Syrian Silk

Portrait of a living cultural heritage

Maya Alkateb

Photography by

Hany Hawasly

Maya Alkateb

Photography by
Hany Hawasly

Syrian Silk

Portrait of a living cultural heritage

Syrian Silk: Portrait of a Living Cultural Heritage

Published by the Danish Institute in Damascus
Second Edition

Layout design by ProMotion
Design and Printing House

ISBN: 978-87-993346-0-5

Cover photo: Abu Nofal (Ahmad al-Ahmad) from the village of Deir Mama, Hama is still part of the Syrian silk industry today. Above: Most farmers use natural mountages made of various shrubs and branches for silkworm rearing. The more clean and spacious the mountage is; the nicer, bigger and therefore more worthy its cocoon yield will be.

Printed and bound in the Syrian Arab Republic

Silk is a word associated for many
with comfort, beauty and a
mysterious magic. However, not
many know that silk was produced
in Syria..

.. and that it still is today.

Foreword
to the Second Edition

This book started with a personal encounter with the Sa'oud family, which has been producing silk and silk fabrics in Syria for generations. When that happened in 2008, saving Syrian silk seemed possible: they only needed good marketing and some business skills, and I thought I was able to help.

Later on, I developed two potential project plans and resolved [with precious help] to start by doing research due to the immense lack of information on the status quo of the craft. That research forms the basis of this publication.

The accomplishment of this book wouldn't have been possible without the help of many individuals and entities. My sincere thanks go to:

The Danish Institute in Damascus and Dawn Group for their enthusiasm and support for the realization of the first edition: namely Dr. Hans Korsholm Nielsen, Mr. Sharif Al-Ferm, Dr. Andres Hastrup, Mrs. Sibba Einarsdottir and Mr. Nawar Al-Sioufi.

The Syrian Ministry of Tourism for supporting this second edition of the book, and pledging to distribute it at exhibits to raise awareness of the importance and survival of the Syrian silk craft up to date.

Mrs. Deborah Felmeth, my introducer to the Syrian silk scene and the spirituality behind silk making, and for editing the first and second copies of the text.

Mrs. Sibba Einarsdottir for generously offering the use of her personal library and for her encouragement.

Dr. Nader Kabbani for believing in my capacity and investing in the research that has formed the basis of this publication.

Mr. Zaki Mehchy for his feedback and honest opinions.

Dr. Patrick Martens and Mrs. Mieke van Riet for their valuable advice and help in planning.

Mr. Hany Hawasly for his companionship, encouragement and great photography.

The Institut Francais du Proche Orient for granting me access to its library, and to its friendly and helpful library staff.

The Danish Institute in Damascus, Maastricht School of Management and the Netherlands Institute for Academic Studies in Damascus for their Project Planning and Management course, which has provided most of the context for the research work behind this book and to course colleagues for their feedback.

The Syrian Ministry of Agriculture and Agricultural Reform for its support, and especially the staff of its Department of Silk and its director Mr. Mu'in Sleiman.

Special thanks to the Syria Trust for Development for supporting the research that has led to the realization of this book.

And most importantly, thanks to the cocoon cultivators, craftsmen and women and those involved in the Syrian silk industry for opening their homes and hearts to us. This work wouldn't have been possible without you.

Maya Alkateb, May 2011

It takes the work of many hands and hearts to produce a fine silken shawl: silkworm rearing, reeling (the production of silk yarn), weaving and crocheting.

Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF MAPS

LIST OF 'STORIES IN BOXES'

Preface

Cultural heritages need to be protected at a time when the world is getting ever smaller, the sweeping force of consumerism is changing cultural attitudes, and tourism is becoming a major industry and a vital one for many communities. Material culture, present through arts and handcrafts, is an important asset that helps define who we are, and serves as a tool for stressing human commonalities and promoting understanding, respect and appreciation between people who belong to different cultures and generations.

Handcrafts, if fostered, can open a door to cultural tourism, empower the communities that make them, including women and youth, decrease poverty and create participation occasions to help civil society to emerge.

Syria has a rich history of making handcrafts, which include cotton, woolen and silk fabrics and rugs, in addition to metalwork, glass crafts, mosaics and organic products.

This book focuses on the Syrian silk craft; with an in depth look at its traditions of cocoon cultivation, reeling and weaving. It focuses on the disappearance of the silk craft as an income generating activity that contributes to economic development and improvement of quality of life for people living in rural areas, highlighting at the same time its importance as cultural heritage and as an expression and re-creation of beauty.

This work aims at addressing the problems of shortage of information and statistics, lack of awareness and absence of an analysis of the status quo and of best approaches to tackle the disappearance of the silk craft in Syria.

The research was accomplished in 2009 along with the shooting of all photographs in the book.

Syrian silk: cultural and historical background

Silk [*harir* حرير] was first woven in Syria in the 1st century AD in Palmyra, while cocoons were first reared in the 7th century during the Umayyad Caliphate (Shehab 1968: 13-20).

From the mid-19th century up to the breakup of World War I, silk became the main cash-crop of Ottoman Syria in order to meet the European demand for raw materials. It is noted that during that period, silk yarn (raw silk) and cocoon exports averaged almost 30 percent of the value of exports shipped from all Syrian ports, and close to 70 percent of those at the Beirut port (Firro 1990: 151-65).

In 1840, three quarters of produced cocoons were consumed by the local market and the rest was exported to Europe, but by 1873, more than 40 percent of Syrian-produced cocoons reached France, which rose to 90 percent by the early 1900s, and peaked at 99 percent just before World War I (Firro 1990: 154; Labaki 1984: 28).

After 1860, the silk producing areas of then Ottoman Syria (mainly Mount Lebanon, the coastal plain and certain areas of the Bekaa) were fully integrated into the French market (Firro 1990: 151, 166). Therefore, when the silk industry in Lyon went into decline after 1930 (due to the introduction of artificial silk, the world financial crisis, and competition of natural silk from the Far East), demand on local cocoon production decreased dramatically and farmers who had switched to cocoon rearing faced financial ruin (Pavaloi 1992: 216).

As silkworms mainly feed on the leaves of white mulberry trees, the presence of those is an essential element for the successful cultivation of cocoons.

It is noted that mulberry plantations in Syria expanded from 1860 to 1914, and Firro states the flowing reasons: the increasing European demand for silk, the encouragement of the Egyptian administration in Syria between 1832 and 1840, the eradication of silk diseases in the 1880s, and the encouragement of the Ottoman government in 1882, when mulberry trees were freed from tax for the first three years after their planting (Firro 1990: 154-5).

Gaston Ducousso sees the decline of silk production in the region as starting in 1903, when farmers began to uproot mulberry trees in order to clear land for citrus groves, especially on the coastal plain (Firro 1990: 155). However, Margarete Pavaloi (1992: 229) spots an expansion in mulberry planting in 1929.

Based on available resources, the number of mulberry trees that formed the basis of Syrian silk production is not clear, added to the presence of conflicting data in different sources about it. The estimate is around 43 million trees in an area of about 20,260 hectares, most of which were grown in modern Lebanon. Only about 10 percent of those were grown in Syria, on about 31 percent of the total area that was devoted to growing mulberry trees (Firro 1990: 152).

It wasn't only cocoon production that Ottoman Syria was involved in. The first modern silk reeling plant [*karkhaneh* كرخانة] in the region was built in 1840, and integration into the French market and the expansion of mulberry plantations from 1860 to 1914 encouraged the building of more plants, the number of which reached almost 200 by 1913 (Firro 1990: 154).

Close to 90 percent of both the number and productive capacity of these plants was in Mount Lebanon (Labaki 1984: 108).

After the decline of the silk industry in Lyon, which used to consume most of the domestically produced cocoons, cocoon exports decreased and so did their production.

The decrease of cocoon consumption led to the decline of the local weaving industry, which was prosperous in the cities of Damascus, Aleppo, Homs and Hama (Firro 1990: 160; Shehab 1968: 53). The industry was still sustained though, in order to satisfy local demand on fabrics.

It is worth mentioning that during the Second World War, local reeling plants supplied raw silk to England for use in the manufacture of parachutes (al-Atrash 1996: 15) and that at all times, farmers continued to reel silk using traditional methods and employ the resulting yarn in the creation of different handmade products.

Passed from one generation to the next, the traditions and crafts of producing silk have survived in Syria for centuries.

As craftsmen and women worry about having to let go of their heritage because of lack of profit, an entrepreneur has started a traditional production line for silk yarn (left).

On the cultural aspect:

For centuries, silk has been employed to make many of Syria's traditional costumes, ranging from head and waist-wear to dresses and non-clothing items. Fabrics in which natural silk was mixed with cotton or other materials were also common.

In her book, ***Silk in Syria: Alexandretta Province, Syria and Lebanon***, Rim al-Atrash lists seventy three different traditional clothing items worn in Syria in which natural silk is utilized (58 for women, 12 for men and 3 unisex), in addition to five non-clothing items and thirteen ones that are made exclusively for export to Iraq, Lebanon, Palestine, Saudi Arabia, Turkey, Yemen and the Maghreb (1996, p. 98-110).

Silk's constitution of a significant cultural issue and its economic relevance to the livelihoods of Syria's people is reflected in their proverbs and the many family names related to the industry, including al-Fattal [الفتّال] (the twister), al-Msaddi [المسدّي] (the warp layer), Shammat [شمّاط] (reeler or merchant of traditionally reeled silk [***harir shamet*** حرير شمط]), al-Qazzi [القزّي] and Qazziha [قزّيها] (related to silkworms [***qaz*** قز]). Proverbs and more family names could be found in al-Atrash's book (p. 129-130).

One may ask, "Why is silk a Syrian heritage?"

The answer would include that silk-making (cocoon cultivation and the production of silk yarn and fabrics) has been practiced by many generations of Syrian workers, performing through a rooted tradition, the production and processing of natural silk in Syria have deep historical roots and the tradition of rearing silkworms and the crafts of reeling, weaving and crocheting, which have been handed over from generation to generation, are still practiced today.

Silk is connected to Syria's people by proverbs, family last names and many traditional costumes and the many white mulberry trees available in Syria today constitute part of the natural landscape of the Western Mountains and the Syrian coast and of their natural heritages.

The fact that cocoon cultivation is an environment friendly activity adds to the importance of silk-making in Syria, as the white mulberry trees that get used to feed silkworms hardly consume any fertilizers and absolutely no pesticides.

And finally, farmers and craftsmen and women deal with silk yarn as something that has a 'soul'; handling it with utter delicacy and love, and silk making for many of them is an expression and re-creation of beauty.

Table 1: Chronology

Around 12th-8th c. BC	Chinese silk, in the form of threads and fabrics, reaches the Phoenicians on the Syrian coast and gets dyed in their royal purples
1st c. AD	Silk is woven in Palmyra
7th c. AD	Cocoons are cultivated and silk is reeled in the region during the Omayyad Caliphate
By 12th c. AD at least	Damascus becomes famous for its trade in exquisite and expensive silks
1840	The first modern silk reeling factory is built in Ottoman Syria
1893	Ottoman Syria produces 5,900,000 kg of cocoons, of which France absorbs around 90%. It also produces 520,000 kg of silk yarn (raw silk)
1911-1912	Syria and Lebanon use about 143,000 kg of raw silk to make local fabrics
1913	10 silk reeling factories operate in Syria
1930s	Decline in local cocoon production begins
1952	Four private silk reeling factories operate in Syria
1963	One public silk reeling factory opens
1970	Syria produces 360,000 kg of cocoons
1980	The public factory almost completely monopolizes purchase of cocoons
1994	Two private factories work along with the public factory and close in 2003 and 2007 consecutively
2000	Syria produces 32,000 kg of cocoons
2008	The public factory (last operating raw silk factory in Syria) closes because of lack of cocoons

Sources: Shehab 1968: 13-20; Emery 1994: 133; Firro 1990: 154, 156; Labaki 1984: 28, 109, 141, 165-6; Sizes, Inc. 2001; Sa'oud et al. 2000a: 8, 14; Annual Report on Animals for the Year 2000 by the Syrian Ministry of Agriculture and Agricultural Reform; Memo no. 8716/1 by the Syrian Council of Ministers, dated 8 October 2008.

The industry chain

Silk making consists of both agricultural and industrial activities, involving many people from different cultural backgrounds, economic classes and genders.

In order to facilitate the research and analysis, I have broken the silk industry into four sub-industries based on the ability to obtain a final product at the end of each. Those are:

- The silkworm eggs industry (breeding and production).

- The cocoon industry (sericulture).

- The raw silk industry (yarn).

- The silk fabrics industry.

In 2009, only the last three of those were practiced in Syria, under the two following production chains (figure no. 1):

In the first chain:

o Mono-generation* silkworm eggs are imported.

o Silkworms are reared in Syria by local labor, using locally available mulberry foliage.

o The resulting cocoon yield is manually reeled, and then manually processed (re-reeling, and throwing (twisting and combining).

o The resulting thread is employed in the creation of hand-woven and crocheted fabrics.

In the second production chain:

o Natural and artificial silk yarn are imported then thrown in Syria.

o The resulting thread is employed in the creation of different fabrics.

After the closure of the last operating silk reeling factory in October 2008 (Memo no. 8716/1 by the Syrian Council of Ministers, dated 8 October 2008), only the traditional method of reeling on the Arab wheel [*doulab arabi* دولاب عربي] remained to produce silk yarn within Syria's borders. This method produces yarn that is uneven along its length, and therefore could only be handled on a hand-loom or with hooks, and not with an industrial machine.

To conclude, two types of natural silk fabrics got produced in Syria in 2009:

* Mono-generation eggs give a good cocoon yield for one year only.

o One used local silk yarn (that had been produce locally utilizing locally cultivated cocoons).

o The second used imported silk yarn and only wove in Syria (Brocade for example).

Hereafter, this study focuses on 'Pure Syrian Silk Products'; these of the first type (see figure no. 1).

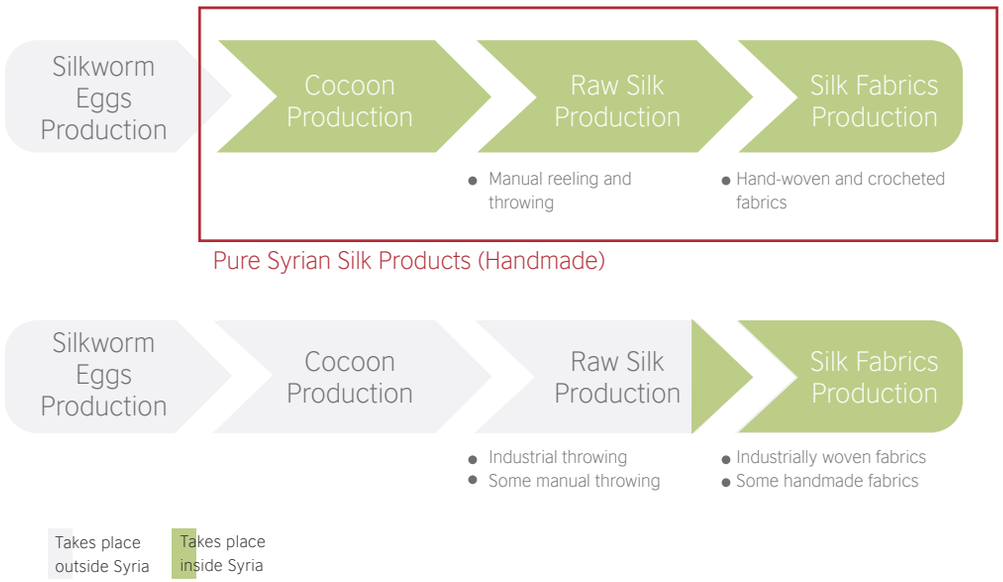


Figure 1: Silk production chains in Syria in 2009

Syria's cocoon industry in 2009

To present the status quo of Syria's cocoon industry in 2009, information will be presented on the raw materials it consumes, its producers, production and market, in addition to an analysis of the production trend.

Raw materials

Silkworm eggs and the foliage of white mulberry trees are the main raw materials for cultivating cocoons because the domesticated mulberry silk moth, ***Bombyx mori***, undergoes a complete metamorphosis in the course of development into an adult (embryo inside an egg, larva, pupa, and adult), of which the pupa stage is spent in the silken cocoon, and the main food of the larva (the silkworm) is the leaves of the white mulberry specie, ***Morus alba***, of the mulberry genus (Sayed, Mahmoud & Mejle' 1995: 27; Gillow & Sentence 1999: 30).

a) Silkworm eggs

A survey was performed towards the cocoon cultivating community of 2009 (see Annex I), from which the following information was derived:

All surveyed families used silkworm eggs that had been imported by the Ministry of Agriculture and Agricultural Reform.

The eggs were mono-generation eggs of the Japanese specie (interview with Mu'in Sleiman, Director of the Department of Silk at the Ministry*, on 8 July 2009), which give a good cocoon yield for one year only. This means that if a family chooses to breed some of the moths on its own and keep some eggs for the next season, they will not get a good cocoon yield then.

Silkworm eggs have been imported periodically in Ottoman Syria since the 1850s, resulting in the hybridization of native eggs [***bizir baladi*** بزر بلدي] and the fluctuation of their production rates (Firro 1990: 155).

The native eggs, which give yellow cocoons, are thought to be extinct today for the following reasons:

- All the surveyed families who produced cocoons in 2009 have used imported eggs that had been obtained by the Syrian Ministry of Agriculture and Agricultural Reform.

- The local silk reeling factories either did not accept to buy the yellow cocoons resulting from the native eggs, or bought them at half the price of the white ones that emerge from imported species because they were of inferior quality to those (interview with Shafiq Othman, partner in As'ad and Othman Silk [reeling] Factory, on 8 August 2009).

- None of the three families in practice of the silk reeling craft in 2009 have seen yellow cocoons for seven years at least (interviews with Mohammad Sa'oud and Yousef Hasan on 1 June 2009, and Eid al-Hasan on 20 August 2009).

Farmers have to subscribe for the eggs/seeds in July-August, in order to get them in April of the following year for the spring rearing period, in June for the summer period and in August for the autumn period.

The farmers pay the Ministry the cost of the eggs, plus airmail costs split amongst them (interview with Naziha al-Sayed, Department of Silk, on 29 July 2009).

* The Department of Silk operates under the Section of Bees and Silk, the Directorate of Plant Protection, the Ministry of Agriculture and Agricultural Reform in Syria.

In 2009, most of the Syrian farmers who produced cocoons reared the silkworms in their private homes.

This cash crop takes only about 40 days to give yield, but the delicate worms need much care and extensive labor, especially towards the end of the rearing period.

Since 2004, eggs have been imported from Japan, Bulgaria and lately North Korea. Sleiman justified the shift to North Korean silkworm eggs in 2007 in an interview on 8 July 2009, by the following reasons:

- Their cheap price comparatively to that of the excellent quality eggs from Japan.

- Their relatively good productivity in contrast with cost.

- Their good level of immunity against diseases.

Silkworm eggs have not been produced in Syria as an economic activity for many years. Since 2008, they have been imported from the Democratic People's Republic of Korea by the Ministry of Agriculture and Agricultural Reform.

b) White mulberry trees

Out of the needed elements to cultivate cocoons (labor, knowledge, silkworm eggs, space, equipment and white mulberry trees), the availability of adequate mulberry trees is the most crucial factor in the success of cocoon cultivation within a certain geographical area, since it is the only needed element that cannot be obtained if not suitable for the geography of that area. To make it clearer, it is only this element that makes cocoon cultivation possible in Syria and not in Libya for example, as all other elements could be secured in one way or another.

