

Market Research

PLANT PROPAGATION MATERIAL SECTOR IN ETHIOPIA



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Photo front page: Joep van den Broek, courtesy to Wout van Koppen of Zuqualla Horti Farms

LIST OF ABBREVIATIONS

ATA	Agricultural Transformation Agency
DHI	Demonstration projects, Feasibility studies and Investment preparation projects (an instrument of RVO)
DTCC	Dessie Tissue Culture Centre
EIAR	Ethiopian Institute of Agricultural Research
ENSP	Ethio-Netherlands Seed Partnership
GIZ	German Organisation for International Cooperation
Horti-LIFE	Horticultural Livelihoods Innovation and Food Safety in Ethiopia project (a horticultural development project implemented by SNV Ethiopia)
ISSD Ethiopia	Integrated Seed Sector Development Ethiopia project (implemented by Wageningen Centre for Development Innovation)
KEPHIS	Kenya Plant Health Inspectorate Service
NBE	National Bank of Ethiopia
NGO	Non-Governmental Organisation
NVWA	Netherlands Food and Consumer Products Safety Authority
OPV	Open Pollinated Variety
SDGP	Sustainable Development Goals Partnerships
ToBRFV	Tomato Brown Rugose Fruit Virus
VCU	Value for Cultivation and Use

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EXECUTIVE SUMMARY

Introduction

This study is commissioned by the Agricultural Department of the Netherlands Embassy in Addis Ababa. The aim of the research was to map the needs of both the Ethiopian public and private sector in order to develop the sector and market of plant propagation material in Ethiopia, and match these needs with required (Dutch) expertise and investments. The study has been informed by 23 interviews and a thorough literature review. The report is structured in line with the most important subsectors: plant tissue propagation, vegetable seed production and sales, vegetable seedling production, seed potatoes and true potato seed, soft fruit and young plants, and ornamental cuttings for export. The selection of these subsectors was informed by the fact that they are fast growing in the Ethiopian economy, and that the Netherlands has a lot to offer. In addition to these six subsectors, the regulatory environment was reviewed, including important frameworks like the Seed Law, the Seed Regulations, and the Plant Variety Protection Law.

Plant tissue propagation

A number of plant tissue laboratories have been established in Ethiopia in the past two decades. Most have a public sector funding background, while a few started on commercial basis. Most plant tissue labs were focusing on the production of sugar cane plantlets to support the expansion of the large-scale parastatal sugar cane plantations in the mid-2010s. At the moment limited expansion is taking place which is putting pressure on the plant tissue laboratories. In 2020-2021, the Dessie Tissue Culture Centre (DTCC) in South Wollo was one of the more active plant tissue laboratories. The lab has a capacity of 20 million plantlets per year, and is working towards ISO accreditation. The lab works on four crops: banana, potato, sweet potato and highland fruits. Overall, the market for in vitro plantlets appears limited in Ethiopia. Looking at the current production, only a few million plants per year can be produced for commercial farms in the fruit and potato sector. Main recurrent demand would come from potato growers that want clean planting material (every season), and a number of more commercial fruit producers, especially for banana and pineapple.

Vegetable seed production

At the moment two major multinational seed companies are involved in the production of vegetable seed in Ethiopia. Together they represent an export value of around EUR 1 million in 2020, with a planned export value of EUR 5 million by 2025. Agro-ecologically Ethiopia has excellent conditions for the production of high-value seeds of Solanum (tomato, pepper), as well as lower-value seeds of crops in the Cucurbitaceae (squash, cucumber, melon) and Malvaceae families (including okra and mallow). The success of the currently active companies will determine to a large extent if more multinational companies invest in Ethiopia. As such, ensuring that these two companies become successful should be the top priority of the Ministry of Agriculture.

The main challenge for the vegetable seed production companies has been in the capacity of the Ethiopian Ministry of Agriculture to implement new EU phytosanitary requirements with respect to Tomato Brown Rugose Fruit Virus (ToBRFV). Ideally, testing of ToBRFV is done within Ethiopia; with both the Ambo and Holetta government laboratories in the possession of the necessary equipment. Specific support that the Ethiopian government could provide to these companies is: ensuring import and export of seeds takes place smoothly, and arranging sufficient and quality real time PCR testing capacity for detecting ToBRFV.

Vegetable seed sales

Total imports of vegetable seed to Ethiopia amounted to EUR 12 million in 2020. The majority of the seeds came from two countries: the Netherlands and Israel. In 2020, these two countries accounted for more than 85% of all vegetable seed imported to Ethiopia. Use of quality seed of improved varieties has shown great yield improvements for farmers. Preliminary evidence of Horti-LIFE, a large horticultural development programme funded by the Netherlands Embassy, shows farmers that use hybrid vegetable varieties increase their yields by 40%. Importantly, an additional 40% yield increase is achieved when farmers participated in Horti-LIFE's Farmer Field Schools. This shows that good opportunities exist for international vegetable seed companies who want to go the extra mile in terms of variety registration, employment of dedicated staff, and organisation of demonstrations and trainings.

There are two issues in the enabling environment that require particular attention. The first is the shortage of foreign currency for importing vegetable seeds. It is estimated that the potential demand for hybrid vegetable seed sales is double that of the current actual imports (EUR 24 million compared to EUR 12 million). Concerted effort by the sector associations (EHPEA, ESA), projects (Horti-LIFE and ENSP) and the Netherlands Embassy should be employed to discuss this topic at the highest level possible (Prime Minister's Office and NBE). The second topic concerns the expensive and tedious process of variety release. Here, the entire organisation of testing and release needs a serious review, looking at the mandates of the responsible institutes. Both staff of the Ministry itself and the private sector recommend to move in the direction of an independent regulatory authority, like KEPHIS in Kenya and Naktuinbouw in the Netherlands.

Vegetable seedlings

Production of vegetable seedlings is common practice in Ethiopia, especially for crops like tomato and pepper. In the last ten years a number of large-scale professional seedling production companies have increased market share, and increasingly vegetable farmers purchase seedlings instead of seed. At the moment, there are four major young plant raisers in Ethiopia, all situated in the Central Rift Valley, basically running from Debre Zeyt to Ziway. These nurseries make use of professional equipment and inputs (germination rooms, seed trays and cocopeat) and often have two stages of seedling raising, the first in a greenhouse and the second under shade net for hardening. The capacity of the four nurseries is estimated at around 300 million seedlings per year, with a current production of 200 million seedlings. Tomato and hot pepper account for more than 80% of production capacity. It appears that there is still room for increasing the capacity more than twofold (to 625 million seedlings). To reduce cost of transport, a business opportunity is to move outside of the Central Rift Valley to other horticulture hotspots like Arba Minch, Bahir Dar and Dire Dawa. The main obstacle for growth of the nursery subsector is the availability of seed (see also above). There are also opportunities for Dutch companies that sell nursery equipment.

Seed potatoes and true potato seed

Ethiopia is one of the biggest producers of potato in sub-Saharan Africa with more than 900 thousand tons produced per year. Yields are low at around 13 t/ha, with major disease problems like phytophthora and ralstonia present. In general, seed potato availability is low and researchers estimate that farmers re-use their own potato planting material for five to eight times. Currently it is discouraged to import seed potatoes into Ethiopia and most imports take place in the form of in vitro plantlets and mini-tubers. In general, the route of G1 and G2 multiplication from mini-tubers (G0) is seen as the most likely route for supplying Ethiopian farmers with sufficient clean planting material. In order to make it profitable a Horti-LIFE study showed that an additional multiplication step (to G3) is probably needed.

In parallel, true potato seed (TPS) shows good potential in Ethiopia. Current research trials with new hybrid TPS varieties show that they can compete with existing seed potato varieties. Varieties also have good resistances against phytophthora and ralstonia. The main constraint for the introduction of TPS is the registration process. There are two options that can be explored for including TPS in the variety trials: (1) comparing the TPS seedling to an existing seed potato reference variety; or (2) develop a new protocol and taking the first TPS variety as the reference.

Soft fruit

Ethiopia has excellent production conditions for strawberries, blackberries and raspberries, especially in the Rift Valley, but also in higher altitudes west and north of Addis Ababa. Importantly Ethiopia has good flight connections to major markets in the Middle East, Africa and the EU. The global market for strawberries, raspberries and black berries has shown a growth of respectively 6% and 15% year-on-year in the past five years. Ethiopia has picked up on this trend and expanded strawberry production significantly. The export value grew five-fold between 2015 and 2020 from USD 1 million to USD 5 million. There are five main farms that contributed to this growth. The lion's share of these exports head for the Middle East, with Saudi Arabia and the United Arab Emirates responsible for almost 80% of the market. Ethiopia currently has a market share of 5% in the Middle East.

Most planting material for strawberries currently comes from Israel and growers are satisfied with the variety's performance. Raspberries have been grown successfully both in the Rift Valley and Raya Valley, while growing blackberries has been more difficult. This probably requires an R&D approach, finetuning choice of varieties and production practices. Something similar holds for technological innovations for strawberry production, looking at high gutter production systems and hydroponics.

Ornamental cuttings for export

Ethiopia is one of the main exporters of ornamental cuttings globally. The climate in the Central Rift Valley and Upper Awash is ideal for growing cuttings, having good water availability, low rainfall, warm day and cool night temperatures, and high light intensity. In addition, there is the opportunity for installing geothermal energy. As such, almost all major multinational ornamental plant raisers are represented in Ethiopia. Together they produce on an estimated 120 hectares, with an additional 20 hectares planned for the next two years. Main crops produced are: Pelargonium, Chrysanthemum and Poinsettia, and Aster, Dipladenia, Lavandula and Osteospermum. The sector is doing well, and exports in 2020 grew to around USD 26 million per year. The most important export destination by far is the Netherlands, taking up more than 70% of the value of cuttings in 2020. The other three important export destinations are the USA, Germany and Belgium. Main challenges faced by the companies relate to phytosanitary services, land availability and tax free imports.

The most urgent issue concerned the implementation of the new EU phytosanitary regulations with respect to *Xylella fastidiosa*. *Xylella* is one of the most dangerous plant bacteria, and was first found in olive farms in Italy. For now, production sites have been declared free of *Xylella*, through testing of samples of the cutting farms. Still, NPPOs in the EU can take samples at the point of entry, because Ethiopia is not declared free of *Xylella*. Once a sample is taken an entire batch is blocked until the results are ready (and the plants have died). Therefore, the next step is to declare Ethiopia as a country free of *Xylella*. To this end, more extensive sampling is implemented. As such, there is a good opportunity for collaboration between the Ethiopian Ministry of Agriculture, Dutch NVWA, Naktuinbouw and the companies to further work on registering and maintaining Ethiopia as a *Xylella* free country. This needs continuous follow-up as annual inspections are required by EU regulation.

On a different note, after two years of Covid-restrictions, the Ethiopia HortiFlora Expo is back, and will be organized on 23-25 March 2022 at the Millennium Hall in Addis Ababa. Many of the subsectors and companies presented in this report will be present at this Expo. More information on: www.hortifloraexpo.com.

