

Understanding coffee farming practices and prospects in Yemen

A case study from Bani Matar

Arzaq Al-Najjar, Youri Dijkxhoorn, Rehab Zubiry, Ruerd Ruben



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Yemen faces a multitude of conflict-related and structural challenges, as a result, the agricultural productivity has been low. Coffee has been an important subsector and used to be an important source of income for farmers but nowadays coffee hardly generates a profit. Farmers are expanding qat production due to increasing consumer demand and better profits. An expansion of qat production also puts pressure on the scarce water supply in the country. This study provides insight into how coffee is grown and traded and how the sector can be supported for sustainable development and how it can be more attractive to grow coffee instead of qat.

Jemen wordt geconfronteerd met een groot aantal conflictgerelateerde en structurele problemen. In de landbouw is de productiviteit laag. Koffie is van oudsher een belangrijke subsector geweest en zorgde vroeger voor inkomsten voor boeren, maar tegenwoordig maken de boeren nauwelijks nog winst met de koffieteelt. Daarentegen breiden de boeren de productie van qat uit vanwege de toenemende consumentenvraag en de goede winsten voor de boeren. De productie van qat legt ook een druk op de schaarse watervoorraad in het land. Deze studie geeft inzicht in de manier waarop koffie wordt verbouwd en verhandeld in de Jemenitische koffiesector. Ook worden aanbevelingen gedaan over hoe de koffiesector kan worden ondersteund met het oog op duurzame ontwikkeling.

Key words: Coffee, Yemen, value chain, Bani Matar, qat

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Preface

Coffee production has been an essential part of Yemen's cultural and economic identity for centuries. Yemen is widely regarded as the birthplace of coffee, and the country's coffee industry has played a significant role in shaping global coffee culture.

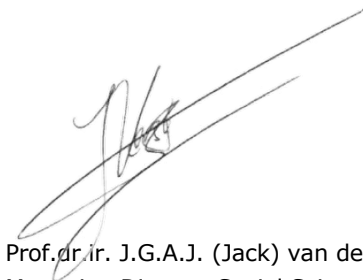
The importance of coffee production in Yemen cannot be overstated. Coffee has been a critical source of income for Yemeni farmers, who have relied on coffee cultivation to support their families for generations. Yemen's coffee beans are renowned for their unique flavour and aroma, which have earned the country a reputation as a top producer of high-quality, specialty coffee. Beyond its economic significance, coffee has also played a pivotal role in Yemen's social and cultural history.

Despite its rich history and cultural importance, Yemen's coffee industry has faced numerous challenges in recent years. Political instability, economic hardship, and environmental factors have all contributed to a decline in coffee production and a loss of income for Yemeni farmers. In addition, farmers are expanding qat production due to increasing consumer demand and good profits for farmers. Expansion of qat production also puts pressure on the already scarce water supply in the country.


Nevertheless, Yemen's coffee industry remains a source of pride and resilience for the country and its people. As the world becomes increasingly aware of the value of sustainable and high-quality coffee production, Yemen's unique coffee beans and centuries-old cultivation techniques are once again gaining recognition and appreciation on the global market.

In this study, we will explore the rich history, cultural significance, and economic importance of coffee production in Yemen, while also examining the challenges and opportunities facing the industry today. Through interviews with farmers and traders, we will gain a deeper understanding of the complex and fascinating world of Yemeni coffee and the people who produce it. It also provides recommendations on how the coffee sector can be supported for sustainable development and to be a more sustainable alternative compared to qat production.

This study would not have been possible without the financial support of the Food & Nutrition Security (FNS) Support Facility. We are particularly grateful to Jan-Pieter Ohler from the Embassy of the Kingdom of the Netherlands to Yemen, for his support during the study. We want to thank all enumerators that collected data among farmers and traders. We would also like to thank all respondents for their willingness to participate in the survey. Finally, we want to thank Abdulrahman Mohammed Al-Emad (Mocha Valley capacity building officer) and Aqdar Abdullah Alnajjar (Mocha Valley finance officer) for their support in training the enumerators and supervising the field work.



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Summary

This study provides insight into how coffee in relation to other crops is grown and traded by actors in the Yemeni coffee sector. It also lists recommendations on how the coffee sector can be supported for sustainable development. Coffee production used to play an important role in local livelihoods but nowadays hardly contributes to the household income. This is mainly a result of the expansion of qat production, because farmers favour qat production over coffee production due to the limited investment needed compared to coffee. This qat production also puts serious pressure on the scarce water supply in the country, thereby also stressing coffee production.

The study focused on the Bani Matar region, which was selected for its rich tradition in coffee cultivation. This region was known as one of the best Yemeni coffee regions with a good international reputation. The study shows that the practices of coffee farmers in Bani Matar are of the same low level of farm practices as in other coffee production areas in Yemen. Our data shows that most coffee farmers in Bani Matar realize a negative income from coffee cultivation, only one-third break even or make a small profit from coffee cultivation.

Bani Matar represents the same issues as other Yemeni coffee areas in terms of the potential to produce good quality coffee but lacks essential technical and financial support to capture current (international) market opportunities. Adequate training in farm management by the government and development organisations is needed and could increase the current coffee practices significantly resulting in higher yields and better quality.

The current bargaining position of coffee farmers in Bani Matar is restricted due to limited commercial organisation and non-transparent pricing procedures. Opportunities for improving the conditions of access to markets and reinforcing the consistency of income from coffee for rural households can be based on stronger linkages with reliable market outlets, long-term engagement in contractual deliveries and eventually the development of recognised origin statements for coffee from particular regions.

The current situation of women and their important role in the coffee sector can be mobilised as a vehicle for strengthening its impact for more empowerment of women's roles in the coffee sector. This can only be expected when the governance and ownership over coffee transactions also recognise the vital role of women in upstream activities. Women's engagement in savings associations can likely provide suitable incentives in this respect.

Finally, in the longer term, opportunities for improving coffee tree varieties may become interesting, especially if international market conditions are met, based on quality considerations or status of origin recognition. This requires contractual arrangements between producers and traders based on consistent quality management and traceability of supply chain operations.

The research is based on a literature review of available material on the Yemeni coffee sector including reports and findings from prior assessments. In addition, enumerators did interviews with small and medium sized coffee farmers in Bani Matar and with (international) traders. By using both qualitative and quantitative approaches, the study offers a critical review of the current status of coffee farming and trading in the area.

1 Introduction

1.1 Background

Agriculture has been the lifeblood of the Yemeni economy since the early ages of the Yemeni civilisation and agriculture provides an income for almost 37% of the population in Yemen.¹ Currently, this sector faces many challenges. The major challenges are low production, scarcity of natural resources (especially water and soil nutrients), lack of infrastructure, insufficient supply of inputs. Furthermore, it suffers from the loss of food and cash crops lands due to qat expansion and urbanisation.

An important subsector is the coffee sector. Yemen holds a special place in coffee history. While the coffee plant, *Coffea Arabica*, was indigenous to Ethiopia, the production and drinking of the brewed beverage started in Yemen, around 1450. During the next 250 years, Yemen monopolised coffee production as demand for the beverage spread abroad. Yemen's production monopoly ended in the first half of the eighteenth century when other countries started cultivating coffee at scale. By 1840 Yemen produced just 2% to 3% of the global coffee supply and today Yemen produces less than 1% (Topik, 2004).

The results of this study aim to support the future development of the Yemeni coffee sector and will provide guidelines for improving prospects for coffee production in Yemen. The study has been conducted by Mocha Valley, a local consultancy company in Yemen, and Wageningen Economic Research, part of Wageningen University and Research (WUR) in the Netherlands under the supervision of the Netherlands Embassy in Yemen.

1.2 Objectives

This study is to provide greater insight into how coffee and other crops can sustainably be grown by smallholders in Yemen to provide a sufficient income. Therefore, this study combines expertise in the coffee sector from Yemen and the Netherlands to understand and to provide recommendations for further development of the entire coffee sector in Yemen. This may lead to economic growth and help establish linkages to high end international markets which will be a building block for future opportunities for Yemeni coffee producers. The results of this study are intended to inform strategic thinking on how to design future development in the agricultural, socio-economic and institutional aspects of the coffee sector in Yemen.

¹ Based on information from a FAO factsheet on Yemen: <https://www.fao.org/family-farming/detail/ar/c/880742/>

2 Methodology

2.1 Approach

The study is based on a mixed-method approach for data collection and analysis. The team conducted a literature review of available material on the Yemeni coffee sector including reports and findings from prior assessments. Enumerators realised field visits in July 2022 in Bani Matar and conducted interviews with targeted large-scale coffee farmers and traders in Sana'a. By using both qualitative and quantitative findings, the study offers a critical review of the current status of coffee farming and trading in the selected area. The Bani Matar region has been selected for its rich tradition in coffee cultivation.

2.1.1 Desk study

In the last two decades, several reports have been published. These reports have been reviewed to summarise the collated information to increase the overall effectiveness of the study and to make sure that we built upon the existing knowledge.

2.1.2 Field study: farmer and trader survey

Wageningen Economic Research and Mocha Valley developed a survey format that was used to study the current farming practices of coffee farmers. Before we started the survey, we conducted several test interviews. The survey was tested and implemented by the Mocha Valley team. A training session for 6 enumerators was organised to train them on data collection and to make them familiar with the survey.

After testing the survey, we started the data collection among coffee farmers. The data collection was done by 6 trained enumerators. The data collection took place in June and July 2022. In total 100 farmers were interviewed. Next to the data collection amongst coffee farmers in the selected study region, we conducted a limited number of in-depth interviews with other value chain actors. For example, 9 Yemeni coffee traders were interviewed that are involved in trading with the coffee farmers in the study region. The team also conducted 2 interviews with international importers of (specialty) coffee.

The data was analysed using SPSS and Excel.

2.1.3 Bani Matar as study site

The Bani Matar was famously known as one of the best Yemeni coffee regions with a good international reputation. The coffee produced in Bani Matar is all *arabica*. It is a high-altitude region, with exceptionally hard, dense beans. The flavour profile is 'distinguished by their high sweetness level, citrusy and fruity flavours, with a slightly rose taste', according to Mocha Valley coffee experts. Bani Matar represents the issues of many other Yemeni coffee areas in terms of the potential to produce good quality coffee but lacks essential technical and financial support to capture current market opportunities.