Statistics by the Ministry of Agriculture and Agricultural Reform for the year 2008 state that the Administrative Areas of Mesyaf (Governorate of Hama), Tal Kalakh (Homs), Jableh and Latakia (Latakia), al-Dreikish, al-Sheikh Bader, Banias, Safita and Tartous (Tartous), in which cocoon rearing has continuously or partially taken place since 1979, have 138,400 white mulberries spread over an area of 2,913 hectares, and that most of them are rain-fed.

Those include native white mulberries [***tut baladi*** توت بلدي] and foreign ones (Indian and Japanese varieties) that were introduced by the Syrian Ministry of Agriculture and Agricultural Reform in 1997 (Sa'oud et al. 2000a: 39; Khwanda 2003) (more in Annex II).

However, the availability of sufficient white mulberry trees besides other needed elements for cocoon cultivation is not the only required factor, as the delicate and demandy silkworms refuse to eat just any white mulberry leaves.

The leaves have to be served to silkworms in suitable quantities. Serving too much would result in loss of both effort and mulberry foliage, plus the increase of mold and disease, while serving too little would result in uneven growth amongst worms, the spread of diseases, longer feeding periods and inferior quality of cocoons (Sayed, Mahmoud & Mejle' 1995: 43).

The quality of served leaves is also important. They need to be clean and absolutely free of

Story in a box no. 1: Farmer who crochets

Wearing a silk shawl [***masloubeh*** مسلوبة] on her head on many occasions, Um Muhammad (Shahira Hdiyeh) lives in the mountainous village of Deir Mama, located near Mesyaf, Hama. She has reared cocoons with her family since she was a child, then at her home for 45 years now, since she got married.

Mother of three daughters and three sons, five of whom have moved away to urban areas, she now shares a house of two big rooms with her husband, Abu Muhammad (Badie' Saniyeh).

They receive half of their income from their children and the other half from farming (including the cultivation of cocoons), plus the throwing (twisting and combining) and crocheting work that Um Muhammad does with silk yarn.

Um Muhammad is very proud of her silk work and refuses to quit rearing silkworms despite the urging of some of her children, who say that she has become old for such tiring work.

She has crocheted her own shawl years ago, and says that it has gotten thin in some areas because it had been applied to the skins of her many grandchildren whenever they got rashes as babies.

She and her husband rear silkworms every spring, using the frequent help of their one daughter who lives close by. They do so at their home; emptying the two big rooms for the worms for about twenty days and sleeping outside.

They pick mulberry leaves off of their own trees and carry them to the house on foot, then collaborate to collect dry branches and arrange them to form mountages that the worms would later climb to spin cocoons.

The fully domesticated silkworm, ***Bombyx mori***, which gets reared in Syria, is completely dependent upon humans: leaves have to be finely chopped for the worms when they are little and have to be served to their reach, certain ranges of heat and humidity should be maintained in the rearing environment, which also has to be free of smoke, odors, and even disturbing noise (Gillow & Sentence 1999: 30) and the more care is allocated to worms, the bigger and nicer cocoons they give, and therefore the more value.

A silkworm takes about 35 days between hatching from its egg and starting to wrap itself in a cocoon. During that time, it passes through five different ages (each lasting for about a week) (Sayed, Mahmoud & Mejle' 1995: 39-41), and increases about 10,000 times in weight (The Silk Museum).

In the village of Deir Mama, the first four ages draw their names from the physical characteristics of the silkworms at each:

The first age is called the seed [***al-bizreh*** البزرة].

The domesticated silkworm that gets reared in Syria is fully dependent upon humans. Therefore, among other tasks that Um Muhammad has to do for the worms, she has to secure fresh mulberry leaves and deliver them to their reach as needed. However, while cocoon cultivation is a seasonal job for her, she crochets silk year-round.

The second: the green [*al-khadra* الخضرة].

The third: the pattern [*al-naqsheh* النقشة].

The fourth: the red [*al-hamra* الحمرا] (interview with Mohammad Sa'oud on 16 May 2009).

The fifth age has no specific name, but gets referred to with phrases such as "after the sleep of al-hamra [*ba'ed nomet al-hamra* بعد نومة الحمرا]", "we've broken their [the silkworms'] fasting for (x) number of days [*ilna mfattrin (x) days* إلنا مفطّرين (س) يوم]" and similar ones (interview with Muniefeh M'alla on 8 August 2009).

Those ages could be split into two groups, young (first to third) and old (fourth and fifth), differing in used rearing methods, required degrees of temperature and humidity and the physical condition of food served to the worms (Sayed, Mahmoud & Mejle' 1995: 27).

Each age ends with a fasting period and a casting of a worm's skin.

Um and Abu Muhammad have always obtained the eggs [*seeds/ bizir* بزر] through the Syrian Ministry of Agriculture and Agricultural Reform and normally sell their cocoon yield to a neighbor whose family reels silk manually.

In 2009, they reared one carton of seeds, weighing 11.7 grams and containing 22,000 eggs in the two big rooms of their house.

They placed the worms on mattresses on the floor, on furniture and Styrofoam boxes and on plates that have been made of mixed cow dung, straw and water then dried in the sun [*kreinat* كرينات].

Um Muhammad handles the delicate worms as if they were her pets; watching that they have enough food, and generating heat or opening up the windows for those creatures - who almost only eat and sleep - as needed.

During their last ages, one carton consumes about four big bags of mulberry foliage per day, split over three meals. Those are equivalent to the yield of one to four healthy elderly white mulberry trees, *Morus alba*, of the native variety [*tut baladi* توت بلدي].

When the big silkworms start turning transparent, Um Muhammad and her husband rush to bring the natural mountages that they have assembled earlier of dry branches of shrubs [*shieh* شيح], in order to accommodate the worms that are ready to start spinning cocoons.

In one week, the yield is collected and sold before the metamorphosis ends and the moths emerge from their cocoons as adults, eating their way out (Gillow & Sentence 1999: 30).

The new cycle begins in the following month of August, when the family subscribes with the Ministry of Agriculture and Agricultural Reform (Department of Silk) for a certain number of silkworm egg cartons for rearing next spring.

pesticides; making trees planted on the main roads or near other fruit bearing trees that get sprayed with pesticides unusable for rearing.

Some of the measures that have to be taken to ensure the level of quality are:

- Picking leaves [***shafit*** شفط] should not happen in the middle of the day when the weather is hot,

- the leaves should not be piled in large quantities for a long time, as this would increase their level of humidity, and

- wet ones or those bearing dew should not be picked, nor those exposed to cigarette smoke (Surveillance Office on Silkworm Seeds and General Steroids for Everything Related to Mulberry Trees and Silk in Countries under the Mandate 1931: 20).

When the worms are tiny, they should be served with young, tender, fresh mulberry leaves, finely and carefully chopped (Kalter, Pavoloi & Zerrnickel 1992: 203).

There is a general agreement amongst farmers that the more – healthy – nutrition the worms receive, the better the final cocoon yield will turn out.

Different sources present different information on how much mulberry foliage is needed to feed a quantity of silkworms:

The local unit of measurement (a unit of mass) is a bag that is about one meter in height and 60 centimeters in diameter, which is called shwal [شوال] or 'addouleh [عدّولة].

The weight of a silkworm increases 10,000 times between its emergence from the egg and the time of spinning itself a cocoon.

The biggest elder native tree gives about four shwals if in good health and if its foliage has not been partially damaged by the weather (by hail for example). A carton of silkworm eggs of the Japanese specie, which is currently used in Syria, and which weighs about 12 grams and contains 22,000 eggs, consumes about 2 shwals of mulberry leaves during the first three ages of the silkworms, then about one per day during the fourth age (total of 7 shwals), and about 3 to 4 per day during the fifth one, adding to a total of 30-40 shwals per carton.

All this makes the total amount needed per such carton equivalent to the yields of 40-50 native trees that are 10 years old at least.

I have concluded the information above based on interviews with several farmers who bore with me to do the math, despite most saying that it is impossible to really calculate the needed amount of mulberry foliage per carton.

Not only is calculating the needed amount of mulberry foliage to rear a certain number of silkworms difficult, but so is to estimate the quantity of mulberry foliage that a family has available for cocoon rearing.

To do such task, inquiries should be made about the variety of white mulberry trees the family owns (native or foreign), their ages, sizes, numbers, whether they get irrigated or fertilized and whether they might be unusable because of potential exposure to pesticides. These inquiries were not included in the survey towards cocoon cultivators in Annex I but the answer was availed by questions on the varieties of owned mulberries, their system of irrigation and how much foliage the families utilized from outside of their private farms (through borrowing or buying).

The survey shows that 71 percent of the families (20 out of the surveyed 28) employed their own trees for more than half of what they needed, while the others either borrowed the extra needed foliage from neighbors or bought it, 45 percent of those in the first group (9 families) obtained 100% of the foliage they needed from their private farms and all have only bought the foliage of native trees when their own mulberry foliage yield was not sufficient.

It also shows that 19 families own native trees (68%) and 18 leave their mulberries to be rain-fed (64%). Furthermore, that all families have raised silkworms in the spring period, and the overwhelming majority raised them only in the spring period (25 out of 28 surveyed families), which is to be put in contrast with the maximum of three potential seasons per year, which has been successfully practiced in Syria.

To further understand mulberry trees as a raw material, here are a few more remarks:

- Mulberries are either planted alone in fields or on the boundaries of farms (Sa'oud et al. 2000a: 31).

- Mulberry seedlings take about three years to produce the first leaves that feed silkworms (interview with Mu'in Sleiman on 8 July 2009), and the bigger the tree becomes, the more foliage it gives.

Trees that are used to feed silkworms get pruned every year to keep their sizes small and

Silkworms mainly feed on the leaves of white mulberry trees, making their availability essential for successful cocoon cultivation. The native white mulberry [tut baladi توت بلدي] (pictured) is what most Syrian farmers use.

their leaves reachable. Also before the summer and autumn periods to increase their foliage yields and generate young tender leaves for the young worms (interview with Naziha al-Sayed on 29 July 2009).

- Non-fruit bearing mulberry trees are better for feeding the worms in their older ages, mainly because their leaves are richer in nutrients (interview with Mu'in Sleiman on 8 July 2009).

And finally, mulberry trees are not only good for cocoon cultivation: excess leaves are normally used to feed cattle and other milk-generating animals as a rich food supplement in summer (of the surveyed families, 5 out of 7 who had extra leaves did so), excess branches are used to heat homes and farmers who own fruit-bearing white mulberries make use of their fruit yields as well.

Furthermore, planting mulberry trees prevents soil erosions (Reddy & Shankar 2009). The survey shows that most families did not apply fertilizers to them (71%, or 20 out of 28) and that the ones who did (except for one) have applied them only to foreign varieties.

Profile of producers

Cocoon rearing is a cottage industry in which 48 families were involved in 2009 in Syria.

The families were identified starting from charts obtained from the Department of Silk at the Ministry of Agriculture and Agricultural Reform, of persons who have registered cocoon production in 2009 to be eligible for receiving a newly introduced government subsidy (discussed under 'Recent governmental and non-governmental initiatives to save the silk craft', p. 36).

Of the 48 registered families, 28 were approached in a survey that included the following questions:

A. Whether they knew people from their village who have cultivated cocoons in 2009 and who were not mentioned in the list I had.

B. Whether they have turned in cocoon production to the Ministry, partially or totally, on behalf of another family.

After posing the questions, it was found that two families were not on the list, and two of the ones who were listed had not cultivated cocoons and turned in their production in the place of other families. As a result, the number of families who cultivated cocoons in 2009 was still estimated at 48.

The number of producers in 2009 should be put in contrast with that of families who cultivated cocoons ten years earlier. Those were 1600 families in 1999 (Sa'oud et al. 2000a: 15-8) in contrast with the nearly only 50 in 2009.

This drop of 97% in the number of producers goes in line with the drop rate of cocoon production from 38 tons to only two between 1999 and 2009, which amounts to 95%.

In order to find more about the demographics and characteristics of the Syrian cocoon producing community in 2009, a survey was conducted (see Annex I) and the following information was found about the 28 surveyed families:

- The families have an average size of 8 members (the largest had 15 and the smallest 4, including parents, children, grandparents, grandchildren and in-laws living at the same house).

- An average of 6 members resides at the family home, either because some daughters have gotten married or some sons have moved out.

- 50 percent of the members who reside at family homes are women.

- Out of the total number residing at home (155), 87 (56%) work in cocoon cultivation for some time of the year.

- One hundred members (72%) have completed primary school at least and 18 (13%) have a university degree.

White mulberries of foreign varieties have been imported by the Syrian Ministry of Agriculture and Agricultural Reform and distributed inexpensively to increase silk production. However, most Syrian farmers prefer the native variety to those and graft their trees of foreign varieties with it.

- 7 out of the 28 families descend from others who cultivated cocoons too.

- Many have reared silkworms since the creation of their families (marked by the marriage of the mother and father), which in some cases goes back to 60 years.

- 90 percent of the families raised silkworms once a year in 2007-2009: in the spring.

- 66 silkworm egg cartons were raised in 2009 (57 in the spring period, 0 in summer and 9 in autumn*), with an average of 2 cartons per family.

- Only three families were involved in rearing the 9 silkworm egg cartons in the autumn of 2009.

- All family members are involved in cocoon cultivation to varying degrees (mothers 41%, fathers 35%, children 23% and grandparents 2%).

- Mothers mostly take care of the worms and feed them, while fathers mostly collect white mulberry foliage and prepare mountages for the silkworms to climb and spin cocoons. Children mostly collect mulberry foliage, and grandparents mostly do the delicate task of preparing the mountages (see survey in Annex I).

- A quarter of the families received help from extended family members in 2009 in the cocoon cultivation season and four of them hired employees to assist them or do the entire job.

And on the surveyed families' income:

- Twelve (43%) of the families have at least one member who is a governmental employee.

- Agricultural activity counts for less than 50% of the total income for twenty of the families (71%).

- Cocoon cultivation counts for more than three quarters of the agricultural income of nine (32%) of them, and less than half of 16 (57%).

- This reflects that cocoon cultivation for the majority of the families is an activity they practice to generate supplementary income and increase their well being.

Furthermore, around a third of the families (9 out of 28) practice income generating activities related to silk other than rearing silkworms, such as reeling and crocheting.

Cocoon production

Syria's cocoon production in 2009 will be examined by describing its quantity, quality, geographical distribution and the equipment used to produce it. A trend analysis of production in 1979-2008 will also be presented.

a) Quantity

Syria's cocoon production in 2009 amounted to 2,374 kg (2,143 kg in the spring period and 231 in autumn)**.

Local cocoon production dropped from about 248,000 kg in 1979 to only 2,000 kg in 2008 (figure no. 2; details in Annex III). This drop has gone in line with another one in the number of silkworm egg cartons reared per year (Annex V). Reasons for the decline will be thoroughly investigated in the following trend and problem analyses for the Syrian cocoon industry.

b) Quality

Employed quantitative standards that are normally used to evaluate the quality of cocoons are the weight of the fresh cocoon, the weight of its skin, the ratio of its silk content and its reelability, in addition to the ratio of defective cocoons and using size as a standard (number of cocoons per liter) (Sayed, Mahmoud & Mejle' 1995: 53-54).

No records are available to determine the comparative quality of Syria's cocoon production over the years, especially in the absence of a national standard for them.

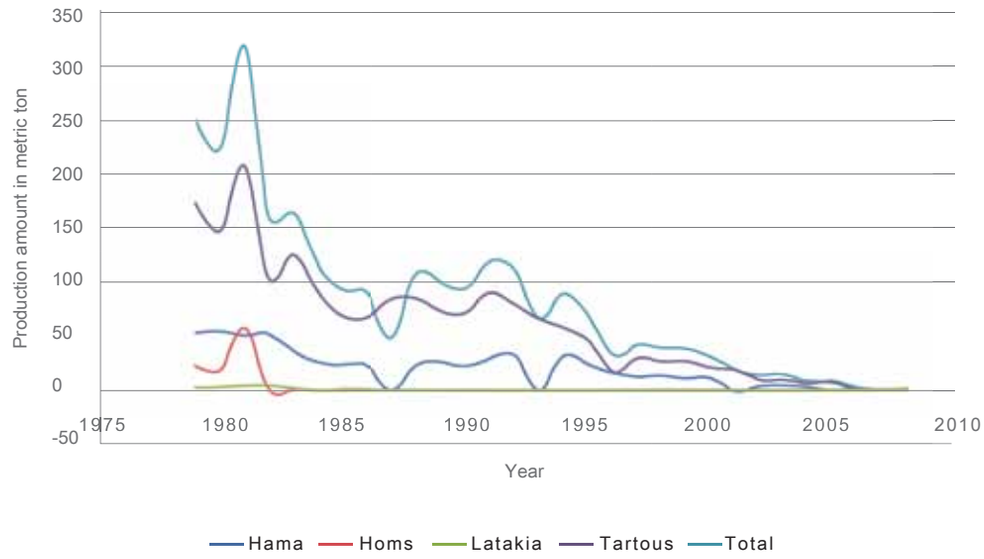


Figure 2: Cocoon production in 1979-2008 by Governorate

* No cocoons were cultivated in the summer period of 2009 because silkworm egg cartons for both the summer and autumn periods have been delivered in autumn (late) by the Ministry of Agriculture and Agricultural Reform.
** (interview with Mu'in Sleiman, Director of the Department of Silk at the Ministry of Agriculture and Agricultural Reform, on 15 November 2009).

c) Geographical distribution

In 2009, cocoons were reared in the Governorates of Hama, Latakia and Tartous, in the Administrative Areas of Mesyaf (Hama), al-Haffeh and Latakia (Latakia), and al-Dreikish, al-Sheikh Bader, Safita and Tartous (Tartous), where sixteen villages were involved* (map no. 1).

Villages with the highest production rates were al-Kamlieh and Deir Mama (Mesyaf), B-Menneh (al-Dreikish) and Beit al-Hajj (Tartous).

Among Governorates, Tartous came first in production, with 1,330 kg, followed by Hama (1,013 kg) and Latakia (31 kg).

In the Periodic Report on Agricultural Animals for the Year 1979, which is the oldest available record on cocoon production at the Syrian Ministry of Agriculture and Agricultural Reform, locations of cocoon production coincide with Administrative Areas that are listed above, minus al-Haffeh (Latakia) and plus Tal Kalakh (Homs), Banias (Tartous), and Jableh (Latakia).

Between 1997 and 2005, trials to produce cocoons were conducted in other Administrative Areas and had failed. Those Areas are Sfiera (Aleppo) and al-Sweida city (Governorate al-Sweida) (Annexes III and V)

d) Equipment

Rearing equipment used in Syria in 2009 are:

- Sufficient suitable rearing space:

o Special conditions should be met for a space to qualify for rearing silkworms. It should be clean, dry, bright, airy, and the temperature must be constant (Kalter, Pavoloi & Zerrnickel 1992: 203).

o Providing insufficient space would lead to overcrowding the worms, therefore increasing temperature and humidity levels, where one that is too big would result in losing mulberry foliage and increasing equipment and labor costs (Sayed, Mahmoud & Mejle' 1995: 44).

o The rearing space should have a suitable number of windows and doors so that it is not too cold for the silkworms, and be equipped with a heat source for use when needed.

o The silkworms should be protected from natural predators: holes through which mice might enter should be closed, nets should be placed on the windows against birds and the floor should be sprayed with limestone against ants (Sayed, Mahmoud & Mejle' 1995: 35).

o Out of the 28 surveyed families of cocoon cultivators in 2009, 19 (68%) reared silkworms

* (Unpublished data from the Department of Silk, the Ministry of Agriculture and Agricultural Reform).

inside their private homes. An average of 53 square meters were allocated to rearing per family in the spring period and the average area allocated to rearing one carton (11.7 g; 22,000 silkworm eggs) was 28 square meters; mostly spread over two rooms.