Regulations and government services

Main issues around variety release and phytosanitary standards are discussed above. This is not the case for plant breeder rights. Protection of plant breeders' rights has been pending enforcement since 2006, when the Plant Breeders' Right Proclamation was enacted. Amendments were approved in 2017 and draft regulations were finalized in 2021 and only the Council of Ministers still needs to approve them. Also, a Directive (to guide implementation) has been finalized and is approved by the Ministry. There is a huge interest and drive of the government to implement plant breeder's rights. As part of this, also a high-level mission of Ethiopian officials visited the Netherlands in August 2021.

Both this report and the outcomes of the mission highlighted the importance of the private sector to further expand the availability and access to new varieties for farmers, as well as stimulate exports. As such, a major objective of the government is to further ensure that the private sector, especially the one active in vegetables, potato and fruit, is enabled to invest and grow further. It is recommended that the government focuses on ensuring that existing companies sustain and expand their activities. In line with this, the government could help improve the procedures for imports and exports of plant propagation material in an efficient way. As part of this the following detailed activities have been recommended by government staff and the private sector:

- Support for the Ministry's capacity to implement seed phytosanitary services, in particular those related to exports of planting material and cuttings, as well as the introduction of e-phyto.
- Support for restructuring the responsibilities, organisation and implementation of the variety release system; with special attention for potato, vegetable and fruit varieties.
- Support the overall institutional framework and coordination mechanisms between the seed regulatory services and between development partners and projects.
- Revitalize the dormant Ethio-Netherlands Seed Committee that brings together the most important public and private sector stakeholders, especially involved in vegetable seed production and sales, seed potato production and true potato seed. It will be important to frequently organize discussions between the government and the private sector to jointly support the growth of the sector.

1. INTRODUCTION

This study has been commissioned by the Agricultural Department of the Netherlands Embassy in Addis Ababa. The aim of the research was to map the needs of both the Ethiopian public and private sector in order to develop the sector and market of plant propagation material in Ethiopia, and match these needs with required (Dutch) expertise and investments.

The outcome of the research is two-fold, on the one hand it is a starting point for a better market entry for Ethiopian and foreign private companies in Ethiopia, on the other hand it serves as an identification of technical measures recommended to be taken by the Ethiopian authorities in order to remove possible obstacles and to create a transparent business environment in the market of propagation material.

The long-term effect of the research project is to contribute to the competitiveness of the Ethiopian economy; in particular to promote the development of the Ethiopian flower, vegetable, fruit, and potato sectors. High quality and new varieties of propagation material are essential for creating a high value, export-oriented agricultural sector.

Given the various and diverse elements of the plant propagation material sector we have structured the report along the following subsectors (chapter 2):

- Plant tissue propagation
- Vegetable seed production and sales
- Vegetable seedling production
- Seed potatoes and true potato seed
- Soft fruit and young plants
- Ornamental cuttings for export

Selection of these subsectors is informed by the fact that they are fast growing in the Ethiopian economy, and that the Netherlands has a lot to offer. As such, we excluded other subsectors like cereals and legumes seeds and fruit seedling production. Even though these are very relevant subsectors for Ethiopia's agriculture sector, the Netherlands has (comparatively) less expertise than other countries (like Germany, France, Israel and the United States). For the selected six subsectors we describe the general scale of operations, the major trends and possible bottlenecks for further growth.

In addition to a detailed description and analysis of the current status of the six subsectors, we reviewed the regulatory environment (chapter 3). Here we have taken the plant propagation material sector as a whole, and highlighted those laws and regulations that are most relevant. Important frameworks include the Seed Law, the Seed Regulations, and the Plant Variety Protection law (and upcoming regulations). In addition, we analysed the implementation of these laws and regulations and most important gaps.

Chapter 4 provides the conclusions and recommendations of the study, including a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of each of the six sub-sectors. The recommendations further provide opportunities for concrete Dutch interventions, both within the context of the upcoming Ethio-Netherlands Seed Partnership as well as outside the partnership using RVO private sector development instruments (like Impact Cluster, DHI, and SDGP – or its successor).

The methodology applied for this study includes the analysis of secondary literature and data, as well as interviews with key representatives from the public and private sector. In total 23 people were interviewed, ranging from government officials to company managers, and from NGO / international agency's project coordinators to researchers.

2. THE PLANT PROPAGATION MATERIAL SECTOR

2.1. PLANT TISSUE CULTURE

Background

Plant tissue culture is a form of biotechnology that develops identical clones from plant vegetative parts (often the stem) and is widely used for the propagation of crops like sugar cane, banana, pineapple, lilies, and to a lesser extent sweet potato, Irish potato and cassava. The advantage of tissue culture is that provides clean disease-free planting material that is genetically exactly the same as the mother plant. The process of plant tissue cultivation or cloning requires sterile conditions, where no pathogens can interfere with the cloning activities.

Steps involved in the process of micro-propagation include: pre-propagation, initiation of explants, subculture of explants for proliferation, shooting and rooting, and hardening. The pre-propagation focuses on the maintenance of the mother plant under disease and insect free environment (often a greenhouse). Explants are taken from the mother plant and taken to the plant tissue laboratory for propagation. Here, the explant is dissected into smaller pieces that are sterilized. After a few days the plant piece is put on medium and starts to produce shoots. The shoots later develop roots and subsequently can be kept in shadow conditions, with diffused light to get used to natural climatic conditions. Lastly, the plantlet can be transplanted to an appropriate substrate and gradually hardened. The entire process is labour intensive and requires high levels of skill and knowledge, especially where it concerns using the right media, including growth hormones.

Current Status

A number of plant tissue laboratories have been established in Ethiopia in the past two decades. Most have a public sector funding background, while a few started on commercial basis. The most important (semi-)public sector laboratories are: Dessie Tissue Culture, and till recently, Mekelle Plant Tissue Culture Laboratory. There are a number of centres of the Ethiopian Institute of Agricultural Research (EIAR) that have the capacity to produce in vitro plantlets, but this is done more at research level and scale, in Holetta, Jimma and Melkassa. Also, at quite a number of universities courses are provided in biotechnology (including plant tissue culture); i.e. Addis Ababa, Arba Minch, Bahir Dar, Haramaya, Jimma and Mekelle University all offer Master-level programmes in modern biotechnology.

In the private sector, VCI was active till 2017 but closed down, the same holds for Narus Biotechnology, which seems to have stopped operations. Waginos Biotech is still operational but focuses more on ornamental plants for the local market and seed potato plantlets, at a small scale. The most active private plant tissue lab is Bahir Dar Plant Tissue Culture PLC, which produces around 500,000 plantlets per year.

Most production-oriented plant tissue initiatives were oriented at the expansion of the large-scale parastatal sugar cane plantations during the mid-2010s. The bulk of the plantlets produced in the various labs focused on these new plantations, and Mekelle alone had a production capacity of 40 million plantlets to supply this market. Between 2009 and 2019, the government had a plan to expand the area covered with state-run sugarcane cultivations by more than 330 thousand hectares. The programme implemented a number of new sugar estates, amongst others in the Omo Valley (Kuraz 1 and 2). As a result Ethiopia has increased sugar cane production to around 1.5 million tons in 2019. However, at the moment limited expansion is taking place which is putting pressure on the plant tissue laboratories.

Last year, the Dessie Tissue Culture Centre (DTCC) in South Wollo was one of the more active plant tissue laboratories. The public lab has a capacity of 20 million plantlets per year, and is working towards ISO accreditation. The lab works on four crops: banana, potato, sweet potato and highland fruits. The lab produces mostly for farmers (which are supplied by the regional Bureau of Agriculture), but they also supply smaller quantities for private investors, NGOs and universities (for their community outreach programmes). For potato they sell mini-tubers at ETB 6 (EUR 0.12) per plantlet, and for banana it is ETB 20 (EUR 0.38) per plantlet. In 2020-2021 they sold 150,000 plantlets of banana and 30,000 mini-tubers; in addition, they will work on an additional 190,000 mini-tubers in 2021-2022 for the SNV-Horti-LIFE project. Mini-tubers require at least two seasons of multiplication afterwards, into G2 and G3, to make them commercially viable.

There are a number of investments in banana and pineapple farmers in Southern Nations, including the Omo Valley, around Omorate (Fri-EI Ethiopia). For these investments banana plantlets were imported (from India). This shows there is still room to produce more locally. This also holds true for pineapple.

Bottlenecks and Opportunities

Overall, the market for plantlets appears limited in Ethiopia. Looking at the current production, only a few million plants per year can be produced on a commercial scale to supply the fruit and potato sectors. Main recurrent demand would come from potato growers that want clean planting material (every season), and a number of more commercial fruit producers, especially for banana and pineapple. Possibly ginger can come up as an interesting crop, especially because many soils have been infected with aflatoxin. Sugar cane can still be an interesting crop for the plant tissue laboratories but given the political nature of the sugar cane investments, it is hard to build a sustainable business case on it.

Companies indicate that the main challenge is to find skilled manpower for the plant tissue lab. The work in the laboratories is tedious and requires dedication. The university graduates (undergraduate level) do not want to work in the laboratories as ordinary workers. In addition, the price for inputs is increasing this especially concerns the chemicals needed to prepare the media and growth hormones. Though the capacity of the lab itself is 20 million plantlets, the capacity for rooting and hardening is often less (more in the range of 200-500,000 plants).

2.2. VEGETABLE SEED PRODUCTION AND SALES

Background

The quality of the seed and the choice of variety determine to a large extent the yield potential of vegetable farmers. It is therefore important that farmers have access to a wide range of vegetable varieties. In Ethiopia the most important vegetable crops are tomato, onion, hot pepper and cabbage. Other important crops include African kale, carrot, and increasingly some more 'Western' crops like bell pepper, broccoli, cauliflower, cucumber and lettuce.

Current Status

VEGETABLE SEED PRODUCTION

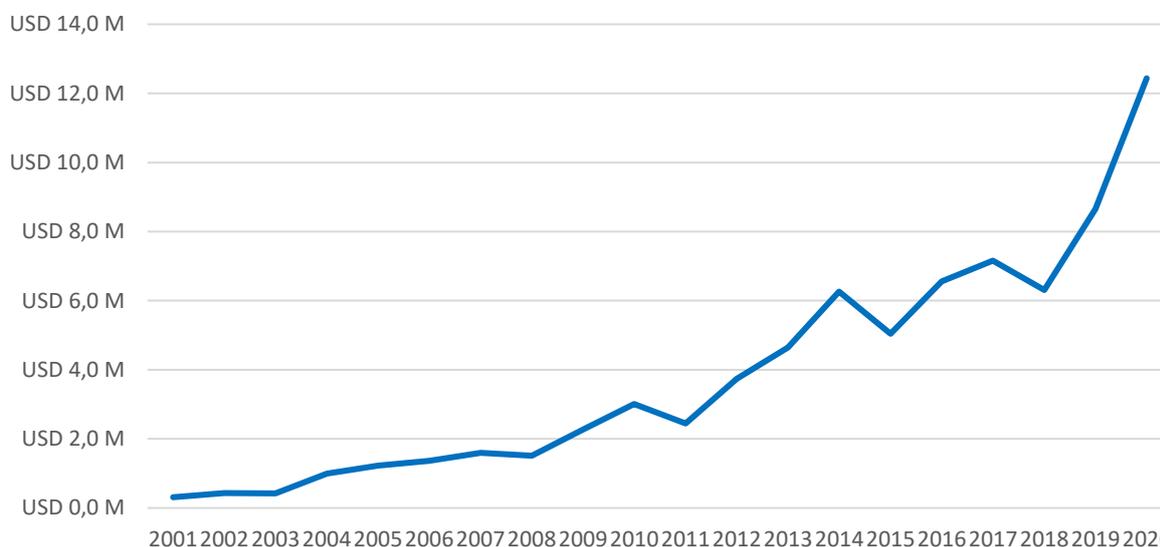
At the moment two major multinational seed companies have started production of vegetable seed in Ethiopia. One of these companies produces hybrid tomato, sweet pepper and cucumber seed in a high-tech greenhouse, alongside open field seed production of other crops at the same premises as well as through contracted companies. The second company also produces hybrid tomato seed in tunnels. Together they represent an export value of around EUR 1 million in 2020, with a planned export value of EUR 5 million by 2025. Success of these companies can inform other multinational seed companies to start up vegetable seed production in Ethiopia. Agro-ecologically Ethiopia has excellent conditions for the production of high-value seeds of Solanum (tomato, pepper), as well as lower-value seeds of crops in the Cucurbitaceae (squash, cucumber, melon) and Malvaceae families (including okra and mallow).