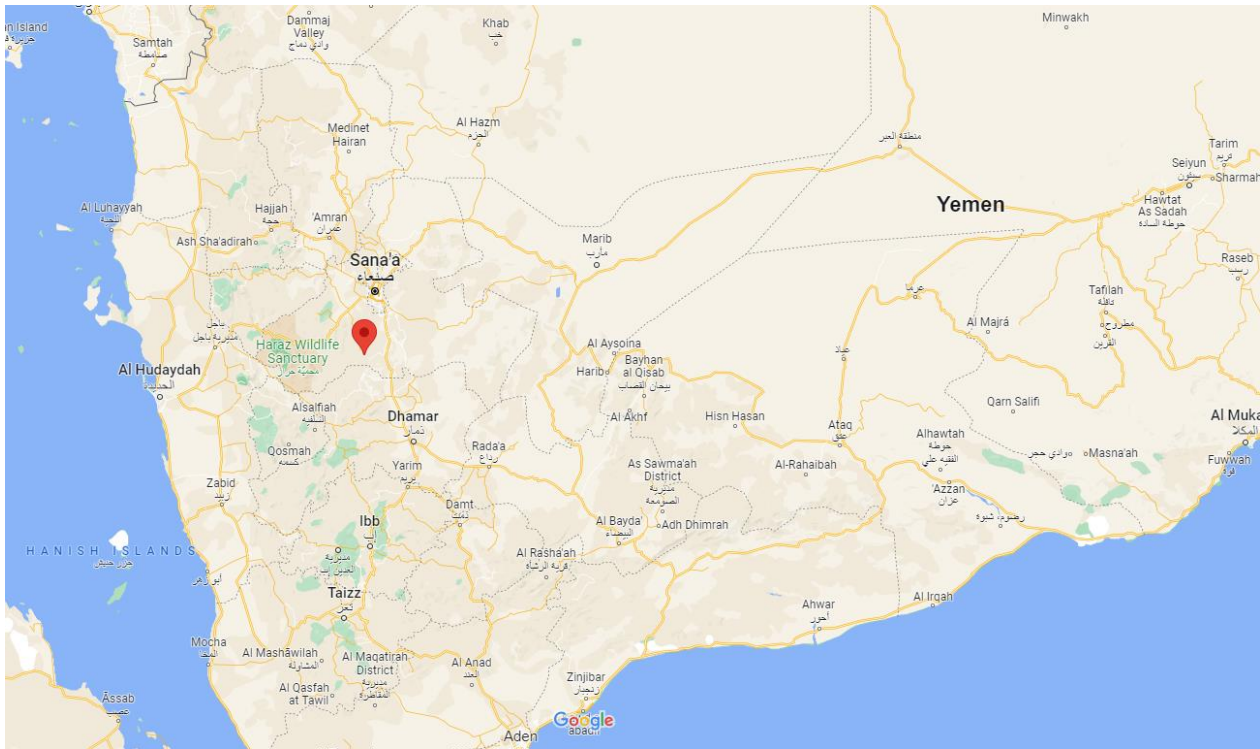


Figure 2.1 Map of Yemen indicating Bani Matar
 Source: Google maps, visited in 2023.

2.2 Limitations

Bani Matar is considered to be a conservative area in terms of gender equality. For example interviewing women for research purposes can be problematic. Therefore we worked with trained female enumerators to do one-on-one interviews with female farmers. In addition, receiving accurate information from farmers (e.g. regarding production costs) can be problematic. In the past, international organisations have collected information on coffee, but failed to provide a good follow-up. For that reason, some farmers lost their confidence and were unwilling to cooperate with the enumerators during the survey. Also, some farmers deliberately gave inaccurate information intending to mislead the survey results. This happened due to negative recent experiences with non-governmental organisations that were asking for detailed information on coffee revenues and this was used by local authorities for Islamic taxation purposes (*Al Zakat*). We have identified and excluded these outliers.

We applied a snowball sampling strategy. The research team selected an initial group of individual farmers. Then, these farmers indicated other potential farmers with similar characteristics to take part in the study. This non-random selection of participants might have led to a bias in the sample used for this study. However, there is no national and regional data available that enables us to control for this possible bias. Finally, the road to the coffee areas in Bani Matar made it difficult for the survey team to move between regions, especially during rainy days.

Most attention is given to direct coffee production and marketing, and therefore information on other income-generating activities is partial and no full household income calculations were made. For example, recent work by Waarts and Kiewisch (2021) on the living income for cocoa farmers in West Africa is providing important insights on how to enable a farming family to realise a decent standard of living (Waarts & Kiewisch, 2021). Therefore we are only able to identify general relationships between production, trade and revenues from coffee activities.

3 The coffee sector in Yemen

3.1 Overview of the coffee sector in Yemen

3.1.1 Coffee production: smallholders and low yields

The agri-food sector is considered to be a key source of livelihoods in Yemen as it is an important foundation of the Yemeni economy.² Over the past decades, agricultural productivity has been low because of insufficient availability of inputs, high post-harvest losses, inadequate marketing systems, low human resource capacity, and lack of infrastructure, across all of its subsectors, in addition to the multitude of conflict-related, emerging and structural challenges Yemen faces.

The agricultural systems in Yemen in the rainfed highlands are characterised by terraced agriculture for coffee, fruits, grains and qat, and extensive livestock production, and in the plains by irrigated horticulture and grains.

Coffee is an important cash crop in Yemen, where it is grown in 15 out of the country's 21 governorates. Coffee is grown (semi)commercially in Yemen, mostly by smallholder farmers. Since coffee is grown on steep terraces in Yemen, the average farm size is small. The average farm size per farmer is 0.29 hectares (with 394 coffee trees), and a production of 114 kg per farm (UNDP, 2022).

Table 3.1. shows the coffee area, produced coffee volume and the calculated yield per hectare for coffee production in Yemen. However, the data on the total production has been deeply ambiguous for the last fifteen years. FAO data shows increasing production whereas other sources report declining production. For example, ICO gives a decreasing production volume ranging from 5,100 to 12,000 tonnes (Greeney, 2022). Calculated yields give a more stable picture and are much lower compared to other coffee-producing countries such as Colombia (1 tonne per hectare) and Ethiopia (0.7 tonne per hectare). The key reasons for the low yield are (Al-Zaidi et al., 2016):

- Many of the coffee-growing areas are located at high altitudes, extremely steep slopes and deep valleys. This limits access to services such as roads, electricity and telephone.
- Current farmers have a low level of knowledge of modern coffee farming practices due to poor accessibility for the (few) agricultural extension workers, and the difficulty in delivering modern inputs or mechanisms that contribute to improving yields. As a result, the technical capacities of coffee farmers remain extremely poor across Yemen.
- Fragmentation of agricultural holdings is another important factor that reduces coffee yields, which increases production costs and decreases the overall crop yield due to the difficulty of using some modern inputs.

Table 3.1 Area harvested and production of green coffee beans in Yemen

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Area harvested (ha)	34,717	34,837	34,987	35,060	34,652	33,959	33,929	33,544	32,984	34,981	37,314
Production (tonnes)	19,029	19,275	19,828	19,984	20,059	19,257	18,945	18,767	18,642	20,812	22,383
Yield (tonne per ha)	0.55	0.55	0.57	0.57	0.58	0.57	0.56	0.56	0.57	0.59	0.60

Source: FAOSTAT 2022.

The recent conflict affected the coffee sector in different ways. First, the development came to a standstill due to the lack of support to the coffee sector and farmers, for example such as insurance programmes. Second, the conflict affected the economy negatively such as the inflation of the Yemeni Riyal (YR). Third,

² Based on information from a FAO factsheet on Yemen: <https://www.fao.org/family-farming/detail/ar/c/880742/>

the costs of production inputs increased, mainly caused by fuel costs that were approximately 6 times higher than before the conflict. Fourth, transportation became more difficult and costly due to the closure of many roads.

3.1.2 Genetic diversification

There have been many issues with determining the appropriate varieties and types of Yemeni coffee that can survive and match environmental conditions. In a recent research paper on Yemeni coffee genetic classification, conducted by Qima Coffee (see Montagnon et al., 2021), it was mentioned a new variety was introduced under the name 'New-Yemen'. Qima coffee is a Yemeni coffee trade company based in Yemen and the UK that introduced this variety to the country. 'New-Yemen' represents an opportunity for the sustainability of the Yemen coffee sector (Montagnon et al., 2021). This 'New-Yemen' variety is climate change resistant, according to the same research.

3.1.3 Gender

Examples of female ownership in the coffee subsector are currently very rare in Yemen. A recent report by UNDP (2022) gives some insight into the division of tasks in coffee farming between men and women. It appears that women play a significant role in maintaining coffee trees. However, they lack decision-making power concerning coffee production. Therefore, coffee is generally seen as a men's crop, and revenues from coffee sales generally go directly to the men of the household, even though the largest part of the labour is done by women (UNDP, 2022).

3.1.4 Qat production

Coffee trees are vulnerable to drought and farmers often replace coffee trees with qat. Despite being more drought tolerant than coffee, qat still requires large volumes of water to be productive. The qat water requirement ranges from 700 to 1,300 mm per year depending on local conditions (FAO, 2008; Hellegers et al., 2008; Ward & Gatter, 2000). For coffee, studies suggest that a minimum of 1,200 to 1,600 mm per annum is required (Wrigley, 1988). Qat is irrigated up to 12 times per year (McCracken, 2012). When rain-fed, the qat water requirement can drop as low as 400 to 500 mm per year (Atroosh & Al-Moayad, 2011). However, newly introduced qat varieties are becoming more productive and also need more water. Qat was estimated to consume about 37% of the available water for agriculture (McCracken, 2012).

The demand for qat has increased in the country. This increasing demand has resulted in a secure revenue for farmers and has increased the production of qat in the last decades. Any data on qat production is scarce, but in 2000, the World Bank estimated that qat accounted already for 30% of Yemen's economy. Since the war broke out in 2015, the production of qat is said to be increasing by 12% a year and consumed by 70% of the Yemeni people. Thus, qat has become the most important crop in the country's economy. The crop provides income for many Yemeni farmers during critical situations. This has serious consequences on the long-term health of the population, poverty, food and nutrition security.

This increase in demand for qat has resulted in a further expansion of the production area. In combination with these new varieties, this is putting further pressure on the scarce water sources of Yemen.

Table 3.2 Coffee and qat production compared

	Altitude	Water need per year	Temperature	Areas
Coffee	1,000 – 2,400	1,200 to 1,600 mm	19 c	Valleys and mountains
Qat	1,200 – 2,400	700 to 1,300 mm	15 – 20 c	Valleys and mountains

Source: FAO (2008); Ward & Gatter (2000); Wrigley (1988); Zahran et al., (2014).

3.1.5 Water scarcity

Yemen is categorised at an 'extreme risk' of water scarcity and is predicted to become the 16th most water stressed country by 2040, according to the World Resource Institute.³ This water scarcity is one of the most important factors affecting the quantity and quality of the coffee crop. Coffee trees need on average between 10 to 28 times watering per year, the frequency decreasing with the age of the tree in normal circumstances. But, climate change is also influencing the coffee sector. According to IFPRI, the local climate change impacts will affect some agricultural areas positively with a higher rate of agriculture GDP growth (Wiebelt et al., 2011). But the desert areas will have the biggest loss. As most of the coffee production areas are not in desert lands, climate change will likely help the growth of the coffee sector in the future. Also, the National Food Security Strategy encourages the use of more water-efficient crops, and investments to promote agricultural alternatives (Wiebelt et al., 2011).