- Cleaning materials to prepare the rearing space, including sterilizers and limestone.

- A thermometer and a hygrometer to watch for suitable heat and humidity levels in the rearing environment (those were used by 50% of the surveyed cocoon cultivators in 2009).

- A light source: for use to persuade the worms to eat more when needed.

- Something for the silkworms to lay on, which could be either or a combination of:

o Trays locally made of cow dung, straw and water, called kreinat [كرينات]. To make these trays (not necessarily by the same people who raise the worms): fresh cow dung is collected and melded with straw and water, the mixture is gathered in balls and spread into circles, the sides of the circles are pulled up to bound the flat mass inside, then the trays are left to dry in the sun, giving a final product that is stiff and not easily breakable*. This craft has disappeared today, but 13 out of the 28 surveyed families (46%) either used their old trays, the singular of which is also called Tafoura [طافورة]**, or ones they have obtained from other families who had quit cocoon production.

o Styrofoam boxes: the use of which is relatively new. (They were used by 5 of the surveyed families).

o Straw mats placed on the ground and mostly covered with grass (21 out of 28 surveyed families (75%) reared silkworms on the ground, either alone or combined with other means).

o Rearing stands with shelves: The shelves are normally 60 centimeters apart and their sizes are large so as to keep the silkworms reachable for feeding***. Wooden frames are placed on them and get either padded with straw [*qashaq* قشق] or wired nets. Hole sizes of those nets differ depending on worm sizes that are meant to be reared on them (which differ by age). 22 of the surveyed families used rearing stands either alone or combined with other means and two of those used wooden trays without stands; placing them on the ground.

o The most used equipment combination by the surveyed families is 'stands, wooden trays, on ground and kreinat', which was used by 7 families, followed by 'stands, wooden trays, on ground' (by 6 families) (see survey in Annex I).

- A saw to cut mulberry branches (of foreign varieties).

- Bags to carry leaves into the rearing space.

- A sharp knife for chopping the leaves for the worms during their young ages.

- Potentially a vehicle to transport the leaves. (Sixteen of the surveyed families employed a car fully or partially during the rearing periods).

* Interview with Manal Sha'ban on 9 July 2009
** Interview with Issa Deeb on 13 October 2009
*** Interview with Muhammad Sa'oud on 16 May 2009

- Mountages that the silkworms could climb onto in order to start spinning cocoons.

o The reelability of cocoons decreases and the quantity of double cocoons and floss silk increases if the quality of employed mountages is not good (Sayed, Mahmoud & Mejle' 1995: 28-34).

o The more spaces there are in a mountage, the bigger, cleaner and nicer the cocoons spun on it would be, and therefore the more value the product will be worth (interview with Manal Sha'ban on 9 July 2009).

o Two types of mountages are used in Syria. Natural ones [*sheeh* شيح], which are made of various available shrubs and branches, plus plastic ones [*sheeh sina'i* شيح صناعي].

o The natural mountages are made in the following manner: Dry branches are collected and tied together into a shape closest possible to a cylinder. Leaves that might get into the cocoons while being spun by the silkworms on the mountage are removed (interview with Manal Sha'ban on 9 July 2009).

o 22 of the surveyed families employed natural mountages, four of them plastic ones and two used both types.

- Bags for the cocoon yield.

- Storage space for tools till the next rearing season.

While piled cocoons sit ready for reeling (background), others wait to be collected off of the mountages that were climbed earlier by the silkworms to spin silk. Most Syrian farmers use natural mountages (picture on p. 2) in contrast with plastic ones shown above.

e) Trend analysis

The production trend of cocoons in Syria has changed between 1979 and 2008 with rates that are as low as -66% and as high as 123%, added to a general moderately steep decline (figure no. 3 and Annex III).

As mentioned before, the crop of cocoons is very sensitive to poor climatic conditions, silkworm epidemics and deficient care. However, those reasons alone are not enough to justify the steep decline in production.

Reasons will be discussed in two sets. The first includes those behind the general decline in production, while the second investigates reasons behind major drops within the period 1979-2008.

The first set is thoroughly investigated in the problem analysis of cocoon cultivation in Syria (see 'Problem analysis for cocoon cultivation'; p. 38), while the second follows.

As noticed in figure no. 3, major declines in production took place in the years 1987, 1993, 1996, 2001 and 2006. By an analysis of several available data and conducting interviews, the following explanations were reached:

- By calculating the cocoon yield per carton in 1979-2008 using available data on the amount of cocoon production and numbers of subscriptions on silkworm egg cartons by the Ministry of Agriculture and Agricultural Reform, it is clear that the reason behind major decreases in production in the years 1987 and 1993 (by 46% and 41% consecutively) is the low cocoon yield per carton (Annex IV). It is speculated that disease of the worms or poor weather conditions have been the reason behind that low production rate.

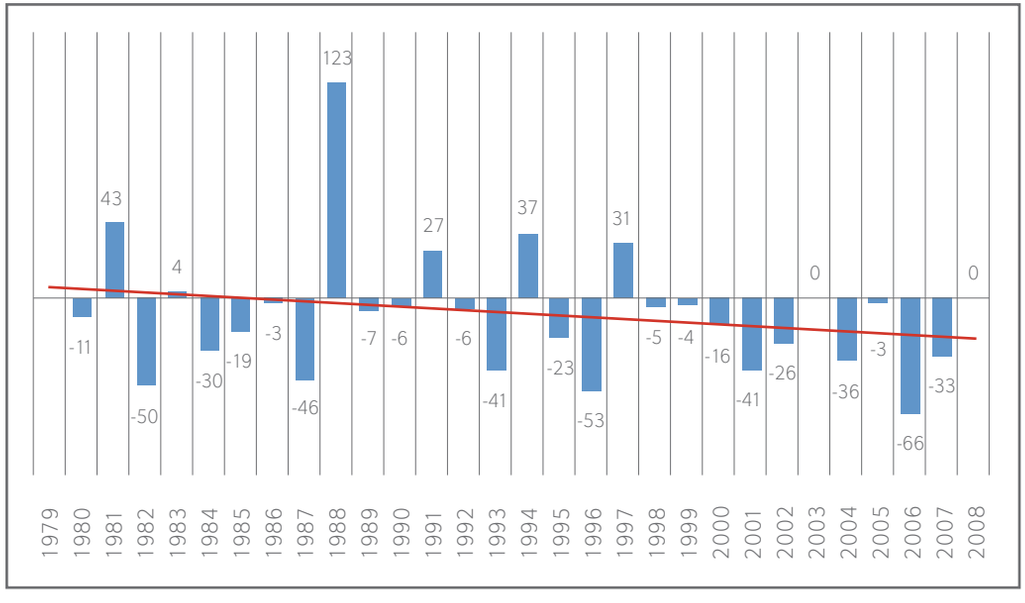


Figure 3: Change in cocoon production in 1979-2008 (percentages)

- For the years 1996 and 2001, the decrease of cocoon production (by 53% and 41% consecutively) goes in line with lower registration rates on silkworm egg cartons by farmers (those down by 48% and 43% consecutively) and there is no clear reason for this phenomenon. A general shift to planting tobacco instead of rearing silkworms for extra income is speculated.

- In 2006, the drop in both cocoon production (by 66%) and the registration rate over silkworm egg cartons (by 61%) is due to a setback towards the farmers, which happened in 2005:

In that year, the Ministry of Agriculture and Agricultural Reform was late in delivering silkworm egg cartons for more than 15 days for the spring rearing period, therefore missing availability time of young tender mulberry leaves that are suitable for feeding the young silkworms. As a result, many farmers refused to receive the amounts they had earlier subscribed on (a total of 42 cartons) and 50 of the received cartons did not give any yield that season. The Ministry insisted on getting paid for both the un-received cartons and those that did not give yield despite a recommendation from a committee that was formed based on Tartous Governor decision no. /3695/T, dated 5 November 2006, to refund the farmers for what they have paid for silkworm egg cartons that season. This incident has been the quitting verge for many farmers (interview with Shafiq Othman on 10 July 2009).

Market

In 2009, all cocoon production was sold in Syria and none got exported.

The internal selling options for cocoon cultivators are either to sell the production to manual reelers (also to silk reeling factories prior to mid 2008), to get it reeled for a fee and receive it back in the form of unprocessed silk yarn, or to reel it themselves.

Cocoon yields are normally sold in bulks whose prices vary a little by quality. In 2009, all selling activity happened directly from producer to consumer and the quality got inspected only visually.

When private factories operated, some used to send agents out to buy cocoons from the farmers (interview with Shafiq Othman on 8 August 2009) and a committee at the public factory assessed the quality of purchased cocoons. Now that all the factories are closed, the only way to process cocoon production is through the traditional method of using the Arab wheel. Production of silk yarn with this method has gone through the following phases: it was used to process almost all the local cocoon yield prior to 1860 (Firro 1990: 154), around 35-40% of it before 1945 (interview with Shafiq Othman on 8 August 2009), 5% of it in both 2000 and 2003 (Sa'oud et al. 2000a: 59, 96; Sa'ied 2003), and100% of the production in 2009.

Silkworms live through five ages, each followed by a fasting period and a casting of a worm's skin. Those ages hold traditional names that reflect the worms' physical characteristics. The first one (pictured) is called [al-bizreh البزرة] (the seed).

The mulberry silk moth, Bombyx mori, undergoes a complete metamorphosis: an embryo forms inside an egg. Second, a caterpillar that is famously called the silkworm hatches from it. Third is the pupa stage, in which the larva develops inside a cocoon (above). And finally, the adult moth emerges from the cocoon, mates, lays eggs if female and dies shortly after.

In the picture below, the male moth is on the right side

Produced cocoons could be split in two categories, cocoons that are suitable for reeling and waste silk, which mainly includes the outer layer of cocoons, called silk floss [***mashaqa*** مشاقة] and ones that are not suitable for reeling, or 'defective cocoons'.

Sa'oud et al. (2000: 82) estimates production in Syria per silkworm egg carton (which weighs about 12 grams) at 32 kg of reelable cocoons and 3 kg of defective ones.

Defective cocoons include double ones [***bgheileh*** بغيلة], which were made by two worms spinning together, those from which the adult moth has emerged, and those which got partially physically damaged by any reason. Today, the produced quantity of waste silk is too small to do anything with and gets mostly thrown away by traditional reelers (interviews with Mohammad Sa'oud on 1 June 2009 and Hourieh Hasan on 20 August 2009).

As for export:

In 1840, three quarters of the produced quantity of cocoons was consumed by the local market and the rest was exported to Europe. By 1873, more than 40% of Syrian-produced cocoons reached France, which rose to 90% by the early 1900s (Firro 1990: 154; Labaki 1984: 28).

A portion of cocoons was still exported to Europe and especially France in 1920-1940 (Sa'oud et al. 2000a: 120).

Available foreign trade statistics by the Syrian Central Bureau of Statistics show that production was consumed locally between 1990 and 2006 (except for a few years, where most of it was exported) (Annex VII).

Floss silk was exported by the As'ad and Othman factory on behalf of all of the reeling factories and the remaining silk waste was re-sold by the factories to hand-spinners (interview with Shafiq Othman on 8 August 2009).

It should be mentioned that cocoon cultivation has two useful by-products: excess mulberry foliage, which has been investigated under the section 'Syria's cocoon Industry in 2009: Raw materials: White mulberry trees' (p. 14), in addition to the waste of silkworms combined with the leaves they have left behind while eating, which make a valuable fertilizer.

Reeling is a process in which filaments from different cocoons get unwound and combined to form one continuous strand. The thickness of the emerging thread depends on the number of employed filaments.

Each filament measures 500-1500 meters in length (FAO 2009), making silk strong enough to have been used in the manufacture of parachutes (Gillow & Sentence 1999: 30).

Syria's reeling craft in 2009

Filature or "silk reeling" is the process in which the pupa of the silkworm moth is killed, the hardened filaments of the cocoon are softened with heat so that they could be unwound and single filaments are combined with a slight twist into one silk strand (FAO 2009).

In 1964, six reeling factories operated in Syria along with the practice of manual reeling by farmers.

In 2009, the last of those factories closed, making the craft of silk reeling on the traditional primitive machine called the Arab wheel [***doulab arabi*** دولاب عربي], the only remaining way of producing silk yarn locally.

The silk reeling craft will be investigated in this section, in addition to related yarn-processing crafts that follow it, which are re-reeling and throwing.

Re-reeling [***mawsara/ mawsra*** موسَرة/ موسُرة] is the transfer of silk skeins [***shelleh/ khesleh*** خصلة/ شلّة] reeled with the Arab wheel onto small spools, while throwing is to combine [***qaren*** قرن] and twist [***barem*** برم], or only twist the emerging threads in order to create strands that are strong enough for use in weaving or crocheting.

Different types of silk yarn are produced depending on employed twisting and combining methods:

- Yarn that is used for crocheting ***[kharej*** خرِج] is obtained by twisting single threads in one direction, then combining the group and twisting it in the opposite direction.

- The one used for hand-weaving is produced by only twisting individual threads in one direction.

Most locals use the term spinning [***ghazil*** غزل] not only for the activity of spinning waste silk on a spindle [***maghzal*** مغزل], but also for throwing. However, they do differentiate between them when asked in detail.

After the thread that had been thrown using a spindle is ready, it gets transferred onto spools. In order to do this, it gets re-reeled again using a method called [***maswara 'at-tayyar*** موسرة ع الطّيّار], which is only slightly different from previously performed re-reeling [***mawsara*** موسرة].

Used equipment will be further investigated in the section 'Syria's reeling craft in 2009: Raw silk production: Equipment', p. 29.

Silk yarn that is manually reeled could be referred to as masloubeh [مسلوبة], which is the same term used to describe the traditional shawl made with the same material.

For Syria's silk reeling craft (and the thread processing crafts associated with it) in 2009, information about its producers, production and market follows, in addition to that on the raw materials and equipment it employs.

Silk yarn production by factories and the hand-spinning of waste silk, which used to exist in Syria as economic activities prior to 2009, are briefly investigated in Annexes VI and VIII.

Raw Materials

The raw material consumed by the silk reeling craft is cocoons that are suitable for reeling. However, out of the defective cocoons that are not suitable for it, the double ones that were formed by two silkworms spinning in the same direction could be reeled by a skilled reeler on the Arab wheel.

This raw material is very delicate in terms of time because, first, silkworms undergo metamorphosis and emerge as adults from their cocoons after about three weeks from the start of spinning (Cotton 1996), therefore destroying them. And second, the later cocoon harvesting is performed, the lighter they become and therefore the less value they give (Sayed, Mahmoud & Mejle' 1995: 50-51).

In 2009, cocoons got purchased fresh in Syria. After that, they either got dried by the buyer in order to get rid of the time factor, or quickly reeled.

Available foreign trade records from the Central Bureau of Statistics for the years 1990-2006 show that no cocoons were imported during that period, meaning that only locally produced ones were employed in the silk reeling craft.

It should be noted that a family may be involved in both cocoon cultivation and silk reeling; performing vertical integration in silk production.

Furthermore, raw silk produced by the reeling craft constitutes the main raw material for the related re-reeling and throwing crafts.

Profile of producers

Manual reeling and other yarn processing crafts were cottage industries in 2009. Manual reeling was practiced by two families and one non-family business, while the knowledge of throwing and re-reeling was widely available amongst women but hard to quantify.

The Arab wheel needs two persons to run it at any given time, one at the pot of boiling cocoons and the other at the wheel on which silk yarn gets collected. Normally, men take charge of reeling, while both men and women turn the big wheel, and if the to-be-processed cocoons have not been dried, family members take turns, working day and night, in order to process them before they get ruined.

Skeins of unprocessed silk yarn are normally sold to families who wish to create final fabric

In Beit al-Hajj, Tartous, 80 year old Abu Mohammad, aided by a young villager, uses the traditional Arab Wheel [doulab arabi دولاب عربي] to reel silk.

The Arab Wheel mainly consists of a pot to boil cocoons, an end to collect reeled filaments and a big wheel to gather reeled silk yarn.

Because of Yusef Muhammad's family choice not to dry the cocoons they have at hand, they have to take turns (working day and night) to finish reeling before the silkworm moths emerge and destroy the crop.

products, and those families, or the people they employ if the workload is large, further process the yarn to make it usable for handloom weaving or crocheting.

Raw silk production

Production of manually reeled raw silk will be expressed in terms of quantity, quality, geographical distribution and equipment.

This activity is thought to have been present since cocoons were first produced in the region, even when industrial reeling alternatives were available. However, there is not enough data to analyze its production trend.

a) Quantity

One kilogram of raw silk could be obtained from every 6 to 8 kilograms of cocoons via the Arab wheel (interview with Mohammad Sa'oud, reeler, on 16 May 2009; Sa'oud et al. 2000a: 97-8). Therefore, the estimated quantity of raw silk production on the Arab wheel in 2009 is 400 kg.

Until the mid-1800s, most of raw silk produced in the region had been reeled locally using traditional methods (Firro 1990: 160), and in 1911-1912, about 85,000 kg of manually reeled silk yarn were produced in Syria at least (Labaki 1984: 165-6; conversion unit from oke to kg: Sizes, Inc. 2001).

b) Quality

Only factories are able to produce silk yarn with standardized measurements (the unit of measurement for silk is denier).

Yarn produced via the Arab wheel consumes between 40-60 cocoons at a given time and measures about 100 denier (al-Atrash 1996: 83; Othman & Othman 2006: 2-4; interview with Shafiq Othman on 8 August 2009). However, because there is no set number of cocoons consumed by the thread at any given time, its diameter is uneven along its length, and therefore it could only be processed on a handloom or with hooks, and not using an automatic machine.

Different qualities of raw silk are available on the market, which get mostly visually inspected by the experienced consumers, demanding prices that slightly differ.

The silk reeling process, especially cooking methods and the quality of reeling water counts for 30% of the quality of reeled yarn, added to the quality of employed cocoons and the employed drying methods (Sayed, Mahmoud & Mejle' 1995: 58; Lee 1999).

c) Geographical distribution

In Syria in 2009, two Arab wheels were operated by families in the village of Deir Mama, Mesyaf (reeling fresh cocoons) and a third by a non-family business in the village of Beit al-Hajj (Dahir Rajab), Tartous. The third operates year round as long as there are cocoons to process, and is attached to a cocoon drying room.

In 2009, only one business dried its cocoons before turning them into thread. This act makes them harder to reel but gets rid of the crucial time factor in the industry.

In 2003, Arab wheels were operated in Deir Mama (Mesyaf) and Wadi al-Qale' (Jableh) (Sa'ied 2003), plus ones in al-Bahlouliyeh (Latakia) in the year 2000 (Sa'oud et al. 2000a: 95).