From a regulatory point of view the Ministry of Agriculture has resolved a number of bottlenecks in recent years. As such a new directive has created an exception for variety registration for those varieties that are produced 100% for export. In addition, an initial check on the exports of plant genetic material from the seed production companies, by the biodiversity institute, was lifted. Seed producer companies can also contract other companies to do contract farming. In general, the Ethiopian government is keen to attract more multinational vegetable seed production companies and balance the sizable vegetable seed imports by vegetable seed exports.

The main challenge for the vegetable seed production companies has been in the capacity of the Ethiopian Ministry of Agriculture to implement new EU phytosanitary requirements with respect to Tomato Brown Rugose Fruit Virus (ToBRFV). This lethal viral disease has been found in countries like Mexico and Israel and to stop its further spread the EU implemented strict measures on the imports of tomato, pepper and their seeds, starting August 2020. This causes export companies to provide evidence on their phytosanitary certificates that the batch is free of ToBRFV, for each batch of production. Detecting ToBRFV requires real time PCR testing of the specific viral strain which is currently not possible in Ethiopia. Therefore, companies sent samples to laboratories in the Netherlands and Israel to provide proof to Ethiopia's phytosanitary department that shipments are free of ToBRFV. Ideally, testing of ToBRFV is done within Ethiopia; with both the Ambo and Holetta government laboratories in the possession of the necessary equipment. In order to enable a conducive export climate, there is a need for continued capacity building at the phytosanitary body of the Ethiopian Ministry of Agriculture so that field inspections and pest risk analysis (PRA) can be effectively conducted.

VEGETABLE SEED SALES

The below graph shows that total imports of vegetable seed to Ethiopia amounted to EUR 12 million in 2020. Excluding local OPV onion seeds, most vegetable seeds are imported by Ethiopia. Given the current forex issues, the increasing appetite of Ethiopian farmers to use hybrids, and the underrepresentation of smaller vegetable crops (due to registration issues), the potential vegetable seed demand can be estimated at double of this, i.e. EUR 24 million.



Source: ITC Trademap (2021)

Figure 1: Vegetable seed imports Ethiopia (in million USD) 2001-2020

Roughly, the graph shows three growth phases; (1) a phase from 2001 to 2011 moving from USD 300,000 to USD 2 million; (2) from 2011 to 2016 growing from USD 2 million to USD 6 million; and (3) from 2016 to 2020, a further doubling to USD 12 million (ITC Trademap, 2021).

The majority of the seeds came from two countries: the Netherlands and Israel. In 2020, these two countries together accounted for more than 85% of all vegetable seed imported to Ethiopia (taking into account that the imports from the Netherlands Antilles should be added to the Netherlands). Important players include: Hazera-Limagrain, Enza Zaden, Rijk Zwaan and Bakker Brothers. In terms of varieties Galilea F1 of Hazera for tomato and Serenade F1 of Hazera for hot pepper are the market leaders (by some distance). For onion Red Coach of Enza and Russet of Hazera are in the lead, while for cabbage Monsanto's variety Victoria is most popular (Horti-LIFE and own observations).

Table 1: Origin of consignment by country 2018-2020

#	Country	2018	2019	2020	% (2020)
1	Netherlands	USD 1.973.717	USD 2.616.807	USD 5.408.402	43,6%
2	Israel	USD 2.586.460	USD 4.228.399	USD 5.053.216	40,7%
3	Italy	USD 455.274	USD 567.815	USD 484.899	3,9%
4	United Arab Emirates	USD 0	USD 55.425	USD 347.055	2,8%
5	Netherlands Antilles	USD 0	USD 0	USD 284.394	2,3%
6	Kenya	USD 813.304	USD 651.839	USD 259.627	2,1%
7	Spain	USD 105.787	USD 212.229	USD 143.181	1,2%
8	United States	USD 11.919	USD 18.605	USD 139.012	1,1%
9	France	USD 32.609	USD 84.355	USD 86.384	0,7%
10	Other	USD 451.156	USD 224.108	USD 197.868	1,6%
	Total	USD 6.430.227	USD 8.659.580	USD 12.404.038	100,0%

Source: ERCA (2021)

The table further shows the sharp increase of Dutch seed sales in recent years; probably indicating impact of variety registration, and increased demonstration and promotion activities, also supported by initiatives like Horti-LIFE, Fair Planet and ISSD Ethiopia. It also shows a good understanding by farmers of the benefits of using improved (hybrid) varieties. Hybridization rates in Ethiopia are high, especially for crops like tomato and pepper, but they are also significant for crops like onion and cabbage. Other factors that have boosted farmer uptake of improved (hybrid) varieties include the presence of professional nurseries, spill-overs from the horticulture export sector, and cluster effects in key producing areas (stimulating farmer-to-farmer learning).

For a variety to be officially registered the Ethiopian Seed Law requires a performance evaluation for one season at six locations (which is most common), or two seasons at three locations (which is less common). The variety registration process can be initiated by a locally registered seed company (often a distributor). The trials can be implemented through an agreement (MoU) between a research institute or university and the seed company. Regulation 361/20155 stipulates the service charges for conducting the tests. Officially, it costs € 375 per variety per season per site for value-for-cultivation-and-use (VCU) (Hassena et al, 2020). Given the fact that a variety must be tested at six locations, the total cost goes up to € 2,250 per variety. In practices, the research centres decide the cost by themselves and actual costs go up to EUR 3,000 – EUR 28,000 per variety, with EUR 4,000-6,000 being most common for registering a tomato or onion variety. The exact price depends on the type of crop as well as the number of varieties being put in the release process together.

In addition, companies are often required to provide regular follow-up guidance at the trial sites to ensure crop management is done adequately. Companies regularly resort to managing a number of trials themselves ‘on farm’, e.g. at commercial export farms, with only one or two trials implemented by the research centre or university. In the end, it is the National Variety Release Committee, consisting of researchers, that advises on the release of the variety. The committee is informed by a technical evaluation report that is developed by the researchers from either the contracted research institute or university. In a number of cases varieties (that successfully passed the trials in neighbouring East African countries) were rejected because the committee deemed their performance insufficient, or found the number of varieties that were put in the release process too many.

For international seed companies the regulations and their implementation comprise the biggest bottleneck for further expanding in the Ethiopian seed market. Especially for smaller crops like broccoli, cucumber, lettuce or radish, the costs often are prohibitively expensive and don't weigh up to the potential sales profits. In addition, the fact that the researchers both implement and evaluate the trials (while often also being involved in vegetable breeding) provides for bias against foreign imported varieties.

The other, even greater, bottleneck concerns the lack of foreign currency available in the country to import vegetable seeds. This situation has only worsened in recent years. Interviews with companies indicate that current seed demand is only met by 50% because of this constraint. Requests for forex (to open a letter of credit that enables seed imports) often take 3 to 6 months. The government has put in place a Directive that should prioritize pharmaceutical products and agricultural inputs, however, in practice the exporters and the banks decide on the type of products being imported – with a preference for luxury items that can fetch the highest profits (e.g. cars, refrigerators and televisions).

Seed distributors typically make a margin of 30-50% on the seed import price. These margins are influenced by the availability foreign currency. The greater the lack of forex the higher the seed price for seedling producers and farmers. On average, retail seed prices in Ethiopia are estimated to be at least 100% higher than in neighbouring Kenya. This also impacts the overall competitiveness of the Ethiopian horticultural sector, as higher input prices not only affect seeds but also pesticides, specialized fertilizers and irrigation equipment.

Bottlenecks and Opportunities

Use of quality seed of improved varieties has shown great yield improvements for farmers. Preliminary evidence of Horti-LIFE, a large horticultural development programme funded by the Netherlands Embassy, shows farmers that use hybrid vegetable varieties increase their yields by 40%. Importantly, an additional 40% yield increase is achieved when farmers participated in Horti-LIFE's Farmer Field Schools (G. Holtland, personal communication). This clearly shows the added value of quality inputs combined with good agricultural practices (including soil fertility and pest and disease management). This in turn shows that good opportunities exist for international vegetable seed companies who want to go the extra mile in terms of variety registration, employment of dedicated staff, and organisation of demonstrations and trainings.

Both Horti-LIFE and the upcoming Ethio-Netherlands Seed Partnership (ENSP) project can further assist these companies in increasing their foothold in Ethiopia, through their agronomic and regulatory expertise and network, collaborations with their field activities, and possibly financial support. Already, Horti-LIFE organizes variety demonstrations in the seven most prominent horticultural hotspots, together with the seven most important seed distributors. Likewise, the international seed companies and their association (Plantum) can further contribute to broadening the variety portfolio (including smaller crops), training of farmers and supporting the regulatory system (with their in-house expertise).

There are two issues in the enabling environment that require particular attention. The first is the shortage of foreign currency for importing vegetable seeds. It is estimated that the potential demand for hybrid vegetable seed sales is double that of the current actual imports (EUR 24 million compared to EUR 12 million). The lack of access to foreign currency runs throughout the Ethiopian economy, but priority should be given to imports of agricultural inputs (as well as medicine) in line with the directive of the National Bank of Ethiopia (NBE) on this subject. Concerted effort by the sector associations (EHPEA, ESA), projects (Horti-LIFE and ENSP) and the Netherlands Embassy should be employed to discuss this topic at the highest level possible (Prime Minister's Office and NBE).

The second topic concerns the expensive and tedious process of variety release. Here, the entire organisation of testing and release needs a serious review, looking at the mandates of the responsible institutes. Disentangling the role of the research system, and strengthening the regulatory role of the Ministry is probably necessary. As an intermediary solution the Ministry of Agriculture could take up the role of organizing the variety trials; with a final solution moving towards an independent regulatory authority (cf. KEPHIS in Kenya and Naktuinbouw in the Netherlands). Advanced proposals have already been drafted to establish such an entity, and these could be pushed after the new government has been installed (anticipated for October 2021).

In terms of vegetable seed production, the success of the currently active companies will determine whether more multinational companies will invest in Ethiopia. As such, ensuring that these two companies become successful should be the top priority of the Ministry of Agriculture. Specific support that the Ethiopian government could provide to these companies is: ensuring import and export of seeds takes place smoothly, and arranging sufficient and quality real time PCR testing capacity for detecting ToBRFV.