3.2 The coffee value chain

3.2.1 Value chain map of Yemeni coffee

The coffee value chain map is presented in Figure 3.1. The international coffee sector is mainly divided into commercial and specialty. The share of specialty coffee remains small and differs per country. For example in France it was estimated at 2 to 3% of the total coffee market and is expected to grow⁴. In addition, in Yemen, the qeshr (the outer skin of the cherry beans) is the most essential product and is consumed as tea. This byproduct of coffee is not consumed in most other countries and makes the Yemeni coffee sector unique in this sense. In the following paragraphs, the different actors are described. Coffee is graded according to an international standardised method into various grades based on the number of defects and a taste profile. Class 1 coffee has no primary defect and is considered to be specialty coffee. Commercial coffee often contains a large number of defects per 350 grams of green coffee. This is often the result of poor practices at farm level. All these factors lead to commercial coffee of low quality with low market prices. The presented value chain map also applies to the coffee production in Bani Matar, but only for the commercial coffee since there are hardly any farmers in the Bani Matar area that are involved in specialty coffee production.

³ www.wri.org

⁴ <https://www.cafemag.fr/>

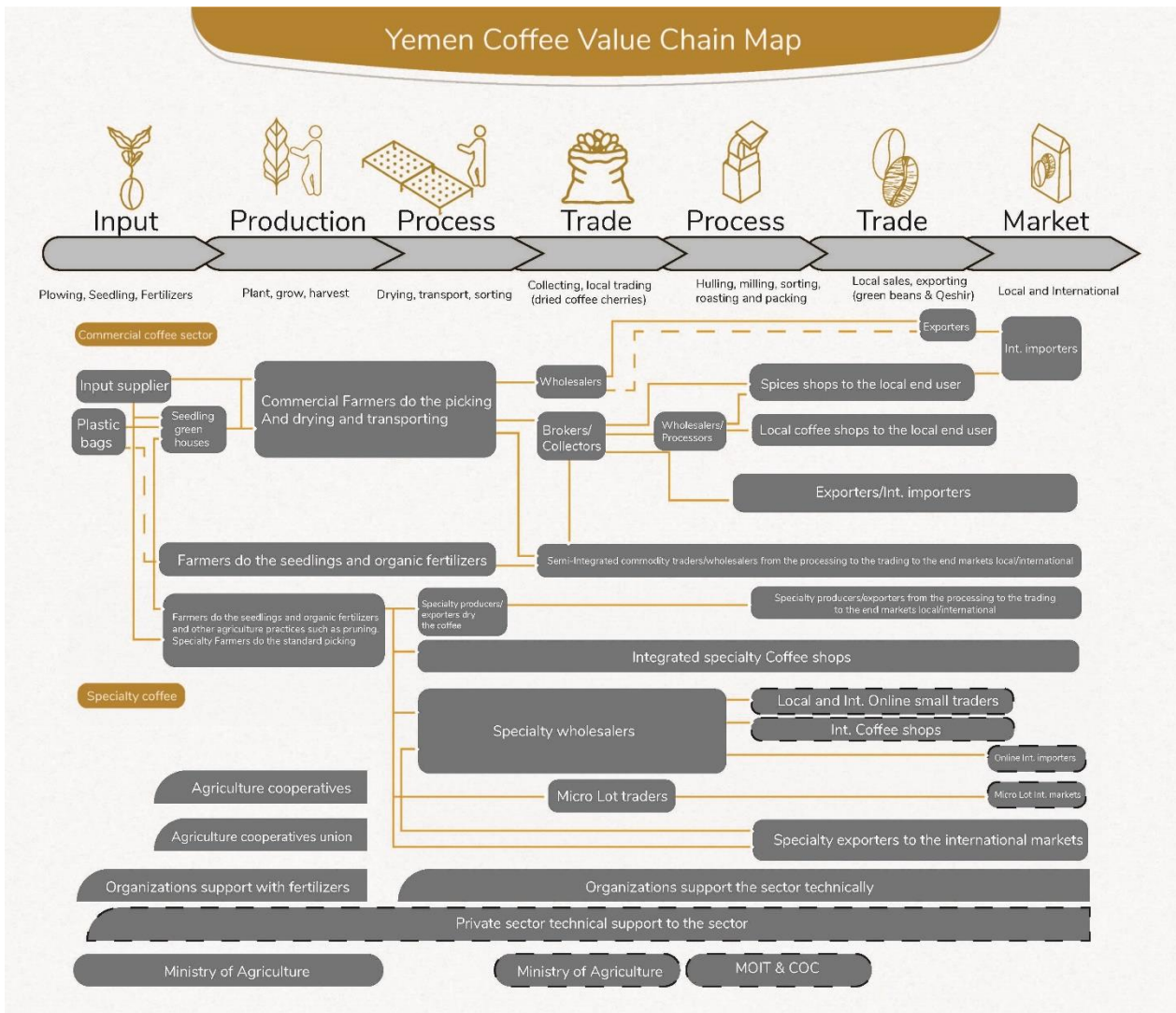


Figure 3.1 The Yemeni coffee value chain map
 Source: Mocha Valley (2022).

3.2.2 Input provision

The input stage in the Yemeni coffee market includes the providers of soil treatment equipment such as ploughing tools, pruning shears, tractors, seedlings, and organic and chemical fertilisers that are added to the lands before cultivating coffee. Nurseries are primarily located in the main coffee-producing areas and are supported by the Ministry of Agriculture, which has provided coffee plants at no charge for distribution to farmers. This step seems good and supportive for the farmer, but looking more closely it can be noticed that the coffee seedlings are collected from different regions. Without taking into account the divisional standards for separating each district and variety, this results in a misallocation of varieties between coffee-growing districts. This can cause negative impacts not only on the plant’s health, but also on the adaptation to the new growing environment. This has led to higher expenses and losses for the farmer over the last years, increases the risk of spreading sickness and pests throughout the country, and also negatively affects the genetic diversity of the coffee plants in Yemen. Variety confusion in a valley can destroy the capability of having a genetic base of coffee trees in Yemen.

Some NGOs and donors provide farmers with fertilisers, seedlings, pesticides, and provide training to align with good agricultural practice. The focus of most NGOs is on the specialty coffee value chain since it has the most opportunities in terms of added value and most of the actors are not aware of the international specialty coffee standards and required production methods. Besides that, marketing specialty coffee to the international market is considered challenging. Therefore, technical support is important to guide farmers.

The commercial coffee value chain does not have these challenges, since they are targeting the local and regional markets only.

3.2.3 The domestic market is small

Estimations indicate that about 15% of the production is consumed on the domestic market (Greeney, 2022; USAID, 2013). Yemeni people used to drink a lot of coffee, although, at the moment coffee is not the main drink anymore, due to several reasons:

- *The coffee quality*
The local coffee production can cover the domestic demand at low prices to accommodate the majority of people who can't distinguish good or bad coffee as the specialty coffee culture only appeared from 2010 and is considered too expensive.
- *Coffee prices versus income*
Speciality coffee has a very high price for local standards, preventing it from spreading among most groups of Yemeni society. So consumers prefer to buy coffee of low quality but at the most suitable price for their income.
- *Qeshr as the official drink for Yemenis rather than coffee*
Qeshr is a beverage made from coffee husk. Yemen is the only coffee-cultivating country that uses qeshr as a drink. Other coffee-cultivating countries use qeshr as a fertiliser, animal food, or waste. The importance of qeshr is explained in Box 3.1.
- *Tea is increasing as the greatest competitor*
Compared to coffee, tea is much easier to buy prepare, and to be found in any supermarket or shop or small groceries.

Box 1: Qeshr

In the coffee value chain, coffee beans have a byproduct, the coffee husk. From this husk they make a drink called qeshr. Yemenis drink qeshr for any occasion. They drink qeshr as a hot drink, which is prepared by boiling it with water with some spices added such as gingers, cardamom, and cloves. Yemenis prefer qeshr for its health benefits in addition to its availability in the local markets at low prices which helps it to be found in each house in Yemen in contrary to coffee. The markets value a beverage made from coffee husks, thereby, transforming what is elsewhere considered a byproduct into a product of value. Estimates from different sources indicate that approximately 11,000 tonnes of qeshr are exported to international markets, particularly the countries in the region. Qeshr prices are around half of what is paid for green coffee (USD 3.5 per kg). In some markets, coffee beans are considered almost a byproduct of qeshr. Qeshr from Bani Matar is the most preferred type among all Yemeni qeshr types.

The coffee culture among Yemeni people is spread more in the Northern areas of Yemen as it is cultivated in larger areas compared to the Southern areas. Although Southern areas cultivate coffee, they drink more tea than coffee or qeshr. They drink the tea with specially made concentrated milk, which might be a result of colonialism and the arrival of Indians, especially in the city of Aden and Yafi.

Northern areas cultivate coffee in larger areas and consider themselves as the source of coffee from ages ago. As they were important coffee and qeshr consumers they were considering quality standards. Bani Matar coffee and qeshr are the sweetest beans among other kinds. This originates from the nature of the land, and it is keeping its reputation from ages ago until now as the sweetest qeshr type ever. Therefore, people in Northern areas buying Matari qeshr always preferred it above other types and nearly they hardly even ask for other types.

Coffee is mostly sold at the farm gates and can pass through several traders before reaching the processing stations and exporters. Coffee is traditionally routed through intermediary traders to the domestic and export markets. Most production areas are now active with farmer associations, which negotiate prices with large traders. Collectors play a major role in the marketing process, buying coffee from farmers and bringing it to wholesalers, traders, and exporters. Some of the main wholesale markets are situated in Bajel, Hudaidah, Almansuriah, and Bait Alfaqeeh (UNDP, 2022). The traditional auction method in these markets is open and does not require a specific quantity to enter the market.

Consumers will find coffee on local markets or in spice shops next, or in supermarkets also in the spice sections. As mentioned previously, this can be a result of the common lack of awareness of the culture of coffee. Specialty coffee is difficult to find in Yemen but can only be found at special sales points or big coffee shops.

3.2.4 Export is mainly regional; specialty export is still limited

Yemen is considered to be the first country that commercialized coffee and exported it to the world. Although at present the export is limited, there remains a competitive advantage of Yemeni coffee based on its tradition, history, and unique flavour profile.

Some exporters mention that coffee exports from Yemen account for about 50% of the total production (USAID, 2013) and also that cheaper coffee is imported and exported as Yemeni coffee. This affects the reputation of the Yemeni coffee. The authentic high quality coffee from Yemen enjoys some of the highest export prices in the world. Among professional tasters, Yemeni coffee stands out as being among the best in the world. Protecting this tradition could become the primary tool to preserve its competitive advantage.

Interviews with international traders taught us that the demand for specialty coffee in the US and the EU is under pressure due to the current global economic situation. In addition, an interviewed European coffee trader states that the current quality being produced is too unreliable and the reputation of Yemen's coffee has suffered from inconsistencies in quality in recent years.

Yemen's largest export market is Saudi Arabia: in 2020 it accounted for more about 85% of the export volume of Yemeni coffee. Also, Japan and the US market are being served (both accounting for about 3.5% in 2020). The trade with European countries is neglectable (see Figure 3.2).