As for re-reeling and throwing silk yarn, the knowledge exists among women residing in villages where cocoons are produced today. However, the utilization of this knowledge depends upon demand on final fabric products

d) Equipment

The following equipment are totally or partially employed in silk reeling and the re-reeling and throwing crafts associated with it:

- Storage place for fresh or dried cocoons.

- Drying room for cocoons, in which hot air is primitively used (only one of the three reelers in 2009 had one).

Extracting yarn from cocoons is not just enough, the resulting silk threads need to be twisted alone or twisted and combined with others to become employable in creating fabrics. Women do those tasks using a spindle.

- The Arab wheel, a primitive machine closest to a 'sitting type reeling machine' as described in the Silk Reeling and Testing Manual, published by the Food and Agriculture Organization (FAO) (Lee 1999):

o The Arab wheel mainly consists of a caldron to boil cocoons, in order to release the sticky sericin on the outside and soften the gum that binds the filaments together (Cotton 1996; Gillow & Sentence 1999: 30), a movement axis, picking ends of reeled thread, bobbins, hooks, a traverse guider and finally a big wheel (a hexagon with a circumference of six meters and with six arms, called doors, one of which is movable, called a door) (interview with Eid al-Hasan, a reeler, on 20 August 2009).

o Either gas or wood are used to produce the necessary heat to boil the cocoons, and

o a rod called Manfad [منفض]* is utilized to pull out the beginnings of silk filaments from cocoons in the boiling pot.

- The wheel, also called the mawsara wheel [*al-doulab/ doulab al-mawsara* دولاب الموسرة/ الدولاب]. This tool consists of a wheel, a handle, and a rod on which spools are placed, and is used for:

o Transferring silk skeins that were reeled on the Arab wheel onto small portable spools (the process of mawsara).

o Transferring thrown silk yarn off of spindles onto spools (the process of mawsara at-tayyar).

- Spools [*masoura* ماسورة]: canes on which silk yarn is wrapped.

- Spindle [*maghzal* مغزل]: used for combining and twisting.

- Niddy-noddy [*meselkeh* مسِلكِة]: a wooden bar used to make small loose skeins from silk yarn on spindles.

- Skein winder [*al-tayyar* الطيّار]: a four legged table-like tool (without top) that is rotatable around an axis. Small skeins of silk yarn obtained after removal from the meselkeh are placed on it in order to transfer them onto spools using the wheel [*al-doulab* الدولاب].

Market

Raw thread that is reeled with the Arab wheel is hardly marketed. If craftsmen do not urgently need the money from selling the yarn, they prefer to keep it and make use of the added value of selling a finalized fabric product.

When sold, the yarn is handed to consumers in the form of skeins, which get processed later (via re-reeling and throwing) to create silk thread that is usable in the creation of fabrics.

In 2009, manually reeled raw silk was mostly employed in the production of hand-woven and knitted fabrics by the families of reelers and their relatives or fellow villagers, and none of it got exported. (More under the section 'Silk fabric-making crafts in 2009: Profile of producers', p. 35).

Scarce data is available on the production trend of raw thread via the Arab wheel, especially when local reeling plants were widely in operation. This data points that until the mid-1800s, raw silk produced with the Arab wheel was sold to Damascus, Aleppo, Homs and Hama for the local weaving industries, or Beirut and Tripoli for export (Firro 1990: 160) and that in 1911-1912, 84,645 kg of silk yarn produced with the Arab wheel were employed to make local fabrics in Syria and Lebanon (Labaki 1984: 117-9, 165-6; conversion unit from oke to kg: Sizes, Inc. 2001).

In the 19th century, that type of yarn constituted 59% of all silk yarn that was needed to produce local fabrics in Syria and Lebanon. The rest was either locally produced via mechanical reeling or imported (Labaki 1984: 165-6; al-Atrash 1996: 67).

The by-products of manual silk reeling are the dead pupae, which could be used as a natural fertilizer or to feed fish (Sa'oud et al. 2000a: 119) and waste silk, which could be hand-spun. However, the available quantity of waste silk in recent years up to 2009 was not sufficient to sustain this practice as an economic activity.

* Interview with Mohammad Saoud on 15 November 2010.

In re-reeling [mawsara موسرة], a silk skein is wrapped around two barrels on the floor and the tip of its thread is passed through a hook-like metal piece fixed to the ceiling. Using a small wheel, the thread gets conveyed onto small spools.

Syria's silk fabric-making crafts in 2009

The silk fabrics referred to in this section are those which have been made with 'pure Syrian silk', meaning that they have been created using silk yarn that has been produced within Syria's boundaries, and with cocoons cultivated on Syrian land.

Furthermore, this chapter investigates silk fabric production using raw silk only, as hand-spun silk production in Syria has gotten lower and lower over the years and was marginal in 2009. However, fabric production using hand spun-silk is briefly investigated in Annex VIII.

The most famous and mostly produced 'pure Syrian silk fabric product' today is the mandil [المنديل], which is also referred to as the masloubeh [المسلوبة] (with the same name of manually reeled silk yarn).

This is a large shawl that is traditional to wear in coastal areas and mountainous ones near the coast. It consists of two woven fabric pieces, each called a fajj [فَج] and about 35*175 cm in size (al-Atrash 1996: 83); crocheted together along their length and on the edges [*dayrah* دايرة].

After the masloubeh is woven and crocheted, it is boiled in hot water and soap to further remove the sticky sericin coat off of silk and make it soft. The fabric is boiled for 1.5 to 2 hours depending on the thickness of the utilized silk yarn (which in turn depends on the number of cocoon filaments that went into its making). In the past, women used to boil silk using ashes to soften it. Nowadays, they use the kind of soap available on the market for manual washing machines (interview with Mohammad Sa'oud on 19 December 2009).

Some of the masloubeh shawls are dyed with a yellow dye called sfeira [صفيرة], in which the kerchief gets dipped then directly squeezed, so that it only acquires a light yellow shade (Othman & Othman 2006: 6). However, most produced shawls get left to their natural off-white color.

The silk fabric-making crafts are those of weaving and crocheting [*kharej* خَرِج]. In the following paragraphs, raw materials employed in them will be investigated as well as their producing community, production and market.

Raw Materials

The majority of craftsmen and women who produced silk handmade fabrics in 2009 used traditionally reeled silk yarn in Syria, while a very limited number used imported natural silk yarn in addition to it.

Locally produced silk yarn has recently been in high demand because most of its producers prefer to turn it into a finalized fabric product either on their own or by outsourcing some parts of the production chain to their family friends. Their second-preferred option would be to sell it to their relatives.

Story in a box no. 2: The process of silk-making

A garment of silk that you may see someone wearing or pick from a store's shelf has changed a lot to reach the stage in which you've met it.

It started as being hundreds of hungry silkworms eating white mulberry leaves voraciously. The worms are dependent upon humans and require their delicate care. About a month after they hatch from their eggs, and after their weight has incresed about 10,000 times, the silkworms wrap themselves in cocoons to spend the larva stage of their lifecycle before turning into moths.

It is then that cocoons are unraveled into filaments that are often as long as 1,500 m and a little thicker than filaments produced by spiders. Skilled reelers join those filaments to produce beautiful strong silk yarn, which is later twisted to make it even stronger and most of the time died in different colors. Now, this natural thread is ready for use in the creation of fabrics.

Traditional silk shawls [masloubeh مسلوبة] are made by crocheting two pieces of woven fabric together at their selvedges then on their edges. Each of those is done with a plain weave in which weft thread passes over warp thread, under one, over one... and so on.

In 2009, all of the weavers who used Syrian produced silk yarn operated on a pit loom and all were men. The loom is not hard to replicate and is built into the ground.

It is thought that until very recently, traditionally reeled raw silk in Syria had always been the raw material used in the production of traditional silk fabrics that are still on the market today. However, there is lack of data that differentiates production of traditional fabrics based on fabric type to back this assumption.

Profile of producers

In 2009, weaving of silk by hand was practiced by three families (fathers and their sons).

The knowledge of the crocheting craft is widely available in villages where cocoons were cultivated in 2009. However, its practice depends upon demand on final fabric products.

About a third of the surveyed families who cultivated cocoons in 2009 (Annex I) practice crocheting.

After the production of the fabric, it gets further processed by women, who boil it in soap and water to make it soft and potentially dye it and apply primitive tailoring work to it.

Silk fabrics' production

Production will be presented in terms of quantity, quality, geographical distribution and equipment. Analysis of the production trend, which has generally run in decline, will be presented through the problem analysis of the silk fabric-making crafts.

a) Quantity and quality

Thirty kilograms of raw silk could be employed to make about one hundred mandil or masloubeh shawls, as estimated by Mohammad Sa'oud, a reeler and weaver whose family has been in the business for four generations at least (interviews on 16 May and 19 December 2009).

Production in 2009 is hard to quantify because the great majority of craftsmen and women do not run their crafts as businesses; not keeping records of production and sales. However, using available production figures, it could be calculated that if the whole cocoon yield of 2009 was employed to create shawls of the masloubeh type, around a thousand would be produced.

A general decline in production is assessed based on interviews with the producers in 2009, the observed decline in consumption of silk-made traditional fabrics and the decrease in the number of villages in which the fabrics are produced (see 'Geographical distribution' right next).

As for quality, there are different qualities available on the market, which are dependent on the skill of the different weavers and the women who crochet, and the quality could be visually inspected.

The richness of religious symbols at the right side of reeler and weaver Mohammad Sa'oud is a sign of tolerance.

b) Geographical distribution

Two of the families who practiced silk weaving on a handloom in 2009 lived in the village of Deir Mama, in the Administrative Area of Mesyaf and one in the city of Mesyaf, Hama Governorate.

The surveyed cocoon cultivators in 2009 who also practiced crocheting live in the villages of Deir Mama, Mesyaf (Hama), and Deirouneh, al-Dreikish (Tartous).

According to Sa'oud et al., in 2000, the masloubeh was produced in Deir Mama (Mesyaf), Wadi al-Qale' (Jableh), and al-Bahlawiyeh, 'Ein al-Beida, al-Shamieh and Dam-Sarkho (Latakia) (2000b: 39).

c) Equipment

Weavers operate on a handloom, producing a plain weave (in which weft thread passes over warp thread, under one, over one... etc), while the only needed equipment for crocheting is a hook.

Equipment for silk fabric-making crafts is differentiated from that used for cocoon cultivation and reeling.

While cocoon cultivation mainly needs land, labor services and raw materials, and silk reeling and weaving mainly need raw materials, and labor services in addition to machinery, The creation of final fabric products (through crocheting and tailoring) needs the previously produced raw materials, which are silk yarn, woven silk textile or both, labor services and 'the entrepreneur', which is the key component to successfully sell the final product.

Market

In 2009, fabrics were sold directly from producer to consumer, except for a few cases, in which a retail store or a mediator was involved. There was a slight organized sales activity (including selling to stores), and some craftsmen and women participated in a few exhibitions and fairs.

Traditional consumers from Sqeilbieh and Sahl al-Ghab still purchased the mandil/masloubeh in 2009 (interview with Mohammad Sa'oud on 16 May 2009), while new consumers (locals and foreigners) heard about production mostly by word of mouth.

Recent governmental and non-governmental initiatives to save the silk craft

The threat for the Syrian silk craft to disappear has not gone unnoticed, as governmental bodies, non-governmental organizations and individuals have all carried recent efforts to save it.

Some of those efforts form part of the status quo of the craft and some lay margins for future conduct. The most important ones are:

In 2008, the Syrian Council of Ministers took a decision (Memo no. 8716/1, dated 8 October 2008) to:

- Protect the silk industry as a craft and not as an industrial activity.

- Exempt all crafts and businesses that use local silk yarn from tax on profits.

- Subsidize cocoon crops with 250 SYP for every produced kilogram of fresh cocoons in 2009-2013; to be implemented by the Ministry of Agriculture and Agricultural Reform. This subsidy equals 100 percent of the cocoons' price on the market in 2008.

- Reel silk yarn for farmers for free.

- Allocate shops in the crafts' markets that are operated by the Ministry of Tourism to craftsmen who make silk products using local silk yarn.

As for efforts by the Ministry of Agriculture and Agricultural Reform:

- It started to issue the subsidy to farmers who produced cocoons in 2009 , (regardless of the quality of production and only based on quantity).

- It has been raising silkworms for farmers for the duration of the first three critical ages since 2006; reducing the number of days that they have to tend the worms in from 34 to 17.

- It is planning to reel for farmers for free (either with a small machine or using the shut down public factory again).

- The Department of Silk at the Ministry gives consultation to farmers on rearing.

- Government nurseries sell white mulberry seedlings of foreign varieties for very cheap prices.

The Ministry of Tourism made several announcements for a vacant spot on the crafts' market of Khan Rostom Basha in Hama, and did not receive applications from a silk producer until July 2010 (interview with Samer Sayyaleh, Ministry of Tourism, on 1 August 2010) for the same marketing reasons discussed in the problem analysis (see 'Problem analysis for silk fabric-making crafts', p. 44).

Two Microcredit projects targeted at current and potential future cocoon cultivators were started in 2009 by the Women's and Farmer's Unions in the villages of al-Dreikish and Deir Mama (Tartous and Hama consecutively) and are still running. Those projects are funded by the Small Grants Program- the Global Environment Facility.

There have also been minor efforts by locals and foreigners alike, to help craftsmen and women in advertising and getting more access to markets.

As obvious, the decision to reel for farmers for free, whose application started in 2010, poses a major threat to the existence of the silk reeling craft. Furthermore, many farmers are not interested in getting their cocoons turned into silk yarn and given back to them. They just want to sell their cocoon product for profit to the next community part of the production chain.

Many farmers prefer to use native white mulberries [*tut baladi* توت بلدي] to the foreign ones [*ajnabi* أجنبي] distributed by the Ministry of Agriculture for cheap prices, saying that the first variety gives better foliage yields. And some who have planted foreign mulberries have grafted them with the native type.

The approach of giving microcredit loans is also debatable because rearing cocoons is a cottage industry that does not need much capital and the best target group to approach is that of farmers who had recently quit rearing and who still own mulberry trees, rather than potential new cultivators who are attracted by the subsidy.

* As a result of this subsidy, cocoon production increased from 2,374 kg in 2009 to 3,830 kg in 2010 (3,600 kg in the spring period and 230 in the summer period) (interview with Mu'in Sleiman on 12 October 2010).

Story in a box no. 3: Entrepreneur

Businessman Ismail al-Hajj started a silk business in 2005 and is now experimenting with traditional practices to get more value for work. One of his adopted techniques is the use of plastic mountages (right) instead of traditional ones made with dry branches.

Villages that surround the city of al-Dreikish have produced 1,544 kg of cocoons in the spring rearing period of 2009, which amounted to 73% of Syria's production then.

Those villages used to sell their cocoon crops to the public factory or one of the operating private ones, but in the spring of 2009, they sold their yields to a private businessman from Tartous.

Ismail al-Hajj Mou'alla runs a small farm of vegetables,citrons, fruit-bearing trees, poultry and cows in the village of Beit al-Hajj (Dahir Rajab); his home town, located close to the city of Tartous. He is also a government employee, and is starting a silk business.

Al-Hajj began cultivating cocoons in 2006. After getting upset with the purchasing portal of the public reeling factory, he decided to reel his cocoon crop and turn it into finalized products on his own.

Accordingly, he has raised silkworms every year since, over the three rearing periods (spring, summer and autumn; as silkworm eggs had been available).

Today, Al-Hajj has an equipped silkworm rearing house of 180 square meters that is dedicated to the business year-round and that includes space to rear silkworms, a cocoon drying room and a storage room.

Furthermore, he has about 0.1 hectares of white mulberries of the native variety, has planted 0.2 hectares with those of foreign varieties, and is grafting them with native ones to enhance their foliage yield.

The four employees who run his farm also operate the cocoon cultivation and silk reeling businesses.

He reels silk yarn using a traditional Arab wheel, which has been copied from one in the village of Deir Mama, and an 80 year old man (Abu Muhammad; pictured on p. 27) who had quit the craft for 30 years started reeling silk for him with the aid of one employee.

On my second visit to the farm (the first was on 1 June and the second on 8 August 2009), I saw that the old man was replaced by one of the young workers, and the employee who was turning the big wheel, with a small motor.

Ismail al-Hajj is determined to carry on till the end. "I will turn the yarn into lingeré with the help of my talented mother," he says with a smile .

This businessman is of the type that does not view competition as bad, is willing to teach others, and has a vision to enter the market.

He has already created demand on the whole cocoon production of al-Dreikish area in the spring of 2009 and portrays the kind of private business entrepreneur who will contribute to saving Syrian silk if his business ran successfully.

Key intervention areas to save the Syrian silk craft are to encourage other businesses to join the front and help everyone in the design of products, in marketing and in distribution.

Problem Analysis

I used the Problem Tree approach to present problems facing each of the silk reeling and fabric-making crafts, plus cocoon cultivation in Syria, as analyzed at the end of 2009, in addition to clarifying interrelations between them.

Because this approach does not signify the different levels of threat posed by each problem, I will elaborate below on most of them, in addition to clarifying why some ones were not listed in the Problem Trees.

Three separate Problem Trees will be presented, followed by one that integrates them, signifying that without tackling the root problems that face silk fabric-making crafts; demand on cocoons could not be generated as to sustain cocoon cultivation in Syria.

Problem analysis for cocoon cultivation

Factors behind the vanishing of cocoon rearing in Syria have been categorized under two groups:

The first is economic: farmers do not find cocoon cultivation a profitable enough activity in contrast with the effort it requires.

The second is psychological: they are losing hope that the conditions of their cocoon rearing businesses will get better in the future.

A. The economic factor

Cocoons are a labor intensive crop, mainly because silkworms consume a lot of food, especially during their last ages.

They are a crop with a high risk factor:

- Silkworms need much care.

- If they get infected with a disease, signs might not show on them until it is time for spinning, which means that a family whose crop had been infected at early stages would still spend the same effort it would have spent on a healthy crop, but without getting rewarded at the end.

- Different factors may affect the size of cocoon yield per silkworm egg carton, including the quality and species of silkworm eggs. the quality of the rearing environment (heat, humidity, food, space and cleanliness), growing disease free and receiving proper care.

- The cocoon yield per carton differs between years, and even within the same year between different families.

- Examples of bad practices by farmers, leading to smaller yield per carton are improper cleaning. poor observance of suitable heat levels, rearing more silkworms than space allows for and infecting them with insect killers or pesticides by mistake.

- Those practices are most common among new comers to the business and result from little circulation of information amongst cocoon cultivators, the absence of a network between them and the lack of academic knowledge of the practice (sericulture) whether by the farmers themselves, or the governmental body responsible for providing them with advice, which is the Department of Silk at the Ministry of Agriculture and Agricultural Reform.

On social and environmental aspects of cocoon cultivation:

- Rearing mostly takes place in private homes.

No single problem is behind the decline of cocoon cultivation in Syria and the lack of mulberry trees as a reason is a myth.

Figure 4: Problem Tree for cocoon cultivation

- Families leave space for the silkworms in the warm rooms inside and sleep outside for about two weeks every cultivation season.

- Silkworms require more space as they grow older.

- The size of the required space depends on the primitiveness of used equipment. For example, rearing silkworms in one layer on the floor requires more space than if multilayered stands are used.