2.3. VEGETABLE SEEDLINGS

Background

Production of vegetable seedlings is common practice in Ethiopia, especially for crops like tomato, pepper and lettuce. Direct sowing can still be applied for onions, though even there many farmers resort to seedling production (in seedbeds) and transplanting. In the last ten years a number of large-scale professional seedling production companies (from here on: nurseries) have increased market shares, and increasingly vegetable farmers purchase seedlings instead of seed. This also has to do with the fact that most nurseries have direct relationships with the seed distributors and as such have better access to (hybrid) vegetable seed. Nurseries ensure optimum germination rates, disease free production and a strong (and hardened) seedling, that can better withstand biotic and abiotic stresses.

Current Status

There are four major young plant raisers in Ethiopia, all situated in the Central Rift Valley, basically running from Debre Zeyt to Ziway. These nurseries make use of professional equipment and inputs (germination rooms, seed trays and cocopeat) and often have two stages of seedling raising, the first in a greenhouse and the second under shade net (for hardening). The seedlings are sold at farm gate in trays or boxes and farmers arrange transport themselves. In addition, there are a number of smaller nurseries throughout the country, with a number of them supported by development projects.

The capacity of the four nurseries is estimated at around 300 million seedlings per year, with a current production of 200 million seedlings. Out of this the two main crops cultivated are tomato and hot pepper, probably amounting to more than 80% of production capacity. The remainder of the seedlings are cabbage (and other brassica species), lettuce and onion. A capacity of 300 million seedlings translates to around 8,400 ha of tomato and pepper production. Given the fact that the overall acreage of tomato and pepper is estimated at around 35,000 ha (own assumptions), with 50% used by hybrids and the other 50% by OPs, it appears that there is still room for increasing the capacity more than twofold (to 625 million seedlings). To reduce cost of transport, a business opportunity could be to move outside of the Central Rift Valley to other horticulture hotspots like Dire Dawa and Arba Minch (and possibly in the future the Raya Valley).

Typical prices at the time of writing in September 2021 were ETB 4.2-4.6 (EUR 0.08-0.09) per tomato seedling. Much of this price consists of the seed itself (ETB 3.0-3.5 per seed) and the rest is used for inputs, labour and depreciation of assets. For hot pepper prices were slightly higher, at ETB 1.8 (EUR 0,04) per seedling calculated for plant raising only (excluding the price of the seed).

Bottlenecks and Opportunities

The main obstacle for growth of the nursery subsector is the availability of seed (see also chapter 2.2). Many of the nurseries run below optimal capacity because of this. In addition, some nurseries that work directly with foreign breeders indicate that the variety release process is taking them long to introduce new varieties. It is interesting to see that the nurseries have an ambition (and position) to intensively work directly with multinational seed companies. It is not a coincidence that the largest nurseries have good access to forex due to their other export activities.

For the upcoming Ethio-Netherlands Seed Partnership project, that operates under the umbrella of Seed-NL, it is worth exploring collaboration with some of the nurseries; also in terms of training and variety demonstration activities. Staff at the nurseries is knowledgeable and there are sufficient facilities available to host groups of farmers. In addition, a number of nurseries work together with vegetable breeding companies, assist in the variety registration process, support for farmer training, and have the ambition to popularize new varieties (and crops).

There are also opportunities for Dutch companies that sell nursery equipment. It is interesting to see that also one Dutch company has developed specialized equipment 'made for Africa'. This includes container-based solutions and semi-automatic seeding machines. It is worth further exploring how Dutch equipment and expertise in young plant raising can be utilized in Ethiopia.

2.4. SEED POTATOES AND TRUE POTATO SEED

Background

Ethiopia is one of the biggest producers of potato in sub-Saharan Africa with more than 900 thousand tons produced per year. Yields are low at around 13 t/ha, with major disease problems present (phytophthora and ralstonia) . In general, seed potato availability is low and researchers estimate that farmers re-use their own potato planting material for five to eight times.¹

Current Status

Currently it is discouraged to import seed potatoes into Ethiopia and most imports take place in the form of in vitro plantlets and mini-tubers. This planting material needs to be of registered varieties, and can be multiplied within the country into subsequent generations. As such, companies have the following four options for producing seed potatoes: (1) import of in vitro plantlets or mini-tubers (G0) and production of G1 and G2; (2) purchasing plantlets from local plant tissue laboratories (see chapter 2.1), and multiplication through mini-tubers to G1 and G2; (3) purchasing basic seed (G1) from EIAR and producing G2; and (4) production from true potato seed, through seedlings and transplanting (and a possible second round production).

¹ Sharma K, G Woldegiorgis, L Tessema, T Desta, W Zegeye, MA Teklu, A Abdurahman, T Lunt, J Smith, and E Schulte Geldermann E, 2018, Tackling bacterial wilt of potato in Ethiopia. CIP Policy Brief No . 01, Pages 1-4; CIP: Lima, Peru

Clean production of mini tubers in plant tissue laboratories is showing potential for seed potato production. Horti-LIFE (in a paper presented at the Irish Potato Coalition) has calculated that two cycles of multiplication (to G1 and G2) is needed to have a profitable business case. The step from mini-tuber (G0) to G1 does require sufficient scale of screenhouses with buckets and a disease free medium. Purchasing the G0 and producing the G1 and G2 requires substantial upfront investment, which needs a longer-term financing plan (if company or cooperative resources are insufficient). In addition, the step of G2 production requires a clean soil (not having cultivated Solanaceae for a period of four years before), and testing of soil samples is needed to ensure the soil is free of diseases. Basically, this is the most probable pathway for increasing availability of clean seed potatoes in Ethiopia for the coming years, as the capacity of EIAR to produce G1 is too low to meet the market demand. Increasing G1 and G2 production should go in hand in hand with improving the inspection capacity of the Ministry. The current capacity, both in manpower and knowledge of potato is low, and investments are needed to bring these up to standard. Horti-LIFE and possibly NAK in the Netherlands can play an important role in this.

Alternatively, Dutch potato breeding companies can follow this route and bring in their (in vitro) plantlets from the Netherlands. Already a number of Dutch ware and crisp varieties are registered in Ethiopia and new promising varieties with high yields and in-built resistances are currently being tested in the country.

In parallel, true potato seed (TPS) offers good opportunities. Current research trials with new hybrid TPS varieties show that they can compete with existing seed potato varieties, achieving yields of 30 tons/ha. Varieties also have good resistances against phytophthora and ralstonia. Typically, TPS varieties are produced from seedlings of 4-5 weeks old. The growing season of the seedling matches that of seed potatoes, with a 100-120 days after transplanting. The main constraint for the introduction of TPS is the registration process. At the moment only registration protocols are in place for seed potatoes. There are two options that can be explored for including TPS in the variety trials: (1) comparing the TPS seedling to an existing seed potato reference variety; or (2) develop a new protocol and taking the first TPS variety globally introduced as the reference (Oliver F1 of Bejo). The latter is implemented in Kenya. Both the Ministry of Agriculture and EIAR Holetta are keen to collaborate on this, and explore both options.

Bottlenecks and Opportunities

There are two main opportunities that can be further explored with the Dutch private sector. The first concerns teaming up with the Horti-LIFE activities of seed potato multiplication with cooperatives and including their varieties. The Dutch companies could also introduce possible new varieties with better resistances. A relationship with a registered Ethiopian seed company is required for this. Stricter PVP enforcement is probably needed to organize the intellectual property of the genetic material. A (royalty based) licensing agreement could be developed between the Dutch breeder and the Ethiopian cooperative to facilitate this process, including production support and supervision on the implementation of the agreement.

The second opportunity is in the registration and popularization of true potato seed in Ethiopia. This needs follow-up discussions with the Ministry of Agriculture to agree on the rules for TPS variety release (crop management protocols, evaluation criteria and reference variety). The Kenyan protocols can be used as an example in this respect. After registration, popularization can take place through demonstrations and trainings, most likely with an existing nursery (see chapter 4.3) that also produces the TPS seedlings. One seed potato company and one TPS company have expressed interest to work on this, and would like to explore collaboration with the Ethio-Netherlands Seed Partnership (ENSP) project to undertake follow-up activities.

2.5. SOFT FRUIT

Background

Soft fruits has been added to this report as globally the demand for strawberries, rasp berries and blue berries is booming. In addition, Ethiopia has excellent production conditions for these crops, especially in the Rift Valley, but also in higher altitudes west and north of Addis Ababa. Importantly Ethiopia has good flight connections to major markets in the Middle East, Africa and the EU. In addition, the Netherlands is an important player in the sector, with professional companies that can provide planting material, equipment and expertise.

Current Status

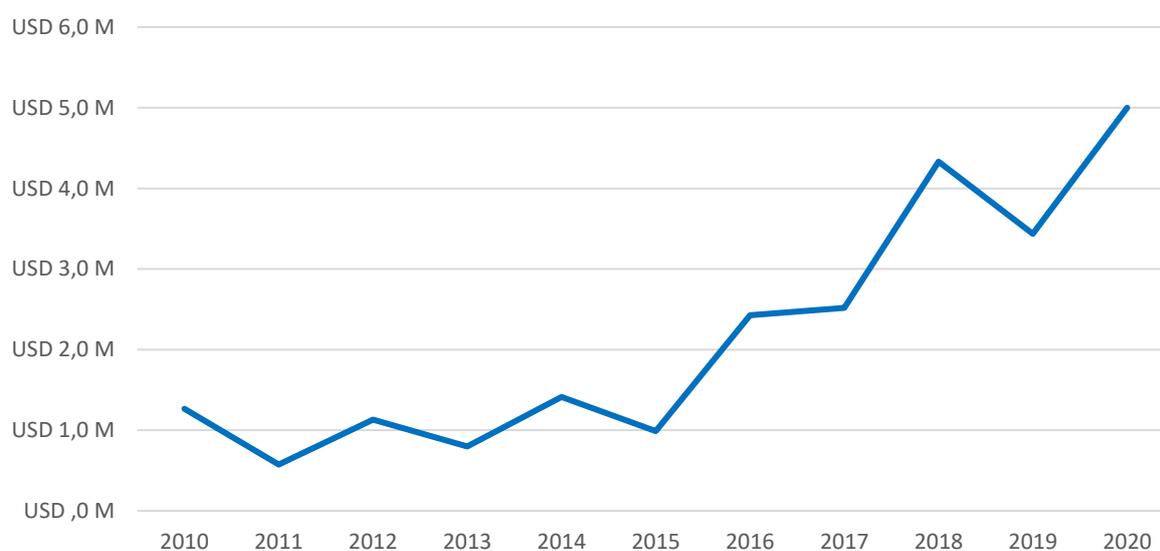
The global market for strawberries, raspberries and black berries has shown a growth of respectively 6% and 15% year-on-year in the past five years. Table 2 below shows these trends.

Table 2: World imports of strawberries (HS 08010) and raspberries & black berries (HS 08020) 2015-2020

World imports (in million USD)	2015	2016	2017	2018	2019	2020	Growth 2015-20	Average growth/y
Strawberries	2.424	2.619	2.866	2.869	3.150	3.208	32%	6%
Raspberries & blackberries	1.941	2.074	2.402	2.889	3.254	3.431	77%	15%

Source: ITC Trademap 2021

Ethiopia has picked up on this trend and has expanded strawberry production and exports significantly over the past years. Below graph presents this sharp growth.



