage in the design and implementation **NGOs -** To promote the innovation competition **Business Incubators-** To provide business development support to selected entrepreneurs (nationwide) **MALR extension workers -** To promote successful solutions and support

Roll out successful models and promote their replication	- Provide technical and business development support to turn developed solutions into viable business models with the goal to market them to a large base of users among small-scale farmers. - Provide financial and technical support to establish a first demonstration of each solution at the farmer level. - Design and disseminate knowledge material on successful cases to support their marketing and outreach.	dissemination of knowledge material

Table 6 Second Recommended Intervention

Improve Post-Harvest Practices and Introduce Low-Cost Solutions for Safe Drying and Handling of MAPs Products		
Expected Outcome: **MAPs post-harvest and field drying facilities adhere to best hygiene and food safety standards and control the biological and physical contamination of the end product**		**Indicators:** **Number of post-harvest and drying facilities improved** **The percentage reduced of the level of biological and foreign material loads in dried MAPs products reported by processors and exporters**
Key Activity	**Sub-activities**	**Potential partners**
Support farmer organizations and traders in establishing /upgrading post-harvest facilities	- Provide funds and grants to establish/upgrade post- harvest and drying units with cost sharing of beneficiaries comprised of traders (consolidators who buy fresh MAPs, dry it and supply to processors) and exporters and farmer organizations conducting the same activity. - Build the capacities of farmer organizations and traders on the safe handling of products and raise the awareness of farmers on best practices for safe field drying. - Provide business development services to farmer organizations on management of post-harvest facilities based on a viable business model. - Raise awareness on enabling working environments (OHS and PPE).	**Technical Experts –** To design low-cost solutions for post-harvest practices and infrastructure to comply with food safety and hygiene requirements. **Farmer organizations –** To implement and co-invest in developed solutions and infrastructure. **MALR-** To promote successful solutions and support the dissemination of knowledge material. **Beni Suef and Minya Universities and Agricultural Technical Schools –** To provide technical support to the improvement process and to disseminate the knowledge to students.
Promoting improved facilities and models	- - Organize field visits to improved post-harvest and drying facilities (used as demonstration) to promote best practices and models. - - Provide targeted farmers with practical training on best practices for safe field drying. - - Develop and disseminate knowledge material to a wider group of farmer organizations, traders, and farmers.	

	- Introduce the improved models and practices to university instructors and agricultural schoolteachers and organize student field visits to demonstration facilities.

Table 7 Third Recommended Intervention

Analysis of the Pepper Value Chain

Overview

The pepper crop, both sweet and chili, is a vegetable crop that belongs to the nightshade family, same as eggplants and potatoes. It is one of the most important vegetable crops cultivated in Egypt, and it is grown in all governorates throughout the year. A great number of pepper varieties fall under these two categories, sweet and chili, and vary in taste (in terms of sweetness, pungency, etc.), shape and length, colour, yield and productivity, and their resilience to climate and pest. The pepper plant is ready for harvest after 2-2.5 months of its cultivation, and it will keep producing pepper for 7 months (in rare cases may extend to 10 months). The sweet and chili peppers grown in Egypt are “genus capsicum or pimenta” and are either sold fresh for immediate consumption or used in pickling. Chili pepper is sold fresh or dried, as whole fruit or crushed in flakes or powder, either for local consumption or for export.

In middle Egypt, peppers are cultivated in the winter season and the summer season. The winter peppers are cultivated in greenhouses (mainly hybrid types of peppers that are produced for export and are more expensive to grow), and the summer peppers are cultivated in open fields (they are usually those planted from broken seeds and mostly produced for local consumption only). This study focuses on the summer peppers, since they are mostly cultivated by small farmers and face many challenges that hinder the development of their value chain.

As shown in the table below, Upper Egypt contributed in 2016-2017 to about 13.6 of pepper production in Egypt. In that same year, Beni Suef and Minya were the highest producers of pepper in Upper Egypt, with 4.1% and 3.1% respectively.

Governorate	Cultivated area (in feddan)	Quantity produced (in tons)	Share of national production (%)	Value (in 1000 EGP)
Beni Suef	4,887	27,722	4.1	62683
Fayoum	1,733	8,693	1.3	19656
Minya	2,904	21,228	3.1	47999
Assiut	618	4,380	0.6	9904
Sohag	1,325	10,512	1.6	23769
Qena	1,341	10,205	1.5	23075
Aswan	814	5,738	0.8	12974
Luxor	465	2,215	0.3	5008
New Valley	153	574	0.1	1298
Egypt		676,427	13.6%	1529486

Table 8 Pepper production in Upper Egypt's Governorates

Pepper Production and Exports

Egypt produces 650,000 -750,000 tons of fresh pepper per year.[28] Most of the production is consumed locally. The exports of fresh pepper range between 5,000 to 7,000 tons, reaching a peak in 2016 of 17,000 tons valued at 7.5 million USD.[29] This is considered a negligible ratio of global fresh pepper trade, which ranges between 5-6 million tons. Egypt also exports an additional 600-700 tons of dried and/or crushed chili pepper (of 4-5 million tons traded globally) at a value of 1-1.2 million USD. This amount of exported dried pepper comes from a volume of about 5,000 tons of fresh pepper. Additional amounts of pickled peppers (sold alone or as part of a mix of pickled vegetables) are exported, but the amount exported cannot be precisely estimated because they are often sold mixed with other pickled vegetables. According to market

[28] FAOSTAT

[29] TRADEMAP

experts, the amount of exported pickled peppers are negligible compared to the total amount of fresh peppers produced.

Despite a relatively limited share of exports-to-production, the existence of a global market gap gives Egypt a strong prospect to expand its share of pepper exports. This is achievable on the condition that the pepper value chain is developed, for both the fresh and the processed streams. This includes the drying of chili peppers and the pickling of high-end varieties demanded in the global market. The recent production and export trends of fresh pepper are presented in the figure below.

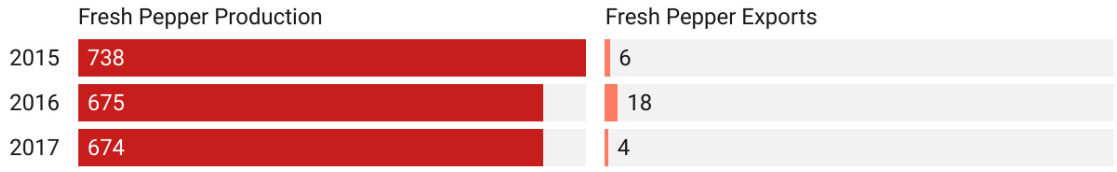


Figure 18 Egypt's production (left) and exports (right) of fresh pepper (in thousand tons)

The main importers of fresh pepper are Libya, Saudi Arabia, Hungary, Russia, Italy, and Lebanon, and of dried chili pepper are Tunisia, Libya, Pakistan, Morocco, Algeria, Jordan, and Turkey.

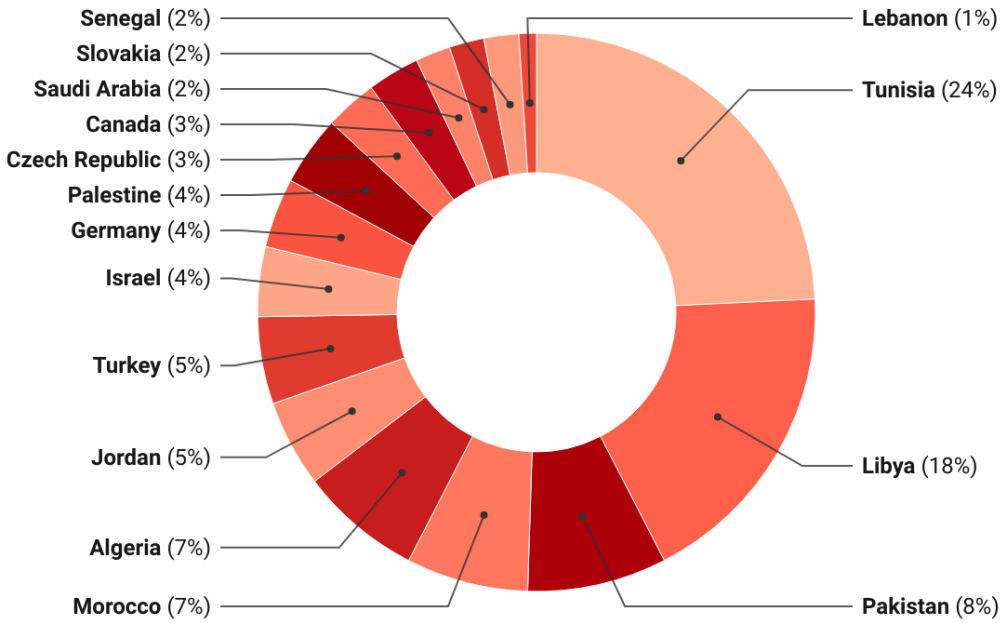


Figure 19 Egypt's Dried Pepper Exports

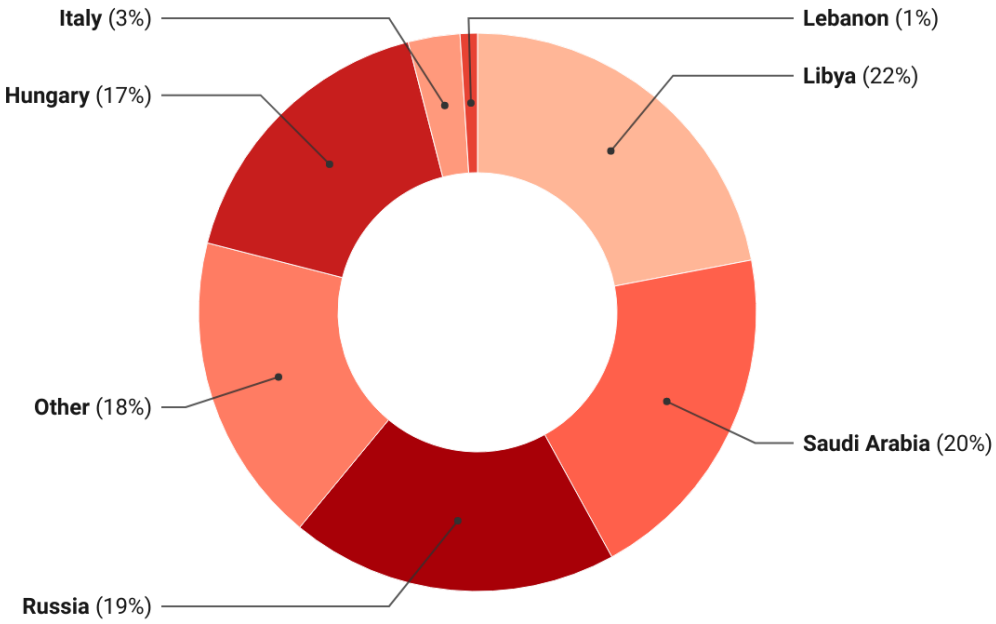


Figure 20: Egypt's Green pepper Exports

Potential for Growth

Pepper exports have high potential to expand in the international market. This provides incentive for growers to improve the quality of their produce and adopt the best crop management practices that will make their products approved for exports. Egypt's most promising markets for fresh pepper exports are the UAE, Russian Federation, and Saudi Arabia. Egypt has the strongest export relations with Lebanon. The United States of America has the biggest demand for fresh peppers.[30]

As for dried, crushed or ground peppers, the markets with the highest potential to receive Egypt's exports are the USA, Libya, and Algeria. Egypt has the strongest export links with Libya. The US market has the highest demand for dried, crushed or ground

[30]https://exportpotential.intracen.org/en/markets/gapchart?fromMarker=i&exporter=818&toMarker=j&whatMarker=k&what=070960

peppers, but with a relatively weak potential for exploitation compared to its demand for fresh peppers.[31]

Geographical Distribution of Peppers

Mapping the production of peppers in Minya and Beni Suef is problematic because, according to the official data collected from the agricultural directorates, there are no lands registered for pepper cultivation. However, the conducted fieldwork proved otherwise.

The fieldwork helped the project's team identify the main districts in which pepper cultivation is concentrated in Minya and Beni Suef. These districts are:

Beni Suef: Alasety district, Nasser district, Beni Suef district

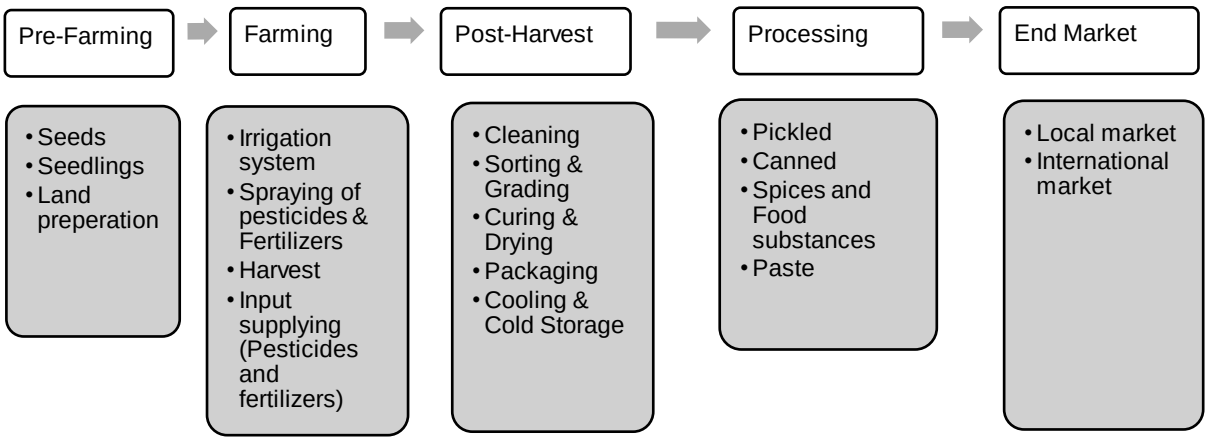
Minya: Al Idwa contributes the highest

[31]https://exportpotential.intracen.org/en/markets/gapchart?fromMarker=i&exporter=818&toMarker=j&whatMarker=k&what=0904XX

Value Chain Analysis

Using the market system approach, this section focuses on the pepper value chain in Minya and Beni Suef, detailing all its activities including pre-farming, farming, preparing, processing, and trading.

Figure 21: The Activities of the Pepper Value Chain



The pepper Value Chain involves five main activities. The following section explains the baseline state of each of these activities.

VC stages vary greatly when comparing farmers. Some farmers cultivate peppers independently and some cultivate peppers under contract with large-scale processors and exporters as part of a fully integrated business model.

A farmer's source of inputs differs according to the cultivation model followed. Contracted farmers obtain their inputs from contracting buyers who also provide advice on the use of pesticides, fertilization, and irrigation. Independent farmers buy seedlings from nurseries, access fertilizers through cooperatives at a subsidized/lower cost and get their pesticides from private suppliers who are not mandated to provide technical assistance. Independent farmers, therefore, also have no access to information about the most adequate irrigation practices for their crop.

Private large-scale processors are relatively privileged compared to small-scale farmers. They access seedlings from buyers and are provided with credit extension. With this, they receive mandatory guidance and technical advice for the crops they are growing. This ensures both cost control and quality control. Moreover, they get direct financial support from the buyer (extend credit, reduction in seedling prices, informal financial aid, etc.).