The preformed survey (Annex I) shows that families who reared cocoons in 2009 allocated 28 square meters of space for each reared carton on average; mostly spread over two big rooms.

In the Governorates of Hama, Latakia and Tartous, where cocoons have been reared on a large scale in the past, most houses were big, made of mud and soil and had thick walls.

They were occupied by large families, composed of parents, their children, and mostly the families of the married sons. This setting of living provided valuable working hand (including children) for rearing silkworms and the big houses helped clear home space for the silkworms when needed.

During the past century, both the social and architectural structures of these homes have changed as cement was employed instead of mud and soil to construct new ones in the place of those deteriorating and big houses were divided amongst children; mostly by inheritance after the death of the father. Cement houses are less suitable for rearing silkworms because of cement's heat transmission characteristics. Additionally, after splitting the big homes into smaller ones, smaller families identified more strictly with privately owned space and many became not ready to leave the comfort of their homes for the comparatively not very profitable cocoon crop.

As for availability of mulberry foliage that is good for rearing silkworms:

- The number of mulberry trees that formed the basis of silk production in Ottoman Syria is not clear and the estimate is around 43 million (Firro 1990: 152). However, the decrease of that number, at least during the second half of the 20th century, is certain.

- One statistic of mulberries in Ottoman Syria in 1900, which is thought not to have differentiated between the two types of local mulberries, shami and baladi (shami of which is not good for silkworm rearing), has mentioned the existence of 1,700,000 mulberries in Latakia in 1900 (Ducousso 1913: 117-8). Although the boundaries of the Sanjak of Latakia differ by a small margin from those of present-day Governorate of Latakia (World History at KMLA 2009; al-Naddaf Maps), this number could, to some extent, be compared with 17,700 trees present in the Governorate of Latakia in 2008 (Ministry of Agriculture and Agricultural Reform 1995-2009). And it is worth noticing that the drop between those two numbers is close to 99%.

- The decrease could be attributed to that of demand on cocoons (see 'Syrian silk: cultural and historical background', p. 9), the increase in planting citrons, apples and olives instead of mulberries (Firro 1990: 155; Sa'oud et al. 2000a: 63), shrinking sizes of land property due to inheritance and the expansion of the built environment at the expense of farms.

However, white mulberries remain widely available in areas where cocoons have been cultivated for at least three years between 1979 and 2008; namely, al-Dreikish, al-Sheikh Bader, Banias, Jableh, Latakia, Mesyaf, Safita, Tal Kalakh and Tartous (more in Annex II). Available data between 1994 and 2008 does not show serious deterioration in the number of mulberries and none of the interviewed farmers mentioned the lack or non-availability of mulberry foliage as a problem facing cocoon cultivation in Syria.

Normally, families who lack mulberry foliage for rearing either borrow it or buy it from others, both of which don't pose much difficulty.

Borrowing or purchasing foliage from others could add an extra transportation cost to the overall cost of rearing cocoons, especially if good leaves need to be brought from faraway places because nearby mulberries have been affected with pesticides.

Both recent statistics and the rates of borrowing and purchase of mulberry foliage from families who do not rear silkworms anymore reflect the existence of mulberry fields that are not well invested in by their owners. This pattern could change, should the estate value of these fields increase in the future.

The public silk reeling factory monopolized demand over cocoons almost completely between 1980 and 1993, and partially in 1994-2008.

- Hypothetical reasons for such act are that the factory operated with high fixed costs (having permanent employees) and had an annual production capacity of about 33,000 kg of raw silk (200,000 kg of cocoon) (Sa'oud et al. 2000a: 78). Being an automatic factory with high production capacity (see Annex VI). It needed to process an annual 420 ton of cocoons in order to generate profit (Syrian Council of Ministers, Memo no. 8716/1, dated 8 October 2008).

- In the absence of a national standard to classify cocoons based on quality, the measurement used by the Classification Committee at the factory to classify cocoons sold to it by farmers, and equally to determine at which price they would be purchased, was based on the personal experience of Committee members. This type of measurement created two potential defaults. First, it was possible for Committee members (or people behind them) to exploit the system; classifying cocoons as less worthy in order to get the money difference, and second, assuming the absolute integrity of the Classification Committee, the farmers could still doubt that the latter default had happened, that they were treated with injustice and that their crops were estimated less worthy than their real value.

- The prices paid by the public factory were set by the Higher Agricultural Council at the Council of Ministers and were not flexible to changes in the market (Ahmad & Khaddam 2009).

- When the private factories re-entered the scene, they did not pay more than the government's highest paid price (interview with Shafiq Othman on 10 July 2009).

The public factory closed mainly because it had functioned under high fixed production costs and had problems in selling its production starting in 1991 (Syrian Council of Ministers, Memo no. 8716/1, dated 8 October 2008) because of decline of quality, added to the decrease in local cocoon production, in contrast with the high potential production power of the factory (table no. 11; Annex VI).

After the shutdown of the last operating silk reeling factory in Syria in 2008 (the public one) and introducing the government subsidy in 2009, an additional set of problems arose:

Silk yarn is stiff after it's reeled and doesn't become soft until treated.

Traditionally, it used to be softened by boiling it with ash. Today, craftsmen and women have substituted that for the more practical washing powder of manual washing machines.

- Secured demand on cocoons by the public factory for years had meant that farmers did not have to market their cocoon crops, nor face the competition of imported silk yarn. Now, there is lack of marketing from farmers, added to lack of demand over cocoons.

- Those could be attributed to the lack of demand on final silk fabric products and the competition of foreign silk yarn; two problems that will be thoroughly investigated later.

- Furthermore, the quality blind governmental subsidy poses the threat of cocoon quality deterioration.

B. The psychological factor

One of the problems that led to the despair of many farmers and their quitting of cocoon cultivation is the classification system at the public factory, which made them feel that they have been treated with injustice.

Farmers have also received many unfulfilled promises of help from the government, all leading to their loss of hope of getting fairly rewarded for their hard work in cocoon production.

Non-problematic points

Poverty was not listed in the Problem Tree of cocoon cultivation in Syria (figure no. 4) because although many, if not most, of families who rear cocoons are poor, very little capital is needed to do so if a family has its own mulberry trees, which is the predominant case amongst families who have quit within the past century.

The other issue that was not listed is that most practicing families only rear one season per year, in contrast with the maximum of three potential ones, which has been successfully practiced in Syria. It is thought that the economic factor is stronger than tradition in that regard, and that the farmers only need a satisfactory level of prospected profitability in order to expand their traditionally periodic cocoon rearing activity and further invest in their fields that are planted with mulberries.

Problem analysis for the silk reeling craft

Reading through the problem analysis for the silk reeling craft, one has to keep in mind that the silk yarn it produces is only employed in making hand-woven and crocheted fabrics.

The silk reeling craft is currently the least threatened among other parts of the silk industry chain

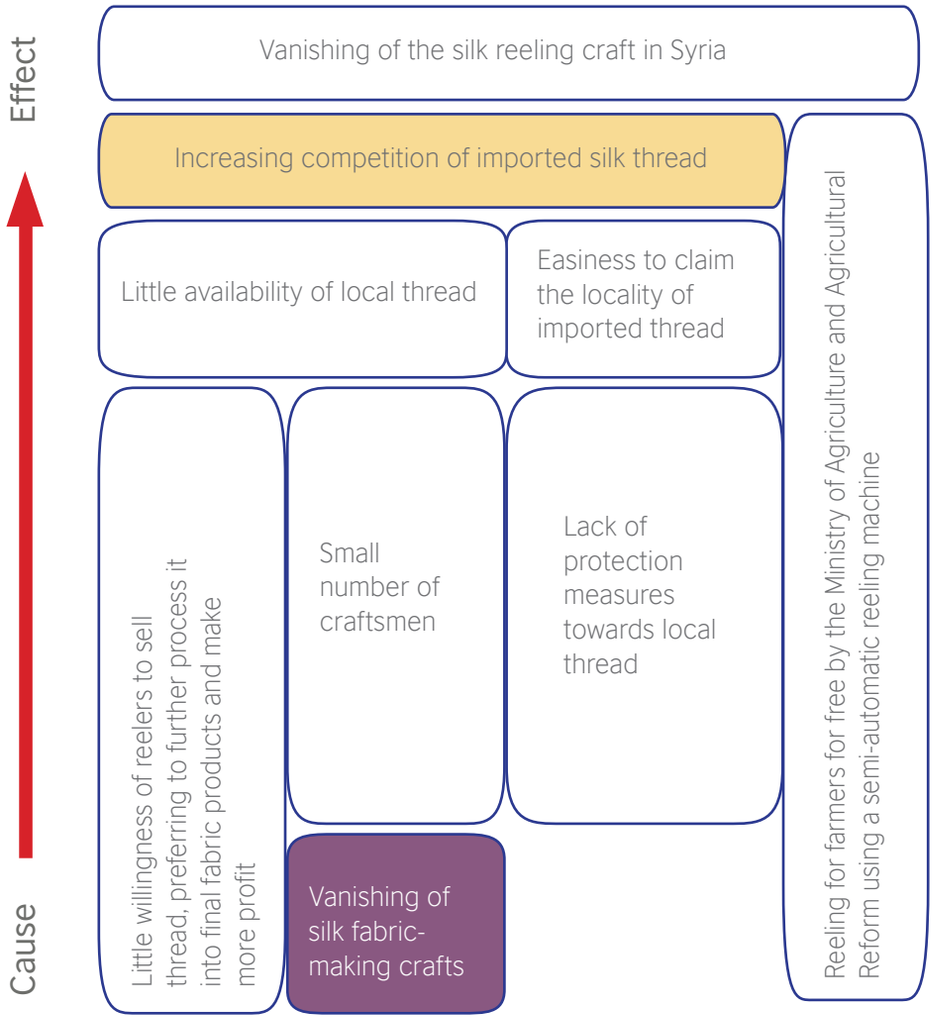


Figure 5: Problem Tree for the silk reeling craft

in Syria, but also the most dependent upon them. This is because there is a need for it as long as handmade silk products and cocoons continue to be made and produced.

Because of the small number of reelers and because most of them prefer to keep the yarn for further processing into finalized fabric products, there is no current shortage of demand on their raw silk production. However, those two reasons are leading craftsmen and women who do not belong or who are not related to a family of a reeler, to search for alternative sources for silk yarn: foreign sources, which are also practically not hard to claim as local.

Until 2009, the use of natural or artificial silk yarn that has been produced outside of Syria had hardly stepped into the creation of handmade silk fabrics – ones that are featured by this study – mainly because the producing families preferred to use local silk yarn when available and, potentially, merchants in it had not found a lucrative market in the craft scene yet.

Should the absence of protection measures towards locally produced silk continue, the competition might increase and pose a threat to both local silk yarn production, as well as that of cocoons that are used as its raw material.

Those will also be threatened if demand on final fabric products decreases, and/ or the utilization of imported silk yarn in them increases.

Additionally, the government's decition to reel for farmers for free, whose application started in 2010, poses a major threat against the existence of the silk reeling craft, and will most likely cause a decrease in the quality of produced silk yarn on the long term (see 'Recent governmental and non-governmental initiatives to save the silk craft', p. 36).

Obtaining and running reeling equipment by the Ministry not only poses a threat against the reeling craft, but also has minor positive impact towards sustaining the cocoon industry. First, because the minority of cocoon cultivators practice other activities from the silk industry chain (other than cultivating cocoons) (For instance, 9 out of the 28 surveyed families in 2009 practiced income generating activities related to silk other than rearing, out of which 8 practiced crocheting). The second reason is that economic options are already available in front of cocoon producing families who wish to turn their cocoon production into silk yarn. The real problem is not the non-availability of a cheap way to turn the cocoons into thread, but the lack of demand over the products they will make with it.

The lack of new working hand and the lack of willingness to teach a new generation of workers have not been mentioned among the problems facing the silk reeling craft because although most reelers are not willing to pass their craft knowledge to non-family members, the new reeling business (featured entrepreneur in 'story in a box' no. 3, p. 37) does not view competition as bad and is willing to teach and have its equipment replicated.

Problem analysis for silk fabric-making crafts

What is meant by silk fabric-making crafts here are those of weaving and crocheting. They have been grouped together through this problem analysis because they face a very similar set of problems:

Most craftsmen and women involved in silk fabric production perceive competition as bad, and therefore do not share market information or their knowledge pools outside the borders of their families.

In their current form, silk fabric-making crafts generate low profit for a set of reasons, which include decrease in demand over production, low value addition, not running the crafts as businesses by practitioners and little marketing, plus producing unattractive and obsolete designs.

Demand on traditional products made with manually reeled silk has lately decreased, mainly because of changing consumption patterns of the traditional customers from Iraq, Jordan, Kuwait, Palestine, Saudi Arabia and Syria (Sa'oud et al. 2000a: 104-5), which is primarily due to:

- The emergence of a new generation with a different clothing taste.

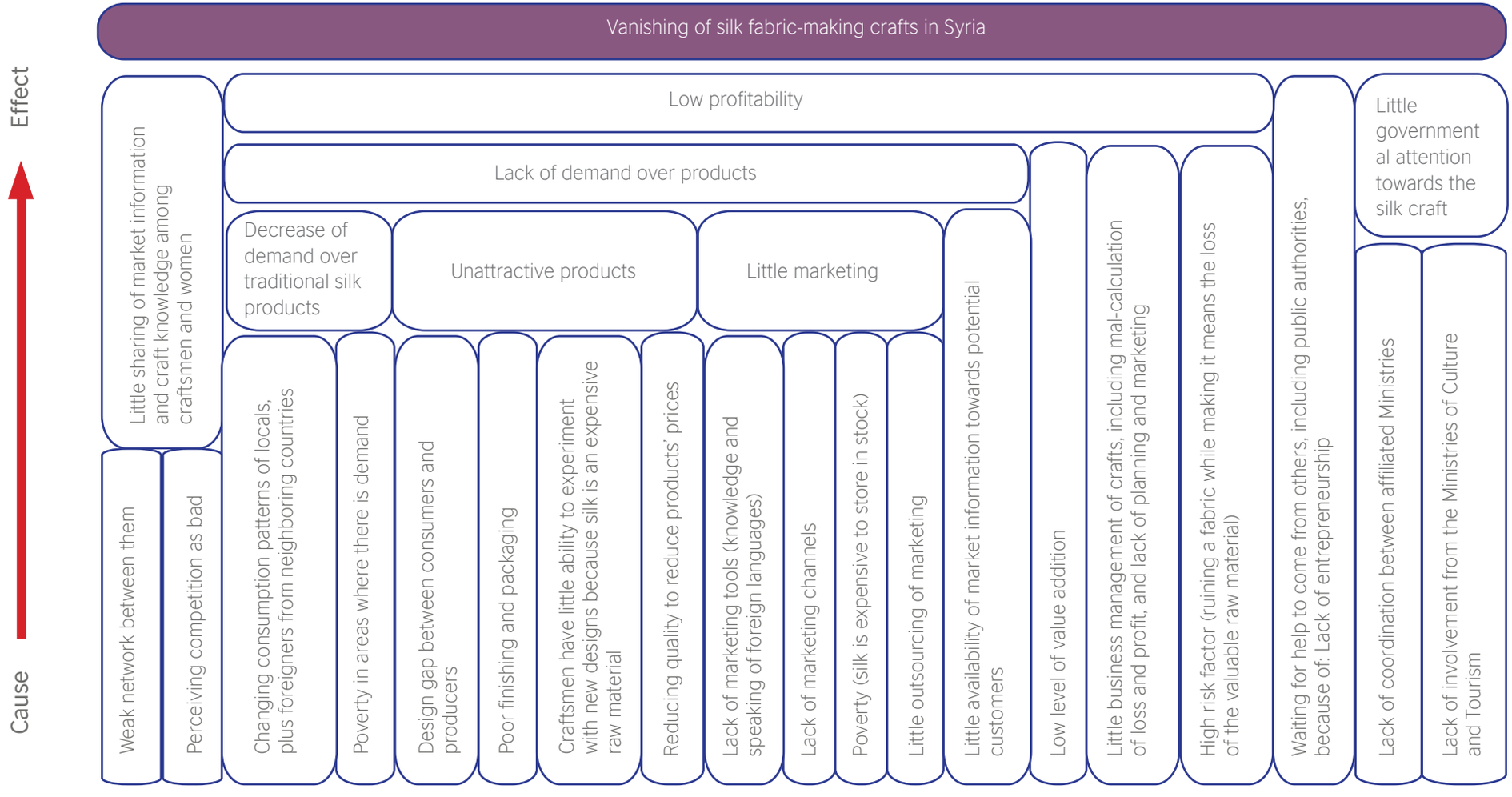


Figure 6: Problem Tree for silk fabric-making crafts

- Poverty plays an apparent role in the abandoning of traditional silk wear by poor and middle classes because the tradition has become too expensive for them (Othman & Othman 2006: 12-3) and alternatives are more available. It is noticed that women in many Syrian families who form the remaining traditional consumers of these products have refrained from buying silken shawls every year, preserving the practice for special occasions, such as marriage.

Furthermore, the products suffer from a design gap because:

- Most craftsmen and women are satisfied with the few designs they have and do not trust in experimentation or in asking customers what they would prefer to see produced in the future.

- There is lack of experimentation with new designs by craftsmen and women, mainly because silk is an expensive raw material to experiment with, waste in products thought to have no market or store in stock in order to show a variety of options to potential customers.

- The high cost of the raw material also leads craftsmen and women to the almost complete abstinence from creating items that require serious tailoring work, as tailoring causes the loss of some of the precious textile.

The main selling strategy that is adopted by most handmade silk fabric-makers is to lower prices as much as possible, mostly on the expense of quality. Additionally, poverty leads some craftsmen and women to produce more items or do more jobs per a unit of time, instead of spending the same unit on quality production of a smaller number of items and then sell them for a higher price.

It should be noted that almost none of the problems could be considered in isolation from the general context. For example, the problem of 'reducing quality to reduce product price' is linked to those of 'lack of marketing' and 'lack of running the crafts as businesses'.

Another problem is that practitioners of silk fabric-making crafts hardly spend effort on finishing, packaging or any other activity that adds value to their products. For many, the work gets almost completely done by the time they have a product at hand.

And on marketing:

- Most craftsmen and women do marketing on their own rather than outsourcing it partially or totally, or selling through middle people.

- Most marketing is done by word of mouth, and hardly do any craftsmen take trips to big cities to market products to stores because they are generally not convinced in spending money on marketing in order to get it back in the form of sales and they generally do not have the financial luxury to do so.

- Craftsmen and women lack connections to markets, especially to wholesalers.

- They lack marketing skills.

- They have difficulty in pricing their products.

- They mostly do not run their crafts as businesses.

Trays of cow dung and straw, called kreinat [كرينات], are minorly used by farmers today for rearing silkworms.