Source: ITC Trademap 2021

Figure 2: Strawberry exports from Ethiopia (in million USD) 2010-2020

It is interesting to see that export value was stable at around USD 1 million per year between 2010 and 2015, but grew five-fold between 2015 to 2020 from USD 1 million to USD 5 million. There are five main farms that contributed to this growth. The lion's share of these exports head for the Middle East, with Saudi Arabia and the United Arab Emirates responsible for almost 80% of the market. Table 3 shows the Top-5 export destinations. The total import value of strawberries for the top-3 countries combined (Saudi, UAE and Qatar) is close to USD 100 million, giving Ethiopia a 5% market share. This also shows there is room for expansion with Ethiopian strawberries appreciated by buyers for their sweetness.

Table 3: Strawberry exports from Ethiopia: Top-5 destination (HS Code 081010) 2015-2020

Exports (in thousand USD)	2015	2016	2017	2018	2019	2020	% of total (2020)
Saudi Arabia	407	1.341	1.421	2.938	1.761	3.075	61,5%
UAE	80	454	144	463	464	898	18,0%
Qatar	120	17	72	67	127	356	7,1%
Nigeria	141	215	202	166	318	262	5,2%
South Africa	11	6	126	228	520	251	5,0%
Total	988	2.425	2.516	4.330	3.435	5.000	96,8%

Source: ITC Trademap (2021)

Exports benefit from daily flights to Riyadh, Dubai and Doha with sufficient cargo capacity and competitive prices. The same holds for other African destinations like Lagos and Johannesburg, that provide good opportunities for direct shipments. Exports also take place to other African countries like Seychelles and Gabon.

Total production acreage of strawberries is estimated at 30 ha, with strawberry sales destined for both the domestic and export market. Growers in the colder areas around Holetta make use of greenhouses whereas growers in lower altitude areas like Raya and the Central Rift Valley make use of plastic covers (low tunnels). Most planting material for strawberries currently comes from Israel and growers are satisfied with the variety's performance (in terms of yield, colour, size and brix). Imported plantlets are multiplied locally under (remote) supervision of the breeder.

Production and exports of raspberries and black berries is non-existent at the moment, though a few growers indicated that raspberries have been grown successfully (both in the Rift Valley and Raya Valley). Growing blackberries has been more difficult, with several attempts failing to reach sufficient quality and quantity production. Given the global boom in raspberries and black berries it is worth investing more time and energy in growing these crops. Both crops also have a good market in the Middle East, though its much smaller than the strawberry market.

There is also interest of cuttings exporting companies to start exporting strawberry planting material to the EU. At the moment the EU's plant health regulation 2019/2027 prohibits the import of strawberry (and other) cuttings from outside the EU. Under strict conditions a derogation can be requested; however this is a very tedious and lengthy process. Given other more urgent issues with respect to phytosanitary services in Ethiopia (see also chapter 3), it is probably not feasible to also embark on this derogation process.

Bottlenecks and Opportunities

Production conditions in Ethiopia are good with good water quality, high light intensity and cooler night temperatures. Ethiopian strawberries are well appreciated by the market because of their colour and sweetness (brix levels). Ethiopia currently has a market share of 5% in the Middle East. With current prices at USD 4 per kg (FOB Addis Ababa), a further expansion of strawberry production and exports looks profitable. In summary: Ethiopia's climate, vicinity to the Middle East and logistics infrastructure are ideal for expanding the soft fruits sector. In addition, the Ethiopian consumers are increasingly appreciating strawberries as well, providing a solid market for B-grade. Also new products are being introduced like strawberry yoghurt.

There is another opportunity to embark on the production of raspberries and blackberries. This probably does require an R&D approach first, finetuning choice of varieties and production practices. A collaboration could be explored between Dutch and Ethiopian companies, including consultancy, to work on this; introducing new varieties, technology and crop management practices. Something similar holds for technological innovations for strawberry production, looking at high gutter production systems and hydroponics.

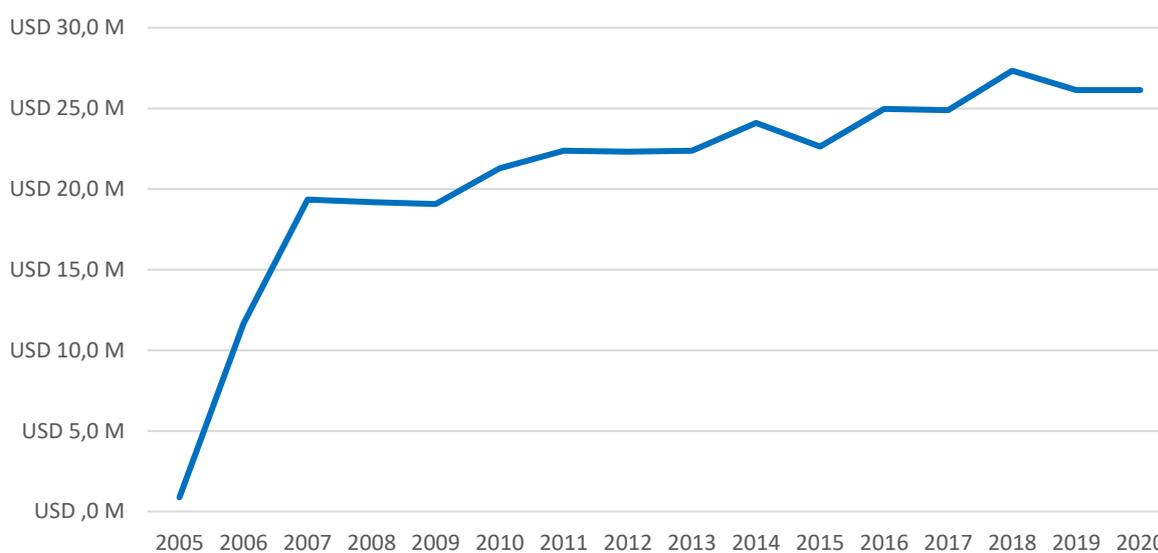
2.6. ORNAMENTAL CUTTINGS FOR EXPORT

Background

Ethiopia is one of the main exporters of ornamental cuttings globally. The climate in the Central Rift Valley and Upper Awash is ideal for growing cuttings, having good water availability, low rainfall, warm day and cool night temperatures, and high light intensity. In addition, there is the opportunity for installing geothermal energy for heating the greenhouses for increasing night temperatures (especially during the months of December-February). Ethiopia is further praised for its good logistics and airfreight prices, as well as low levels of corruption (e.g. compared to Tanzania and Uganda). As such, almost all major multinational ornamental plant raisers are represented in Ethiopia. Together they currently produce on an estimated 120 hectares, with an additional 20 hectares planned for the next two years. Main crops produced are: Pelargonium (incl. geranium), Chrysanthemum and Poinsettia, and Aster, Dipladenia, Lavandula and Osteospermum. Cuttings production of succulent plants are produced more in subtropical climates in Tanzania and Uganda.

Current Status

The sector is doing well, and exports in 2020 grew to around USD 26 million per year. Growth has been modest in the last decade, with 2007 already achieving close to EUR 22 million exports. However, a number of companies are expanding their operations and one take-over took place in 2021. In addition, the new Kunzila horticulture cluster near Bahir Bar also hosts a new ornamental cutting company. Figure 3 below portrays the export growth in the last 20 years.



Source: ITC Trademap (2021)

Figure 3: Unrooted cuttings and slips exports from Ethiopia (in million USD) 2010-2020

The most important export destination (by far) is the Netherlands, taking up more than 70% of the value of cuttings in 2020. The other three important export destinations are the USA, Germany and Belgium.

Table 4: Unrooted cuttings and slips exports from Ethiopia: Top-10 destination (HS Code 060210) 2016-2020

Exports (in million USD)	2016	2017	2018	2019	2020	% of total (2020)
Netherlands	10,3	12,3	15,3	16,2	18,4	70,5%
USA	3,3	2,7	2,9	2,4	1,8	6,9%
Germany	4,0	3,2	2,7	1,7	1,3	5,0%
Belgium	3,0	2,4	2,0	1,8	1,6	6,1%
Canada	1,1	1,0	1,0	0,8	0,6	2,3%
Italy	0,8	0,9	0,9	0,9	0,9	3,4%
Spain	0,6	0,6	0,7	0,7	0,5	1,9%
France	0,7	0,5	0,6	0,5	0,4	1,5%
Japan	0,4	0,4	0,3	0,3	0,4	1,5%
Other	0,8	0,9	0,9	0,8	0,2	0,8%
Total	25,0	24,9	27,3	26,1	26,1	100,0%

Source: ITC Trademap (2021)

Main challenges faced by the companies relate to phytosanitary services, land availability and tax-free imports. The most urgent issue concerned the implementation of the new EU phytosanitary regulations with respect to *Xylella fastidiosa*. *Xylella* is one of the most dangerous plant bacteria, and was first found in olive farms in Italy. As such the EU put in place a regulation on 14 August 2020 to stop it entering from third countries. The regulation gave third countries six months to translate the regulation into national legislation. The EU demands of third countries that “the national plant protection organisation of the third country [communicates] in writing to the Commission that the specified pest is known not to be present in the country on the basis of inspection, sampling and molecular testing [...]” (Commission implementing regulation, 2020/1201). In addition, the phytosanitary certificate for each export shipment needs to have an additional declaration that indicates that it is free of *Xylella*. Furthermore, annual inspections need to take place to ascertain the area is free of *Xylella*.

The Ethiopian Ministry of Agriculture was too late in translating these EU regulations into national legislation and putting in place adequate inspection activities to communicate the EU about the absence of *Xylella*. As such, exports of cuttings almost stopped in February 2021. However, through concerted efforts by the Ministry, Netherlands Embassy and the cutting export companies, company samples were quickly sent to Kenya, and later in February 2021 the companies were able to export again.

This is by far the biggest regulatory issue for the cutting companies at the moment. For now, production sites have been declared ‘free of *Xylella*’, through testing of samples of the cutting farms, mostly at KEPHIS in Kenya. Still, NPPOs in the EU can take samples at the point of entry, because Ethiopia is not declared free of *Xylella*. Once a sample is taken an entire batch is blocked until the results are ready (and the plants have died). This is a huge risk for the cuttings export companies.

Therefore, the next step is to declare Ethiopia as a country free of *Xylella*. To this end, more extensive sampling is implemented, and results are expected by the end of September 2021. The exporting seed companies already showed their commitment and supplied the Ethiopian laboratories with testing kits to analyse samples on *Xylella*. In addition, the Dutch NVWA and Naktuinbouw organized an online training for the Ministry’s staff on how to implement the phytosanitary requirements around both *Xylella* and ToBRFV. At the moment, most other East African countries, including Kenya, Tanzania and Uganda, have been registered as being free from *Xylella fastidiosa*.

Other smaller issues include unclarity about the import tax regulations of inputs and equipment. The list that specifies those materials that can be imported tax free is old. Examples include equipment for greenhouses that is perceived to be for industrial purposes (like gutters and paint for greenhouse plastic) which are then taxed. Also VAT repayments by ERCA take very long and all companies have a large outstanding amount.