PRE-FARMING ACTIVITIES

Information regarding new varieties is obtained from nurseries. Independent and contracted farmers can also obtain seedlings from nurseries. Farmers reported that the quality of pepper seedlings available for purchase is often not good. The vast majority of small pepper farmers use broken seeds instead of the hybrid seeds (that are cultivated in greenhouses during winter), which are less productive and less resilient to pests and diseases.

FARMING ACTIVITIES

Farmers often exceed the amounts of pesticides allowed, as per standards, because the pesticides available for purchase are no longer effective, which makes them end up applying more.

In addition, the vast majority of pepper farmers rely on flood irrigation, which reduces the productivity of the crop. Only very few farmers started using drip irrigation in their lands. Flood irrigation remains widespread in old lands, while irrigation in new lands mostly relies on drip irrigation. The main reason why farmers are not yet widely adopting the new irrigation system is lack of knowledge and awareness.

Farming and harvesting peppers require mostly manual work and is, thus, labour intensive. Labour costs the most in the pepper VC, accounting for over 17% of total crop expenditures. Harvesting alone requires an average of 40 workers per day. Women are not involved in pepper farming in Minya and Beni Suef.

POST-HARVESTING

Pepper, with the exception of that produced by large exporters/processors, is often mistreated in the post-harvest stage, which causes unnecessary losses and shortening of the crop's shelf life.

Post-harvest activities under contract farming may include cleaning, sorting, grading, curing, and packaging of the produce.

PROCESSING

Processed peppers in Minya and Beni Suef are typically of low quality due to informal small processing units (primarily producing pickled peppers or mixed vegetable pickles that include pepper). These units do not meet the bare minimum of food safety and hygiene standards. There is a clear absence of infrastructure for pepper processing activities (i.e., pickling). Processing units do not have acceptable working environments and do not practise Occupational Health and Safety (OHS) or employ Personal Protective Equipment (PPE).

END MARKET

Summer peppers cultivated outside contract farming are only sold to local markets. Summer peppers (cultivated on open lands) and winter peppers (cultivated in greenhouses) that comply with export specifications and standards are concentrated in the hands of a few large-scale processors in Beni Suef and Minya.

VALUE CHAIN LINKAGES

Most of the produced fresh pepper is sold to collectors and traders in the vicinity of the production land or sent to traders in wholesale markets. These traders then sell the products to retail markets or to pickling processors. Farmers sometimes sell all or part of their produce directly to small processors nearby. In contract farming (usually mediated by a lead farmer or a farmer organization), farmers receive the seedlings and some of the inputs on a credit basis from the contracting buyer (usually pickling processing facilities catering to export markets or local high-end shops or restaurants). The buyer also provides technical support and mandatory quality control.

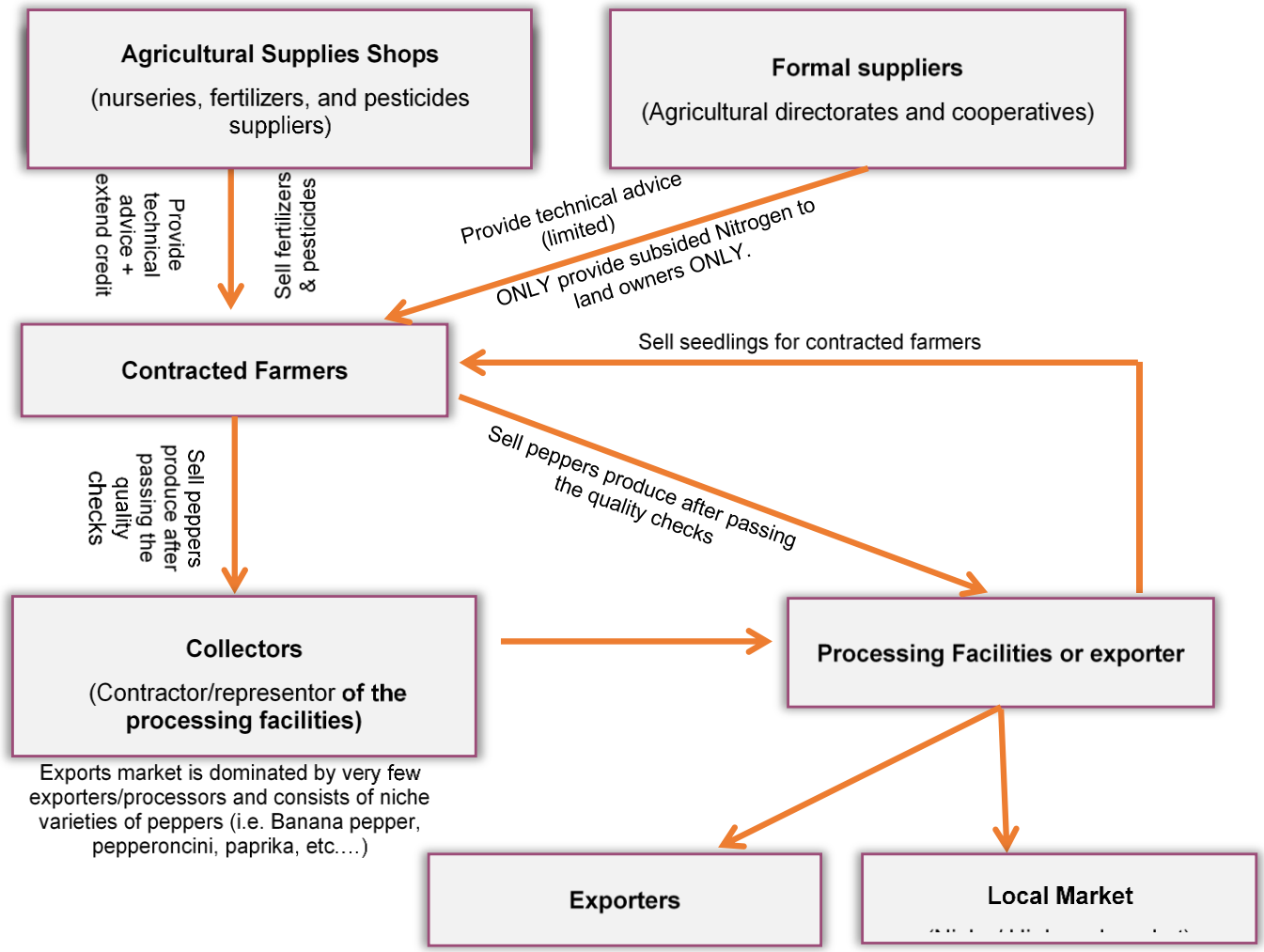


Figure 22: Pepper Contract Farming Business and Market Interlinkages

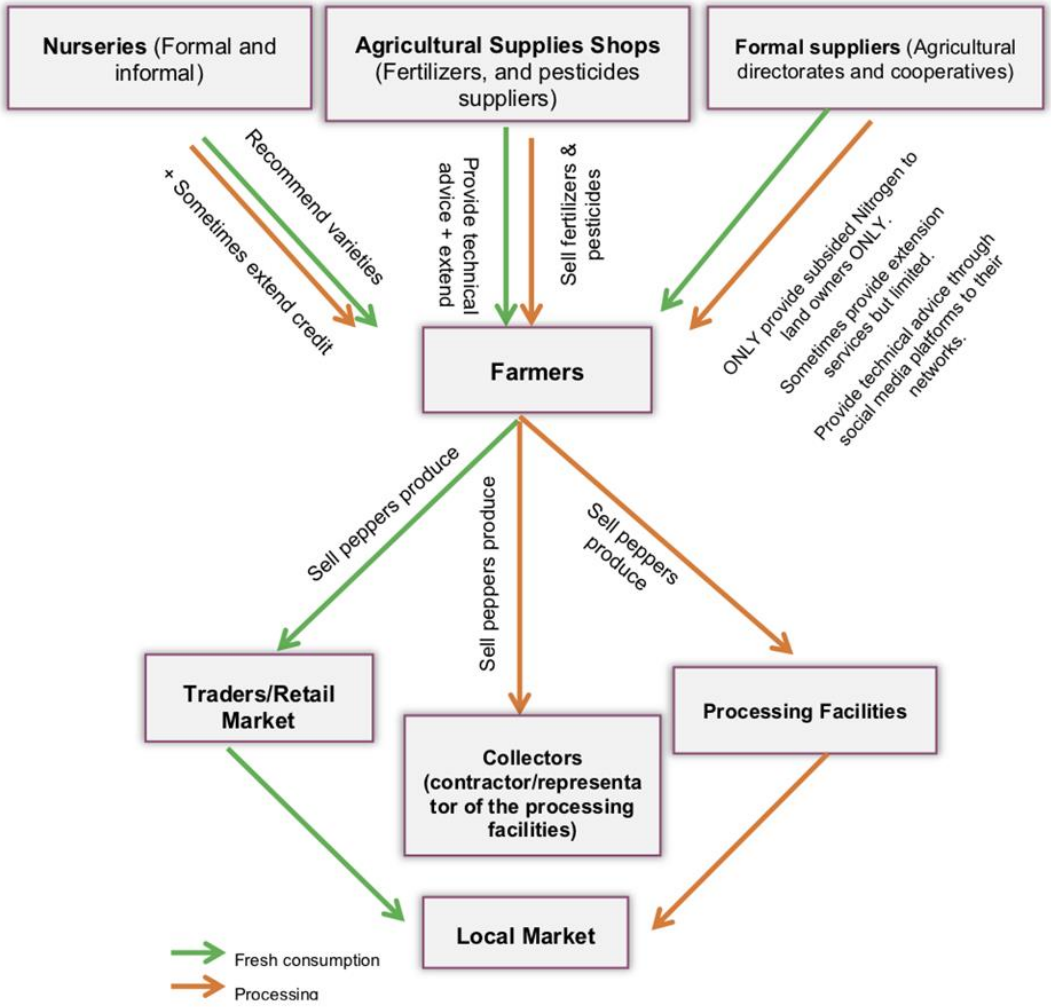


Figure 23: Pepper Business and Market Interlinkages Outside Contract Farming

COST ANALYSIS

The below diagram indicates the average cost of all pepper cultivation-related activities based on the data collected from the pepper growers in both governorates. It is worth mentioning that because the pepper market suffers greatly from price fluctuations, these prices, and thus the proportion of each activity to the overall cost, may vary every year.

As shown below, irrigation contributes the highest to the overall cost of cultivation. The conducted fieldwork revealed that most growers resorted to flood irrigation even though it damages the produce. However, few of the growers interviewed in both governorates (1 in each) indicated that they used drip irrigation and that it costs less, results in higher crop productivity and does not damage the produce.

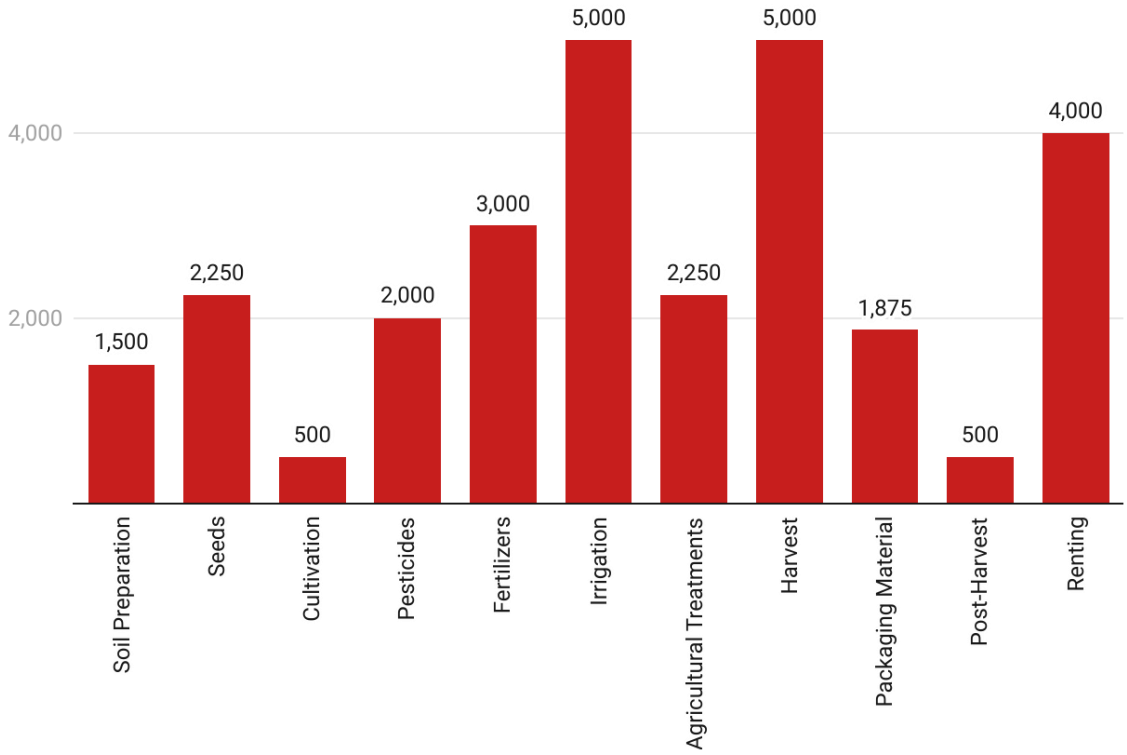


Figure 24: The Cultivation Cost Analysis of Summer Pepper, in EGP

SUPPORTING FUNCTIONS

This section details the factors that influence the pepper value chain in Minya and Beni Suef. It will also analyse the factors that limit the development of the value chain.

Financial services

The buyer (processor/exporter) extends credit to the farmer under the group farming and contract farming business models. Furthermore, fieldwork has revealed that large processors/exporters may provide informal financial assistance and cut the cost of seedlings as a kind of support to contracted small farmers.

Suppliers of inputs also extend credit to all small farmers. However, farmers are rarely given credit by nurseries (only if there is mutual trust).

Labour

Labour Supply is mainly provided by the farmers' households and neighbouring households.

Labour Training, if any, is conducted on the job, whether in the field or in processing units.

In the interviews, farmers did not complain about the quality of labour. Still, introducing new and innovative techniques will require labour training.

Extension Services

Pepper growers no longer receive extension services from agricultural directorates or cooperatives. Under group farming and contract farming business models, as well as other contract farming schemes, the buyer (processor/exporter) provides all the technical support that growers require to ensure harvest quality and regulate harvest price.

Outside of the business model, such services (technical support and market information) are given by lead farmers, merchants, nursery owners, and input suppliers, because they are considered of highest expertise. However, these knowledge agents do not always give adequate/trusted information.

Most of the time, each of these actors has only incomplete information and does not have all of the necessary knowledge about crop requirements and best practises. Suppliers, for example, would only have information on the products they offer, whereas nurseries would only have information about the new pepper types they trade in. They provide information about the items they are attempting to market, which are not always the best for the crop that the farmer is growing and may occasionally have a negative impact on crop productivity and quality, as well as the farmer's profitability.

Market Linkages

The market linkages in the pepper VC are evidently broken. Growers do not have access to promising market channels that may increase their profitability. The decision to cultivate certain types of pepper is not market-driven, rather availability driven. Independent farmers are significantly ignorant of pepper market trends.