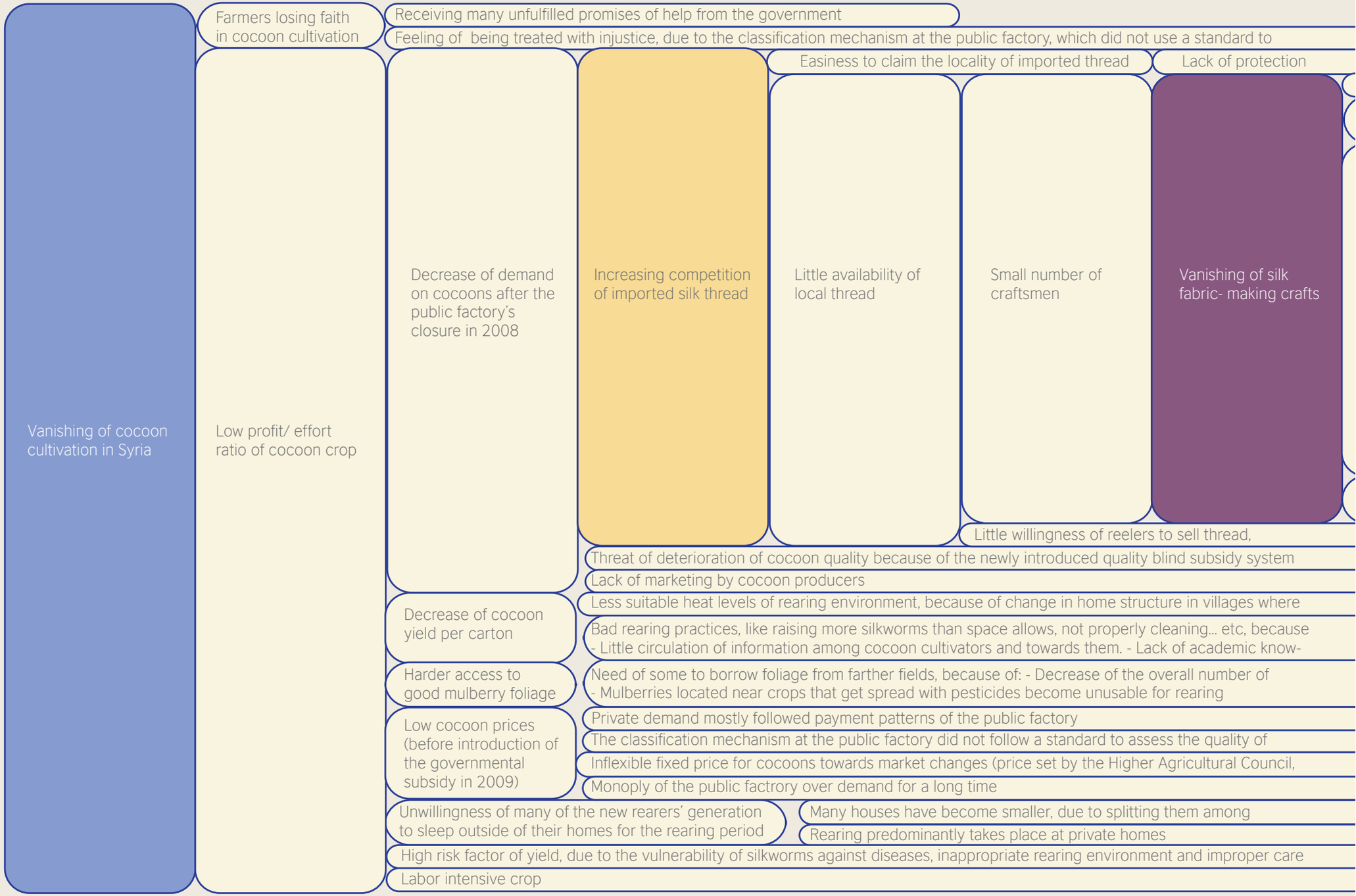
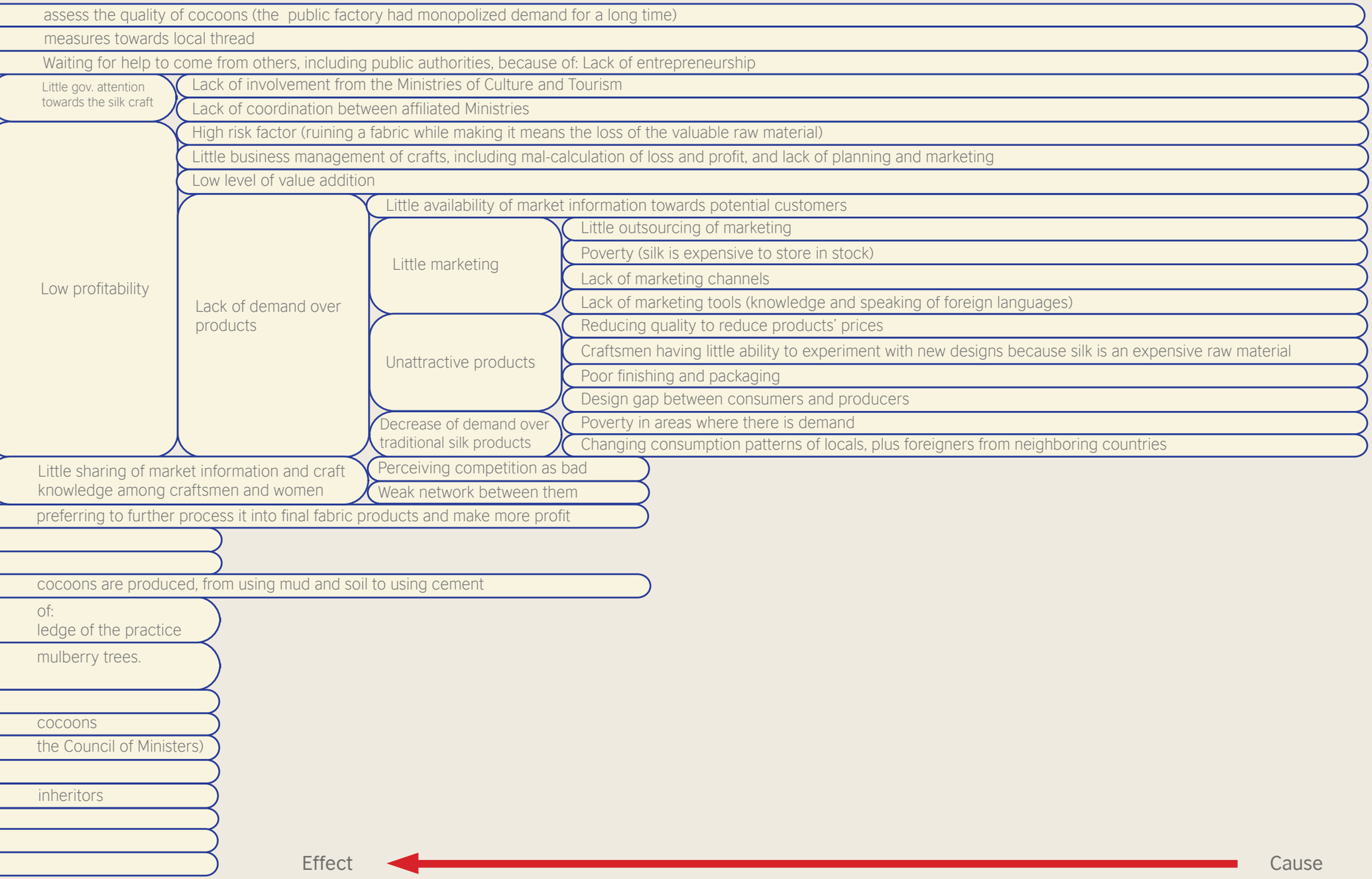


Figure 7: An integrated Problem Tree following the industry chain


assess the quality of cocoons (the public factory had monopolized demand for a long time)
measures towards local thread
Waiting for help to come from others, including public authorities, because of: Lack of entrepreneurship
Little gov. attention towards the silk craft
Lack of involvement from the Ministries of Culture and Tourism
Lack of coordination between affiliated Ministries
Low profitability
High risk factor (ruining a fabric while making it means the loss of the valuable raw material)
Little business management of crafts, including mal-calculation of loss and profit, and lack of planning and marketing
Low level of value addition
Lack of demand over products
Little availability of market information towards potential customers
Little marketing
Little outsourcing of marketing
Poverty (silk is expensive to store in stock)
Lack of marketing channels
Lack of marketing tools (knowledge and speaking of foreign languages)
Unattractive products
Reducing quality to reduce products' prices
Craftsmen having little ability to experiment with new designs because silk is an expensive raw material
Poor finishing and packaging
Design gap between consumers and producers
Decrease of demand over traditional silk products
Poverty in areas where there is demand
Changing consumption patterns of locals, plus foreigners from neighboring countries
Little sharing of market information and craft knowledge among craftsmen and women
Perceiving competition as bad
Weak network between them
preferring to further process it into final fabric products and make more profit
cocoons are produced, from using mud and soil to using cement
of:
ledge of the practice
mulberry trees.
cocoons
the Council of Ministers)
inheritors
Effect
Cause

People who have heard of Syrian silk and want to learn more about it or buy an item made of it face lack of information on where to find products and producers, which results in the loss of potential customers.

Most practitioners of the crafts think that the government holds the main responsibility to save their businesses. They have much emotional and logical buildup to support their argument but also lack the will to fight for it on their own.

A risk factor is associated especially with the weaving craft: unfixable mistakes while creating fabrics result in partial or total loss of the used expensive raw material, as the final defaulted product would not sell, or would sell for less than its cost. This risk factor contributes to rendering new working hand from joining the business and makes the job of the practicing craftsmen harder.

Silk making includes both agricultural and industrial activities, but the government has always been involved in one sector over the other, leading to disproportionate care towards one part or another of the industry chain:

The Department of Silk, which operates under the Section of Bees and Silk, the Directorate of Plant Protection, the Ministry of Agriculture and Agricultural Reform, was established and became in charge since 2003.

During previous years, responsibility shifted between the Ministry of Industry; namely al-Dreikish Natural Silk Factory, The General Establishment of Textile Industries, and the Ministry of Agriculture and Agricultural Reform.

There has never been one public institution that overlooks all matters related to silk and coordinates with affiliated Ministries on each.

There has always been lack of coordination between affiliated Ministries on the subject.

Furthermore, the Ministries of Culture and Tourism are hardly involved.

At the end, it should be mentioned that the lack of demand on final silk fabric products affects that on silk yarn and cocoons, in addition to the crafts associated with them. The integrated Problem Tree (figure no. 7) signifies and stresses this point.

Recommendations

Recommendations are presented in three groups: for governmental authorities, for interested NGOs and for individuals.

For the Syrian Government

To send one or two employees from the Silk Department at the Ministry of Agriculture and Agricultural Reform for training in sericulture abroad, as none of the current employees are specialized in that field, nor do local universities equip interested students with such knowledge.

To adopt a geographical indicator for 'pure Syrian silk products' (those created using local yarn) as a protection measurement, which could be done under Syrian Law no. 8 for the year 2007.

To cancel the decision under (Memo no. 8716/1, dated 8 October 2008, by the Syrian Council of Ministers) to reel for farmers for free, because of the threat its implementation would pose against the reeling craft.

It is better to increase the demand over produced cocoons (by the existing reeling craft) by marketing the final products.

To upgrade the statistics module used by the Ministry of Agriculture and Agricultural Reform for mulberry trees, so that it differentiates between ones that are usable for cultivating cocoons and those that are not (between white and red mulberries).

To market "Syrian Silk" (Ministry of Tourism).

And in all future undertaken efforts:

- To minimize economic intervention and leave the market to function.

- To be extra transparent with beneficiaries, as there is already a trust gap between them and governmental authorities, which has to be overcome.

For Interested NGOs

NGO intervention is a delicate matter because if done in a wrong way, it could do more damage than benefit on the long term.

As has been recommended for governmental action, it is best to minimize intervention to ensure better sustainability, and being transparent with beneficiaries is also recommended.

Recommendations for interested NGOs have been pooled under the categories of product development, marketing, training, promotion and lobbying for recommendations towards the Syrian government:

a) Product development:

By providing knowledge and financial help to craftsmen and women. (The financial help is needed because silk is an expensive raw material for craftsmen and women to experiment with).

b) Marketing:

To market products, but not blind marketing, as that would result in the decay of quality. Marketing ideas include selling 'stories' along with products and using potential constrains (such as the specific fabric product Syria has) as strengths.

To market producers, including towards tour operators.

To market investment in the craft; especially in retail and marketing.

To provide producers with marketing materials and connect them to markets, including wholesalers

c) Training:

In business, marketing, customer service and foreign languages: for craftsmen and women.

And in sericulture:

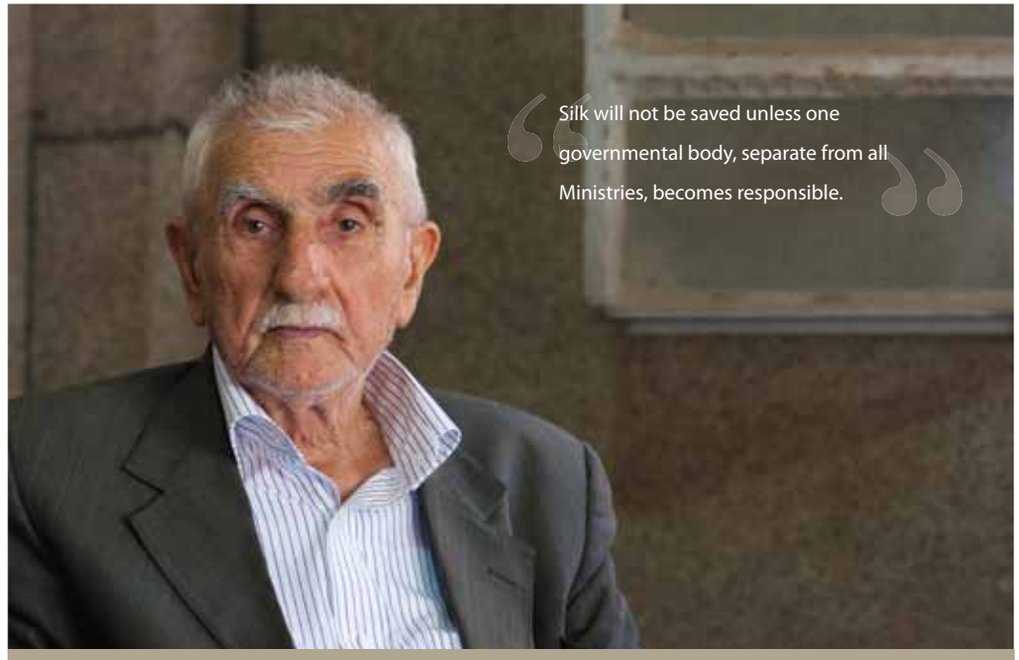
- Sending a small number of interested students abroad to learn.

- Getting the cocoon cultivation knowledge that is mostly transmitted by oral tradition into written form, and disseminating information about best practices amongst farmers.

- Cocoons have been reared in Syria along a rooted tradition, in which knowledge got passed from generation to generation. Absorbing the latest scientific discoveries into that tradition and circulating the information (including towards new comers into the business) could improve the quality and quantity of production.

d) Promotion:

To promote cooperation among craftsmen: sharing knowledge pools and maximizing profit for everyone.



Mr. Shafiq Othman is the last surviving owner of a private silk reeling factory in Syria.

To promote sustainable product development by craftsmen and women: by promoting their periodic inquisition about customers' tastes.

To promote 'Silk' in villages where it has or had recently been produced: towards producers and non-producers alike, and especially towards children and youth.

e) Lobbying for recommendations towards the Syrian government.

For Individuals

To save the craft by buying a product, whether for personal use or as a present (such as a gift for a newlywed bride or a newborn baby), then telling your friends how happy you were with your purchase!

To invest (as a business) in the marketing part of the production chain of silk fabrics, and promote such investment.

Strengths, opportunities and crucial factors; why save the Syrian silk craft?

Table 2: Why save the Syrian silk craft?

Because of its historical importance	Because the knowledge and skills are present	Because the craft is being killed by silence	It is an important part of Syria's cultural heritage
Because suitable weather and mulberries are present	To empower women and youth	To reduce poverty	To produce a mentality change and not only set up businesses*
To increase tourism	To improve quality of life in rural areas	It is an environment friendly activity	Because it is an artistic expression and re-creation of beauty

* A successful initiative to save the Syrian silk craft should transcend to the producing communities values such as: competition is good, to share knowledge and work together, to be courageous and innovative and to initiate and not wait for others' help.

Saving the Syrian silk craft does not only aim at increasing sales of Syrian silk, but also at sending a message to its producers, the inhabitants of 'silk villages' and Syrian society as a whole that old is good; that the cultural heritages which have survived through generations of people are worth protection and promotion; not only because of their sentimental value, but also because they help us define who we are and could be invested in to improve our well being.

As the photographer and I were walking down the main village street, a woman rushed inside her house and brought a spindle to show us her craft. Silk is part of village life in Deir Mama, Hama and one that inhabitants are very proud of.

Bibliography

Ahmad, R & Khaddam, M 2009,'صرخة جديدة لتربية دودة الحرير' [A New Cry for Raising Silkworms]', *Thawra Newspaper*, 22 July, p. 13.

Al-Atrash, RM 1996, الحرير في سورية: لواء اسكندرون. سورية ولبنان *[Silk in Syria: Alexandretta Province, Syria and Lebanon]*, Ministry of Culture, Damascus.

Al-Naddaf Maps, *Map of Syria, Governorates of Hama, Latakia and Tartous*, al-Naddaf Maps, Aleppo.

Central Bureau of Statistics 1991-2007, *Foreign Trade Statistics for the Years 1990-2006*, Central Bureau of Statistics, Syria.

Cotton, LP 1996, *Silk Production in the Seventeenth Century*, National Park Service, U.S. Department of the Interior, viewed 22 July 2009, <http://www.nps.gov/jame/historyculture/silk-production-in-the-seventeenth-century.htm>.

Council of Ministers 2008, Memo no. 8716/1, dated 8 October 2008, Council of Ministers, Syria.

Ducousso, G 1913, *L'industrie de la soie en Syrie et au Liban*, Librairie Maritime et Coloniale Augustin Challamel, Paris.

Emery, I 1994, *The Primary Structures of Fabrics*, 2nd edn, Thames and Hudson Ltd., Washington D.C.

FAO 2009, *Natural Fibres: Silk*, viewed 17 July 2009, <http://www.naturalfibres2009.org/en/fibres/silk.html>.

Firro, K 1990, 'Silk and Agrarian Changes in Lebanon 1860-1914', in *International Journal of Middle East Studies*, vol. 22, pp. 151-69.

Gillow, J & Sentance, B 1999, *World Textiles: A Visual Guide to Traditional Techniques*, Thames & Hudson Ltd., London.

Kalter, J, Pavoloi, M & Zerrnickel, M 1992, *The Arts and Crafts of Syria*, Thames and Hudson, London.

Khwanda, J 2003, 'واقع تربية دودة الحرير في سورية' [Rearing Silkworms in Syria]', *Central Training Courses on Silkworm Rearing and the Cultivation of Mulberry Seedlings, Tartous, 2003-2004*, Ministry of Agriculture and Agricultural Reform, Syria.

Labaki, B 1984, *Introduction a l'histoire economique du Leban: Soie et commerce exterieru en fin de periode Ottomane (1840-1914)*, l'Universite Lebanaise, Beirut.

Lee, Y 1999, *Silk Reeling and Testing Manual*, FAO Agricultural Services Bulletin no. 136, Food and Agriculture Organization of the United Nations, viewed 22 November 2009, <http://www.fao.org/docrep/x2099E/x2099e07.htm>.