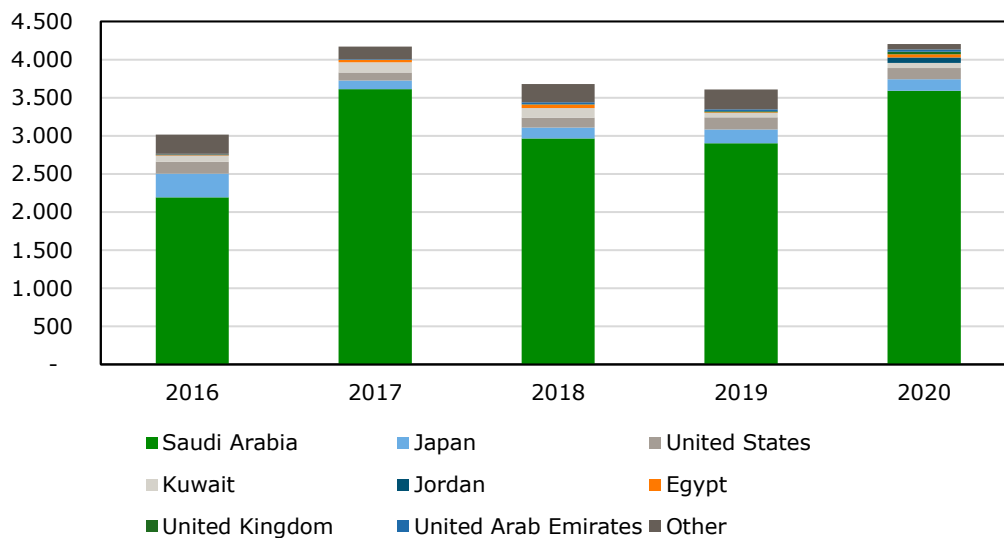


Figure 3.2 Import flows registered by partner countries 2006-2020 in 1,000 kg
Source: UNComtrade.

Processors and exporters

Most processors are based in Sana'a and some are located in other major cities. They often provide services such as hulling, cleaning and aggregating coffee lots. The exporter provides services like quality inspection, aggregating of coffee lots and some sort of international promotion and often takes care of the transportation.

Current incorrect and damaging post-harvest handling, transport and storage practices negatively affect the quality of the crop. This likely negatively affects the prices and reputation of Yemeni coffee.

Specialty coffee

The specialty coffee value chain is different from the conventional coffee value chain. According to the Specialty Coffee Association (SCA), specialty coffee is based on specific standards: grade samples must have zero category 1 defects and no more than five category 2 defects in 350 grams of green beans. Specialty coffee is graded above 80 points on a 100-point scale⁵, the so-called cupping rate. This high-quality level results from taking very intensive practices in each stage of the coffee value chain starting from the input stage to the final market and end-customer stage. Specialty coffee from Yemen is already exported to international markets, even though it is in small quantities. Specialty beans get a price premium compared to conventional beans, which increases with the cupping rate. On average the price of specialty green beans fetches a price premium of 25% for 83+ points rated coffee beans to almost 100% for 88+ points rated coffee beans compared to conventional green beans, delivered at the New York coffee auction.⁶ Also the prices that farmers get are higher and can be more than double for good quality graded coffee beans.

In the specialty coffee sector, farmers are very aware of the needed practices to produce high-quality coffee, starting with preparing the land with the required organic fertilisers and putting the plant seedlings from which they know the variety. During the growing process, most specialty farmers use organic fertilising from their own animals or from other farmers. Organic fertilisers suppliers are also present but are less common. Farmers do the supplementary irrigation from wells or other sources at specific times during the year, while they fully depend on rainwater to keep the coffee trees productive at a high level of quality and quantity.

The harvesting stage is considered to be very sensitive for controlling the coffee quality directly. Conventional coffee farmers prefer to pick cherries at different stages of maturity to save on labour costs. However, carefully picking only the red cherries can already contribute to a better cupping score. Therefore, for specialty coffee the picking process requires special attention. Also the bags should be made from suitable quality fabrics to prevent red cherries from being squashed or getting affected by the materials such as plastic bags or cans.

After picking, conventional coffee farmers transport coffee to the drying centres or places made for drying coffee. Specialty coffee companies use drying beds made from environmentally friendly nets that are mostly used for agricultural purposes. Specialty coffee companies do the drying and transporting processes themselves. They buy coffee from the farm gate as red cherries and they dry it in the drying centres. These drying facilities are located in the production area or the city. Specialty coffee companies train their team to do the processing or train the farmers in the area who are charged with cultivating the coffee. Some traders use technical support from private companies or NGOs or the government.

3.2.5 International donors

Appendix 1 gives an overview of some of the recent projects conducted in the Yemen coffee sector by various international donors. For example, the USAID's Economic Recovery and Livelihoods Program (ERLP) has been assembling hundreds of coffee farmers from different districts in the Ta'izz Governorate to demonstrate the techniques and requirements of coffee tasting, and to help them understand the critical elements that determine its value in high-end markets. The sessions are the first of their kind in Yemen, and they are led by one of the few people in the country to be certified as a Coffee Quality Grader by the Coffee Quality Institute.

Another initiative has been operating since September 2020 in which USAID has connected 300 coffee farmers in Ta'izz to new buyers. To ensure that high-grade Yemeni coffee makes it into international markets, USAID identifies potential foreign buyers. The team facilitated a sales agreement worth nearly USD 70,000 between a New York-based specialty coffee importer and local coffee processor Mokha Story for more than 3,000 kg of specialty coffee beans. USAID also helped secure a USD 75,000 deal for 10,000 kg of Yemeni coffee with Mokha Story Jeddah. In addition, companies in Germany and South Korea have confirmed their interest in purchasing coffee from USAID-supported farmers based on green coffee samples. These are important first steps to greater market access and increased sales.⁷

⁵ <https://sca.coffee/>

⁶ <https://www.transactionguide.coffee/en/home>

⁷ <https://www.usaid.gov/yemen/program-updates/jun-2021-unlocking-treasure-trove-of-yemeni-coffee>

3.2.6 Institutions in the coffee sector

Governmental policies

The regulatory and enabling environment is weak in Yemen, especially for the agricultural departments. The World Bank composite indicator of 'ease of doing business' has placed Yemen among the lowest rankings in 2022, which represents a discouraging environment for establishing or prosperous country.⁸ The governance structures are self-regulated and largely maintained by private-sector actors, with only minimum transparency and accountability regarding value chain functions.

The regulatory environment for coffee in Yemen is at a standstill, with some necessary policies and frameworks in place but not sufficiently functional to create an enabling environment for the farming community in general, and specifically for coffee producers (UNDP, 2022).

The Yemen Coffee Auctions

Different public and private coffee auctions are organised in Yemen. These types of auctions started to take place since 2019. UNDP (2022) reports of a new auction programme for Yemeni coffees – the National Yemen Coffee Auction – which was inaugurated in Sana'a on 14 November 2021. The programme is being led by The Mokha Institute (TMI), co-based in California and Yemen. TMI was appointed to lead the auction by a multi-stakeholder group that includes the government in the north (Coffee Unite) and private entities in the Yemen coffee sector under the name Cooperative Union of Yemeni Coffee Procurers Association. This National Yemen Coffee Auction is the latest in a series of efforts to promote Yemeni coffee to international markets and the specialty coffee market in particular. Coffee lots will go through qualification rounds, leading to representative samples of specialty lots, which will be inspected and cupped in a coffee laboratory in Yemen's capital, Sana'a, after which further testing and tasting will be done in an international lab. Comprehensive data will be collected about the geographic origin of the coffees, the history of the producers and their communities, the varieties and applied processing protocols, and other relevant quality data. The auction event will be held through an electronic Internet-based platform that will list the coffee lots for sale and where buyers from around the world can submit their bids. Interviewed farmers from Bani Matar are not participating in the auction as they were not accepted by the auction, since the cupping score did not reach the required auction standard of 88 or more.

⁸ <https://www.worldbank.org/en/country/yemen>

4 Coffee production in Bani Matar

4.1 Introduction

This chapter presents a descriptive analysis of the collected data. Furthermore, where possible, we split the data into two groups of farms according to the number of trees, where we considered the farmers who own less than 500 trees as small farmers and those who have 500 or more trees are considered to be medium to large farmers. In the data, a number of outliers were identified in questions related to cost and yield and these data were taken out of the analysis. Outliers were related to a number of farmers reporting very high yields with only a few coffee trees, which is not possible.

4.2 Characteristics of the farmers in Bani Matar

Researchers visited the study area in Bani Matar and surveyed 100 coffee farmers. On average, the interviewed farmers cultivate coffee on 3.6 hectares. The small farmers have an average of 3 hectares and the mediumsized farmers cultivate coffee on 6 hectares. Table 4.1 presents the key characteristics of the two different groups.

Table 4.1 *Distribution of the characteristics of the studied farmers (percentage)*

Characteristics		Farm size	
		Small, <500 trees (N=76)	Medium to large, ≥500 trees (N=24)
Gender	Male	61	83
	Female	39	17
Education	Illiterate	39	13
	Read and write	9	4
	Primary	16	54
	Diploma	1	0
	Highschool	29	21
Age	University	5	8
	Less than 20	7	4
	From 20 to 40	57	63
Family size*	More than 40	37	33
	Below average	33	17
	Average	9	13
Social statute	Above average	58	71
	Married	86	96
	Widowed	5	4
Farm size	Single	9	0
	M ²	9,149	16,489
Coffee area	M ²	3,075	5,917
Trees	Number	213	800

*) The average family size in Yemen is 7.4 people, according to World Bank data.

Coffee is the dominant crop in Bani Matar representing 37% of the total area that the farmers cultivate. This is followed by qat which occupies 29% of the farm area, and cereals, with a share of 13%. Fruit and vegetables only have a small share of 3% only. Also, 17% of the land is not used for cultivation, as shown in Table 4.2.

Coffee cultivation is under pressure since the production of qat is much more lucrative compared to coffee. Fruit and vegetables also have good prospects for profits, but farmers avoid them because of the roughness of the area and the challenges to reach the production area. Many other problems are also present such as the lack of technical supplies, the high price of irrigation, the lack of water and the difficulty to reach the markets as fruit and vegetables are highly perishable.

Table 4.2 *The distribution of cultivated areas according to crop (% in total land area)*

Crop	Share
Coffee	37%
Qat	29%
Uncultivated areas	17%
Cereal	13%
Vegetables	2%
Fruits	1%
Other crops	1%
Total	100%

4.3 Agricultural practices in Bani Matar

4.3.1 Coffee trees

The majority of the farmers have trees of different ages. Including trees over 25 years old, as shown in Table 4.3. At this older age, the tree yield decreases and it needs more pruning to make it active to produce again. This appears to be a main reason for the low yield. The old age of coffee trees results in the spread of 'alternate bearing', a large production for a year followed by light production or no production in the next year. This causes decreased productivity in general and the death of fruit-bearing branches in excessive production years. This is a result of a lack of supply of starches that causes nitrogen to drain from coffee tree roots and a lack of nutrient supply. As a consequence, there is death in the branches of coffee (peripheral death) and if the branches of coffee die it means the end of their productive life. The phenomenon of peripheral death is confirmed by many farmers in Bani Matar (GIZ, n.d.).