Access to innovation and information

A significant challenge facing small pepper farmers is the market's the market oversaturation with pepper cultivated on new lands. A considerable portion of the pepper crop, particularly in Minya, is planted on new lands, primarily on reclaimed lands in the Western Desert. These are not accounted for in official agriculture data. These regions have a better yield and generate more quantities (economy of scale) than older fields, giving them a competitive edge in terms of cost and end-market price. These new areas are not being cultivated by small landowners because the area per grower can reach 10 feddans.

Furthermore, because farmers lack market information, intermediaries and dealers reap the majority of the benefits, while farmers bear any potential financial losses.

Farmers are uninformed about the market (supply and demand, new varieties, best crop management practices, new technologies that could enhance productivity, best irrigation systems, etc.). Furthermore, in order to repair the damage and combat pests, farmers over-use pesticides and fertilisers, further lowering the quality of their end-product.

Growers' only source of information on new fertilisers and insecticides, as well as optimum crop management practises, is the suppliers. The nurseries are their only source of information on new types.

Employment

The total required labour for pepper cultivation, post-harvesting, and processing is 179 workers (man-days) throughout the plant cycle.

Women are mostly involved in the post-harvest activities and during the preparation phase of exporting. The income of farm workers varies between 40-60 EGP for half a day (4 hours), and 130 for a full working day. The main source of labour supply is the household and could extend to neighbouring households.

All interviewed farmers affirmed that workers are well-equipped to cultivate pepper in both governorates. Nevertheless, introducing new and innovative techniques would require further labour trainings.

RULES AND REGULATIONS

Contract Farming

Contract farming in the pepper market is a relatively better model compared to others, yet it is still immature compared to the fully integrated business model in the MAPs market. With contract farming, growers received technical advice and support as needed from the buyers. However, these recommendations of are not binding to growers.

Pricing Mechanisms

When farmers sell their products in wholesale markets or at the periphery of their farmland, prices are decided based on the outcome of negotiations with buyers. The degraded quality of the products decreases the price (market defined prices).

When the crop is sold to processors or exporters (contracted farming or business model), the buyer decides on the price. Exporters set prices based on global market prices and based on their selling price to the importers.

Food Safety Requirements

Independent pepper farmers do not follow food safety requirements. Small and informal post-harvest and processing units do not comply with food safety requirements either and produce low quality products.

Mature business models, on the other hand, strongly follow food safety requirements since their products primarily target the global market. However, small and medium producers do not comply with international standards of traceability, but large producers do.

Specifications and Quality Standards

The implementation of ISO 22000 (Food safety management system) is commercialized but does not consider the key constraints in the VC, especially those facing small and medium producers and growers. Therefore, it becomes ineffective. Lack of national good quality practices to be applied on small and medium producers. Lack of infrastructure and facilities for post-harvest and processing activities.

Challenges and Constraints

The pepper VC faces a variety of challenges that mainly impact small farmers. This section will detail the key-constraints that, if addressed, will improve the quality of products, improve the productivity of the crop, and reduce the cost of cultivation, increasing the profit margin of the growers.

CHALLENGE 1

Challenge: Lack of market information & contract farming

Due to a lack of market information and contract farming, there is a mismatch between supply and demand, causing prices to fluctuate and farmers to incur financial losses.

Underlying cause: The disconnection of farmers from the end market

Impact on Business:

1. A mismatch between supply and demand.
2. Price fluctuations that cause farmers to hesitate about growing pepper.
3. Traders manipulate the price, causing losses to farmers.
4. A mistrust between VC actors.

CHALLENGE 2

Challenge: Lack of access to adequate technical information and extension services

Growers and processors lack adequate and dependable technical information on best practices and crop management needs, resulting in higher expenses, lower profit, lower yield, and lower output quality. These practices include using broken seeds, using too many pesticides and fertilizers, relying on flood irrigation systems, and carrying out inadequate post-harvest activities and poor processing activities.

Underlying causes:

1) The MALR extension services are insufficient, with few human resources and not enough modes of transportation that would allow extension advisors to easily access farmers with the required frequency.

2) Uncertified input suppliers provide farmers with unreliable technical information.

Impact on Business:

The farmers' lack of knowledge about crop requirements results in:

1. Use of broken seeds to cultivate the crop
2. The excessive use of (unregistered & inadequate) pesticides and fertilizers that fail to counteract pests.
3. Reliance on the flood irrigation system.
4. Low product quality and high rejection rates.
5. High and unnecessary costs and lower profitability.
6. Inability to compete with larger scale farmers that grow reclaimed lands.

CHALLENGE 3

Challenge: Lack of collaborative economies and integrated business models

Because of a lack of collaborative economies and integrated business models, there is a mismatch between supply and demand, resulting in price fluctuations and financial losses for farmers

Underlying causes: The disconnection of farmers from the end market.

Impact on Business:

1. A mismatch between supply and demand.
2. Price fluctuations that cause farmers to hesitate about growing pepper.
3. Traders manipulate prices causing farmers to make losses.
4. A mistrust between VC actors
5. Absence of economies of scale and lack of technical information.
6. Higher costs.
7. Lower quality of produce and high rejection rate.
8. Lower profit for growers.

Recommended Interventions

The following interventions were developed to address the key challenges, detailed above, by tackling their underlying causes. They also capitalise on existing opportunities, including the cultivation features that makes the crop appealing to small farmers, the untapped export potential of the sector, in addition to the willingness of the value chain actors to collaborate to develop the sector.

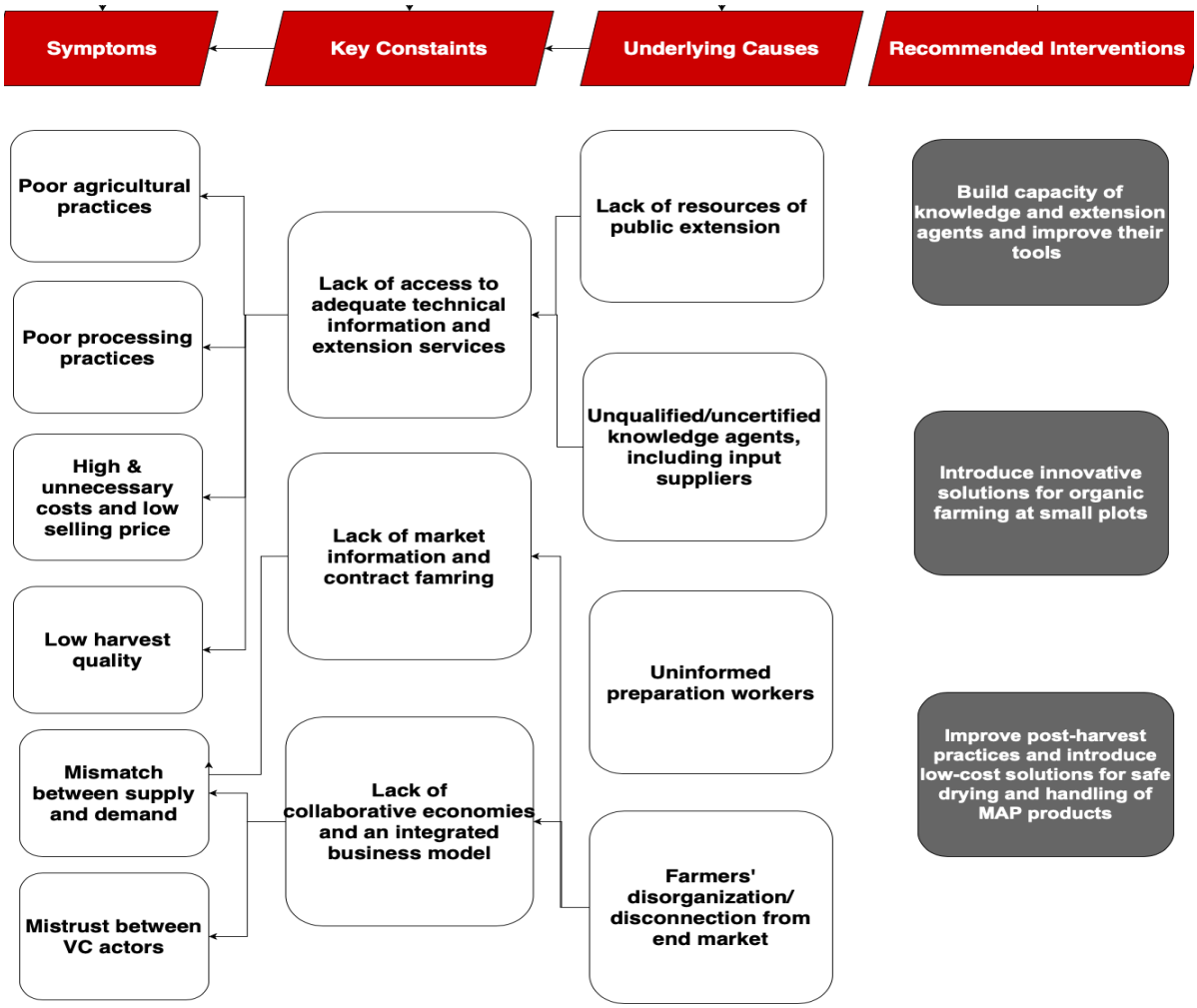


Figure 25 The Pepper VC Key Challenges, their Symptoms and Underlying Causes and Recommended Interventions

The recommended interventions are detailed in the tables below.

Build Knowledge Capacity and Improve Extension Services and Tools		
Expected Outcome: **Small-holder farmers have adequate access to reliable extension information.**		**Indicators:** **The number and type of extension agents with improved knowledge and access to information sources.** **The level of satisfaction of farmers with extension support provided by enabled agents.**
Key Activity	Sub-activities	Potential Partners
Conduct an advanced capacity building program targeting knowledge agents: **- Extension workers** **- Lead farmers** **- Input suppliers** **- Private advisors**	- Conduct basic and advanced trainings for knowledge agents on good agricultural practices. - Establish demonstration fields to introduce innovative practices with special consideration to integrated pest management, varieties and fertigation and irrigation. - Conduct advanced trainings and study tours for excelling knowledge agents (to advanced farms and to facilities of processors and exporters to understand quality requirements and further value chain steps). - Support networking and exchange between knowledge agents. - Engage the technical staff of Minya and Beni Suef universities and teachers at agricultural technical schools in the process.	**Technical Experts and the AIP team –** To design the capacity building program **Private Sector Buyers –** To inform the training content especially regarding the market requirements The MALR (Department of Extension Services and Central Administration for Extension under the Agricultural Research Centre and the Agricultural Extension Centres at the District Level in Beni Suef and Minya) – To participate in identifying the pool of knowledge agents and to participate in the trainings. **Farmer organizations –** To disseminate the knowledge products.

Disseminate information and knowledge to growers	- Conduct field visits to the extension/demonstration fields and invite growers in each area. - Disseminate extension material to reach farmer groups. - Create social media (and other communication) channels to reach growers. - Support the MALR extension services by updating extension material and digitizing its delivery to knowledge agents and farmers across the ministry's centre, governorate and district units, using interactive interfaces (including mobile applications).	Beni Suef and Minya Universities (Faculty of Agriculture) and Agricultural Technical Schools in Beni Suef and Minya.

Table 9 First Proposed Intervention

Introduce Improved Practices for Small-Scale Processing Activities with a Focus on Food Safety and Quality Requirements	
Expected Outcome: **Post-harvest preparation and small-scale processors upgrade food safety and quality assurance practices.**	**Indicators:** **The number of preparation and processing units with improved practices.**

Key Activity	Sub-activities	Potential partners

Conduct an advanced capacity building program for preparation and processing units that focuses on food safety and quality requirements.	- Conduct basic and advanced trainings on food safety and hygiene for workers in small preparation and processing units. - Raise awareness on enabling working environments (OHS & PPE). - Establish demonstration units for preparation and processing facilities to introduce innovative and improved practices. - Conduct study visits and practical trainings in preparation and processing facilities.	**Technical Experts and the AIP team** to design the capacity building program. **Private Sector Buyers** to inform the training content, especially regarding market requirements. **The MALR extension workers** to participate in the outreach. **Farmer organizations** to engage/ co-invest in demonstration units. Universities, TVET and vocational training providers.

Table 10 Second Recommended Intervention

Introduce and Pilot an Integrated Business Model for Pepper Contract Farming and Group Farming		
Expected Outcome: **Farmer organizations in Beni Suef and Minya are adopting effective contract farming business models for Pepper**		**Indicators:** **The Number of farmer organizations adopting the contract farming business models.** **The increase in volume and value of contracted crops of target farmer organizations.**
Key Activity	**Sub-activities**	**Potential partners**
Develop an integrated business model.	- Assess the existing business models in the pepper market in the selected region and map the lessons learned. - Plan an integrated business model for contract farming and group farmers - Raise awareness of both producers and buyerson the advantages of group and contract farming within an integrated business model.	**Private Sector** as institutional buyers. **Agribusiness experts** to support developing the model. **Farmer organizations** to reach the beneficiaries and promote the business model.
Implement and pilot the model.	- Activate the business model using several pilots. - Disseminate information on success cases to farmer groups. - Design knowledge material on successful cases.	

Table 11 Third Recommended Intervention

Onion and Garlic Value chain Analysis

This section of the report analyses the onion and garlic value chains, focusing on the activities and actors engaged in both chains (and their interlinkages), while shedding light on the most pressing challenges hindering their development in Minya and Beni Suef. Since both crops share the exact same value chain activities and actors (the same farmers grow both crops), they are covered in one section to avoid redundancy.

The Onion Crop: An Overview

The onion is an important horticultural crop in Egypt. It is widely grown and is the country's third most important agricultural export.

It is difficult to obtain statistics on the various types of onions (yellow, white, green, and red) and about the varieties grown throughout the country (Giza 20, Giza 6, Giza 6 enhanced, Shandawil, Red Giza, White Giza, Red Italian). The crop is classified in official national data based on the stage at which it was gathered (fully grown onion, green onion, onion seed crop, and pickling onion). Global sources, on the other hand, such as FAOSTAT and COMTRADE, classify the crop as either green or dry. Meanwhile, the agricultural directorates of Minya and Beni Suef do not classify onion crops and refer to onion as a single category, with no further specifications.

Onion Sector growth

In Egypt, onion is a winter crop and, as shown in the table below, its production is concentrated in Upper Egypt. About 31.5% of the fully grown onion production is spread across Upper Egypt, 25.4% of this quantity is concentrated in Sohag (9.1%), Beni Suef (6.2%), Fayoum (5.6%) and Minya (4.5%).

Governorate	Cultivated Area (in feddan)	Quantity produced (in ton)	Share of national production (%)
Beni Suef	13,717	182,080	6.2%
Fayoum	11,039	164,552	5.6%
Minya	10,399	131,428	4.5%
Assiut	4,240	70,929	2.4%
Sohag	14,382	267,960	9.1%
Qena	2,186	34,627	1.2%
Aswan	1,625	27,011	0.9%
Luxor	617	10,203	0.3%
New Valley	2,836	41,923	1.4%
Upper Egypt			31.5%

Table 12 Distribution of Fully Grown Onions in UE (in %) (CAPMAS- 2016/2017)

Onion Production and Exports

In terms of both domestic consumption and exports, onions are one of Egypt's most important crops. After oranges and potatoes, it is the third most important export crop. The country's onion production is estimated to be around 3 million tonnes, as seen in the graph below. Egypt exported 825 thousand tonnes of fresh onion in 2019, valued at 244 million USD, and 13.6 thousand tonnes of dried onion, valued at 30.9 million USD (8.1% of global dry onion exports). Saudi Arabia, India, the Netherlands, Turkey, Russia, the United Kingdom, and the UAE are the top fresh onion importers. The Netherlands, Germany, Japan, the United States, and Croatia are the top dried onion importers.