Lastly, it is increasingly difficult to lease land in the most important production areas in Oromia. A number of companies in the Koka cluster would like to expand but the regional government doesn't collaborate well to assist in the process of compensating farmers or making public land available. This is holding the sector back from further growth. As such, the larger cutting companies are either looking at other regions like Amhara, or taking over existing greenhouse farms.

Bottlenecks and Opportunities

There is a good opportunity for collaboration between the Ethiopian Ministry of Agriculture, Dutch NVWA, Naktuinbouw and the companies to further work on registering and maintaining Ethiopia as a Xylella free country. This needs continuous follow-up as annual inspections are required by EU regulation. In this respect, the sampling strategy (and number of samples taken per company) need to be discussed so as to reduce costs for the companies.

In addition, there is a trend that the EU's phytosanitary policy becomes stricter, also for other crops like tomato, chillies, eggplants, and mangoes (e.g. looking at false codling moth and fruit fly). This in turn requires a professional organisation at the Ethiopian Ministry of Agriculture that stays up to date of new developments and has adequate resources and plans to undertake inspections at export farms, and implement pest risk analyses across the country (to also safeguard domestic production of food crops).

On a more positive note, after two years of Covid-restrictions, the Ethiopia HortiFLora Expo is back, and will be organized on 23-25 March 2022 at the Millennium Hall in Addis Ababa. More information on: www.hortifloraexpo.com.

3. REGULATIONS AND GOVERNMENT SERVICES

A number of subsector specific regulatory bottlenecks have already been presented in the previous chapters. This chapter will focus more on the institutional organisation of the regulatory departments, tasked with services related to: variety release, plant variety protection, seed quality control and phytosanitary standards. The chapter relies heavily on a study carried out last year (2020) on Ethiopia's public seed sector services². That report described the current status of the seed regulatory environment and provided specific recommendations on how the regulatory framework can be strengthened. Excerpts are included below, alongside information distilled from interviews with senior officials of the Ministry of Agriculture (MoA).

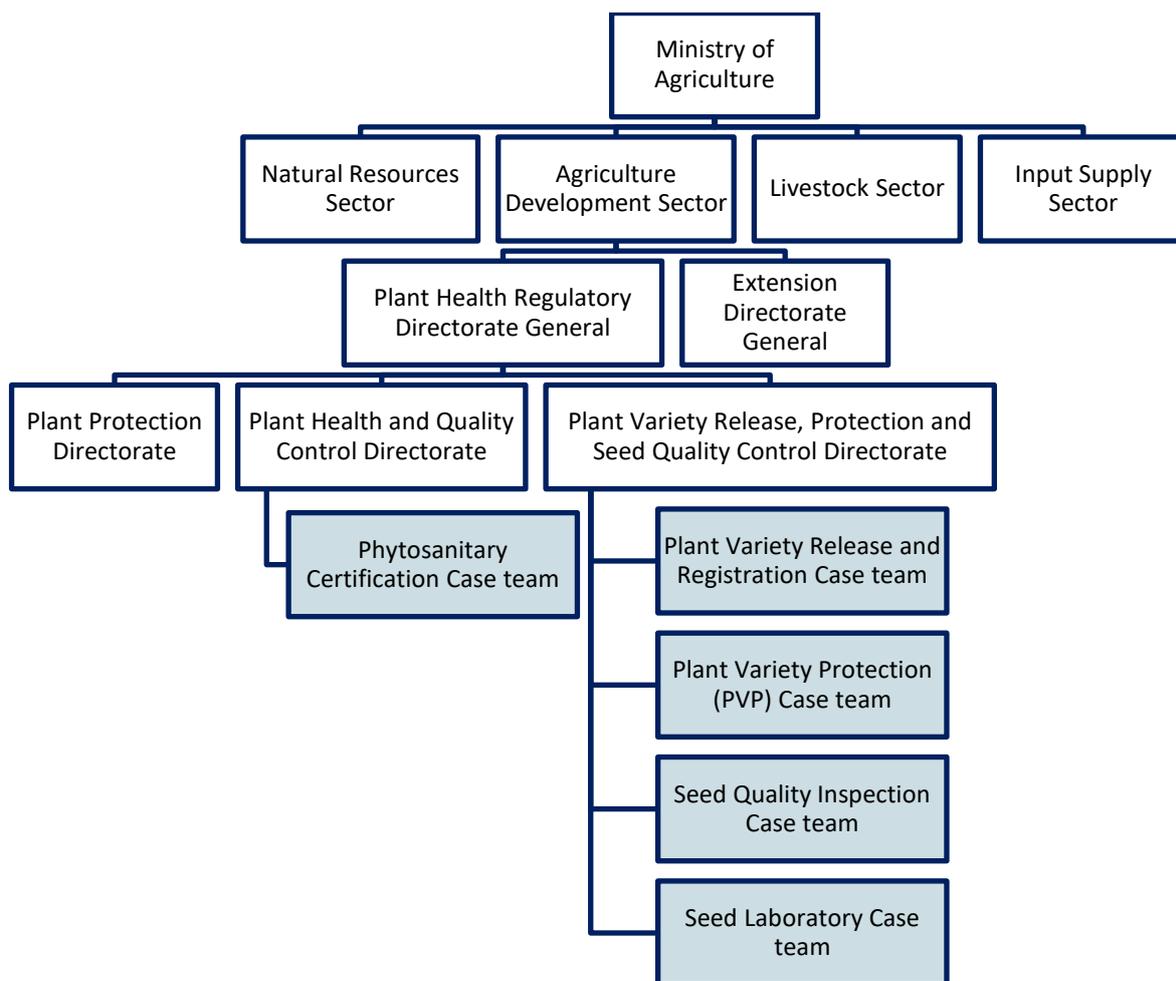
3.1. THE CURRENT ORGANISATIONAL STRUCTURE

At federal level, regulatory services are provided by two directorates accountable to the State Minister of Agricultural Development (see Figure 4 below). These two directorates are: the Plant Variety Release, Protection and Seed Quality Control Directorate; and the Plant Health and Quality Control Directorate. The Plant Variety Release, Protection and Seed Quality Control Directorate has four case teams, each responsible for a different aspect of seed regulatory services: (1) plant variety release; (2) plant variety protection; (3) seed quality inspection; and (4) seed laboratory services. The National Seed Laboratory is also supposed to serve as a reference laboratory and arbitrator for disputes between seed producers and laboratories in the regional states. With regards to seed, the Plant Health and Quality Control Directorate focuses on phytosanitary requirements for imports and exports of seeds, and the issuing of phytosanitary certificates.

The distinction between federal and regional is that the federal level is responsible for the coordination of plant variety release, plant variety protection and phytosanitary services, whereas the regions are responsible for quality assurance. At the regional level, seed regulatory services are provided by semi-autonomous authorities operating under the technical supervision of the Bureaus of Agriculture (BoA) in Amhara, Oromia and SNNPR, and from department level within the BoA in Tigray. Currently, there are 13 seed laboratories in the four regional states that support the authorities in implementing seed inspections and laboratory testing. There is one laboratory that functions under the auspices of MoA (and which should in the future operate as a reference laboratory for the regional laboratories). None of the laboratories are currently ISTA accredited.

There is a strong ambition from the regulatory directorate to establish and capacitate a new national laboratory that can undertake all analyses for seed quality (as a reference laboratory) and phytosanitary tests (e.g. for *Xylella* and ToBRFV). The envisaged laboratory would require major investments and capacity building of staff. It might be worth exploring how these plans for a national lab can be seen in the context of the broader discussion on an independent regulatory authority. In the short run it seems more effective to work with one or more of the regional seed laboratories (like Ambo and Holetta).

² Hassena M, J van den Broek, G Borman, 2020, Institutional mapping and needs assessment of Ethiopia's public seed sector services, Report WCDI-20-101, Wageningen UR



Source: adapted from: Hassena et al, 2020

Figure 4: Federal structure of seed regulatory functions

With regards to this organisational structure, there have always been competing opinions to re-organize regulatory services at both federal and regional levels. Many argue that the services should be more independent and autonomous from the regulator: the Ministry of Agriculture. Before 2005 greater autonomy was in place at federal level when the Agricultural Input Authority was responsible for plant variety release and protection, as well as seed quality control. In 2005 the Authority was dissolved, and its functions were handed over to MoA. Phytosanitary services were always part of MoA. The general sentiment is that the seed regulatory services functioned better in the past. Also, experience from other countries, like Kenya and the Netherlands, shows that an independent seed regulatory authority has many advantages in terms of: operational flexibility, cost recovery and recruitment (and remuneration) of well-qualified staff.

Today, regulatory staff feel that their positions are rather marginalized within MoA. They observe that the agricultural extension department receives far greater attention. Many staff complain that despite the challenges discussed regularly in important stakeholder consultations and forums, recommendations are not followed up on. Staff capacity and continuity is also low. Looking at the serious regulatory challenges observed in the six subsectors of this study, the regulatory department deserves more attention and resources. Basically, the entire seeds and horticulture export sector is highly dependent on the quality of the services of both the phytosanitary department and the plant variety release team (and to a lesser extent the plant variety protection team). Flaws in the implementation of certain EU regulations directly impact the performance of export companies (e.g. related to Xylella and ToBRFV).

3.2. VARIETY RELEASE AND REGISTRATION

Most of the issues concerning variety release and registration have been discussed in chapter 2.1 on vegetable seeds. In summary the main topics here are the cost of the release process, the long time it takes from signing the MoU with the knowledge institute and the eventual release, and concerns about the overlapping responsibilities of the research system. Some of these issues could be resolved by giving the mandate for implementing variety release back to the Ministry. Already, according to the regulations, MoA is responsible to conduct national performance trials (as part of the registration process). However, at present, MoA only facilitates the process of variety testing. They accept applications and approve if varieties qualify to be candidates for release. If the applicant is a private company, MoA writes a letter of request to a research institute or university to conduct the NPTs.

Researchers are poorly incentivized to conduct NPTs. The money also doesn't necessarily make its way to the field of the trial or the researchers responsible for its management. While they receive no additional payment for managing the trials, they also do not see variety testing as part of their job description. In some cases, the research institutes lack the human resources to conduct NPTs. It is also important to note that there is a potential conflict of interest of researchers providing the service to private companies. They may undertake breeding for the same crops themselves, and out of a sense of competition can be biased in their observation and data recording, as well as when participating in the National Variety Release Committee (that formulates the final advice on release to the minister).

Ethiopia could further benefit from incorporating the COMESA harmonisation for variety registration into its Seed Proclamation. This would imply that if a variety has been successfully tested and approved in two COMESA countries, all COMESA countries accept these varieties. Currently, amendments have been drafted for the seed proclamation to include these provisions. In addition, there are ideas to exempt certain crops from variety release (especially the smaller vegetable crops) or have only one location trials. Both proposals are ready but need further discussion in the Ministry and approval by Parliament.

In addition, a new directive has been gazetted that allows for companies to have their own seed testing laboratories (e.g. for larger multinational hybrid maize seed production companies). In these cases only light inspections will be implemented by the government.

In conclusion, significant changes would have to be made for MoA to carry out variety release and registration sustainably and effectively. Maintaining the status quo will require accepting potential conflicts of interest with the research system, a low number of new varieties released every year and discouragement for international seed companies to invest in Ethiopia.