Ministry of Agriculture and Agricultural Reform 1980-2009, *Annual Agricultural Statistical Groups for the Years 1983, 93, 2006-07; Annual Reports on Animals for the Years 91-92, 95-2000; Periodic Reports on Agricultural Animals and Their Products for the Years 80-82, 84-90, 94; Periodic Reports on Agricultural Animals for the Years 79, 2001-05, 08*, Ministry of Agriculture and Agricultural Reform, Syria.

Ministry of Agriculture and Agricultural Reform 1995-2009, *Periodic Reports on Fruit-Bearing Trees for the Agricultural Seasons of 2000-01, 02-03; Periodic Reports on Fruit-Bearing Trees for the Seasons of 05-07; Periodic Reports on Fruit-Bearing Trees for the Years 1994-2000, 04, 08*, Ministry of Agriculture and Agricultural Reform, Syria.

Othman, S & Othman, M 2006, 'Silk Handcrafts Cottage Industries and Silk Enterprises Development in Syria', paper presented to the International Workshop on Silk Handcrafts Cottage Industries and Silk Enterprises Development in Africa, Europe, and Central Asia, held in Bursa, Turkey, and organized by the Food and Agriculture Organization, 6-10 March.

Pavaloi, M 1992, 'Textile Stories', in J Kalter, M Pavoloi & M Zerrnickel, *The Arts and Crafts of Syria*, Thames and Hudson, London, pp. 211-32.

Reddy, R & Shankar, JPA 2009, *Sericulture*, Commonwealth Publishers, New Delhi.

Sa'ied, S 2003, 'تسويق شرانق الحرير المنتجة والأسس المعتمدة لتسويق الشرانق وتصنيفها وفق المواصفات العالمية' [Marketing Produced Cocoons and Established Principles of Their Marketing and Classification Based on International Standards]', *Central Training Courses on Silkworm Rearing and the Cultivation of Mulberry Seedlings, Tartous, 2003-2004*, Ministry of Agriculture and Agricultural Reform, Syria.

Sa'oud, H, Kurdi, SD, al-Obeid, ND, al-Ali, I, Sa'd al-Din, R, Mkayes, Kh, al-Rez, H, 'Awad, DH & Saqer, I 2000a, دراسة قطاع الحرير وتطوير إنتاجه في منطقة عمل مشروع التنمية الزراعية في المنطقة الساحلية والوسطى *[The Silk Sector and the Development of its Production in the Working Area of the Agricultural Development Project in the Coastal and Central Regions]*, The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD) and the Syrian Ministry of Agriculture and Agricultural Reform, Damascus.

Sa'oud, H, Kurdi, SD, al-Obeid, ND, al-Ali, I, Sa'd al-Din, R, Mkayes, Kh, 'Awad, DH & Saqer, I 2000b, دراسة إنتاج الحرير كنشاط مولد للدخل للنساء الريفيات *[A Study of Silk Production as an Income Generating Activity for Rural Women]*, The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)

and the Syrian Ministry of Agriculture and Agricultural Reform, Damascus.

Sayed, AH, Mahmoud, SM & Mejle', AH 1995, الطرق الحديثة لإنتاج الحرير الطبيعي *[Modern Ways of Producing Natural Silk]*, Pamphlet no. 256, Ministry of Agriculture and Land Rehabilitation, Egypt.

Shehab, M 1968, دور لبنان في تاريخ الحرير *[Lebanon's Role in the History of Silk]*, The Lebanese University, Beirut.

Sizes, Inc. 2001, Oke, viewed 4 November 2009, <http://www.sizes.com/units/oke.htm>.

Surveillance Office on Silkworm Seeds and General Steroids for Everything Related to Mulberry Trees and Silk in Countries Under the Mandate 1931, نصائح إلى المشتغلين بهذا الصنف *[Advice to Those Who Work with this Produce]*, High Commission of the French Republic, Beirut.

The Silk Museum, Bsous, Lebanon.

World History at KMLA 2009, *Ottoman Syria 1906-1914*, Zentrale für Unterrichtsmedien, viewed 10 December 2009, < http://www.zum.de/whkmla/histatlas/arabworld/ottsyr19061914text.gif>.

Annexes

Annex I: Survey of the cocoon cultivators of 2009

A survey was performed to identify the main characteristics of the Syrian community that cultivated cocoons in 2009.

The survey investigated demographics of producing families, their involvement in cocoon cultivation, their income specifications and those of their cocoon cultivation business regarding:

a) Silkworm eggs

b) Mulberry trees

c) Rearing space

d) Employed equipment

The survey was performed towards 28 families, who constitute 58% of the silkworm rearing community in 2009. For identification of cocoon cultivators in 2009, see 'Syria's cocoon industry in 2009: Profile of producers', p. 18.

These families reside in almost all Governorates and Administrative Areas in which rearing took place in 2009, specifically in the Administrative Area of Mesyaf (Governorate of Hama), Latakia (Latakia), and al-Dreikish, al-Sheikh Bader, Safita and Tartous (Tartous).

I carried out the survey by phone in September and October 2009, following a conversational and adaptive manner to those interviewed.

The analysis of the survey is spread throughout the paper, while details and numbers follow.

Demographics of producing families

Average number of family members= 8 (total is 235)	
Number of children	
179	
Females	Males
87	92
49%	51%

Average number of family members residing at home (including parents, children, grandparents, grandchildren, and in-laws) = 6 (total is 155)	
Distribution of family members residing at home based on gender	
155	
Females	Males
77	78
50%	50%

Educational status of family members (above 10 years and residing at home; highest degree obtained)		
Educational Status	Number of persons	Percentage
Illiterate	13	9%
Reads and Writes	26	19%
Primary School	39	28%
Middle School	22	16%
Secondary School	21	15%
University or above	18	13%

Involvement in cocoon cultivation

Involvement of family ancestors		
Yes	17	61%
No	11	39%

Duration of involvement since the creation of the family (marked by the marriage of the mother and father)		
Number of years	Number of families	Percentage of families
1	7	25%
2-20	8	29%
21-40	9	32%
41-60	4	14%

Involvement in rearing periods in 2007-2009

Year	Spring period	Spring and autumn periods	Spring and summer periods	Spring, summer and autumn periods	Total number of families	Percentage of those who reared only in the spring period
2007	19	0	1	1	21	90%
2008	18	0	1	1	20	90%
2009	25	3	0	0	28	89%

Average number of silkworm egg cartons reared in 2009 per family= 2 cartons (total is 66)					
Silkworm egg cartons reared per family (a carton weights 11.7 g and contains 22,000 silkworm eggs)					
Number of cartons	1	1.5	2	3-5	6-7
Number of families	8	2	11	4	3
Percentage of families	28.6%	7.1%	39.3%	14.3%	10.71%

Home residents who work in cocoon cultivation
87/155
56%

Different members' involvement in cocoon cultivation (for the 24 families who did not hire any employees)

Task	Number of people involved			
	Mothers	Fathers	Children	Grandparents
Incubating and hatching the eggs*	0	0	0	0
Collecting branches for natural mountages	18 (39%)	16 (35%)	12 (26%)	0 (0%)
Preparing mountages	18 (43%)	15 (36%)	7 (17%)	2 (5%)
Collecting mulberry foliage	15 (34%)	16 (36%)	13 (30%)	0 (0%)
Feeding silkworms and taking care of them	23 (46%)	16 (32%)	10 (20%)	1 (2%)
All tasks	74 (41%)	63 (35%)	42 (23%)	3 (2%)

Families who got assistance from extended family members to rear silkworms
7/28
25%

Families who hired an employee(s) to assist partially or completely in cocoon cultivation
4/28
14%

Family income specifications

Families who have at least one home resident who is a government employee
12/28
43%

Distribution of families who raise cocoons based on the contribution of their income that is generated by agricultural activity towards their overall income

Income generated by agricultural activity as a percentage of overall income	Number of families	Percentage of families
75-100%	5	18%
50-74%	3	11%
25-49%	6	21%
0-24%	14	50%

Families who practice income generating activities related to silk, other than cocoon cultivation
9/28
32%

Business specifications

A) Silkworm eggs

Source of silkworm egg cartons	
The Ministry of Agriculture and Agricultural Reform	Other sources
28	0
100%	0%

B) Mulberry trees

Ownership of white mulberry trees based on irrigation system				
Type of mulberries	Rain-Fed	Irrigated	Both	None
Number of families	16	8	2	2
Percentage of families	57%	29%	7%	7%
Ownership of white mulberry trees based on variety				
Type of mulberries	Native	Foreign	Both	None
Number of families	18	7	1	2
Percentage of families	64%	25%	4%	7%

Families who irrigated their foreign varieties
9/9
100%

* The Ministry of Agriculture and Agricultural Reform has been doing this task for farmers since 2006.

Extent of usage of privately owned mulberry trees for cocoon cultivation					
Percentage of used mulberry foliage from owned mulberry trees (foliage not borrowed or purchased)	100%	75-99%	50-74%	25-49%	0-24%
Number of families	9	6	5	1	7
Percentage of families	32%	21%	18%	4%	25%
Families who lacked mulberry foliage and borrowed or purchased that of the native variety					
19/19					
100%					
Families who applied fertilizers to their mulberry trees					
8/28					
29%					

C) Rearing space

Location of rearing space	
Inside the house	In place outside
19	9
68%	32%
Area and number of rooms allocated to rearing by different families in the spring period of 2009	
Number of reared cartons	Average
4, 2, 3, 1, 2, 2, 2, 2, 2, 1, 3, 4, 1, 1, 1.5, 2, 7, 2, 3, 2, 1, 3, 1, 1.5, 2, 1, 1, 2	2
Number of reared rooms	Average
4, 2, 2, 1, 3, 3, 2, 2, 4, 2, 1, 3, 2, 1, 2, 2, 3, 2, 2, 2, 2, 2, 1, 2, 2, 2, 2, 1	2
Areas allocated to rearing (in square meters)	Average
61, 24, 32, 25, 70, 48, 30, 30, 100, 32, 200, 46, 64, 16, 50, 45, 65, 45, 80, 36, 48, 32, 30, 32, 40, 40, 38, 30	53
Areas allocated to rearing per carton (in square meters)	Average
15, 12, 11, 25, 35, 24, 15, 15, 50, 32, 67, 12, 64, 16, 33, 23, 9, 23, 60, 18, 48, 11, 30, 21, 20, 40, 38, 15	28
Families who fed their extra mulberry leaves to milk-generating animals	
5/7	
71%	

D) Equipment

Families who employed a car, fully or partially, to transport mulberry foliage to the rearing space		
16/28		
57%		
Employed rearing equipment		
Type of equipment, used alone or in combination with other equipment	Number of families (total is 28)	Percentage of families
(rearing on ground)	21	75%
Stands	22	79%
Wooden Trays	24	86%
Kreinat (trays of cow dung and straw)	13	46%
Styrofoam boxes	5	18%
Employed combinations of rearing equipment		
Combination of equipment	Number of families	Percentage of families
Stands, wooden trays, on ground, kreinat	7	25%
Stands, wooden trays, on ground	6	21%
Stands, wooden trays, kreinat	4	14%
Stands, wooden trays	3	11%
On ground, wooden trays	2	7%
On ground, Styrofoam boxes, kreinat	2	7%
On ground, Stands, wooden trays, Styrofoam boxes	2	7%
On ground only	1	4%
On ground, Styrofoam boxes	1	4%
Type of employed mountages		
Mountage type	Number of families	Percentage of families
Natural	22	79%
Plastic	4	14%
Both	2	7%
Families who used a thermometer and a hygrometer for rearing		
14/28		
50%		

Annex II: Syria's white mulberry trees

Statistics by the Ministry of Agriculture and Agricultural Reform on fruit bearing trees start to include mulberry trees in 1994*. However, the problem proposed by these statistics is that they mix white native mulberries [*tut baladi* توت بلدي] with red shami mulberries [*tut shami* توت شامي], which are not good for rearing because their leaves are tough and the silkworms do not like them (interview with Naziha al-Sayed, Department of Silk, on 29 July 2009).

Available statistics were studied for the Administrative Areas of al-Dreikish, al-Sheikh Bader, Banias, Jableh, Latakia, Mesyaf, Safita, Tal Kalakh and Tartous, in which cocoons were reared for more than three years between 1979 and 2008 (Ministry of Agriculture and Agricultural Reform 1980-2009, 1995-2009). This data was assumed to represent native mulberries because shami mulberries are generally not grown there.

Therefore in 2008, the studied areas, in which cocoons were reared for more than three years between 1979 and 2008, included 138,400 white mulberry trees, spread over an area of 2,913 hectares.

The following general observations were also made:

There are more rain-fed mulberries than irrigated ones in studied areas (70% in contrast with 30%).

Between 1994 and 2008, there has been a general increase in the number of rain-fed mulberries. Most of this increase has happened in the Administrative Areas of al-Dreikish and Safita with no clear reason. The reason could be enhancing data collection methods, in terms of implementation and scope by the Ministry of Agriculture and Agricultural Reform.

The number of irrigated mulberries has decreased and areas covered by both types have dropped in size.

* Periodic Reports on Fruit Bearing Trees, which are published annually by the Ministry and available since 1979, were reviewed.

Table 3: Comparison of numbers and areas planted with mulberry trees in selected Administrative Areas in 1994-2008

Year	Number of Mulberry Trees				Area Planted with Mulberries				
	Total	Irrigated	Rain-Fed	% of Irrigated	% of Rain-Fed	Total	Irrigated	Rain-Fed	% of Irrigated	% of Rain-Fed
1994	139,400	50,400	89,000	36	64	4,618	1,487	3,131	32	68
1995	140,600	50,500	90,100	36	64	4,661	1,491	3,170	32	68
1996	161,300	66,900	94,400	41	59	4,533	1,591	2,942	35	65
1997	142,100	50,800	91,300	36	64	5,059	1,491	3,568	29	71
1998	141,100	49,500	91,600	35	65	4,757	1,453	3,304	31	69
1999	139,300	48,900	90,400	35	65	4,739	1,439	3,300	30	70
2000	138,200	47,400	90,800	34	66	4,749	1,412	3,337	30	70
2001	132,000	38,900	93,100	29	71	4,665	1,133	3,532	24	76
2003	217,600	46,800	170,800	22	78	4,069	681	3,388	17	83
2004	215,200	43,500	171,700	20	80	3,807	649	3,158	17	83
2005	184,900	49,400	135,500	27	73	3,797	640	3,157	17	83
2006	170,600	45,200	125,400	26	74	3,549	614	2,935	17	83
2007	153,500	34,100	119,400	22	78	3,211	517	2,694	16	84
2008	138,400	24,600	113,800	18	82	2,913	465	2,448	16	84
Average				30%	70%				24.5%	75.5%

Selection of Administrative Areas was based on rearing cocoons for more than 3 years in each in 1979-2008 and the availability of comparable statistical data for the total spam of that period for each of them. Areas for which numbers in the table are expressed are: al-Dreikish, al-Sheikh Bader, Banias, Mesyaf and Safita. Sources: Ministry of Agriculture and Agricultural Reform 1980-2009, 1995-2009.

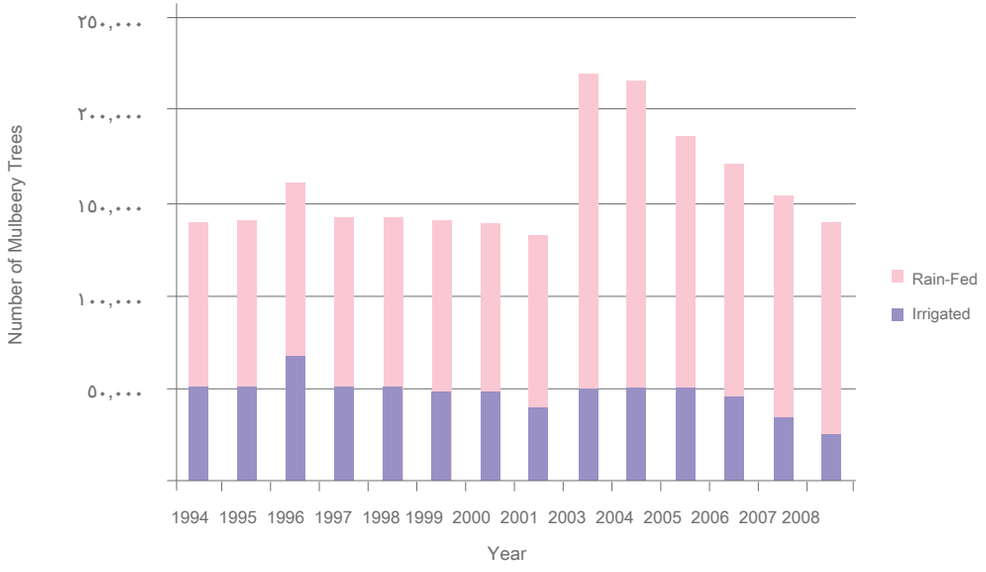


Figure 8: Number of mulberry trees in selected Administrative Areas in 1994-2008 (totals)

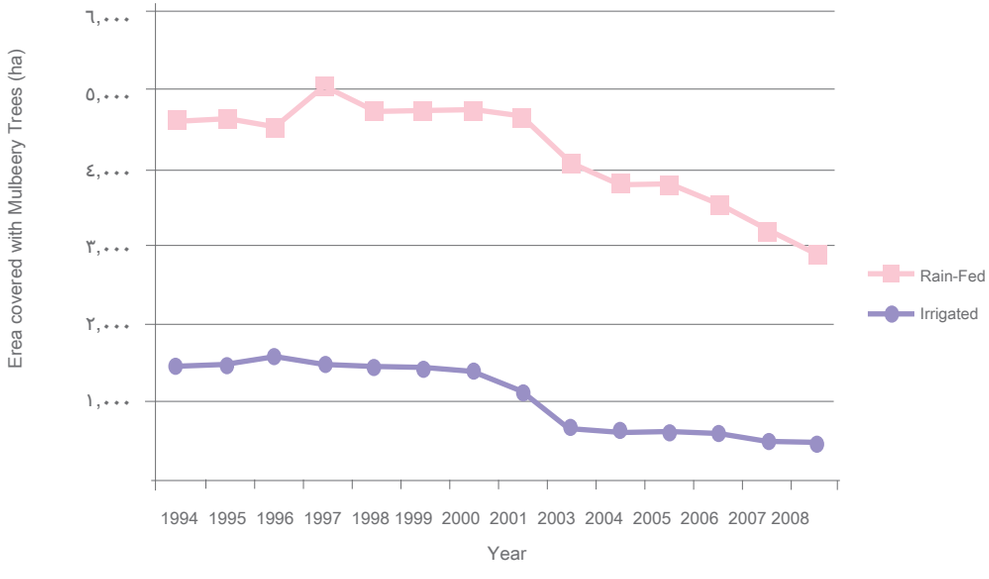


Figure 9: Area covered with mulberry trees in selected Administrative Areas in 1994-2008 (totals)

Table 4: Numbers and areas occupied with mulberry trees in selected Administrative Areas in 1994-2008, by Administrative Area