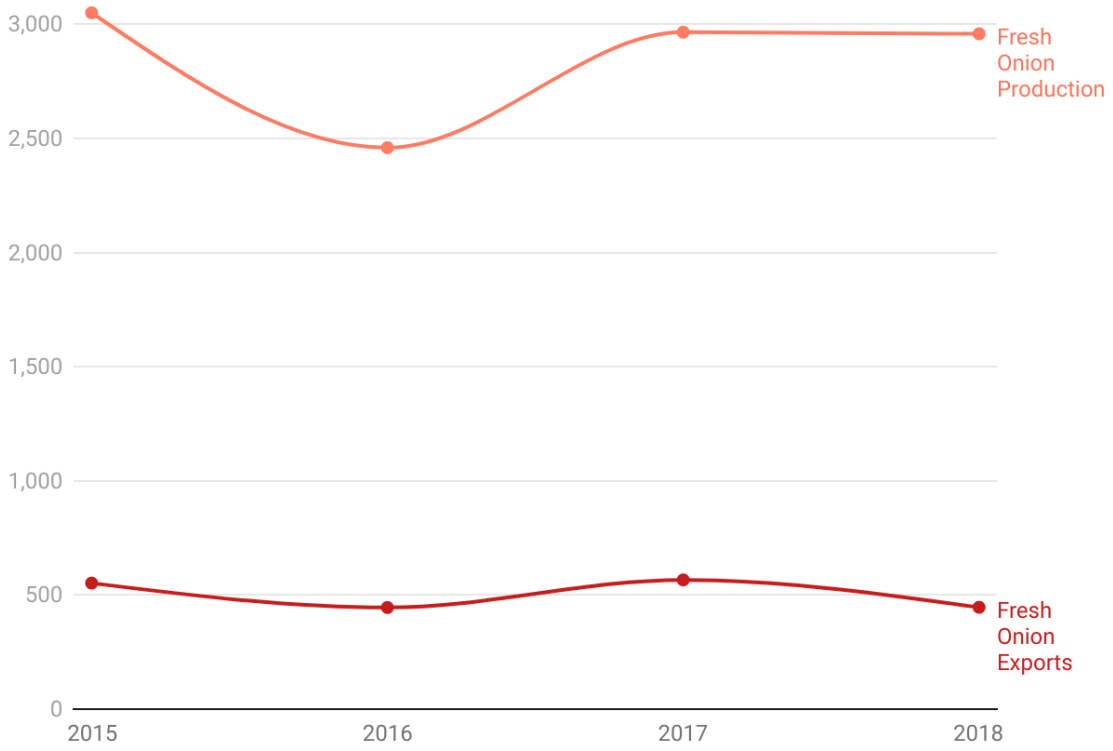


Figure 26 Egypt's Production (left) and Exports (right) of Fresh Onion (in 1000 tons)

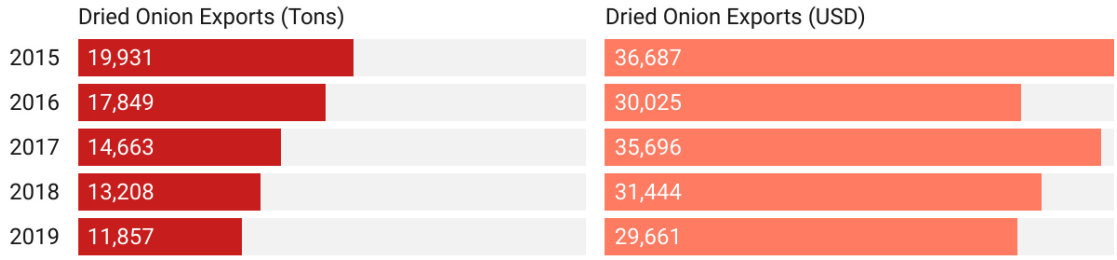


Figure 27 Egypt's Exports of Dried Onion in 1000 tons (left) & 1000 USD (right)

The 12 thousand tons of exported dried onions are produced from an estimated total amount of about 100,000 tonnes (the amount of onion directed to the processing stream of drying). An additional portion of dried onion is sold locally to food processing factories (used as an ingredient in processed meat, soup preparations and flavours) and is estimated at 10% of the exported amount.[32] Another stream of fresh onion is directed for

[32] Estimation by Food Sector Experts from local market knowledge

processing as onion pickles or mixed pickles and estimated at less than 2% of the total fresh production.[33]

The Onion VC's Potential for Expansion

The markets with greatest untapped potential for Egypt's exports of fresh onion are the UK, Belgium, and Germany.

Figure 28 The Untapped Exports Potential of Fresh Onion (in million USD)

As for dried onion, the markets with the greatest export potential are Saudi Arabia, Iraq, the UAE, and Senegal.

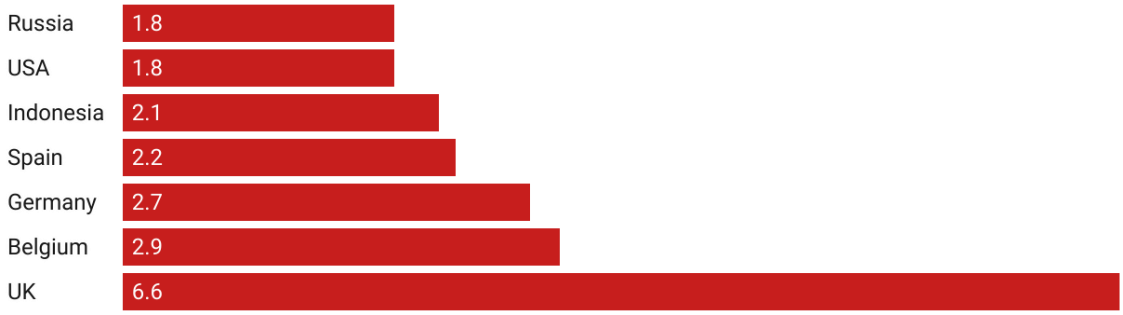


Figure 29 The Untapped Exports Potential of Dried Onion (in million USD)

The Garlic Crop: An Overview

Garlic is one of the oldest horticultural crops cultivated worldwide. It is an indispensable culinary plant in the Asian, Middle Eastern, Latin American, and Mediterranean cuisines. It is one of the most widely known spices, famous for its high health and medicinal benefits.

[33] ibid

Egypt mainly cultivates three varieties of garlic. These are (1) The indigenous/Baladi garlic and (2) the SEDS 41-42 (an originally Chinese variety) and (3) the Spanish garlic. Seed breeding of garlic varieties started in Egypt in the 1980s, introducing the SEDS 41-42 cross section variety.

Planting of both Baladi and SEDS 41-42 garlic varieties now takes place in September and October. Green garlic is harvested between the last week of January and the end of March, and dry garlic is harvested between May and August but for many years now its harvesting period has been extending to September. Accordingly, the post-harvest activities of green garlic take place from January to April, and for dry garlic between May and September.

Garlic Sector Growth

Like onion, garlic is a winter crop and, as shown in the table below, Upper Egypt contributes with about 68.8% of Egypt's garlic production, and 55% of this quantity is concentrated in Beni Suef (43.4%) and Minya (12.4%).

Governorate	Cultivated Area (in Feddan)	Quantity produced (in tons)	Share of National Production (%)
Beni Suef	11,657	125,682	43.4
Fayoum	1,863	13,719	4.7
Minya	4,057	35,907	12.4
Assiut	822	9,081	3.1
Sohag	379	5,137	1.8
Qena	357	3,498	1.2
Aswan	392	4,372	1.5
Luxor	237	1,952	0.7
New Valley	0	0	0.0
Egypt		289,766	68.8%

Table 13 The Distribution of Garlic in UE

Garlic Production and Exports

The country's annual production of garlic reaches about 300,000 tons, as shown in the below figure. Egypt is ranked the 6th highest garlic exporter after China, Spain, Argentina, and the UAE, exporting 36,400 tonnes in 2019 with a value of 28.5 million USD. The increasing global demand for garlic raises Egypt's prospects to expand its global market share.

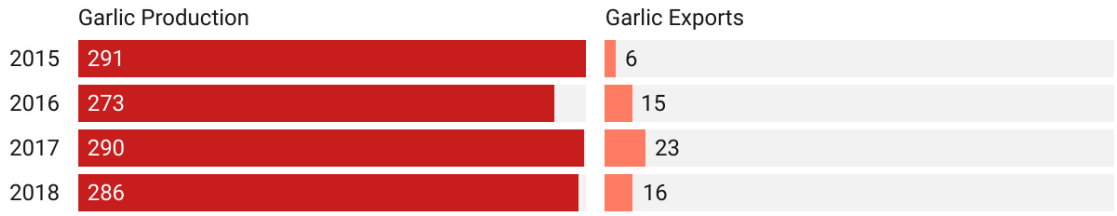


Figure 30 Egypt's Production (left) and Exports (right) of Garlic (in tons)

Egypt's largest importers include China, Russia, Jordan, Poland, Turkey, Brazil, Lebanon, and Palestine. Although Egypt is a major exporter of garlic, it also imports it from China. Egypt's garlic imports climbed from 2,500 tonnes in 2014 to 9,000 tonnes in 2018. The garlic brought to Egypt is properly packaged, easy to peel, and has a relatively good flavour. While Egyptian garlic excels in flavour, it lacks sufficient post-harvest treatment and final consumer packaging. Although garlic imports are minimal in comparison to overall local production, they can be reduced further if more effort is put into enhancing post-harvest activities and packaging of Egyptian garlic.

The Garlic VC's Potential for Expansion

The trade partners with the highest untapped potential for Egypt's exports of garlic are Indonesia, the UAE, the USA, Germany, and the Netherlands.

Figure 31: The Untapped Exports Potential of Garlic (in million USD)

Onion and Garlic Production in Beni Suef and Minya

Onion is grown on both old and new land. According to data from Beni Suef's agricultural directorate, the cultivated area of the new lands reached 6,353 feddans in 2020. Reclaimed land for onion cultivation covers 175 feddans. Onion cultivation on old lands is concentrated in Al Feshn (6,000 feddans), Ahnesia (3,342 feddans), Nasser (1,126 feddans), Samasta (976 feddans), Al Wasta (759 feddans), Beni Suef (756 feddans), and Beba (744 feddans).

Garlic grown on new land, on the other hand, is grown on a lesser scale, with only 229 feddans. The total area of reclaimed garlic growing areas is 662 feddans. Garlic cultivation on old lands is concentrated in Al Wasta (6,022 feddans), Nasser (3362 feddans), Ahnesia (2,994 feddans), Samasta (431 feddans), Beni Suef (425 feddans), Al Feshn (64 feddans), and Beba (38 feddans).

The agricultural directorate of Minya governorate did not provide a detailed distribution of onion and garlic cultivation at the district level. However, the fieldwork revealed that Idwa and Maghagha are the two districts mostly known for onion and garlic cultivation. Salakus district, on the other hand, has become a hub for garlic post-harvest preparation and trade. Accordingly, garlic cultivated in surrounding governorates is transported to Salakus for preparation and the workforce in Salakus is, to a great extent, trained and organized around the garlic sector.

Value Chain Analysis

This section breaks down the onion and garlic value chains into steps to provide a thorough description and analysis using the market system approach.

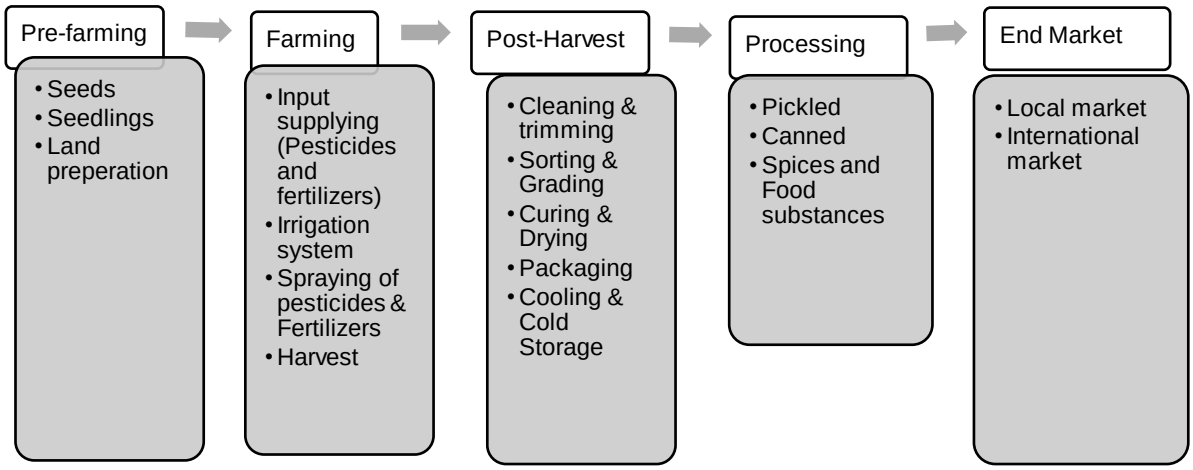


Figure 32 The Activities of the Garlic and Onion Value Chain

The cultivation model that farmers follow for garlic & onion is relatively more mature than the models used in MAPs and peppers, described in detail in the above sections. This is mainly attributed to the active role that the MALR extension providers play in the cultivation models used for garlic & onion. Contracted farmers obtain their inputs from contracting buyers who also provide minimum advice on pesticides, fertilization, and irrigation. Explicit quality assurance measures are absent in this agreement – to remove any obligation from the buyer to buy the produce. The knowledge of contracted farmers is limited to that provided by the contracting buyers and the MALR extension providers.

Independent farmers, on the other hand, buy seedlings from nurseries and obtain fertilizers from formal and informal private sources. Other than the technical advice provided by the MALR extension services, independent farmers have limited knowledge about new techniques and better inputs.

A detailed description is presented below of the onion and garlic value chain activities, including pre-farming, farming, post-harvesting, processing, and trading in the selected governorates of Minya and Beni Suef.

PRE-FARMING & FARMING ACTIVITIES

Farmers use broken seeds to cultivate onion and garlic, this results in lower productivity and makes the produce less pest resilient. Formal and informal nurseries are the main source of seeds and seedlings. Farmers resort to farmer organizations to access fertilizers. However, farmer organizations do not provide enough supplies adequate for the fertilization of onion and garlic.

“The farmer organization don’t get the ‘smart fertilizer’, they get the one used for clover and if you want, you can take it as an alternative” – Garlic and onion FGD conducted in August 2020.

Fertilizers from private informal suppliers are often unregistered by the MALR, unlike those provided by formal chemicals and pesticide companies and their agents. Unregistered fertilizers and pesticides are not adequate nor recommended for the crops. Farmer organizations sometimes also help facilitate the supply of inputs.

Farmers increase the use of pesticides to combat the damages caused by the increasing rainfall. Increase in rainfall and humidity cause damage to the crop (e.g., White Rot) which causes farmers to use pesticides excessively. This, however, has proven to be ineffective as the increase in pesticides fail to combat infestations. White Rot persists as the most common threat facing onion and garlic in Beni Suef and Minya.