Table 4.3 *Age distribution of coffee trees*

	Farm size				Total	
	Small	(%)	Medium - large	(%)		(%)
1 to 5 years old	1	1%	0	0%	1	1%
6 to 12 years	6	8%	1	4%	7	7%
12 to 25 years	11	14%	5	21%	16	16%
25 to 50 years	5	7%	3	13%	8	8%
Above 50 years	3	4%	1	4%	4	4%
Various ages	50	66%	14	58%	64	64%
Total	76		24		100	

Table 4.4 shows what coffee varieties farmers prefer to plant. Farmers have the choice between different types of coffee varieties. However, there is no real scientific classification of coffee varieties in Yemen, and names are usually adopted from the places of plantation and the different flavours that the coffee developed due to climatic conditions. The distribution is made according to the cultivated varieties as identified by the farmers. It shows that 68 farmers cultivate Dawairi, 59 Odaini and 32 cultivate Tuffahi. Odaini and Dawiri are considered to be the most preferred varieties by farmers. Based on the data collected it appears that the Odani is giving the best yields per tree compared to other varieties. The 'New-Yemen' variety is not cultivated by the interviewed farmers. Only 21% of the interviewed farmers are aware that new varieties have been introduced in the targeted area.

Table 4.4 Cultivated coffee varieties

Variety	Farm size				Total	
	Small	(%)	Medium - large	(%)		(%)
Odaini	11	15%	4	17%	15	15%
Dawiri	5	7%	0	0%	5	5%
Tuffahi	3	4%	0	0%	3	3%
Odaini and Dawiri	31	41%	7	29%	38	38%
Odaini and Tuffahi	5	7%	7	29%	12	12%
Dawairi and Tuffahi	4	5%	0	0%	4	4%
Odaini and Dawairi and Tuffahi	14	19%	6	25%	20	20%
Other	2	3%	0	0%	2	2%
Total	75		24		99	

Most farmers leave between 2 and 3 metres between the trees (see Figure 4.1). The recommended tree density for coffee production ranges normally between 3,000 to 4,000 trees per hectare but given the challenging terrain in Bani Matar with many terraces, this is not always possible. As a result, farmers do not make efficient use of the land available. Underusing land adds more costs in ploughing and cleaning. Also, rainfall water is wasted since it is not used for the coffee trees.

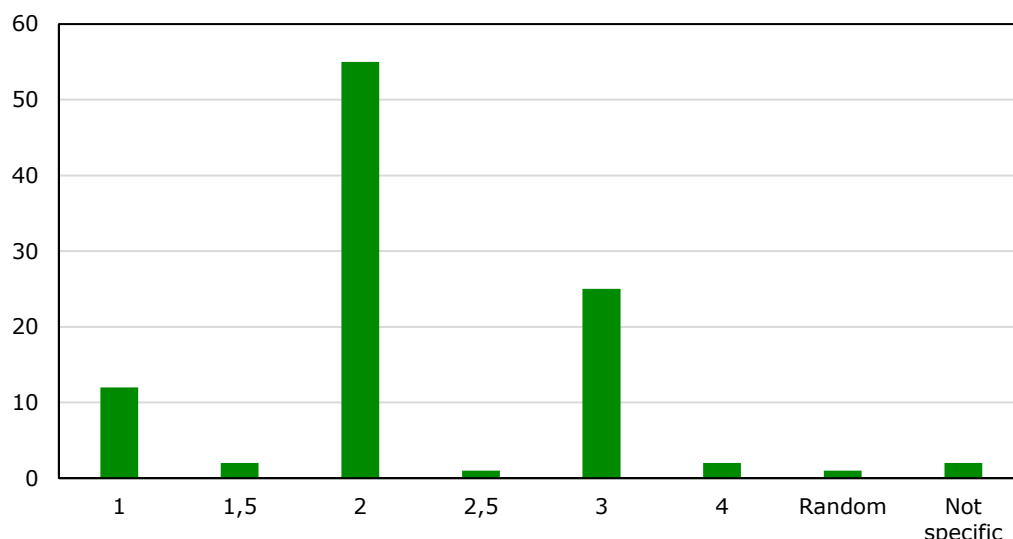


Figure 4.1 Distance between coffee trees, metres

The area allocated to each tree reaches about 15m². This is a large area equivalent to 2.5 times the appropriate area needed by coffee trees, estimated at 4m² per coffee tree (GIZ, n.d.). Smaller farmers that only have 500 trees or less often allocate even more space for a tree going up to on average 16.5m². While the medium to larger farmers have an average of 7.8m² per tree.



Figure 4.2 Coffee trees in Bani Matar

4.3.2 Farm inputs and pest control

In this paragraph, we will discuss the most important cost items for the farmers. The main cost at the farm is labour (65%), mainly for harvesting (26%) and ploughing (26%). This is followed by costs for irrigation (32%). The share of the cost of fertilisers is limited to 3%. See Figure 4.3 for a division of the cost items at the farm level. It appears that smaller farms have a higher cost per tree compared to larger farmers. This is an indication that farmers with fewer trees take their coffee cultivation very seriously.

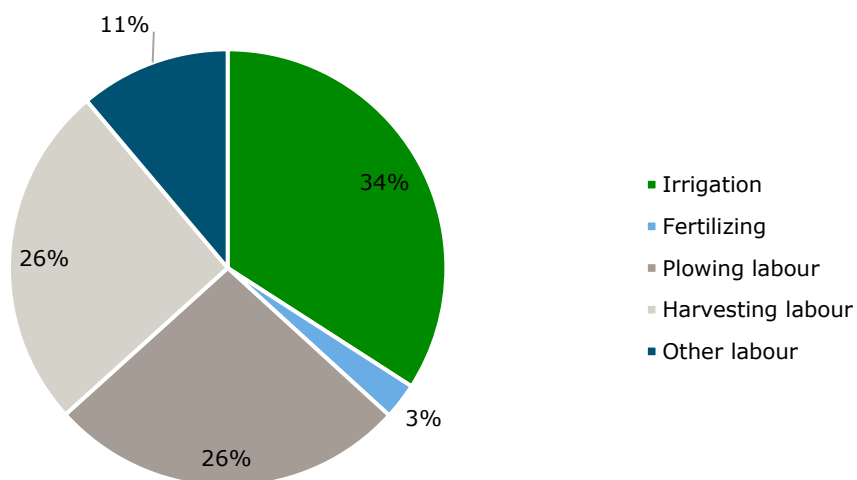


Figure 4.3 Share of different costs (excluding the costs for seedlings)

Irrigation is done mostly during the dry season, on average between 25 and 32 times per year. Medium-size farmers do more harvesting. Pruning and pest control are hardly done by the interviewed farmers. See Table 4.5 for more information on the various activities.

Table 4.5 *Distribution of the activities of the studied farmers per season*

Number of times per year:	Farm size								Total	
	Small (76)				Medium - large (24)				Mean	Std. Dev
	Min	Max	Mean	Std. Dev	Min	Max	Mean	Std. Dev		
Ploughing	1.00	4.00	2.67	0.72	1.00	5.00	2.67	0.82	2.67	0.74
Irrigation	15.00	40.00	24.88	3.93	18.00	48.00	32.00	8.15	26.59	6.04
Fertilising	1.00	5.00	1.82	0.96	1.00	5.00	1.83	0.87	1.82	0.94
Pruning	1.00	4.00	1.68	1.00	1.00	3.00	1.25	0.53	1.58	0.92
Pest control	0.00	3.00	0.26	0.74	0.00	5.00	1.17	1.55	0.48	1.06
Harvesting	0.00	3.00	0.26	0.74	3.00	5.00	3.75	.532	3.56	0.61

Labour

In this paragraph, we discuss the number of workers and their daily wages for each activity and their distribution according to gender. Coffee trees need several treatment practices throughout specific periods during a season. The average number of permanent workers in the studied areas is less than 0.35 for all crops. The activities are concentrated on the farmers' family members or through temporary employment to perform a specific task in return for a salary of one workday.

The problem of depending on temporary employment is related to supply and demand, as the costs of labour may get higher during the seasons of work and sometimes farmers could not find enough workers to fulfil the tasks required at the farm. Also, these labours are sometimes unskilled which causes errors, disables work, and decreases the quality of the coffee. Pruning of coffee trees is often done by hand. The farmers who referred to this work indicate that many branches die annually as a result of the insufficient pruning frequency of the trees, increasing production in some years but stopping production for one or two years after the year of heavy production.

The highest average number of workers is for family workers; those workers are mainly involved in harvesting (average of 3.6 workers) and pruning (average is 2.8 workers). Often child labour is involved. This decreases the likelihood of these children going to school.

Table 4.6 *Labour divided by recruitment type (number of workers)*

	Farm size								Total	
	Small (76)				Medium - large (24)				Mean	Std. Dev
	Min	Max	Mean	Std. Dev	Min	Max	Mean	Std. Dev		
Family workers	0.0	3.0	0.6	0.7	0.0	2.8	0.8	0.9	0.5	0.6
Non-family workers	0.0	8.0	1.2	1.3	0.0	5.0	1.5	1.5	1.3	1.3
Contract workers	0.0	5.6	0.8	1.1	0.0	3.6	1.3	1.2	0.9	1.2
Company workers	0.0	4.8	0.6	0.7	0.0	3.0	0.7	0.8	0.6	0.7
Fixed workers	0.0	5.0	0.7	0.9	0.0	3.4	1.1	1.1	0.8	1.0

The women in the community are responsible for the family, but they also help their husband with many farming-related responsibilities to provide more income for their families. Women occupy an important role in the collection of crop production and the most important one is the cultivation of coffee. The share of female workers reached 34% of the total number of workers. In pruning and harvesting, women also represent a large share of the workers. They are especially active in duties that require patience and precision such as picking red cherries and pruning. See also Figure 4.4. Women also participate in other coffee farming activities, see Figure 4.5.