3.3. PLANT BREEDERS' RIGHTS

Protection of plant breeders' rights has been pending enforcement since 2006, when the Plant Breeders' Right Proclamation was enacted. Amendments were approved in 2017 after nearly eight years of revision. Yet MoA has not yet initiated the implementation of plant breeders' rights, apart from drafting the regulations. These regulations have been finalized in 2021 and are approved by the Ministry. Only the Council of Ministers still needs to approve them. This is expected after the new cabinet is established in October 2021. Also, a Directive (to guide implementation) has been finalized and is approved by the Ministry. At the time of writing in September 2021 there was still discussion where to (re-)position the PVP office. There are plans to establish a separate directorate for plant variety protection, instead of having it under the plant variety release directorate.

Both expertise (human resources) as well as facilities are required for its implementation. To make it work, MoA would need a bigger budget to recruit technical experts. Now, the current capacity is too low to offer these services. While there is demand from company side to register their varieties for protection, no clear registration procedures are in place. Current proposals are to start with a small number of crops (e.g. a legume, potato and roses), and gradually expand over time.

Staff positions for managing the system have been created but remain vacant as the salaries offered are unattractive for the level of staff required. It is difficult to improve this within the scales and human resources policies of the Ministry. Now, research institutes offer better salaries for highly educated staff than the Ministry. If services would be organized independently in an authority, it would be possible to negotiate higher salaries, like the research institutes. Another advantage of an independent federal seed regulatory authority would be the opportunity to generate revenue for the services it provides (through fees). However, given the current political situation in the country, it is generally accepted that no new structure will be approved before a new cabinet takes up its positions in October 2021. However, it is worth putting this topic back on the agenda, as advanced plans were made three years ago to establish an independent regulatory authority for agricultural inputs. This plan would need to be discussed at the highest level, the Prime Minister's Office.

3.4. PHYTOSANITARY SERVICES

With regards to phytosanitary services, no difference can be discerned between seed and other plant products. Attention is given mostly to the control of pests listed for quarantine for Ethiopia's main export destinations (i.e. the EU). For export products, the phytosanitary team of MoA conducts physical inspections and issues phytosanitary certificates. For imported products, the phytosanitary team conducts pest risk analysis and based on the results advises importers to request phytosanitary certificates for specific pests from the countries of origin. Pest risk analysis involves physical inspection of imported products and if suspected to contain quarantined pests, samples are sent to the Ethiopian Institute of Agricultural Research (EIAR), as MoA does not have a functioning laboratory for plant health inspection. Given that EIAR provides the service on voluntary basis, phytosanitary services only submit samples if there is a strong suspicion of pest incidence.

For export seed companies physical (actual) inspections by MoA staff are important to ensure the seed lots are free of quarantine pests and potential seedborne diseases. Now the vegetable seed export companies support the phyto inspectors to visit their farms and undertake the inspections. But the companies must send the samples outside of Ethiopia to produce evidence that the product is free from quarantine pest (including ToBRFV). The Ethiopian authorities must use the results of the laboratory to give a phytosanitary certificate for the product. Seed companies want to have inspectors to have more knowledge of the pests and diseases specific to their crops and issue reliable certificates. In addition, they want a functional laboratory that can do real-time PCR testing of ToBRFV.

3.5. EXTERNAL SUPPORT FOR SEED REGULATORY SERVICES

In addition to government organisations, there are also several development partners and NGOs that support seed sector development in Ethiopia. The Agricultural Transformation Agency (ATA) and Agricultural Growth Programme (as managed by the World Bank) have funding available to support the seed regulatory system. In specific, ATA has been instrumental in facilitating seed quality assurance standards. And in some cases, ATA and AGP provided financial support for the operational costs of field inspections, variety evaluations and convenings of the NVRC. Recently, AGP has purchased equipment for the seed testing laboratories. These included polymerase chain reaction (PCR) machines for identification of varieties. However, no laboratory has yet been trained on how to use the machines. These recent investments in hardware should cover a large share of the requirements of seed laboratories. In addition, ATA is also leading the drafting of the regulation for Plant Breeders' Right.

The Alliance for a Green Revolution in Africa (AGRA) implemented a project focusing on seed quality assurance and plant variety protection. As part of the support activity AGRA donated five cars to alleviate the mobility constraints of the seed inspectors. They also introduced a digital seed certification system, including software for tracking and tracing of seed inspectors and laboratory testing activities. In addition, they supported the capacity of the Ministry to implement plant variety protection, and organized an experience-sharing tour to the Netherlands.

Supporting Sustainable Agricultural Productivity in Ethiopia (SSAP), a GIZ project, recently purchased some laboratory equipment including growth chambers. In addition, an MoU has been signed to establish a relationship between the Ethiopian and German seed regulatory services. Yet an actual plan of action is to be developed. The first phase of SSAP ended in 2020, but a second phase started in 2021 (and will run till 2024). Proposed intervention areas for the second phase are: quality standards and laboratory procedures for phytosanitation; harmonization with international seed quality standards; variety release and registration; and plant variety protection.

ISSD Ethiopia also provided support to seed regulatory services in the country. The programme was influential in the establishment of the independent authorities in Amhara, Oromia and SNNPR, and has been training regulatory services' staff at both federal and regional levels. Modest investments were made in the facilities of the authorities, for example in purchasing moisture meters, weighing balances and GPS. ISSD Ethiopia also contributed to the regulatory and institutional reforms and the development of seed sector strategies that in part aim to improve the long-term performance of the regulatory system of the country.

An overarching objective would be to support the establishment of an independent seed regulatory authority. Main advantages of such an authority are:

- For the staff involved in the seed regulatory services it will first and foremost provide recognition for their work; through a more dedicated institutional environment that has professional services at the heart of it. In addition, recruitment of qualified staff will be made easier as Authorities can have higher salary scales than the Ministry.
- Another advantage of the legal entity of an authority is that an authority can generate revenue for the services provided. As such the fees for the field inspections, seed tests and variety trials can flow back into the organization, and hence be reinvested in equipment, staff training and/or other staff incentives.
- More efficient services, especially those related to variety release, breeders' right and phytosanitary services, can attract more (domestic and international) companies to invest in Ethiopia. Now poor trial management, high cost for the trials and absence of breeders' right protection are discouraging companies to invest.

4. CONCLUSIONS AND SWOT ANALYSES

4.1. PLANT TISSUE CULTURE

Main Conclusions

- A number of government and semi-government plant tissue laboratories have been established in the past years. Especially Bahir Dar, Dessie and Mekelle have a capacity of >40 million plantlets per year. Main limiting factor is the space for transplanting, rooting and hardening.
- Demand for plantlets mainly came from public sector projects, i.e. sugarcane plantations; and development projects (e.g. banana and potato). There are a few smaller private initiatives like Waginos that work on ornamentals for the domestic market. Demand from the private sector is limited due to the relative absence of larger commercial farmers in the potato, banana and pineapple sectors.
- Exports of plantlets (especially lilies) took place in the past by a Dutch plant tissue lab, but the company ceased operations in 2016 due to slow and expensive imports of raw materials and the political unrest at the time.
- Many universities have included biotechnology and plant tissue culture in their BSc and MSc-curricula. There are many students that leave university with the required expertise to support the industry.

<p>STRENGTHS</p> <p>Well educated graduates (BSc/MSc level)</p> <p>Large public sugarcane plantations</p> <p>A number of professional (semi/ government) companies with sufficient capacity</p>	<p>WEAKNESSES</p> <p>Limited private sector demand</p> <p>Difficult and expensive import process (for consumables)</p> <p>Limited availability of nurseries that can do the rooting and hardening of young plants</p>
<p>OPPORTUNITIES</p> <p>Developing a potato multiplication system of at least two years (G0 → G2) from mini-tubers</p> <p>Matchmaking between Arba Minch banana and pineapple farmers and the plant tissue labs in Amhara</p>	<p>THREATS</p> <p>Lack of inputs / consumables at semi-government plant tissue labs</p> <p>Staff turnover at semi-government plant tissue labs</p> <p>High overheads and low output of semi-government plant tissue labs (leading to financial losses)</p>

4.2. VEGETABLE SEED PRODUCTION AND SALES

Main Conclusions

- Total vegetable seed imports in 2020 amounted to more than EUR 12 million, about half of which came from the Netherlands. This confirms a general upward trend from roughly EUR 1 million imports in 2005, to EUR 3 million in 2010 and EUR 6 million in 2016. The positive trend is influenced by trainings and demonstrations organized by development projects like Horti-LIFE and Fair Planet, and a professional young plant industry.
- Further growth is constrained by the lack of forex availability. Seed companies indicate that they could sell twice the amount traded in 2020 if sufficient forex had been available. Even though there is a directive in place that favours imports of agricultural inputs, this directive is not being implemented by the commercial banks.
- Another issue that foreign companies face is the expensive and slow variety release process, both for popular crops (tomato, onion, pepper and cabbage) and smaller crops (e.g. lettuce, broccoli and cucumber). The Ministry of Agriculture is aware of these issues and wants to explore a more effective variety release system.
- Vegetable seed production for export is confined to two multinational companies. Together they are expected to export EUR 2 million in seed value in 2021. These companies also work with outgrower companies for lower value seeds, enhancing employment and investments.
- Main challenges for them include the continuous change in (the enforcement of) import requirements for parental lines, and complying to the conditions of an export phytosanitary certificate for tomato brown rugose fruit virus (ToBRFV). For the latter it would help them if professional laboratory capacity is available that can undertake PCR testing of the virus.

<p>STRENGTHS</p> <p>More and more skilled commercial vegetable farmers</p> <p>Many vegetable varieties registered, of key crops: tomato, pepper, onion and cabbage</p> <p>Two major multinational breeding companies started vegetable seed production (for exports)</p>	<p>WEAKNESSES</p> <p>Lack of forex for importing vegetable seeds</p> <p>Expensive and tedious variety release process leading to low number of registered varieties of 'smaller crops' like carrot, cucumber, lettuce and papaya</p> <p>No testing capacity available in the country for ToBRFV</p>
<p>OPPORTUNITIES</p> <p>Further expansion of seed sales (once forex issues are addressed)</p> <p>Introduction of new varieties of all vegetable crops, including smaller ones</p> <p>Developing a more effective variety release and phyto system with the Ministry of Agriculture</p>	<p>THREATS</p> <p>The macro-economic situation of the country (war, limited exports, forex crunch)</p> <p>Limited attention for regulatory aspects and their implementation within the Ministry of Agriculture</p>

4.3. VEGETABLE SEEDLING PRODUCTION

Main Conclusions

- Ethiopia has four large and professional young plant raisers with a capacity of 50 million+.
- Prices for seedlings are relatively high; with farmers paying ETB 4.2-4.6 per tomato seedling (EUR 0.08-0.09 per seedling). Much of this price consists of the seed itself (ETB 3.0-3.5 per seed) and the rest is used for inputs and labour.
- The capacity of the five nurseries is currently estimated at around 300 million seedlings per year, with a current production of 200 million seedlings. Out of this the vast majority of more than 80% of the seedlings is tomato and hot pepper.
- 200 million seedlings translates to 8,400 ha of tomato and pepper production. Given the fact that the overall acreage of tomato and pepper is around 35,000 ha, with 50% used for hybrids and the other 50% for OPVs, there seems to be room to double the capacity to 625 million seedlings.
- Main challenges for the nurseries are access to seed (and hence forex). Often the nurseries operate as distributors for the seed companies and as such they also face issues with the registration of new varieties.
- Nursery companies indicate that there is still room for growth in other vegetable producing areas like Dire Dawa and Raya Valley (once that area is stable again). In addition, there are opportunities for Dutch companies that are involved in sales of semi-automatic equipment for nurseries (e.g. germination chambers, automatic seeding machines).