All onion and garlic growers at the Nile Valley use flood irrigation. This irrigation method, however, increases pests and diseases, reduces the productivity and quality of the crop and results in higher water waste (an unnecessary additional cost that farmers endure). Diesel is the main source of energy used in flood irrigation pumps. Onion water consumption in Minya and Beni Suef reaches 7,200 cubic meters per feddan, while the field rated water is 2,503 cubic meters per feddan. (CAPMAS)

Onion and garlic growers get their need of fertilizers either from formal farmer organizations or (formal or informal) private input suppliers. The former suppliers of fertilizers provide subsided nitrogen to landowners only. Landowners, however, still often resort to other suppliers for more fertilizers (which is a bad practice as the quantity they use exceeds the recommended quantity).

POST-HARVEST

Dry garlic and onion undergo indispensable post-harvest activities (i.e., curing by drying, cleaning, packing, storing, etc.) whether the products are for local or international markets. These activities extend the shelf life of the crop. Contrary to the pepper VC, onion and garlic post-harvest activities are conducted by the growers. Traders also conduct post-harvest activities. Specific to onion, post-harvest and preparation activities include the peeling and cutting of onions to be supplied to onion drying factories. This step takes place in preparation units where female workers carry out this operation manually. Workers in that phase are adequately trained for the process. Still, the preparation facilities usually lack the required standards for food safety and hygiene as well as occupational health and safety, especially considering the quantity of manual work required for cutting and peeling. Similar garlic preparation units also exist, mainly to prepare the garlic for local and export consumer markets, by cutting the green parts and roots from the garlic heads.

PROCESSING

Onion processing facilities are large and medium in scale and are mainly for drying the already cut onion into flakes of different sizes using oven dryers. These facilities are generally in compliance with food safety and hygiene standards and have all the

required quality and food safety certifications for the different markets. Most of this product is for exporting. An additional portion of dried onion is sold locally to food processing factories (as an ingredient added to processed meat, soup preparations and flavours) and is about 10% of the exported amount.[34] Another stream of fresh onion is processed into pickled onions or included in mixed pickles, and is estimated at less than 2% of the total fresh production.[35] There is a limited processing activity done for garlic and involves drying it in advanced facilities to produce garlic powder, or, in smaller quantities, to produce garlic pickles. Some processing units informally produce garlic paste that is preserved frozen and sold via informal channels.

END MARKET

Onion and garlic are produced for both local and export markets. Uncontracted farmers only target the local market. Unlike the onion and garlic that is sold locally, onion and garlic prepared for export must meet quality standards. If the harvest does not abide by them, the buyer refuses to make the purchase, and the farmer has to bear the wasted transportation costs. The quality standards of both crops are related to their size, shape, colour (in the case of onions), quality and the level of used pesticides.

Interlinkages between the actors involved in the onion and garlic value chains are summarized in the below diagram. Most of the produce is sold upon production to traders in nearby collection points or to traders at wholesale markets. With few exceptions (e.g., farmer groups contracted by onion drying processors) these traders are the main link between farmers and market channels, whether for local retail, fresh exports, or processing.

Most of the fresh onion is planted using locally produced seeds that are of relatively lower quality. However, farmers contracted by onion drying factories use seeds provided by the factories to produce onions with a higher solid content and that have other specifications suitable for drying. Onion drying factories are interested to expand the contract farming model but are challenged by the poor capacities of farmer organizations. Most of the large-scale onion drying processors started to either, contract large farms in reclaimed land, or to move backwards in the supply chain to establish and manage their own large-scale farms in the desert to secure part of their supply. There is, thus, room for expanding the contractual farming of onion and garlic by improving the performance of farmer organizations and establishing a viable business model.

[34] Estimation by Food Sector Experts from local market knowledge

[35] ibid

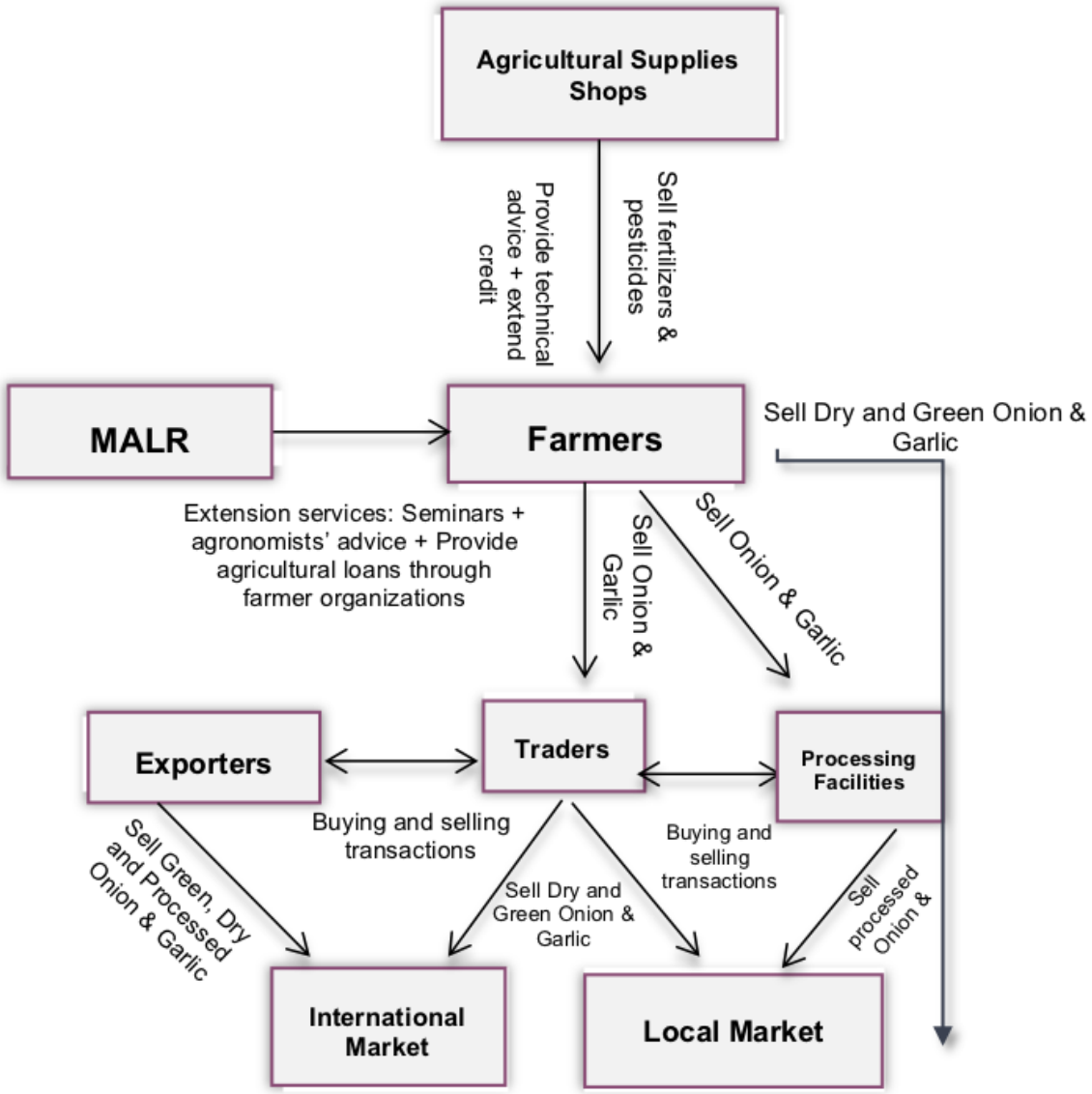


Figure 33 Business and Market Linkages of the Garlic & Onion VC

EMPLOYMENT

The total required labour for cultivation, post-harvesting and processing is 137 man-days for onion and 179 man-days for garlic. The below diagrams display the segregation of workers by stage for each crop.

Women hold a substantial proportion of jobs in the garlic and onion VC. Their daily rate (60 EGP) is, however, lower than that of males (80 EGP). In various processing tasks, women have a daily rate of 80 EGP, whereas men have a daily rate of 150 EGP.

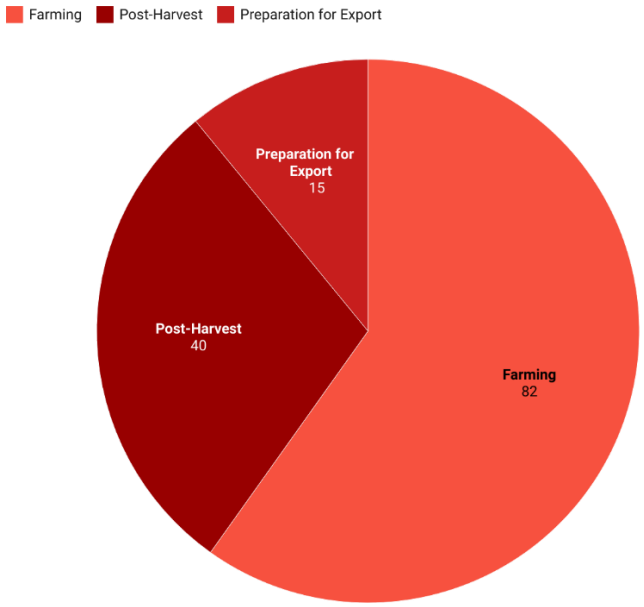


Figure 34: Figure 43: Labour Segregated by stages in Man days for the Onion VC

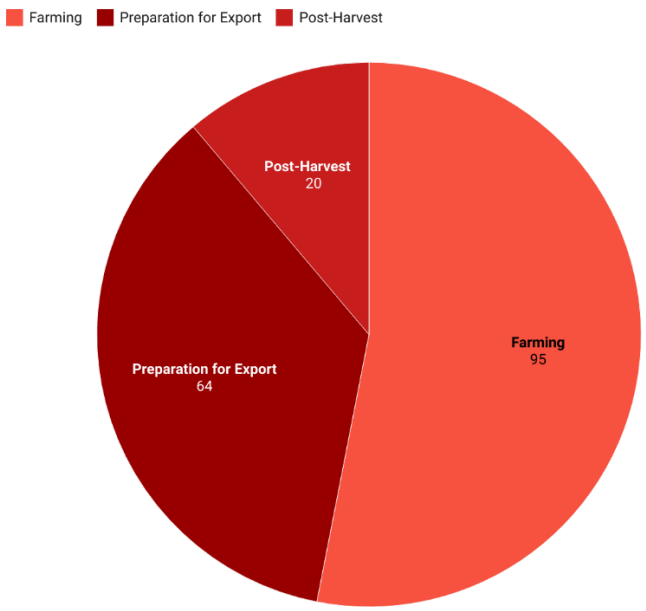


Figure 35: Figure 43: Labour Segregated by stages in Man days for the Garlic VC

Supporting Functions

This section provides an overview of the factors influencing the onion and garlic VC in Minya and Beni Suef. By describing the financial and non-financial services, this section also analyses the factors limiting the value chain.

FINANCIAL SERVICES

Input suppliers of fertilizers and pesticides provide extended credit to all small farmers. Nurseries seldomly extend credit to growers (only if there is mutual trust). Farmer organizations often provide agricultural loans.

"It's easy to take a loan from the farmer organization of up to 4 thousand EGP"- Onion and garlic grower, Minya governorate, August 2020.

LABOUR SUPPLY

Farmers and processors usually need a labour contractor to provide them with labour. Families in Minya and Beni Suef worry about sending their young members to work for growers or processors and require a labour contractor that they trust.

LABOUR TRAINING

Labour contractors provide pre-work training based on the requirements of the job. However, very little training is usually needed because most workers are already acquainted with the skills and activities they require for the job. Further training is required to promote innovation and to encourage better (if not best) practices.

EXTENSION SERVICES

In both farming models, extension services are often provided by the MALR. It is also provided by key knowledge agents, such as lead farmers, traders, nursery owners, and input suppliers as they are the ones with expertise. However, each of them has limited information on overall crop requirements and may provide inaccurate information.

Farmers more often call or text trusted agronomists from farmer organizations to take their advice on problems they face.

As one of the farmers emphasized: “Last year, I sent the agricultural expert of the organization pictures of the pests affecting the crop, or I can call him and he could come look at the pests himself, or I can go visit him directly”. – onion and garlic FGD, Beni Suef governorate, August 2020

ACCESS TO INNOVATION AND INFORMATION

In the onion and garlic VC, farmers rarely have an adequate level of market information. The lead farmers play a big role in transferring this information. Farmers also trust the agricultural consultants of farmer organizations to provide adequate market and technical information. In addition, a minimal level of information is provided to farmers under contract farming. Farmers in all cases are not obliged to follow the information provided by any of these sources and may cultivate any crop or carry out any practice they see fit. Small scale processing units also lack information and innovative techniques.

ACCESS TO MARKET

The market linkages in the onion and garlic VC are evidently lacking. Therefore, growers do not have access to promising market channels to increase their profitability.

Rules and Regulations

CONTRACT FARMING

Contract farming in the onion and garlic VC is not effective as its agreements are non-binding and, therefore, offer no control over the quality of the harvest.

There is an evident lack of information regarding contract farming. growers participating in the focus group discussion believed that contract farming only takes place between traders and processors. This shows that there is lack of information regarding contract farming.

PRICING MECHANISMS

When growers sell their produce in the wholesale market or at their farm gates, prices are decided based on negotiations with buyers. The low quality of the product pushes prices down (market defined prices).

When the crop is sold to processors or exporters (contract farming), the buyer is the one deciding on the price.

FOOD SAFETY REQUIREMENTS

Food safety requirements are neither applied by the growers or by the processors in the onion and garlic VC.

CODING

The traceability system of small and medium producers does not comply with international standards. Large producers however do comply.

SPECIFICATIONS AND QUALITY STANDARDS

The implementation of ISO 22000 (Food safety management system) is commercialized but does not consider challenges facing small and medium producers and growers in the VC and is, therefore, ineffective.

National good quality practices are lacking. Infrastructure and facilities for post-harvest and processing activities are also lacking.

GAP CERTIFICATION

Egypt lacks a national gap certification, which if created can reduce certification costs.

Challenges

A variety of challenges face the onion and garlic VC affecting small growers and the quality of their produce. This section will tackle the key challenges that, if addressed, will improve the quality of the produce and the productivity of the crop, and would inevitably reduce the costs of cultivation and increase the profit margin of farmers.

CHALLENGE 1

Challenge: Lack of Access to Adequate Technical Information and Extension Services

Although the onion and garlic market is better than the pepper market when it comes to technical information provision and extension services (especially through farmer organizations), there is still a need for more (in terms of the quantity and frequency) adequate (in terms of the quality) technical assistance.

Underlying causes:

1) The MALR extension services are insufficient, with little human resources and few transportation modes that can provide extension advisors with easy and frequent access to farmers.

2) Uncertified input suppliers provide farmers with unreliable technical information.

Impact on Business:

Farmers lack of access to adequate technical information and extension services results in:

(1) Use of broken seeds to cultivate the crop.
(2) Excessive use of (unregistered & inadequate) pesticides and fertilizers that fail to counteract pests.
(3) Reliance on flood irrigation systems.
(4) Lower product quality and high rejection rates.
(5) High and unnecessary costs and lower profitability.
(6) Lower profitability from the harvest.
(7) Inability to compete with larger growers from reclaimed lands.