Figure 4.4 Harvested coffee (Left) and a female worker picking coffee cherries (Right)

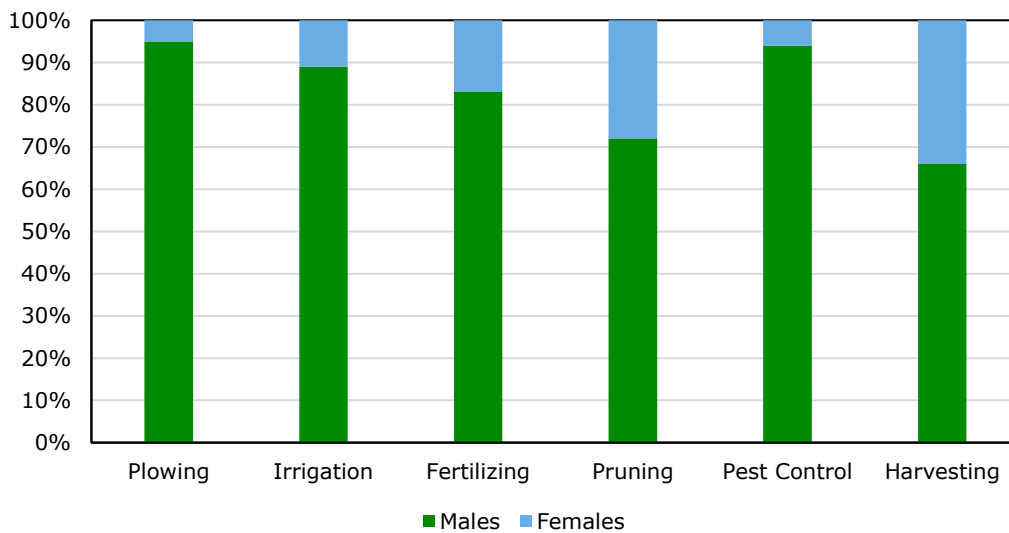


Figure 4.5 Tasks and responsibilities by gender (%)

Female workers earn less than males. When we compare the wages of males and females, we found that there is a gender pay gap in the wages of males and females for the same day of work. The field survey data in Table 4.7 shows that the average salary of women is YER 2,931 (or USD 11.7) while the male's average is YER 3,971 (USD 15.8). Despite the important role of women in the production of coffee, this is a big difference. The average of a women's salary is still low because of the widespread culture in Bani Matar to keep the role of females limited. This attitude originates from the common Yemeni societal's point of view towards females as they have no financial responsibilities toward their family and these responsibilities are a burden upon males who need to provide a household income to their families.

Table 4.7 Labour and wages based on gender

	Farm size								Total	
	Small (76)				Medium - large (24)				Mean	Std. Dev
	Min	Max	Mean	Std. Dev	Min	Max	Mean	Std. Dev		
Male workers (number of workers)	0.33	10.00	2.88	1.98	1.17	7.17	3.82	1.80	3.00	1.89
Female workers (number of workers)	0.00	5.33	0.84	1.02	0.00	4.17	1.06	1.12	0.77	1.03
Average wage for male workers (YER)	2,000.00	6,333.33	4,106.20	1,037.72	2,000.00	6,333.33	3,599.70	1,072.80	3,973.10	1,057.43
Average wage for female workers (YER)	1,750.00	4,333.33	3,054.50	1,157.47	2,000.00	3,833.33	2,496.46	940.20	2,931.10	778.86
Working days for male workers	1.50	18.67	4.87	3.19	2.50	13.33	7.25	3.35	5.73	3.39
Working days for female workers	1.33	10.83	4.24	2.47	2.00	8.67	5.24	3.14	4.13	2.30

*) 1 YER equals USD 0.0040 USD (January 2023)

Irrigation

All surveyed farmers apply farm level irrigation. The farmers use various types of irrigation sources. The distribution was according to the sources of irrigation water, see Table 4.8. There is no data available on the volumes of water used in coffee production in Bani Matar since farmers do not register this.

Table 4.8 Water sources for irrigation

	Farm size				Total	
	Small		Medium - large			
Well	39	52%	12	50%	51	52%
Springs	0	0%	1	4%	1	1%
Rain	0	0%	1	4%	1	1%
Well & Springs	4	5%	0	0%	4	4%
Well & Rain	25	33%	5	21%	30	30%
Well & Ponds	0	0%	1	4%	1	1%
Springs & Rain	1	1%	1	4%	2	2%
Well, Springs & Rain	6	8%	3	13%	9	9%
Total	75		24		99	

The samples were distributed according to the ownership of the irrigation water source. It was found that 39 farmers use only public owned sources and 13 farmers use only privately owned water sources (e.g. a well). A large share of the farmers is classified as 'joint'. This implies that they are connected to private source of water from another farmer. However, the majority of the farmers uses a combination of different sources. Disputes over water sources do sometimes occur and we found that 7% of farmers depend on conflicted water sources, while 93% of the interviewed farmers depend on non-conflicted water sources.

Table 4.9 Ownership of water sources for irrigation

	Farm size				Total	
	Small		Medium - large			
Public	34	45%	5	21%	39	39%
Private	6	8%	7	29%	13	13%
Joint	34	45%	12	50%	46	46%
Public & Joint	2	3%	0	0%	2	2%
Total	76		24		100	

The energy source for pumping the irrigation water is mostly diesel pumps (81 farmers), 48 of which also use solar pumps, and 10 farmers also depend on gravity irrigation (higher water level). It was found that 62 farmers (partly) use solar energy, and 15 farmers (partly) rely on gravity irrigation.

Table 4.10 Energy source for pumping water

	Farm size				Total	
	Small		Medium - large			
Fuel and diesel	17	22%	10	42%	27	27%
Solar system	11	14%	3	13%	14	14%
Higher water level	3	4%	2	8%	5	5%
Fuel and diesel & Solar system	37	49%	7	29%	44	44%
Fuel and diesel & Higher water level	6	8%	0	0%	6	6%
Fuel and diesel, solar system & Higher water level	2	3%	2	8%	4	4%
Total	76		24		100	

Pest control

When farmers were asked about the presence of diseases attacking coffee in the areas of study, all farmers answered affirmative. The most important is the *Prophantis smaragdina*. In Yemen this is called coffee fruit beads or butterfly coffee fruits. About 77% of farmers suffer from this disease. Coffee growers in the study areas also suffer from a disease that has spread recently and farmers call it lacquer. It is a fungal disease called *Fusarium xylarioides* and 'English coffee'. They also mentioned the consequences of this scourge, as the shrubs die successively at a short point in their cultivation and in the first years of production after the farmers had made great efforts in breeding and caring for the trees until they reached the stage of production and appeared fruitful.

Farmers also mention ample source for yield loss, including birds and monkeys. Sixteen per cent of the farmers reported to have trees infected by coffee green scale (*Coccus viridis*) which are absorbent insects that stick to the stems and leaves of coffee. Especially the availability of heat, moisture and proper shading attracts insects. The tree is affected and this causes a general weakness and reduces productivity. They also reported that 7% of farmers suffer from yellowing coffee trees. This is a disease, which results from a lack of nutrients, especially from carrying fruits. The trees are affected by a shortage of nutrient supply from the soil and the symptoms of a lack of items appear on the leaves directly as yellows. Only 2% of farmers mentioned the incidence of leaf coffee leaves such as brown coffee spot disease, which is a fungal disease. See Appendix 2 for an overview of the complete list.

Despite the prevalence of many pests and diseases in coffee cultivation, when farmers are asked how often they do pest and disease control during the season, 79% of the farmers interviewed replied that they do not do control at all, while the rest of the farmers gave different answers between those who do the control once, twice, three, four or five times per season. In addition, the pest and disease control activities carried out are random, and ill-studied, and make them ineffective in combating these pests and diseases.

Fertilisers

The farmers interviewed explained that 43% of them use organic manure only, 5% animal and plant waste, 3% chemical fertiliser, and only 1% plant waste. A large share of the farmers mixes various sources.

Organic fertilisers are mainly applied once or twice a year according to the responses of most farmers. The quantities of the additions are often low due to the lack of organic fertiliser sources and scarcity of animal manure, as well as the difficulty of moving it as a result of the rugged areas of coffee cultivation, which are rough agricultural terraces and narrow areas. Manure is of great benefit to coffee trees because they contain different proportions of plant staples such as nitrogen, phosphorus, potassium and other minerals. Manure can improve soil properties and help them retain water for longer periods. Manure also have a positive acidic

effect on the soil that makes many other nutrients more accessible to the plant and can absorb them easier and in larger quantities (GIZ, n.d.).

Farmers that use chemical fertilisers often depend on only one type of chemical fertiliser, namely urea, which contains 48% nitrogen. This gives the tree only green growth and does not help them to flower as coffee trees need a more balanced addition of nutrients. This type of fertiliser also has an alkaline effect on the soil, while most Yemeni soils already have a high pH and the hydrogen level is usually between 7.5 to 8.5. The addition of urea fertiliser increases the pH level of the soils even further.

Farmers face challenges in the accessibility and affordability of fertilisers. In Yemen, there has been an unprecedented rise in prices as a result of conditions in the country and the deterioration of the local currency. The price of a 50 kg bag of urea fertiliser, for example, increased from YER 10,000 (USD 40) in 2012 to over YER 60,000 (USD 240) in 2021, making many farmers reluctant to use urea. Prices for other fertilisers also have risen significantly. Also, the costs for manure is often expensive since it has to be transported from far. Thus, the availability of fertilisers can be said to be one of the challenges facing Yemen's current coffee production.

Table 4.11 Fertiliser use

	Farm size				Total	
	Small		Medium - large			
Organic manure	30	39%	13	54%	43	43%
Chemical fertilisers	3	4%	0	0%	3	3%
Plant manure	1	1%	0	0%	1	1%
Organic manure & Chemical fertilisers	36	47%	11	46%	47	47%
Organic manure & plant fertilisers	6	8%	0	0%	6	6%
Total	76		24		100	

Seedlings

Most farmers have their seedling production at their own farm. The farmers that source from other places are often medium sized farmers. The average reported price of a coffee seedling is about YER 400 (USD 1.60).

Table 4.12 Source of seedlings

	Farm size				Total	
	Small		Medium - large			
Self-production	34	45%	7	29%	41	41%
Village nursery	10	13%	6	25%	16	16%
Other farmers	9	12%	1	4%	10	10%
Plantation outside the area	7	9%	3	13%	10	10%
Various sources	16	21%	7	29%	23	23%

4.4 Coffee yield

Table 4.13 shows the average production data of the farmers interviewed. We excluded several observations from the data analysis since they were providing outliers. Some farmers reported very high production volumes in combination with only a few coffee trees. The productivity for small and medium-sized farmers per hectare is comparable. Looking at the yield per tree it appears that the smaller farms can generate a higher yield. They likely give more attention to their trees compared to the farmers that are cultivating more trees.

Table 4.13 Analysis of average on farm production of coffee (including husk) per tree 2021

	Small			Medium -Large			Total		
	Mean	N	Std. Dev.	Mean	N	Std. Dev.	Mean	N	Std. Dev.
Average coffee land space (m ²)	3,075.0	81	2,105.9	5,917.4	19	3,435.4	3,615.1	100	2,643.0
Trees (number)	213.5	81	139.6	800.5	19	221.1	325.0	100	279.7
Production in kg per m ²	0.2	78	0.2	0.5	19	0.9	0.3	97	0.4
Production per tree (kg)	3.0	78	2.6	2.0	19	1.8	2.8	97	2.5

4.5 Post-harvest practises

What characterises coffee cultivation in Yemen is the enthusiasm of Yemeni coffee farmers when harvesting the fruits to select the fully ripe red fruits manually. This is very important in obtaining a high quality product. This is a factor that positively affects the final coffee quality when tasting. During the field survey process, we found that 88% of the farmers included in the study harvested the red fruits only, while only 12% proceeded to harvest the red and yellow fruits together. This has one justification, which is that they are trying to reduce the costs of harvest, as harvesting the red fruits only from the coffee tree requires more skills and time. When farmers are required to return to harvesting the same tree more times, this adds additional costs to farmers, as harvesting red and yellow fruits helps farmers to collect larger quantities of fruits during each working day, which reduces overall production costs, but this also reduces the quality of fruits.