<p>STRENGTHS</p> <p>Professional young plant industry especially for vegetables with substantial capacity</p> <p>Some nursery companies are part of bigger horticulture export companies, able to access forex</p> <p>Farmers are well accustomed to buying seedlings</p>	<p>WEAKNESSES</p> <p>Most nurseries are situated in the central Rift Valley (Debre Zeyt, Koka, Ziway)</p> <p>Low availability of seed (due to forex issues)</p>
<p>OPPORTUNITIES</p> <p>Introduction of new nursery equipment (semi-automatic, Africa proof)</p> <p>Expansion of nurseries outside of the Central Rift Valley to be closer to customers</p> <p>Combination of demonstrations and field days at nursery locations (e.g. of new varieties)</p>	<p>THREATS</p> <p>Strong fluctuation in prices can discourage farmers to buy seedlings</p> <p>Lack of competition (a few nurseries control the market)</p>

4.4. SEED POTATOES, MINI TUBERS AND TRUE POTATO SEED

Main Conclusions

- Ethiopia is one of the biggest producers of potato in sub-Saharan Africa with more than 900 thousand tons produced per year. Yields are low at around 13 t/ha, with major disease problems present (phytophthora and ralstonia). In general, seed potato availability is low and researchers estimate that farmers on average re-use their own potatoes for 5-8 seasons.
- Clean production of mini tubers in plant tissue laboratories is showing potential for seed potato production. Calculations show that two cycles (G1 and G2) multiplication are needed to have a profitable business case. In terms of regulations this is relatively straightforward as already a number of domestic and international varieties have been released (e.g. Gudene).
- A number of companies in the Netherlands has developed diploid and haploid hybrid potato varieties that can be grown from seed. True potato seed (TPS) varieties increasingly show good yields and disease resistance in other African countries. Also, given the fact that Ethiopia doesn't allow for imports of seed potatoes, true potato seed can be a good opportunity.
- However, no variety release protocols have been developed for TPS yet. In Kenya protocols have been developed and Ethiopia could learn from this.
- Other issues with respect to seed potato production include: limited inspection capacity (both in the field and in the lab) for seed potato producers, and limited greenhouse capacity to grow G1 seed potatoes (first multiplication step).

<p>STRENGTHS</p> <p>Climatic conditions (due to altitude variations) are good for seed potato production</p> <p>A number of cooperatives and companies that have specialized in seed potato for some time</p>	<p>WEAKNESSES</p> <p>High disease pressure in all potato growing areas</p> <p>Limited availability of screen houses and storage facilities</p> <p>Limited number of varieties registered (that are high yielding with high levels of disease resistance)</p>
<p>OPPORTUNITIES</p> <p>Multiplication through mini tubers and two cycles of production (G1 and G2)</p> <p>TPS introduction and sales through professional young plant companies</p> <p>Collaboration with Dutch companies and knowledge institutes (incl. WUR and NAK)</p>	<p>THREATS</p> <p>Underdeveloped PVP system with no attention for potato (yet)</p> <p>No well-adapted new varieties with high disease resistance coming out of the public breeding system (EIAR)</p>

4.5. SOFT FRUIT

Main Conclusions

- There are 5 larger strawberry farms active in Debre Zeyt, Holetta, Koka and Sululta. They have gradually increased exports from EUR 1.2 million in 2011 to EUR 2.4 million in 2016 to EUR 5.0 million in 2020; basically doubling exports every five years. Total production acreage is estimated at around 30 ha intensive production (both for domestic and export market).
- Production conditions in Ethiopia are good with good water quality, high light intensity and cooler night temperatures. Ethiopian strawberries are well appreciated by the market because of their colour and sweetness (brix levels).
- Both export and domestic prices are good, with export prices at around USD 4 per kg (FOB, excluding air freight). The total combined import value of strawberries in Saudi Arabia, UAE and Qatar is close to USD 100 million, giving Ethiopia a market share of 5%.
- Companies would like to explore other soft fruit as well, in particular raspberries and blue berries. Currently they have not managed to produce these crops consistently with high quality.
- The Netherlands has a lot to offer in terms of propagation material and equipment (including a raised gutter system). Already quite a number of soft fruit projects have been developed in Eastern Europe and the former USSR republics (e.g. Ukraine and Uzbekistan). For the Ethiopian climate evergreen ('doordragende') varieties are recommended that don't require a colder period and can continuously produce for 10-12 months. For Dutch soft fruit companies plant variety protection is important, as plants can be easily multiplied.

<p>STRENGTHS</p> <p>Excellent growing conditions in terms climate and water availability</p> <p>Good logistics system with Ethiopian airlines and most farms relatively close to the airport; air freight prices are lower than neighbouring countries</p>	<p>WEAKNESSES</p> <p>Land availability and political tension in main production areas</p>
<p>OPPORTUNITIES</p> <p>Further expansion of acreage, market: especially to the Middle East but also African export destinations</p> <p>Introducing new varieties of strawberry, but also raspberry and blue berry</p> <p>Introducing new production systems with raised gutters</p>	<p>THREATS</p> <p>Underdeveloped PVP system with no attention for soft fruits (yet), can deter introduction of new varieties in the future</p>

4.6. ORNAMENTAL CUTTINGS FOR EXPORT

Main Conclusions

- Almost all big international cutting companies are present in Ethiopia. Currently there is around 120 ha of greenhouse cutting cultivation in the country, with another 20 ha expansion planned for the next two years. Main cuttings produced are: Pelargonium, Chrysanthemum and Poinsettia, and Aster, Dipladenia, Lavandula and Osteospermum.
- The sector is doing well, and exported around EUR 26 million in 2020. Growth has been modest between 2012 and 2020, with 2012 already exporting EUR 22 million. A number of companies are expanding their operations and one take-over took place in 2021. In addition, the new Kunzila horticulture cluster near Bahir Bar also hosts a cutting company.
- Companies in the sector generally appreciate the climate and water availability in Ethiopia, which provides good production conditions year-round, especially in the Central Rift Valley (i.e. the Koka Cuttings Cluster) and Upper Awash. In addition, there is the opportunity for installing geothermal energy for heating the greenhouses in the cooler season (increasing night temperatures). Ethiopia is praised for its good logistics and airfreight prices, as well as low levels of corruption (e.g. compared to Tanzania and Uganda).
- Main challenges faced by companies relate to phytosanitary services, land availability (especially in Oromia) and tax-free imports. The enforcement of EU phytosanitary regulations with respect to Xylella almost stopped exports of cuttings in February 2021. This is by far the biggest regulatory issue for the cutting companies, where it is important that Ethiopia moves quickly to the list of countries that are free of Xylella.

<p>STRENGTHS</p> <p>Excellent growing conditions in terms of climate and water availability, as well as the availability of geothermal energy</p> <p>Good logistics system with Ethiopian airlines and most farms relatively close to the airport</p>	<p>WEAKNESSES</p> <p>Phytosanitary system that is reactive with high staff turnover</p> <p>Land availability and political tension in main production areas</p>
<p>OPPORTUNITIES</p> <p>Further expansion of existing companies</p> <p>More clarity on tax free imports and updating of list of items that can be imported tax free</p> <p>Work with MoA on phytosanitary capacity and PCR testing</p>	<p>THREATS</p> <p>Stricter EU phytosanitary regulations (beyond Xylella)</p>

4.7. GOVERNMENT REGULATORY SERVICES

Main Conclusions

Given the substantial number of other projects and activities, it is important to be strategic about what additional activities the Netherlands can support, also looking at the specific added value of Dutch government organisations like NVWA and Naktuinbouw, as well as the specific needs of the Ethiopian government. This was further discussed during a high-level mission of Ethiopian officials to the Netherlands in August 2021. Both this report and the outcomes of the mission highlight the importance of the private sector to further expand the availability and access to new varieties for farmers, as well as stimulate exports.

As such, a major objective of the government should be to ensure the private sector, especially the one active in vegetables, potato and fruit, is enabled to invest and grow further. Given the current political situation in the country it is unlikely that many more new investors enter the country. As such the government should focus on ensuring that the existing companies sustain and expand their activities. In line with this, the government could help improve the procedures for imports and exports of plant propagation material in an efficient way. As part of this the following detailed activities are proposed.

- Support for the Ministry's capacity to implement seed phytosanitary services, in particular those related to exports of planting material and cuttings, as well as the introduction of e-phyto.
- Support for restructuring the responsibilities, organisation and implementation of the variety release system; with special attention for potato, vegetable and fruit varieties.
- Support the overall institutional framework and coordination mechanisms between the seed regulatory services and between development partners and projects.
- Revitalize the dormant Ethio-Netherlands Seed Committee that brings together the most important public and private sector stakeholders, especially involved in vegetable seed production and sales, seed potato production and true potato seed. It will be important to frequently organize discussions between the government and the private sector to jointly support the growth of the sector.

ANNEX 1: LIST OF INTERVIEWS

Name	Position	Organisation	Sector
1. Abebe Chindi	Crops Director	Holetta ARC – EIAR	Potato
2. Amare Gebeyehu	Country representative	Rijk Zwaan	Vegetable seed
3. Andrea Ruediger	Project coordinator	GIZ-SSAP	Seed sector
4. Ben Depraetere	General Manager	Nunhems-BASF	Vegetable seed
5. Benjamin Goepferich	Regional Director	Dumen Orange	Cuttings
Yordanos Jemal	General Manager	Dumen Orange	Cuttings
6. Bisrat Ermias	Project Manager	AGRA	PVP
7. Charles Miller	Commercial Director	Solynta	Potato seed
8. Doron Yonay	Regional Manager	Hazera/ET Seed	Vegetable seed
9. Fisseha Teshome	Director	Ministry of Agriculture	PVR
10. Frederique Vogel	General Manager	Holland Rosetta	Soft fruit
11. Gerrit Holtland	Programme Leader	Horti-LIFE	Horticulture
12. Girma Bekele	Director General	Ministry of Agriculture	Regulatory dept.
13. Hassan	General Manager	Dessie Tissue Culture	Plant tissue culture
14. Issayas Mengistu	Farm Manager	ET VegFru	Vegetable seedlings
15. Jagdish Mahajan	General Manager	Joytech	Vegetable seedlings
16. Jan van der Haar	General Manager	Solagrow	Seed potato
17. Klaas Nieuwold	General Manager	Flevo Plants	Soft Fruit
18. Ronald Vijverberg	General Manager	Florensis	Cuttings
19. Shimels Getachew	Technical Manager	Enza/GAWT	Vegetable seed
20. Shoshan Haran	President / Founder	Fair Planet	Seed sector
20. Vincent van Benthem	Board Member	Fair Planet	Seed sector
21. Tewodros Zewdie	Secretary General	EHPEA	Horticulture sector
22. Wout van Koppen	General Manager	Zuqualla Horti	Soft fruit
23. Yoram Perets	General Manager	Gilboa	Fruit seedlings

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