CHALLENGE 2

Challenge: Lack of Market Information & Contract Farming

There seems to be a disconnection between the growers and processors and the market. The decision to produce the crop is price-based, and not demand-based. Additionally, growers do not have access to channels that connect them to big contracting processors or exporters.

Underlying causes: The disconnection of farmers from the end market.

Impact on Business:

1. A mismatch between supply and demand.
2. Price fluctuations that make farmers hesitate to grow onion and garlic.
3. Traders manipulating prices causing losses to growers.
4. A mistrust between VC actors.

CHALLENGE 3

Challenge: Lack of Collaborative Economies and an Integrated Business Model

The most dominant scheme for farming and processing onion and garlic is independent growing followed by contract farming. Although contract farming gives growers more access to technical assistance and advice, it is still largely immature.

Underlying causes: Farmers are unorganized and disconnected from the end market

Impact on Business:

1. A mismatch between supply and demand.
2. Price fluctuation that makes farmers hesitate to grow onion and garlic.
3. Traders manipulating the price and causing losses to the growers.
4. A mistrust between VC actors.
5. Absence of economies of scale and lack of technical information.
6. Higher costs.
7. Lower product quality and high rejection rates.
8. Lower profit for growers.

Recommended Interventions

The following interventions are recommended to address the key challenges and tackle their underlying causes. They also seek to capitalize on existing opportunities, including the crop's cultivation features that makes it appeal to small farmers, the government's

interest in onion as a large strategic sector, the untapped export potential of the sector, in addition to the willingness of the value chain actors to collaborate to develop the sector.

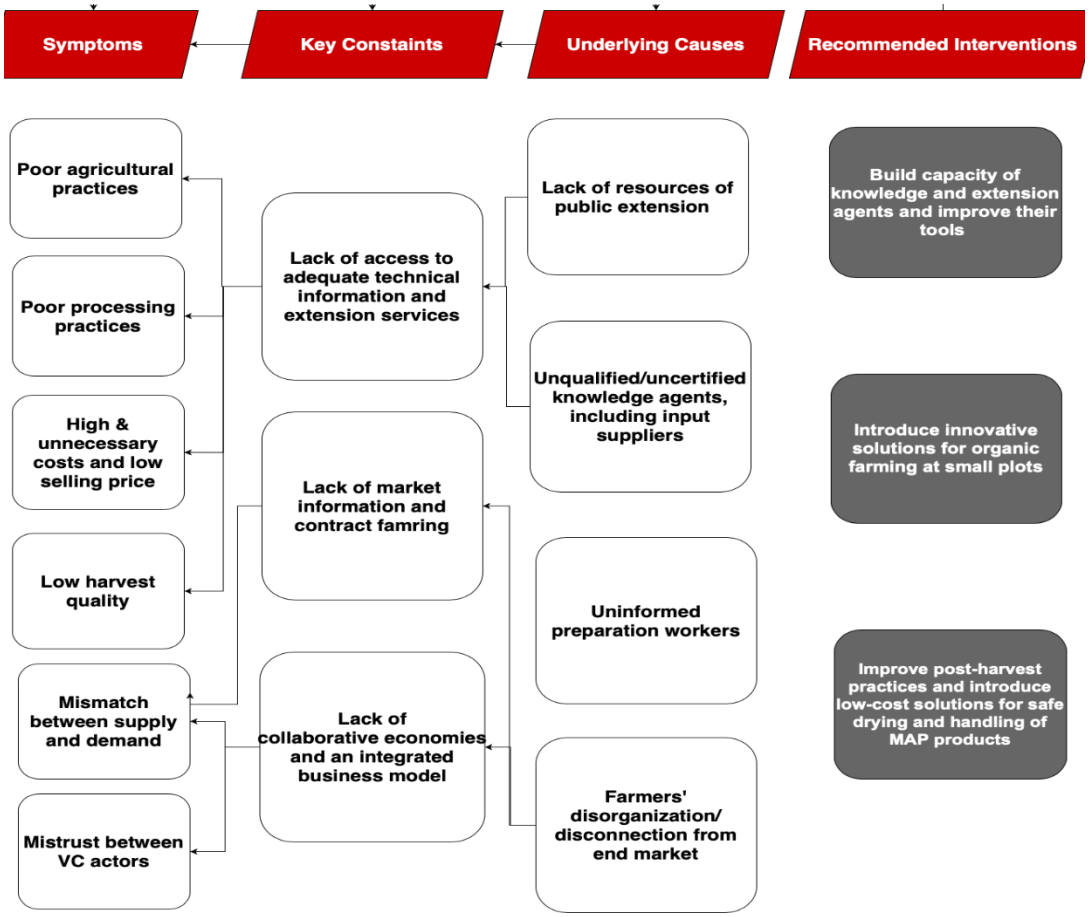


Figure 36 Onion and Garlic Key Constraints, Symptoms, Underlying Causes and Recommended Interventions

Introduce Innovative and Improved Agricultural Practices (including post-harvest activities)		
Expected Outcome: **Small-holder farmers have adequate access to reliable and sustainable extension information.**		**Indicators:** **The number and type of extension agents with improved knowledge and access to information sources.** **The level of satisfaction of farmers with the extension support provided by enabled agents.**
Key Activity	**Sub-activities**	**Potential key partners**
Conduct an advanced capacity building program targeting knowledge agents: **- Extension workers** **- Lead farmers** **- Input suppliers** **- Private advisors**	- Deliver basic and advanced trainings to knowledge agents on good agricultural practices. - Establish demonstration fields to introduce innovative practices. - Provide advanced trainings to excelling knowledge agents and organize for them study tours to modern farms to explain good practices, and to processing facilities to acquaint them with quality specifications. - Support networking and exchange between knowledge agents. - Engage the teaching staff of Beni Suef and Minya universities and technical schoolteachers in the process.	**Technical Experts and the AIP team** to design the capacity building program **Private Sector Buyers** to inform the training content especially regarding market requirements **The MALR extension workers** to participate in identifying the pool of knowledge agents and to participate in the trainings. **Farmer organizations** to disseminate the knowledge products. Universities, TVET and vocational training providers.
Disseminating information to growers	- Conduct field visits to extension/demonstration fields and invite growers in each area. - Disseminate extension material to farmer groups. - Create social media (and other communication) channels to reach growers.	

	- Support the MALR to update its extension material provided to knowledge agents and farmers and to digitize its delivery centrally and across governorates and districts using interactive interfaces (including mobile application).

Table 14 First Recommended Intervention

Introduce Improved Practices for Preparation (pre-processing) with a Focus on Food Safety and Hygiene		
Expected Outcome: **Onion and garlic preparation and pre-processing units in Beni Suef and Minya adhere to best food safety and hygiene practices.**		**Indicators:** **The number and type of units with improved practices.** **The level of satisfaction of buyers (processors and exporters) and farmers with the level of food safety at the supplier units (in terms of practices and supplied products).**
Key Activity	**Sub-activities**	**Potential key partners**
Conduct an advanced capacity building program targeting preparation units with a focus on food safety and quality requirements.	- Deliver basic and advanced training to workers in small preparation units on food safety and hygiene. - Raise awareness on enabling working environments (Occupational health and safety (OHS) and personal protective equipment). - Establish demonstration units for preparation facilities to introduce innovative and improved practices. - Conduct study visits and practical trainings in preparation facilities.	**Technical Experts and the AIP team** to design the capacity building program. **Private Sector Buyers** to inform the training content, especially regarding market requirements. **The MALR extension workers** to participate in the outreach. **Farmer organizations** to engage/ co-invest in demonstration units. Universities, TVET and Vocational training providers.

Table 15 Second Recommended Intervention

Introduce and Pilot an Integrated Business Model for Onion and Garlic Contract Farming and Group Farming		
Expected Outcome: **Farmer organizations in Beni Suef and Minya are adopting effective onion and garlic contract farming business models.**		**Indicators:** **The number of farmer organizations adopting the contract farming business models** **The increase in the volume and value of contracted crops by target farmer organizations.**
Key Activity	**Sub-activities**	**Potential key partners**
Develop an integrated business model	- Planning the integrated business model for contract farming and group farmers. - Raising awareness of both farmers and buyers on the advantages of group and contract farming under an integrated business model.	**Private Sector** as institutional buyers. **Agribusiness experts** to support developing the model. **Farmer organizations** to reach the beneficiaries and promote the business model.
Implementation and piloting of the model	- Activate the business model using several pilots. - Demonstrate success cases and disseminate the information to farmer groups. - Design knowledge material on successful cases.	

Table 16 Third Recommended Intervention

Annexes

Annex 1: Regulatory Framework

As highlighted in the methodology section, the Market strategy analysis addresses the rules and regulations governing the value chain. There are common rules and regulations that impact different value chains as they are concerned with the agricultural sector as a whole. To avoid redundancy in the value chain analysis report, these laws are detailed in this annex.

Table 17: Rules and regulations related to the agricultural market system in Egypt

Rules and Legislations related to Agricultural Market Systems	
Crop Rotation Law	Law number 11 issued in 1964, which enforced a crop rotation cycle, has been stopped in 1993. The crop rotation is the practice of growing a series of different types of crops in the same area across a sequence of growing seasons. It reduces reliance on one set of nutrients, pest and weed pressure, and the probability of developing resistant pest and weeds. The discontinuance of the crop rotation has had a negative effect on the production of crops, especially horticultural crops, due to the unsystematic distribution of crops over the lands and during the seasons, which made any collective measures and monitoring on the spread of diseases & pests impossible, resulting in a reduction of soil fertility.
Contract Farming Law	Law 14, issued in 2015, regulates contract farming. However, this law has not yet become effective. The executive regulations or internal statute for this law is supposed to be issued and enforced by the judicial system and the law enforcement bodies of the Ministry of National Affairs. The law is expected to regulate the relationship between producers, traders, and exporters. The application of the law will regulate the production of crops in accordance with market demand to avoid under and over production. A more widespread application of regulated contract farming will also deter monopolizing practices by intermediaries in the value chain who reap profits without a commensurate value added to the supply chain. These profits will trickle down to the farmers through more transparent agreements and fair price setting at all stages of the chain. Finally, an increased adoption of contract farming will regulate price fluctuations.

Agricultural Land Protection Law	Law number 53, issued in 1996, protects agricultural lands from other commercial uses. Large areas of agricultural land in the Delta and Nile Valley have been lost to residential and commercial constructions. While the law protects against the loss of agricultural lands due to expanding housing needs, yet it also presents a limitation and a real obstacle for constructing agro-industrial facilities for value addition activities within the vicinity of cultivation lands. The government entities' bureaucracy related to applying and receiving licenses to develop post-harvest and value-added activities is a deterrent.
Agricultural Quarantine Rules and Regulations	Agricultural quarantine regulations affect the export of agricultural produce, which is evident in the case of garlic and greenhouse produce. Since **garlic** is a root fruit, it has specific quarantine legislations for each market, which could delay shipments. **Greenhouse production** is considered a special method for production, therefore producers have to obtain a license from the MALR in order to be able to get subsided inputs, if any.
Food Safety Law	Law 1 of 2017 stipulates that the National Food Safety Authority (NFSA), and the Ministry of Health are responsible for the protection of consumer health and consumer interests in fresh and processed foods. Fresh and processed food products have to comply by hygiene and quality standards that ensure consumer health protection. Currently, the the application of this law has been limited to fresh exported produce and highly processed products. There is a great deal of confusion around the application and enforcement mechanisms of the regulations and standards to be applied. This confusion has sparked uncertainty amongst farmers and/or enterprises involved in the food sector. Inconsistent enforcement of the law has also caused a lot of debate about the fairness and effectiveness of the regulations on the food sector, mainly due to a majority of enterprises in Egypt being small scale, whereas the requirements of the law are more applicable to larger-scale enterprises.
FAO legislations and the Agricultural Cooperatives amended law of 2014	Law 204 of 2014 is an amendment of law 122 of 1980. The FAO held workshops to create an action plan to support reforms and the implementation of laws to activate the work of cooperatives; and a future national programme was formulated to ensure that the desired reforms would be implemented as per the suggested plan of action. To ensure the sustainability of the project activities, training of trainers programmes were organized for staff members from the Central Administration of Agricultural Cooperatives (CAAC) of the Ministry of Agriculture and Land Reclamation; the capacities of agricultural cooperative members and CAAC staff were strengthened

	through a capacity-building programme; a pilot activity was implemented to guide four cooperatives to explore the feasibility and potential of the amendments of Law 204/2014; and an electronic/virtual network was established for a National Dialogue Platform. In addition, two study tours to France and Kenya were organized in order to expose participants to successful cooperative experiences.	
Organic Law	Law 12 issued in 2020 regulates organic farming. Two entities are responsible for the value chain of organic farming. The general authority for organic farming is responsible for pre farming and farming and the National Food Safety Authority (NAFSA) is responsible for post-harvest activities and all other activities that follow up to the end market activities. Their responsibilities include setting their own rules and regulations, adding an authorization logo for the products that follow the organic guidelines they set, with every logo containing a code. The code contains the name of the product, which entity is it authorized from and its date of production. If any exporter wishes to export an organic product, they have to have an official certification from either or both entities (depending on the nature of the end product they are offering). The law includes how each entity audits and details exporters' compensation payments and obligations.	
Export Codes	Chamomile	HS Code 12119029
	Fennel	HS Code 09096139
	Basil	HS Code 1211900022
	Marjoram	HS Code 1211900027
	Pepper (fresh)/ (dried) (Capsicum annuum)	HS Code 070960/ 090420
	Garlic/Onion (dried)	HS Code 071290// 071220
	Garlic and Onion (fresh)	HS Code 070320/070310

Annex 2: Brief Governorate Profiling

1- Minya Governorate[36]

Figure 37: Minya districts map

Minya is located in Northern Upper Egypt, South of Beni Suef and North of Assiut. Its total area is 32279 Km2 and is divided into 9 districts (Edwa, Maghagha, Beni Mazar, Matay, Samalout, Minya, Aburqas, Malawi, Der Mowas), with a total of 361 villages.

According to the 2015 census, there are 5 million inhabitants in Minya. Minya's poverty rate reached 56.7% in 2015 and it has an overall illiteracy rate of 29.5%, where female illiteracy rate is higher than males (45.4% vs. 37.2%). (UNFPA, 2018)

Minya has a total workforce of 1,583,500 , where the total employed exceeded 1.4 million. The unemployment rate in the governorate is 8.92%, according to recently published figures on the governorate website. Women participation in the labour force is 27%, with female unemployment at 24.1% compared to only 8.9% of male unemployment .

Minya's economy comprises different sectors, including agriculture, manufacturing, and tourism. Its total cultivated area is 445,418 Feddan and the number of manufacturing entities are 7980. It also has one Industrial Zone that extends over 1516 Feddan.

[36] http://www.minia.gov.eg/New_Investment/default.aspx

The table below table provides an overview of the governorate's infrastructure, including its roads, bridges, water, and sanitary system.

Table 18: Minya infrastructure status and capacity

ITEM	STATUS & CAPACITY
ROADS & BRIDGES[37]	Paved roads: 6117 KM
	Unpaved roads: 296 KM
	Vehicles Bridges: 43
	Pedestrian Bridges: 1
WATER NETWORK[38]	Number of Water Networks: 208; Total Water Production: 287.5 million m^3
	Number of Subscribers= 887279
	Water Loss= 45.6 million m^3
SEWAGE NETWORK[39]	Sewage Station: 11; Actual Capacity (157 million m^3); performance (50%)

2- Beni Suef Governorate

Figure 38: Beni Suef districts map

Beni Suef is located in Northern Upper Egypt and has a total area of 10,169 Km2. The governorate has seven districts, namely Wasta, Nasser, Ihnasia, Beni Suef, Semesta, Beba and Elfashn, and has 222 villages.