In every coffee harvest season, farmers collect the fruits more than once, as only the ripe red fruits were collected and the rest of the fruits were left to ripen, the farmer returns after a short period. This data shows that 50% of the farmers included in the study harvest 4 times, 44% harvest 3 times, 4% harvest 5 times, and 2% harvest twice. The number of harvest times may reach more than that when temperatures are low, which causes a slowdown in the speed of fruit ripening making the farmer wait longer for the fruits to ripen. This causes additional costs to the farmers, while the number of harvest times can be reduced by following appropriate irrigation, pruning and fertilisation systems that help bring the ripening closer.

All the farmers included in the study dry the coffee themselves. This is done in a traditional natural way often directly on the ground or on tarpaulin, see Figure 4.6. The beans are exposed to inert material (dust) and the sun at various temperatures. Both affect the quality of the beans. This traditional natural drying is an indication of farmers' lack of awareness of how the coffee quality can be affected in this way. Although farmers know how to dry on the beds when farmers had been asked about them, they appear unwilling to adopt to the drying beds because of the high manufacturing costs.

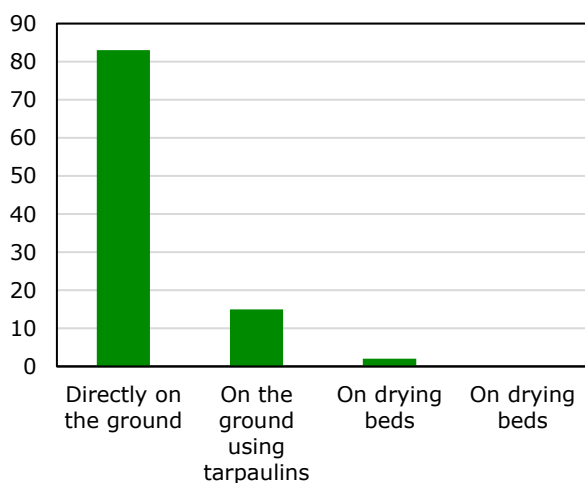


Figure 4.6 The place where the coffee drying process takes place with an example of the traditional way of coffee drying on tarpaulins in Bani Matar

It was found that 68 farmers use a warehouse designated for storing coffee, 21 farmers do not store coffee, while 8 farmers store coffee in any empty place inside the house.

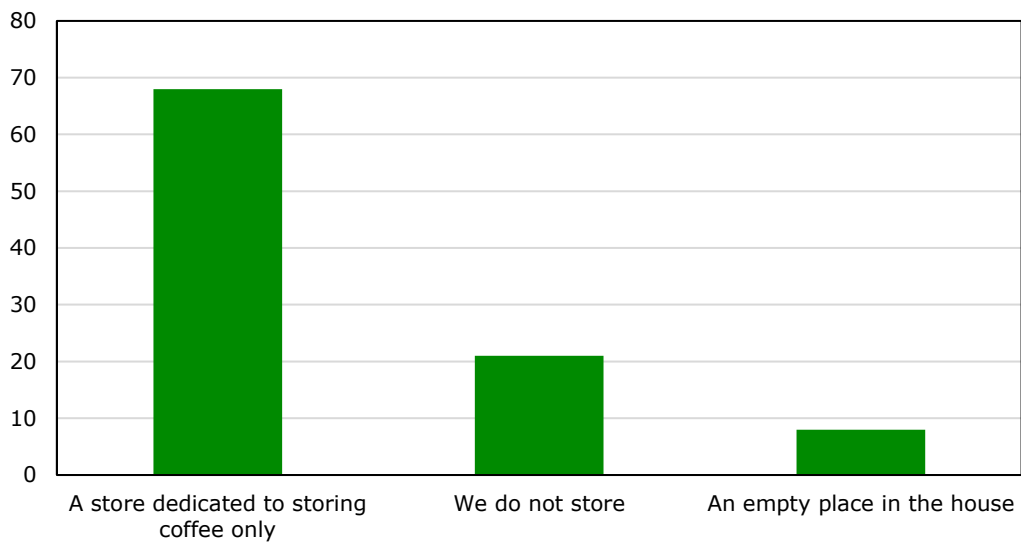


Figure 4.7 Coffee storage places

4.6 Revenues from coffee farming

4.6.1 Coffee only part of the household income next to qat

A total of 59 interviewed coffee farmers indicated that qat production is their most important income source, while 40 farmers indicate that coffee production is their most income source. Attention is given to direct coffee production and trade alone, and therefore information on other income-generating activities is absent. However, farmers reported that they were more dependent on qat revenues than ever before, as demand for qat leaves grows, motivating farmers to expand their qat cultivation rivalling their coffee production. Young Yemeni farmers are even more reluctant than older farmers to grow coffee since qat provides a better income and a constant flow of cash due to a more frequent harvest, favourable market prices and reasonable margins.

4.6.2 Most coffee farmers realise a negative income from coffee cultivation

The majority of the farmers are not able to generate a positive farm income from coffee production. Our data shows that only one-third can break even or to make coffee production a profitable venture. The most important reasons for this are the low productivity due to poor farm management practices. Especially the smaller farmers are faced with higher costs per kg of coffee and are therefore more likely to realize a negative income from coffee cultivation.

In Table 4.14 we present the expected net return from a coffee tree of USD 2.15 calculated as the difference between the returns from the coffee tree at an average selling price per kilo of dried coffee fruits of YER 2,100 (which is equivalent to USD 3.8) and all costs. To obtain an income of USD 2,500 annually as an income to cover the cost of living of a farming family, the farmer needs about 645 coffee trees. If we increase the number of trees by 15% as a precaution to overcome the difference in production quantities from year to year and to maintain the same level of production and annual income from coffee production, the farmer needs 742 coffee trees. As we have seen from paragraph 4.4 this is far above the current average number of trees that is currently cultivated in Bani Matar. Based on this a farmer would need an area of no less than 2,968 m² to generate a positive result from coffee farming.

Table 4.14 Estimated cost-benefit analysis per tree

	Item	Cost per tree in USD
1	Irrigation water value	0.90
2	The top of the organic fertiliser	0.80
3	Cost of the ploughing process	0.26
4	Harvest cost	3.18
5	Irrigation labour	2.10
6	Control labour	0.21
7	Fertilisation labour	0.28
8	Pruning labour	0.18
9	Extra labour, transportation & drying	0.58
	Total operating costs per tree	8.50
10	Production quantity in kilo	2.80
11	Price per kilo	3.80
	Total production value of one tree	10.64
	Net yield per tree in USD	2.15

4.6.3 Prices are not covering the high costs

Ninety-five per cent of the farmers stated that ‘prices are unfair’ and indicated that they feel ‘being exploited by coffee traders and collectors’. The average selling price amounts YER 2,100 for a kg of dried coffee (*jaffl*). Farmers indicate that they deserve higher prices for their crops. About 61% of the interviewed farmers believe that they are entitled to an amount of YER 5,000 (USD 20) for each kg of dried coffee, while others mentioned prices as high as YER 10,000 (USD 40) per kg of dried coffee. This mainly relates to the high production costs, as we explained in Section 4.6.2.

4.6.4 Broken beans

Another important issue that affects farm income is the issue of broken beans. Traders point out that a high level of broken beans has been appearing in the last few years. See the picture below for some broken beans as found in coffee from Bani Matar. They guess that it may be because of the entrance of the new varieties which came from different areas, which did not acclimate well to the area’s environment. Other sources indicate that this is called false polyembryony. UK-based coffee trader Al Mocha states:

‘Two seeds are essentially smooshed together, and one large, lumpy seed—known as an elephant bean—has two embryos. It is problematic, because these lumpy seeds tend to break apart into “shells” or “elephant ears”, which can fragment easily. As such, bean size ranges from bulging oversize to teeny shards.’

Furthermore, they state that this can be related due to the high altitude of Bani Matar which affects the ripening and drying of the beans. ‘Normally, this visually obvious defect of false polyembryony affects perhaps 1%–2% of coffee but in Bani Matar,⁹ we’re talking upwards of 25%’. The issue of broken beans is not only in Bani Matar, it has also been reported in different coffee areas in Yemen such as Anes and Yafi.

⁹ <https://www.almokha.com/pages/bani-matar>



Figure 4.8 Broken coffee beans as often observed in Bani Matar

4.7 Characteristics of the traders

4.7.1 Level of practices among farmers

Farmers themselves inherit the current storage practices from their ancestors and received no further training. All coffee sourced by traders is sun-dried coffee by farmers. All farmers have places built for coffee storage. Almost all farmers sell dried cherries. In general, the traders perceive the level of agricultural practices by the farmers as good but indicate that the current pruning and transport practices are considered to be weak (Table 4.15).

Table 4.15 Perceived level of farmer knowledge by traders (n=9)

	Weak	Acceptable	Good
Level of Agricultural practices knowledge	11%	22%	67%
Level of pruning practices knowledge	78%	22%	0%
Level of pests controlling knowledge	44%	56%	0%
Level of transporting practices knowledge	56%	33%	11%
Level of storing practices knowledge	22%	67%	11%

4.7.2 Trading of coffee

After the harvesting season, the farmers sell the coffee to a trusted and known trader. Fifty per cent of the traders indicate that the price of coffee on the (local) market is fair and the other half argues that the price received is low. All of the interviewed traders have indicated that accessing the local and regional (e.g. Saudi Arabia) markets is possible. However, other markets require high-quality coffee and these are not considered as an option since there is a huge gap to bridge and quality has to be improved (like the speciality market).

All traders sell dried cherries only and they do not do any milling because they have no facilities for this. None of the interviewed traders deals with speciality coffee and they all indicate that the price of speciality coffee is not attractive given the current unpredictable quality in the Yemeni coffee sector.

Table 4.16 Perceived easiness of marketing by traders (n=9)

	Very easy	Easy	Average	Difficult	Very difficult
How easy is it to market coffee to local merchants	44%	33%	22%	0%	0%

1-5: 1 = very easy / 5 = very difficult

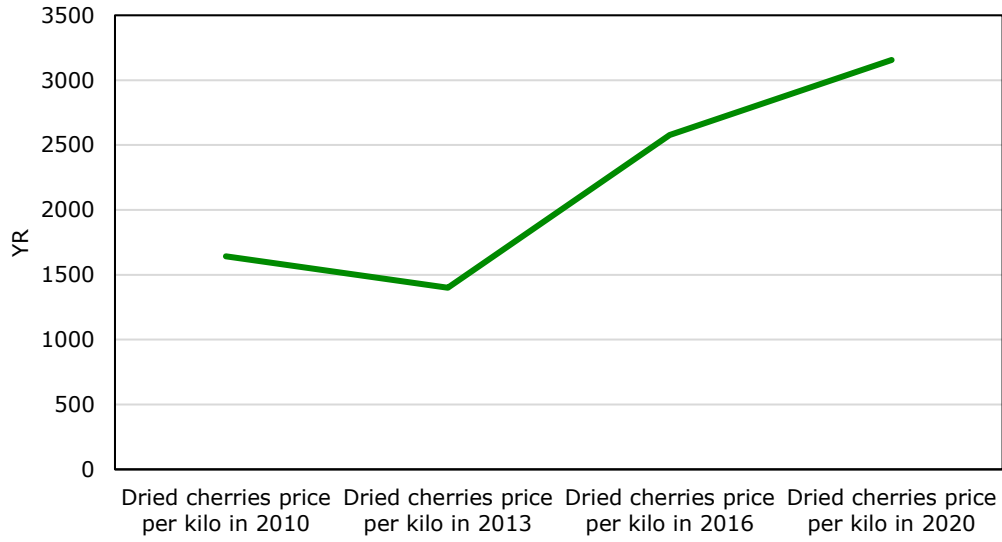


Figure 4.9 Coffee prices as reported by traders interviewed received on the market

5 Conclusion

5.1 Improved practices to improve productivity

Coffee production plays an important role in local livelihoods, but currently contributes only modestly to better living standards. This is due to the fact that seasonal revenue streams for coffee compete with more regular incomes from other crops, notably qat. On the other hand, income from coffee provides important opportunities for some 'lumpy' investments in housing, education, implements and equipment.

The benefit for farmers to participate in coffee farming is currently limited. Our data shows that only one-third of the coffee farmers in Bani Matar break even or make an actual profit from coffee cultivation. To increase their income from coffee farming, farmers often increase the cultivated area but it would be better to increase yield by promoting improved cultivation practices.

The study confirms that the practices of coffee farmers in Bani Matar are of the same low level as in other coffee production areas. It is important to improve these outdated practices such as improved pruning, fertilising, and pest control as well as to introduce climate-smart innovations (e.g. water harvesting to promote reliable flowering of the trees) to increase yield and competitiveness. For short term development, water harvesting tanks are needed to fulfil the water needs for the farmers. For long term water needs, the coffee farmers need dams.

It would be recommended to introduce mixed cropping systems with vegetables and fruit. So that farmers can benefit from additional income sources. However, (rain) water harvesting is not available and the production of vegetables and fruit requires a constant water supply and sufficient water harvesting techniques are much needed.

5.2 Training and extension to improve practices

Current farm practices of the farmers participating in this study are rudimentary and contribute to low yields. There is limited knowledge on up-to-date farm management resulting in low yields and low-quality of coffee. The key areas that are behind are the lack of pruning, the low fertiliser use and the poor harvesting and storage practices. The extension service is considered to be absent by all farmers interviewed. Adequate training in farm management by the government and development organisations is needed and could increase the current coffee practices significantly resulting in higher yields and better quality. With integrated farm management for a more sustainable approach in combination with crop diversification will help to generate different sources of income. Until now there are no research programs or studies by governmental or private entities on how to face the limitation of the water sources which is considered to be one of the main problems. Investments in water-saving technologies and incentives can increase agricultural productivity and food security amongst farm households.

5.3 Strengthened market linkages to improve margins

Opportunities for improving the conditions of access to (international) markets and reinforcing the consistency of income from coffee farming for rural households can be based on stronger linkages with reliable market outlets, long-term engagement in contractual deliveries and eventually the development of recognized origin statements for coffee from particular regions or for high quality coffee according to the speciality standards.

Even during the current conflict in Yemen, there is still (a niche for) the export of coffee which can generate income for the farming communities and also builds the needed livelihood resilience. An interesting side effect is that in some regions of Yemen, such as in Haraz, more Yemeni coffee is being produced, and even replacing the production of qat. Next to the international market also the development of the domestic market outlet is an interesting pathway. Currently, the consumption of coffee is low and initiatives to stimulate the consumption of coffee might be appreciated.

Given the heterogeneity in coffee quality, smallholder farmers need to maintain access to multiple market outlets (local, regional, and international). The current bargaining position of coffee farmers is restricted due to scarce commercial organisation (only a few cooperatives are operational) and non-transparent pricing procedures. On top of this, traders sometimes mix Yemeni coffee with imported coffee to reap the high revenues of Yemeni coffee. This kind of practice negatively affects the reputation of Yemeni coffee in the international market and thereby negatively affects the position of the farmers. Therefore, current post-harvest handling and storage practices need to be improved to increase quality so that better prices can be obtained.

5.4 Improved inclusiveness (women participation) to improve returns to labour

Current welfare effects derived from coffee production, processing and trade remain limited due to low productivity of the labour force, low wages, poor working conditions, and the subordinated role of women. For women, coffee farming is an important means of income. This can be as a farmer or as a casual worker on the coffee farms of the community. The main activities are the more delicate parts of the coffee process such as harvesting. Unfortunately, female workers are paid less than male workers.

Returns to labour can only be improved when coffee management practices are reinforced. Investment in quality upgrading may pay-off if simultaneously market arrangements are strengthened. The current situation of women and their key role in the coffee farms can be mobilised as a vehicle for strengthening its impact on the coffee quality and quantity improvement for more empowering women's role in the coffee sector. This can only be expected when the governance and ownership over coffee transactions also recognises the vital role of women in upstream activities. It is likely that women engagement in savings associations can provide suitable incentives in this respect.

5.5 Outlook

The development and upgrading of coffee production for strengthening the resilience and livelihoods of smallholder farmers in Bani Matar region of Yemen requires a stepwise strategy that gradually addresses most-binding constraints. It is therefore important to combine activities in three distinct areas: (a) improvements in agronomic and resource management practices for higher yields, (b) optimisation of quality of capital stocks (coffee trees and processing capacity) for improving returns, and (c) reinforcement of bargaining position on coffee markets for higher margins.

Combining such interventions might be based on a strategic perspective, considering activities with a short-term, medium-term and long-term horizon to generate tangible outcomes (see Table 5.1). Changes in farm management practices and improved use of water and nutrients can be introduced at short notice, while better harvesting practices may result in quality upgrading and loss reduction. This should be combined with the diversification of cropping systems to guarantee income generation from alternative sources.

In the medium-term, more in-depth investments in tree management are required to improve potential production levels. Involving farmers - especially women - in training and extension programmes for better pruning and disease management are priorities. Also, the gradual renovation of coffee plants and better tree spacing will contribute to further optimization. This needs to be accompanied by the engagement of farmers in some sort of village-level organisation to improve their bargaining power on coffee markets and to

mobilise savings resources as counterpart investment. More systematic studies for scientific identification of the coffee genotypes are needed so that we refer to real coffee varieties in the country.

Finally, in the longer term opportunities for improving coffee tree varieties may become interesting, especially if market competition is based on quality considerations or status of origin recognition. This requires contractual arrangements between producers and traders based on consistent quality management and traceability of supply chain operations.

Most attention is given to direct coffee production and marketing, and therefore information on other income-generating activities is partial and no full household income calculations were made. Moreover, given the explorative character of the study, it is only possible to identify general relationships between production, trade and revenues from coffee activities. Further research is required to assess casual effects on coffee improvement practices and investments for improving rural poverty alleviation.

Table 5.1 *Strategies to support smallholder coffee development*

Short-term	Medium-term	Long term
Farm management (water, energy, nutrients)	Training & extension (pruning, disease management)	Tree renovation (varieties)
Quality upgrading (reduce false polyembryony)	Seedlings & tree density optimisation	Post-harvest management (selection & drying)
Crop variation	Cooperative associations and women's village savings associations	Local origin branding

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Appendix 1 Overview of projects in the Yemen coffee sector

	Project or program	Objective	Locations	Progress (in progress or closed)	Effect/outcome
IFC/FAO	Hand in hand initiative	Evaluating investment entry points for major value chains in Yemen	Yemen	In progress	Policy reforms, technical assistance and projects investments outlined for IFC and FAO
SMEPS	Support Yemeni coffee farmers	<ul style="list-style-type: none"> • Training farmers • Provision of resilience grants to affected farmers to procure irrigation systems, agricultural inputs, drying beds • Supporting coffee farmers with water sources – harvesting tanks. • Supporting Bura'a and Talooq associations with financial and technical support, exposure visits, and linking Talooq association with internal & external specialty markets as well as exporters. • Providing cupping courses and quality enhancement sessions. 	Bora'a and Talooq in Taiz	Closed in 2015	<ul style="list-style-type: none"> • SMEPS increased the level of awareness of the cultural value of coffee and its importance in attracting youth and young people to the industry, creating a competitive coffee market, and raising the reputation in external specialty markets. • The awareness SMEPS spread about specialty coffee standards and Cupping courses that SMEPS held has led to the increase in certified coffee cuppers who play an important role to increase the momentum in the specialty coffee market as they deal closely with farmers, collectors, and external market buyers, as external buyers consider those certified cuppers as trusted sellers. • SMEPS has invested a lot in supporting women farmers who are the primary workers in coffee farms. By doing so, women have been empowered to be literate in various issues and have been able to make decisions on coffee farming in households. • Technical support to framers and associations has significantly increased production and quality increasing the incomes of farmers and household livelihoods. • Water harvesting tanks solved a huge part of the problem for coffee farmers increasing their productivity

	Project or program	Objective	Locations	Progress (in progress or closed)	Effect/outcome
UNDP	Qat-to-Coffee for Climate Resilience and Human Security	Support improved climate security and boost employment in Yemen by piloting the transition from Qat-to-Coffee.	Yemen	In progress for 24 months	<ul style="list-style-type: none"> • A value chain analysis of qat was completed with a focus on the financial benefits and livelihood opportunities offered by the sector, with recommendations on how the coffee value chain can be promoted as an alternative. • Inclusive community plans for coffee production developed, including resource management practices. • Farmers' groups provided the necessary equipment and supplies to undertake a coffee production pilot
SPARK	ABC- Agri business creation	Farmers trainings and supporting in business development	Haraz - Bani Isma'el	Closed - Duration: 1 year	Farmers trained in operating farms as businesses
Acted	Make coffee not war	Supporting coffee farmers in a war-torn country with some agricultural inputs to improve quality	Raymah	Closed in 2018	Fertilizers delivered for farmers use on plantations
USAID	Moving Yemeni Coffee Forward	Assessment of the Coffee Industry in Yemen to Sustainably Improve Incomes and Expand Trade Increase production, quality and market access provided by the Coffee Quality Institute (CQI). Build capacity in the techniques and requirements of coffee tasting and understand the critical elements that determine its value in high-end markets	Yemen	December 2005	Developed selection criteria and intervention options in the industry for the short, medium and long term Developed the capacity of traders in understanding quality standards for exports

Appendix 2 Indicated reasons for yield loss in coffee production

Types	Count
Prophanhis smaragdina	77
Coffee wilt disease fusarium xylarioides	44
Planicoccus citri	16
Worms	12
Monkeys	11
Leaf rust	7
Leaf pests	2
Birds	1



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