[37] CAPMAS (2019), Bulletin Inventory of Roads and Bridges 2017-2018

[38] CAPMAS (2019), Annual Bulleting Pure Water and Sanitation Statistics 2017-2018

[39] Ibid

Beni Suef has 2,415,505 inhabitants, of which 43% live under the poverty line and 28.5% are illiterate (Men: 35.9% vs. Women: 43.7%).

Women's participation in the workforce reached 30%. Female unemployment is estimated at 9.1% and 8.1% among men.

Beni Suef's economy comprises of five main sectors. This includes agriculture, which covers a total area of 284466 Feddans. It also has a manufacturing sector, with seven Industrial Zones, in addition to a mining sector, services sector and tourism.

The table below gives an overview of the status of the governorate's infrastructure.

Table 19: Beni Suef's infrastructure status and capacity

ITEM	STATUS & CAPACITY
ROADS & BRIDGES[40]	Paved roads: 3653 Km
	Unpaved roads: 132
	Vehicles Bridges: 27
	Pedestrian Bridges: 1
WATER NETWORK[41]	Number of Water Networks: 71; Total Water Production: 214.5 million m^3
	Number of Subscribers= 530108
	Water Loss= 29.9 million m^3
SEWAGE NETWORK[42]	Sewage Station: 16; Actual Capacity (141 million m^3); performance (50%)

[40] CAPMAS (2019), Bulletin Inventory of Roads and Bridges 2017-2018

[41] CAPMAS (2019), Annual Bulleting Pure Water and Sanitation Statistics 2017-2018

[42] Ibid

Annex 3: Farmers Discussion Guide

Key Information Areas	Question
1. Farmers Profile	
Location	Governorate District Village
Contact:	Name Telephone How many feddans do you dedicate for horticulture [alternatively herbs and spices? a. <2 b. 2 – 4 c. 4 – 6 d. 6 – 8 e. 8 – 10 f. 10 – 50 g. 50 – 100
Education Level	What is your level of education? a. Formal 1. No education 2. Primary education 3. Secondary education 4. University education b. Non-formal (Adult education)
Profession	Do you have a profession outside farming? If yes, what?
Agriculture Expertise	Years in Practice Size of Land What crops do you cultivate?
Input supplies	

Varieties & SEEDs	• What varieties do you cultivate? • Are these varieties resilient to pests, insects and micro-biological contamination? • What pests and insects are these varieties resilient to?
Irrigation System	• What is the type of irrigation do you use? (Surface, dripping, spraying or pivot? • What type of energy do you use for irrigation? • What is the average amount of water required per crop per 1 feddan?

Input supplies sources	• Who are the main input suppliers?
	  ○ Fertilizers
	  ○ Pesticides
	  ○ Seeds
	  ○ Machines
	  ○ Other – please describe
	• Are they located in the same village, district, governorate?
	• Are there any additional services these suppliers provide?
	• Who provides these services?
	  ○ Government institutions such as cooperatives
	  ○ Local associations including WUAs or farmer groups
	  ○ NGOs
	  ○ Other – please specify
	• Do you purchase inputs from the directorate of agriculture at subsidized prices (Y/N)

Information	• How do you obtain information on advancements and new varieties, fertilizers, and pesticides?
Challenges	• Are there any challenges related to the varieties you use per se? If yes, why are not you using a different one? • What challenges related to irrigation system that affect productivity, quality and price? • Do you face any challenges in sourcing input supplies? • If Yes, • Are they quality related? • Financial related? • Information and linkage to them?

	• Others, please specify
Farmer organizations (including cooperatives)	
- Membership & services	• Are you a member of any farmer organization? If yes, • Did you have to pay membership fees? Did you have to meet any pre-requirements? • What type of farmer organizations? & what is the name of farmer organization? • Are they working on any other crops? • What services/resources do you get access to from these farmer organizations? • What other services would you need?
- Other organizations	• Are there any other farmer organizations working on the same crop that you are aware of? • What are the services that they provide? • What are they and where are they located? • Why you are not a member in these ones?
Labour	
• Jobs	• What is the number of full-time jobs per 1 feddan? • What is the number of man-days required per feddan? • What is the distribution of man-days over the Farming Stage? - Preparation - Cultivation - Irrigation & Fertilization - Harvesting
• Women	• What is the % of women participation over the farming stage? - Preparation - Cultivation - Irrigation & Fertilization - Harvesting • What is the turnover rate? • What are the challenges or reasons for this division in labour
• Wages	• What is the daily rate per worker? • Is there a variation in daily rate among different farming activities? If yes, elaborate

	• Is there a wage disparity between men & women workers? If yes, why?
• Training & Skills	• Where do you supply labour? • Who provide training for your labour? • How much do you have to pay for training your labour?
• Challenges	• What challenges do you face in labour hiring? • What challenges do you face in labour training?
Production: Volume, Production techniques, Cost & Gain	
• Volume & Productivity	• How much do you produce per year? / what is the least amount produced in a year? / what is the biggest amount produced in a year? • What is yield per feddan in tons?
• Standards & Quality	• Are there specific standards requested by the buyer (trader, exporter, processor)? • How do you ensure these standards are met? • How does the buyer supervise/monitor adherence to these standards? • Have you encountered any rejection from the buyer?

• Techniques, Knowledge and technology	• Do you use any technology in the agriculture practice?
	  ○ Equipment
	  ○ Pesticides application
	  ○ irrigation
	  ○ others
	• How do you gain knowledge and technology on production techniques?
	• What further support would you need

• Cost	• What is the cost of 1 ton or 1 feddan production? • Can you distribute the cost over the following items? 1- Land Rental (if any) 2- Pesticides 3- Fertilizers 4- Seeds 5- Labour 6- Irrigation system • Do you undertake a cost calculation when producing your products
• Gains	• What is the price of selling 1 ton of crop? • Have there been any fluctuation in the pricing of the product?

• Climate and NRM	• What challenges do you face with regards to climate change? • What additional support would you requires
Market & Market Channels & Market information	
• Market information & Crop Selection	• Where do you get your market information? • how do you decide what to grow and where to sell? • What other crops do you cultivate and why? • What drives you to select the crops to be planted
• Local Producers	• How many other farmers cultivate the same crop in the village/district? • What is the average size of land sizes? what is the proportion of Small, Medium and Large-scale cultivation?
• Marketing Chanel	Which are your main marketing channels? ○ Marketing co-operative ○ Wholesaler ○ Supermarket (foreign) contract ○ Contract with processing industry ○ Other – please specify
• Local Traders	• Who are the main local traders-collectors/processors (you know/sell to)? • How do you access them? • Do the traders support you financially or provide you with some input suppliers?
• Exporters	• Who are the main Exporters you know or deal with? Can you provide contacts? • How do you access them? • How much of your production do you allocate for export? • Where do you export to?
• Local Markets	• What are the main local markets? • What are the main Wholesale markets that you sell to? • What is your sales method? ○ Cash ○ Credit ○ Both ○ Other - please specify • What type of market information do you use to define the price for your production?

• Contract Farming	• Do you engage in any contract farming with traders or manufactures? If yes, • How many times have you done it in the past? • What type of buyer do you engage with? • Does the buyer provide any additional services to you along with the contract farming? • Do you believe that contract farming is better for the farmer all the way?
• Challenges	• Do you face any challenges in accessing different market channels? • Do you face any challenges in price negotiation with the traders?
Post-Harvest	
• Value Addition	• Do you conduct any on-farm post-harvest activity? If yes, what are they? If No, please move to Supporting Services
• Workers	• How many labour required for the treatment? What is the percentage of females? What is the average for the labour cost or income! • How do you train the workers?

• Technology, Knowledge & Information	• What type of technology do you use in your activities?
	  ○ Equipment
	  ○ Lab works and Scans
	  ○ Production techniques
	  ○ others
	• How do you gain knowledge and technology on production techniques?
	• What further support would you need

• Cost & Gain	• How much does it cost to conduct these activities? • How much do you sell the value-added product for?
Supporting Services	

• Non-Financial Services	• What type of non-financial services do you receive?
	  ○ technical assistance
	  ○ access to market & market linkages
	  ○ access to information
	  ○ workers training
	  ○ others
	• Who provides it?
	• Do you pay for it? If yes, how much?
	• Do you face any challenges in accessing non-financial? If yes, what are they?
	• Do you need access to any other services?

• Financial Services	• Do you use any line of credit or banking services? If Yes, • What type of Services do you use? • Who provides it? If No, • Why you don't use it
Other Challenges and Recommendations	
• Challenges	• What are other challenges you encounter in production • What are your most urgent needs regarding your production?
• Solutions	• What do you believe is required to satisfy these needs? • Who would be able to support you in implementing these possible changes?

Annex 4: Processors/ Manufacturers/Traders Discussion Guide

Key Information Areas	Question
Private Sector Profile	
Location	Governorate District Village
Contact:	Name of interviewee Name of the enterprise Telephone Company type Address: Fax: Email: Website: Mobile Size: Small, Medium/Large
Occupation	Please choose: • Business Owner • Manager • Both
Enterprise Information	Years in Business Enterprise size Business activity – Type of production: Membership in business associations

	Formality Products Grade: Organic or Clean (pesticide free) or Conventional Number of products or product list
**For MAP crops only	
• VC with high potential and high	• What are the MAP VCs cultivated in Minya and/or Beni Suef that has high demand and high potential for exports, value addition & women employment? ○ Chamomile ○ Basil ○ Mint ○ Coriander ○ Marjoram ○ Geranium dalmaticum ○ Anise ○ Fennel ○ Cumin ○ Black Seed-Nigella Seed • What is the reason for selection? ○ Existence of large production or clusters ○ price advantage ○ Quality advantage ○ International Demand: please elaborate • What among these crops require innovation and interventions?
Value Chain	
• Activities	• Can you describe to me the VC activities from farming till end customer?
Post-Harvest & Manufacturing	
Activities	• What type of post-harvest activities do you engage in? ○ Sorting ○ Grading ○ Preparation (cutting) ○ Drying ○ Packaging ○ Processing (manufacturing), what are the processing activities?
Value-addition	• What products line you have?
Production & Access to input supplies	

Yield	• How many ton of crop required to produce 1 ton of the final product?

Production Capacity	• What is the capacity of the production lines vs the actual production?
	• How did it change over the past 5 years?
	• Do you have plans for business expansion?
	  ○ If yes, what are they
	  ○ If No, what are the challenges

Farmers accessibility & linkages	• How do you access small farmers, Farming myself, Directly or traders/drying facilities?
	• What makes you deal with small farmers or traders?
	If traders only, please move to traders' section
	If farming yourself only, please move to farm
	If directly:
	  ○ Do you deal with farmer organizations/groups?
	  ○ Do you make any contract farming with small farmers?
	  ○ Do you rely on contract farming in general?
	  ○ Why you do/do not rely on contract farming?
	  ○ If yes,
	  ▪ how many times did you do it? Do you consider it a successful model?
	  ▪ Number of contracted farmers…. location
	  ▪ What are the main challenges from sourcing from small holders?
	  ▪ What percentage of supply do you source from small holders

Farming Activities	• How many feddans do you cultivate? • what crops do you cultivate
Traders	• How many local traders you deal with? • Where are they located? • How many are of them has small processing units? do you know their production capacity? • How do you access them?
Service provision to farmers	• Do you provide the farmers with seeds/seedlings? • Do you monitor the farmers during the cultivation cycle? • Do you provide the farmers with other services? • What are the services: technical assistance, credit services?

Labour	
Jobs	• What is the number of full-time jobs per 1 tonne of product (male and Female)? • What is the number of man-days required per 1 tonne of product? • What is the distribution of man-days over the Post-Harvest Stage? - Sorting - Grading - Preparation (cutting) - Drying - Packaging - Processing (manufacturing) per product
Women	What is the % of women participation over the Post-Harvest stage? - Sorting - Grading - Preparation (cutting) - Drying - Packaging - Processing (manufacturing) How many women work in your enterprise?
Wages	• What is the daily rate per worker? • Is there a variation in daily rate among different post-harvest activities? If yes, elaborate • Is there a wage disparity between men & women workers? If yes, why?
Training & Labour Skills	• Where do you supply labour from? Is there a middleman? • What level of skill do you require from labour? • Who provide training for your labour? • How much do you have to pay for training your labour?
Challenges	• What challenges do you face in labour hiring? • What challenges do you face in labour training?
• Production & Profitability	
Production Volume	• What is the total production amount per year/per season for each product? • What is the average volume demanded per request? • What is the maximum volume you received a request for?

Demand	• Have there been an increase/decrease in the client's requests or number over the past 5 years? • Did you face any challenges in fulfilling the requests?
Cost	• How much do you purchase the ton for from the farmers or trader? • Can you distribute the (%) cost over the following items? 1. Input supplies 2. Energy 3. Workers 4. Transportation
Gain	• What is the average selling price per ton for export market? • What is the average selling price per ton for local retail markets? • Have there been any fluctuation in the pricing of the product?
Market & Market Channels	
Local Processors	• How many other processing unit/manufactures work on the same crops in the same area?
Exporters	• Do you directly export? or do you sell to a middle trader? If Directly export • What are the main countries you export to? • How do you access these markets? If middle trader, What are the barriers to export yourself?
Local Markets	• What are the main local distribution channels? • Do you distribute yourself or through a local trader
Standards & Certification	• What are the standards & certifications required by local market? • What are the local standards & certifications required for exporting? • What are the international standards & certifications required for exporting? • If you export to US & Europe: What is the difference between European and American standards? How is this affect the price? • How do you ensure standards are being met? • Do you provide any technical assistance or supplies for the farmers to ensure that the standards are being met? o If yes, how much do you charge them for it?

• Pricing mechanism	• How do you decide on the selling price? Is it dictated by importer or in an agreement? • Who has the upper hand in price negotiation? • Is the pricing related to standards? • is pricing based on cost or what's requested by the customer?
• Challenges	• Do you face any challenges in accessing different market & distribution channels? • Do you face any challenges in price negotiation with the traders?
Innovation	
Type of technology	• What type of technology do you use in your activities? o Equipment o Lab works and Scans o Production techniques
Knowledge& Information	• How do you gain knowledge and access to technology on production techniques? • What further support would you need?
Challenges	• what are the challenges you encounter in adopting or learning about new technologies?
Supporting Services	
Business development Support	• Do you receive any BDS? o Access to market o Access to information o Access to labor training • Who provides it? • Do you pay for it? If yes, how much? • Do you face any challenges in accessing BDS? If yes, what are they? • What other services do you need?
Financial Services	• Do you use any line of credit or banking services? If Yes, • What type of Services do you use? • Who provides it? Banks or MFIs • If No, why don't you use it?
Other Challenges and Recommendations	
Other challenges	Are there any challenges that you encounter in your business operation that is directly affecting your profitability?

Solutions	What types of solutions do you want to see on the ground that you believe would directly affect your business, your workers and your income?

Annex 5: Farmer organization/ Input Suppliers Or Service Providers Discussion Guide

Key Information Areas	Question
Interviewee Profile	
Location	Governorate District Village
Contact:	Name Telephone
Education Level	
Enterprise Information	Years in Business Enterprise/organization size Type of enterprise/organization Business activity Formality For farmer organization: Number of members
**For MAP crops only	
VC with high potential and high	• What are the MAP VCs cultivated in Minya and/or Beni Suef that has high demand and high potential? ○ Chamomile ○ Mint ○ Coriander (Leaves, Seeds)) ○ Marjoram ○ Basil ○ Geranium dalmaticum ○ Anise ○ Cumin ○ Fennel ○ Nigella Seeds • What is the reason for selection?

	Existence of large production or clusters High price Quality International Demand: please elaborate
Input Supplies	
Types & Cost	• What type of input supplies do you provide? • What is the cost of inputs: seeds, fertilizers, pesticides?
Source	• Where do you source the input supplies? local or export market?
Marketing	• How do you market new input supplies?
Innovation & Technology	• How do you access information about new advancements and technology in seeds, pesticides and fertilization?
Challenges	• what challenges do you encounter in accessing your market with small farmers? • what challenges do you believe farmers are facing that affect their productivity and income
Other services	• Do you provide any technical assistance to farmers in pesticides and fertilization management? • What is the cost of these service? What other services could you provide (e.g. bulk buying etc.)
Supporting function (Financial & Non-Financial)	

Type of service	• What type of services do you provide?
	  ○ Financial (and access to finance – matchmaking, support to business plans)
	  ○ Non-Financial (Training, Technical Assistance, Market linkages)
	• Are there specific activity or crop that you focus on?
	• Do you provide any technology/innovation related assistance?

Cost	• Do you provide the service for fees? If yes, how much?

Beneficiaries	• How many beneficiaries are men and women? • Type of beneficiaries: Farmers, processors, workers? • How do you outreach the beneficiaries?
Challenges	• Do you face any challenges in accessing your beneficiaries? • Do you face any challenges in marketing your services? • In your opinion, what are the main challenges faced by your key-beneficiaries in accessing these services? • Do you believe that these services impact level to the desired outcome?
Other Challenges and Recommendations	
Challenges	• Are there any challenges that you encounter in your business operation that is directly affecting your profitability or impact?
Solutions	• What types of solutions do you want to see on the ground that you believe would directly affect your business/organization, your beneficiaries and your profitability/income?

Annex 6: Local Traders/Exporters Discussion Guide

Key Information Areas	Question
Private Sector Profile	
Location	Governorate District Village
Contact:	Name Telephone Enterprise Name
Education Level	
Enterprise Information	Years in Business Crops traded in:
**For MAP crops only	
VC with high potential and high	• What are the MAP VCs cultivated in Minya and/or Beni Suef that has high demand and high potential from the following list? ○ Chamomile ○ Basil ○ Mint ○ Coriander ○ Marjoram ○ Geranium dalmaticum ○ Anise ○ Fennel ○ Cumin ○ Black Seed-Nigella Seed • What is the reason for selection? Existence of large production or clusters Price Quality International Demand: please elaborate

	• What other MAP crops that are not cultivated in Minya & Beni-Suef, but are of high potential? • Why they are not cultivated?
Market	
- Local Market	• What are the local markets you deal with? • What is the average annual traded amount with local market?
- Exports	• What are the main markets you Export to? • Have there been any fluctuations in the export's quantities or prices or variation in markets you were dealing with over the past 5 years? • How much do you export on average per year? • Does Egypt have any export market? • Why is this crop demanded by international markets? Price, quality, others?
- Farmers accessibility & linkages	• How do you access small farmers? • Do you deal with farmer organizations/groups? • Do you make any contract farming with small farmers? • Do you rely on contract farming? • Why you do/do not rely on contract farming?
- Service provision to farmers	• Do you provide any services to the farmers? • What are these services? • How do you charge the farmers for these services? • Why do you provide such services
- Standards & Certification	• What are the standards & certifications required by local market? • What are the local standards & certifications required for exporting? • What are the international standards & certifications required for exporting? • What is the difference between requirements of European market and American market? • Do you face challenges in adhering to these standards? • How do you ensure standards are being met?

	• Do you face any challenges in ensuring that the standards are being met? • Do you provide any assistance or supplies for the farmers to ensure that the standards are being met? If yes, how much do you charge them for it?
Profitability	
- Cost & Gain	• How much do you purchase the ton from the farmers or processor? • How much does it cost to package it? • How much does it cost to transfer it? • How much do you pay in tariffs and taxes? • What is the average selling price per ton for export market? • What is the average selling price per ton for local retail markets?
Challenges & Solutions	
- Challenges	• Do you face any challenges in adhering to the required standards? If yes, what are the reasons • Do you face any challenges in fulfilling all the requested demanded quantities for the export market? If yes, what are the reasons • Are there any challenges in accessing new markets? • Are there any challenges that you encounter in your business operation that is directly affecting your profit margin?
- Innovation & Technology Solutions	• Are there any specific technology solutions that you heard of or have been requested by international clients that you think small farmers should use? • Why this specific solution?
- Other Solutions	• What other solutions do you want to see on the ground that you believe would directly affect your business, your workers and your income?

Table 20: Conducted Fieldwork

Data Collection Method	Governorate	MAP	Garlic & Onion	Pepper	Total
IDIs	Beni-Suef	1 with MALR Unit- Beni Suef			24
		1 with MAP-committee; Export Council 1 Large Producer (6th of October) 1 Essential Oil Factory in Beni Suef IZ 2 Drying Factory in IZ 3 NGOs 2 Input Suppliers 1 Essential Oil facility 4 Traders 1 Chamomile Trader	2 with Onion Traders 1 with Garlic Trader	1 Trader of Fresh 1 Trader of Dried 1 Input Supplier 1 Large Processor	
	Minya	1 with MALR Unit- Minya			
		1 Marjoram Trader 1 Essential Oil distillation unit 1 Drying facility 1 Ex-EMAP	2 Drying & Packaging facilities 1 Expert 1 Input Supplier	1 Pickling Unit 1 NGO 1 Nursery	12
Total IDIs					36
FGD	Beni-Suef	1 with Chamomile Farmers 1 with Basil Farmers	3	2	7
	Minya	1 with Fennel Farmers 2 with Marjoram Farmers	3	2	8
Total FGDs					15

Annex 7: Crop Calendar

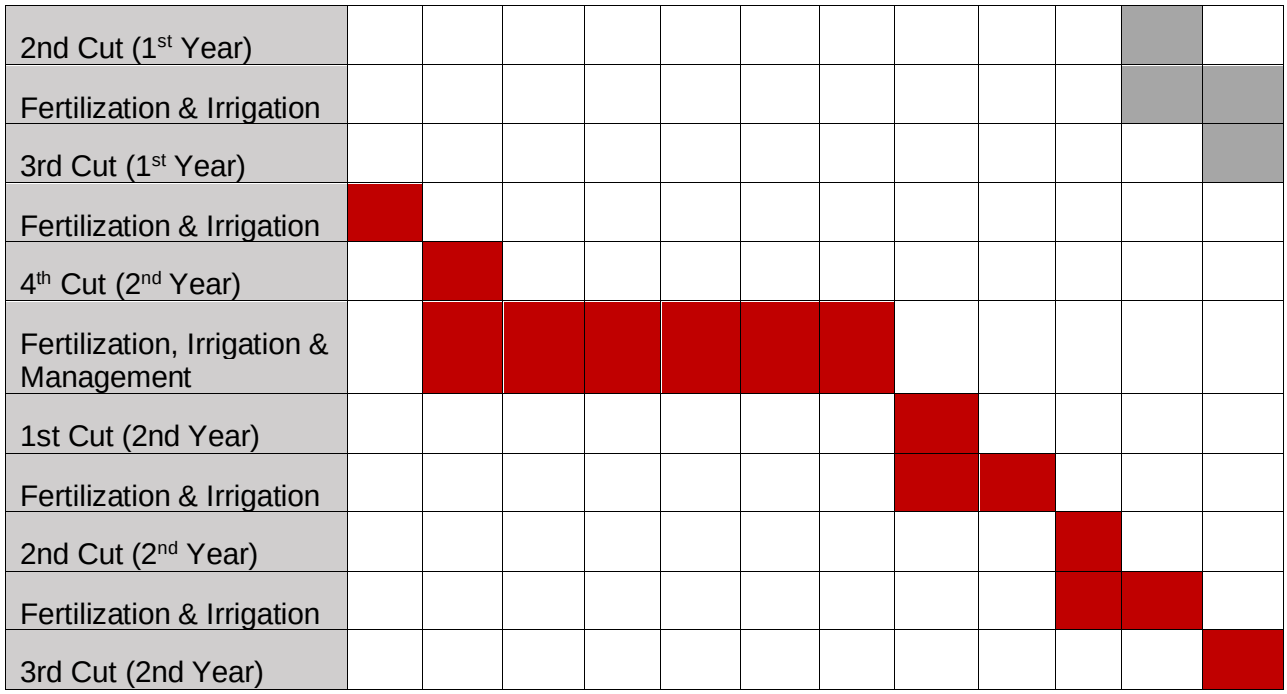
MAP CROP CALENDARS:

FENNEL

Activity	Oct	Nov	Dec	Jan	Feb	March	April	May	June
Land Preparation	Mid								
Cultivation									
Irrigation &Fertilizers									
Harvest									Mid

MARJORAM

Activity	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Seedling land preparation												
Seedling Cultivation												
Seedling Management												
Land Preparation												
Fertilization, Irrigation & Management												
1st Cut (1st Year)												
Fertilization & Irrigation												


2nd Cut (1st Year)
Fertilization & Irrigation
3rd Cut (1st Year)
Fertilization & Irrigation
4th Cut (2nd Year)
Fertilization, Irrigation & Management
1st Cut (2nd Year)
Fertilization & Irrigation
2nd Cut (2nd Year)
Fertilization & Irrigation
3rd Cut (2nd Year)

BASIL

Activity	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct
Land Preparation									
Nursery Cultivation									
Seedling Harvest									
Seedlings planting									
Irrigation & Fertilization									
1st Cut									
Irrigation & Fertilization									
2nd Cut									
Irrigation & Fertilization									
3rd Cut									
Irrigation & Fertilization									
4th Cut									

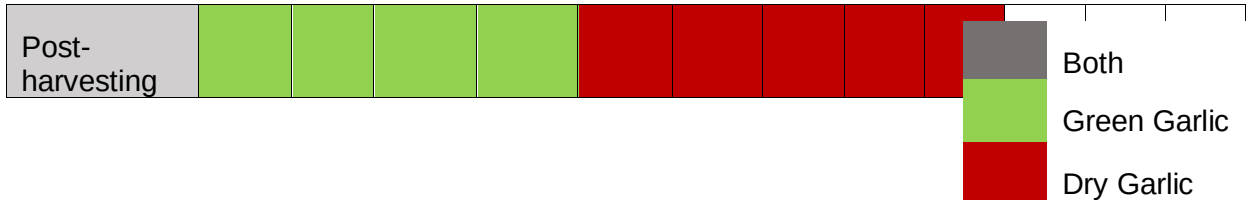
PEPPER

	Winter
	Summer
	Both

	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
Planting												
Harvesting												
Post-harvest Activities												

	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
Farming												
Harvesting												

GARLIC



ONION

	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
Farming												
Harvesting												
Post-harvesting												

Annex 8 Criteria Selection

MAIN CRITERIA

Main	Weight	Sub-criteria	Weight
Market Growth Potential	33.30%	1.a) Market growth potential both domestic and export markets	5.56
		1.b) Value addition	11.11
		1.c) Potential and identified opportunities for out-grower schemes and market linkages	11.11
		1.d) Comparative and Competitive Advantage	5.56
Development impact &Inclusiveness	33.30%	2.a) Small Farmers	4.76
		2.b) Women	9.52
		2.c) MSMEs	4.76
		2.d) Employment intensity	4.76
		2.e) Sustainability	9.52
Feasibility of intervention to stimulate change	33.30%	3.a) Capacity of market players to adopt solutions	6.67
		3.b) Innovation Feasibility & Capacity	13.33
		3.c) Enabling Environment	6.67
		3.d) Competitiveness & Synergies with development partners	6.67

SUB-CATEGORY

Sub-Category	Measurement scale
1.a) Market growth potential both domestic and export markets	The higher the market share or the local demand, the more the scale tends to 5
1.b) Value addition	The more value-added products that has high multiplier in terms of monetary term, the more the score tends toward 5
1.c) Potential and identified opportunities for out grower schemes and market linkages	The more contract farming dominates the sector, the higher the score
1.d) Comparative and competitive advantage	The higher the productivity, the more unique the trade window and the higher the quality is, the higher the score

Sub-Category	Measurement scale
2.a) Small farmers	The less the average cultivation area is, the more the score
2.b) Women	The higher the share of women labor participation, the more the score tends toward 5
2.c) MSMEs	The higher the number or percentage of MSMEs, the more the score tends to 5
2.d) Employment intensity	The more jobs needed per Ton or Feddan, the higher the score
2.e) Sustainability	The more sustainable (i.ethe higher water efficiency and the higher climate resilience) the more the score tends toward 5

SCORING AND WEIGHTS

Main	Sub-criteria	Onions	Garlic	Pepper	Tomatoes	Cucumber-Greenhouses	Palm Dates	Pomegranate	MAP	Sugar Beet	sesame
Market Growth Potential	1.a) Market growth potential both domestic and export markets	0.22	0.28	0.11	0.22	0.06	0.22	0.11	0.17	0.17	0.11
	1.b) Value addition	0.33	0.33	0.44	0.56	0.11	0.56	0.44	0.56	0.11	0.33
	1.c) Potential and identified opportunities for out-grower schemes and market linkages	0.44	0.33	0.33	0.33	0.11	0.11	0.11	0.44	0.56	0.11
	1.d) Comparative and Competitive Advantage	0.22	0.17	0.17	0.11	0.06	0.17	0.17	0.22	0.11	0.11
Development impact &Inclusiveness	2.a) Small Farmers	0.24	0.24	0.24	0.19	0.24	0.24	0.14	0.24	0.14	0.24
	2.b) Women	0.48	0.48	0.48	0.38	0.38	0.38	0.29	0.38	0.10	0.10

	2.c) MSMEs	0.14	0.19	0.19	0.10	0.10	0.14	0.19	0.19	0.05	0.19
	2.d) Employment intensity	0.24	0.19	0.24	0.24	0.19	0.10	0.24	0.24	0.10	0.05
	2.e) Sustainability	0.38	0.38	0.38	0.19	0.10	0.48	0.38	0.38	0.38	0.29
Feasibility of intervention to stimulate change	3.a) Capacity of market players to adopt solutions	0.13	0.07	0.27	0.13	0.20	0.13	0.07	0.13	0.27	0.07
	3.b) Innovation Feasibility & Capacity	0.40	0.40	0.40	0.53	0.40	0.40	0.53	0.67	0.53	0.53
	3.c) Enabling Environment	0.20	0.20	0.07	0.13	0.07	0.07	0.20	0.13	0.07	0.07
	3.d) Competitiveness & Synergies with development partners	0.20	0.33	0.33	0.07	0.20	0.07	0.20	0.20	0.33	0.33
Total		3.63	3.59	3.65	3.18	2.20	3.06	3.07	3.95	2.91	2.52