Year	al-Dreikish			al-Sheikh Bader			Banias		
	Irrigated	Rain-Fed	Total	Irrigated	Rain-Fed	Total	Irrigated	Rain-Fed	Total
1994	19,500	42,800	62,300	300	14,200	14,500	0	9,200	9,200
1995	19,700	42,900	62,600	300	14,600	14,900	0	9,800	9,800
1996	19,700	42,900	62,600	300	14,900	15,200	100	10,200	10,300
1997	19,700	44,100	63,800	300	14,800	15,100	100	10,200	10,300
1998	19,700	44,600	64,300	300	14,700	15,000	0	10,300	10,300
1999	19,700	43,900	63,600	300	14,600	14,900	0	10,600	10,600
2000	18,500	43,700	62,200	300	14,700	15,000	0	11,100	11,100
2001	9,000	37,500	46,500	300	15,300	15,600	0	16,300	16,300
2003	21,800	83,300	105,100	3,100	9,000	12,100	0	12,100	12,100
2004	20,900	85,200	106,100	1,300	8,500	9,800	0	12,000	12,000
2005	20,900	69,100	90,000	1,100	7,800	8,900	0	11,100	11,100
2006	17,600	64,400	82,000	600	6,800	7,400	0	9,700	9,700
2007	10,600	66,400	77,000	600	600	1,200	0	8,300	8,300
2008	8,600	62,800	71,400	500	3,800	4,300	0	5,800	5,800

Year	Jableh			Latakia			Mesyaf		
	Irrigated	Rain-Fed	Total	Irrigated	Rain-Fed	Total	Irrigated	Rain-Fed	Total
1994							27,900	19,200	47,100
1995							27,900	19,200	47,100
1996							29,900	23,200	53,100
1997							27,900	19,100	47,000
1998							26,600	19,100	45,700
1999							26,100	19,100	45,200
2000							25,900	19,100	45,000
2001							26,600	20,100	46,700
2003	1,500	6,200	7,700				19,700	24,800	44,500
2004	300	4,700	5,000	1,000	6,000	7,000	19,100	24,500	43,600
2005	400	5,200	5,600	3,400	2,900	6,300	19,000	23,700	42,700
2006	600	4,400	5,000	9,000	2,800	11,800	18,800	22,500	41,300
2007	500	1,300	1,800	9,000	2,800	11,800	18,600	22,000	40,600
2008	400	1,600	2,000	9,000	2,800	11,800	13,600	20,700	34,300

Year	Safita			Tal Kalakh			Tartous		
	Irrigated	Rain-Fed	Total	Irrigated	Rain-Fed	Total	Irrigated	Rain-Fed	Total
1994	2,700	3,600	6,300						
1995	2,600	3,600	6,200						
1996	16,900	3,200	20,100	0	100	100			
1997	2,800	3,100	5,900	0	100	100			
1998	2,900	2,900	5,800						
1999	2,800	2,200	5,000	0	100	100			
2000	2,700	2,200	4,900	0	100	100			
2001	3,000	3,900	6,900	0	100	100			
2003	2,200	41,600	43,800				59,900	900	60,800
2004	2,200	41,500	43,700				59,900	7,000	66,900
2005	8,400	23,800	32,200				60,000	7,000	67,000
2006	8,200	22,000	30,200				60,500	1,400	61,900
2007	4,300	22,100	26,400				60,200	1,200	61,400
2008	1,900	20,700	22,600				60,200	1,200	61,400

Selection of Administrative Areas was based on rearing cocoons for more than 3 years in each in 1979-2008. Source: Ministry of Agriculture and Agricultural Reform 1980-2009, 1995-2009

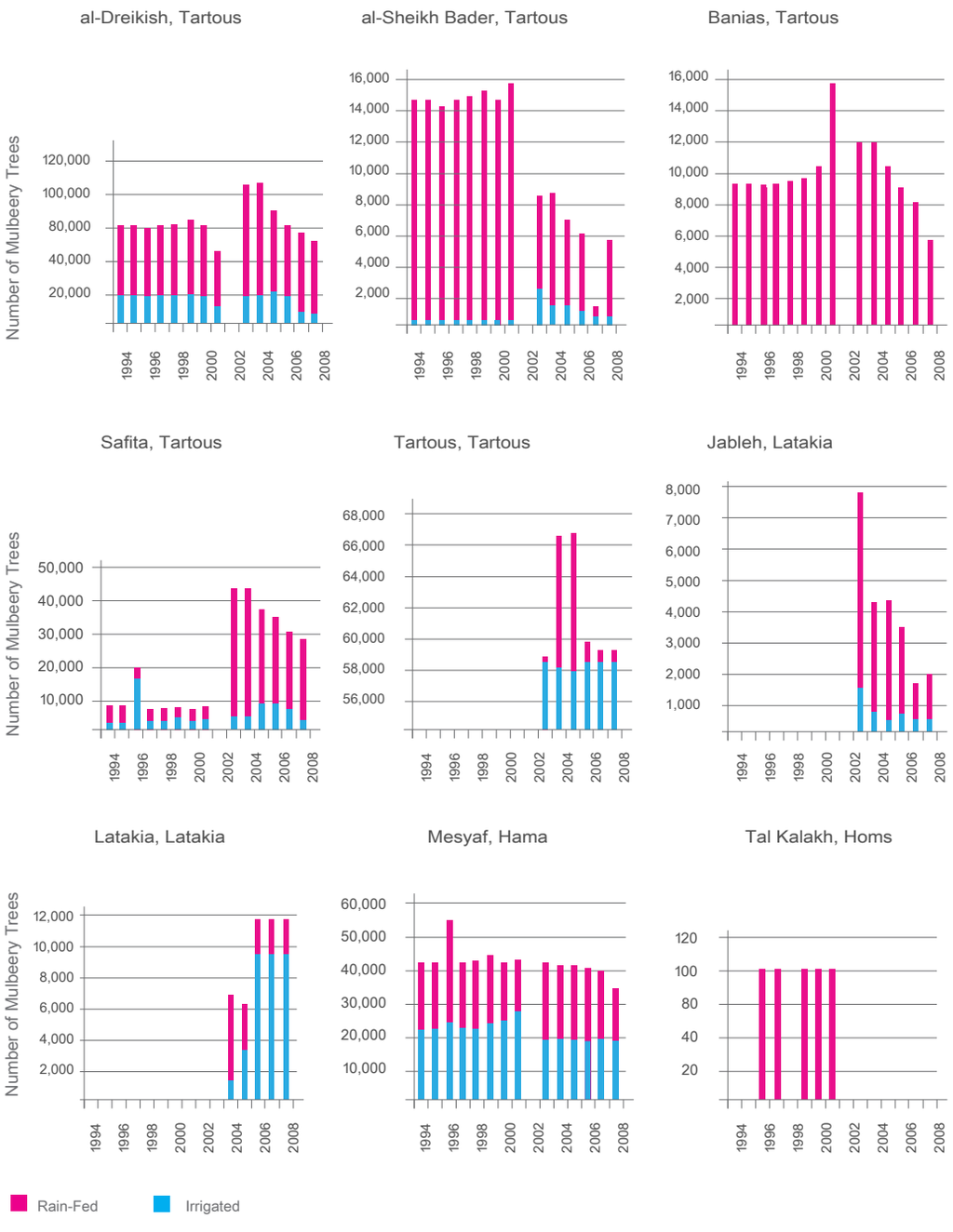


Figure 10: Number of mulberry trees in selected Administrative Areas in 1994-2008 (where cocoons were cultivated for more than 3 years in 1979-2008)

Annexes III: Cocoon production in Syria in 1979-2008

Table 5: Change in cocoon production in 1979-2008 (percentages)

Year	Production in ton	Change in Production	Year	Production in ton	Change in Production	Year	Production in ton	Change in Production
1979	247.6		1989	99	-7%	1999	38.1	-4%
1980	220.4	-11%	1990	92.9	-6%	2000	32	-16%
1981	315.6	43%	1991	118	27%	2001	19	-41%
1982	157.4	-50%	1992	111	-6%	2002	14	-26%
1983	163	4%	1993	65	-41%	2003	14	0%
1984	113.3	-30%	1994	89	37%	2004	9	-36%
1985	92	-19%	1995	68.1	-23%	2005	8.7	-3%
1986	89	-3%	1996	32.1	-53%	2006	3	-66%
1987	48	-46%	1997	42	31%	2007	2	-33%
1988	107	123%	1998	39.7	-5%	2008	2	0%

Source: Ministry of Agriculture and Agricultural Reform 1980-2009. Production for the year 1998 in Sfiera, Aleppo (52 ton) was not calculated as it is thought to be an exaggeration.

Table 6: Cocoon production in 1979-2008 by Governorate [in bold] and Administrative Areas (in metric tons)

Year	**Hama**	Mesyaf	**Homs**	Homs	Tal Kalakh	**Latakia**	Jableh	Latakia	**Tartous**	al-Dreikish	al-Sheikh Bader	Banias	Safita	Tartous	**Other**	**Total**
1979	**52**	52	**22**	1	21	**2.6**	0.6	2	**171**	111	27	5	27	1	**0**	**247.6**
1980	**53**	53	**18.4**	0.3	18.1	**3**	2	1	**146**	92	27	4	23		**0**	**220.4**
1981	**50**	50	**56.5**		56.5	**4.3**	3	1.3	**204.8**	166	25	0.3	13	0.5	**0**	**315.6**
1982	**51**	51	**0**	0	0	**4.4**	2.1	1.3	**102**	62	24	3.7	12	0.3	**0**	**157.4**
1983	**36**	no data	**0**	0	0	**3**	no data	no data	**124**	no data	no data	no data	no data	no data	**0**	**163**
1984	**25**	25	**0**	0	0	**0**	0	0	**88.3**	55	19.4	3.2	10.4	0.2	**0**	**113.3**
1985	**23**	23	**0**	0	0	**1**	1	0	**68**	40	19	2.5	6.3	0.2	**0**	**92**
1986	**22**	22	**0**	0	0	**1**	1	0	**67**	41.5	18	3	4.2	0.3	**0**	**89**
1987	**0**	0	**0**	0	0	**0**	0	0	**84**	55	20	3	6	0	**0**	**48**
1988	**22**	22	**0**	0	0	**0**	0	0	**85**	54	21	4	6	0	**0**	**107**
1989	**26**	26	**0**	0	0	**0**	0	0	**73**	60	7	1	5	0	**0**	**99**
1990	**22**	22	**0**	0	0	**0**	0	0	**70.9**	44	18	3.9	5	0.03	**0**	**92.9**
1991	**29**	29	**0**	0	0	**0**	0	0	**89**	52	22	5	10	0	**0**	**118**
1992	**32**	32	**0**	0	0	**0**	0	0	**79**	48	20	5	6	0	**0**	**111**
1993	**0**	0	**0**	0	0	**0**	0	0	**65**	no data	no data	no data	no data	no data	**0**	**65**
1994	**32**	32	**0**	0	0	**0**	0	0	**57**	35	15	3	4	0	**0**	**89**
1995	**23**	23	**0**	0	0	**0**	0	0	**45.1**	26.2	11.3	3	4.6	0	**0**	**68.1**
1996	**15.6**	15.6	**0**	0	0	**0**	0	0	**16.5**	1.8	7	3	4.7	0	**0**	**32.1**
1997	**12.2**	12.2	**0**	0	0	**0**	0	0	**29.8**	18	8	2.6	1.2	0	**0**	**42**
1998	**13**	13	**0**	0	0	**0**	0	0	**26.7**	12.7	9	3	2	0	**52 (Sfiera, Aleppo)**	**91.7**
1999	**11.5**	11.5	**0**	0	0	**0**	0	0	**26.6**	12.9	9	2.7	2	0	**0**	**38.1**
2000	**11**	11	**0**	0	0	**0**	0	0	**21**	11	5	3	2	0	**0**	**32**
2001	**0**	0	**0**	0	0	**0**	0	0	**19**	9	5	2	2	0	**0**	**19**
2002	**4**	4	**0**	0	0	**0**	0	0	**10**	6	2	1	1	0	**0**	**14**
2003	**4**	4	**0**	0	0	**0**	0	0	**10**	6	3	0	1	0	**0**	**14**
2004	**3**	3	**0**	0	0	**0**	0	0	**6**	3	3	0	0	0	**0**	**9**
2005	**0.7**	0.7	**0**	0	0	**0**	0	0	**8**	7	1	0	0	0	**0**	**8.7**
2006	**2**	no data	**0**	0	0	**0**	0	0	**1**	no data	no data	no data	no data	no data	**0**	**3**
2007	**1**	no data	**0**	0	0	**0**	0	0	**1**	no data	no data	no data	no data	no data	**0**	**2**
2008	**1**	1	**0**	0	0	**0**	0	0	**1**	1	0	0	0	0	**0**	**2**

Source: Ministry of Agriculture and Agricultural Reform 1980-2009.

Annex IV: Syria's cocoon production per carton in 1979-2008

Table 7: Cocoon production per carton in 1979-2008

Year	Production per carton	Year	Production per carton	Year	Production per carton
1979	58.6	1989	37.9	1999	38.4
1980	53.5	1990	32.5	2000	37
1981	68.5	1991	39.6	2001	34.9
1982	38.3	1992	38.1	2002	35.8
1983	30.5	1993	27.4	2003	37.7
1984	32.3	1994	37.4	2004	35.2
1985	39.6	1995	35.6	2005	38.2
1986	37.7	1996	32.7	2006	42.6
1987	13.7	1997	35.7	2007	38.5
1988	33.1	1998	34.5	2008	34.5

Source: Ministry of Agriculture and Agricultural Reform 1980-2009. Averages of production per year were calculated by dividing the quantity produced upon the number of cartons reared in each Administrative Area, then calculating the average for each year. Averages of Administrative Areas that were unrealistic by a large margin (e.g. 200 kg per carton) were excluded from calculating the average of that year, in addition to entries that gave a 0 production per a number of cartons.

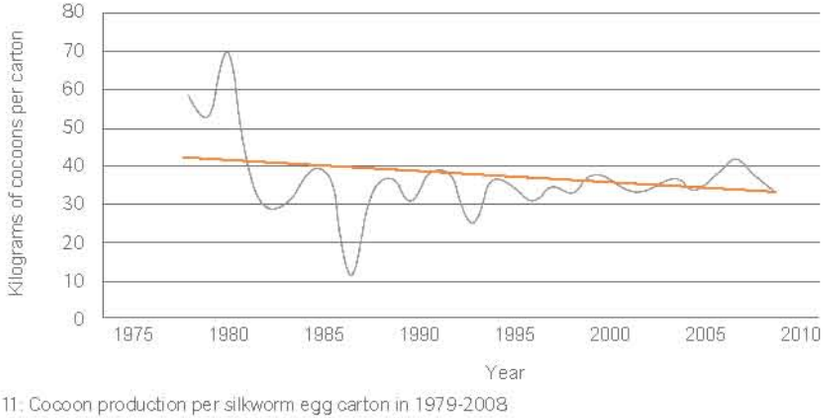


Figure 11: Cocoon production per silkworm egg carton in 1979-2008

Annex V: Silkworm egg cartons reared in Syria in 1979-2008

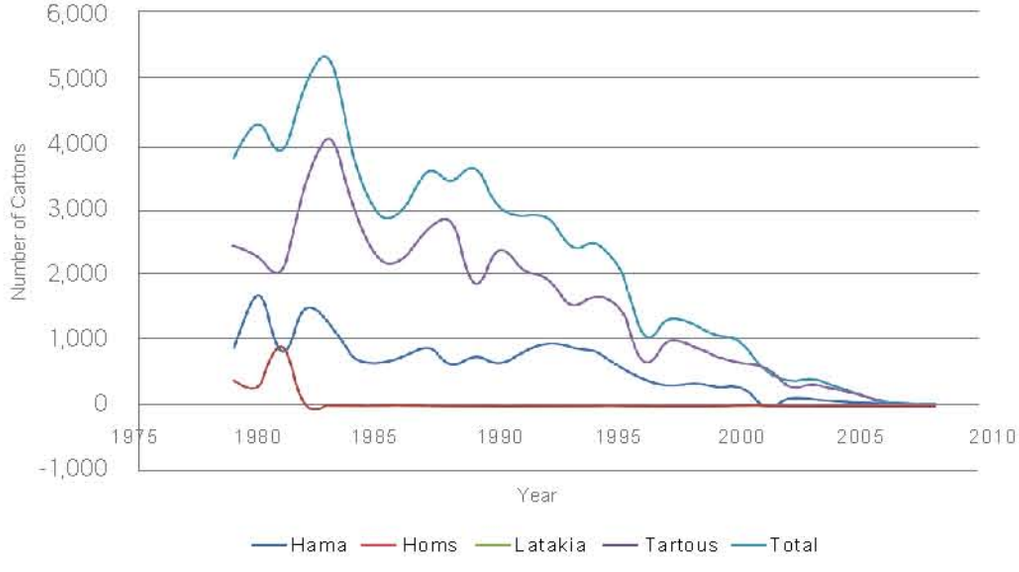


Figure 12: Silkworm egg cartons reared in Syria in 1979-2008 by Governorate (each carton weighs 11.7g)

Table 8: Silkworm egg cartons reared in Syria in 1979-2008 by Governorate [in bold] and Administrative Areas (each carton weighs 11.7g)

Year	**Hama**	Mesyaf	**Homs**	Homs	Tal Kalakh	**Latakia**	Jableh	Latakia	**Tartous**	al-Dreikish	al-Sheikh Bader	Banias	Safita	Tartous	**Other**	**Total**
1979	**862.5**	862.5	**376**	16	360	**59**	15	44	**2394**	1464.5	454	80	375	20.5	**0**	**3691.5**
1980	**1653**	1653	**284**	6	278	**58**	26	32	**2229**	1332	439	64	387	7	**0**	**4224**
1981	**822**	822	**873**	0	873	**90**	56	34	**2034**	1390	418	5	213	8	**0**	**3819**
1982	**1460**	1460	**0**	0	0	**90**	56	34	**3289**	2036	764	140	338	11	**0**	**4839**
1983	**1205**	no data	**0**	0	0	**4**	no data	no data	**3979**	no data	no data	no data	no data	no data	**0**	**5188**
1984	**724**	724	**0**	0	0	**0**	0	0	**2943**	1834	648	110	344	7	**0**	**3667**
1985	**650**	650	**0**	0	0	**19**	19	0	**2206**	1300	638	88	173	7	**0**	**2875**
1986	**740**	740	**0**	0	0	**19**	19	0	**2187**	1358	600	100	119	10	**0**	**2946**
1987	**874**	874	**0**	0	0	**0**	0	0	**2622**	1700	626	111	177	8	**0**	**3496**
1988	**624**	624	**0**	0	0	**0**	0	0	**2752**	1800	662	125	165	0	**0**	**3376**
1989	**730**	730	**0**	0	0	**0**	0	0	**1816**	2400	240	27	148	1	**0**	**3546**
1990	**637**	637	**0**	0	0	**0**	0	0	**2330**	1466	606	113	144	1	**0**	**2967**
1991	**816**	816	**0**	0	0	**0**	0	0	**2042**	1037	646	65	294	0	**0**	**2858**
1992	**931**	931	**0**	0	0	**0**	0	0	**1886**	980	688	55	163	0	**0**	**2817**
1993	**873**	no data	**0**	0	0	**0**	0	0	**1503**	no data	no data	no data	no data	no data	**0**	**2376**
1994	**803**	803	**0**	0	0	**0**	0	0	**1630**	880	510	113	127	0	**0**	**2433**
1995	**577**	577	**0**	0	0	**0**	0	0	**1439**	731	454	120	134	0	**0**	**2016**
1996	**391**	391	**0**	0	0	**0**	0	0	**648**	69	353	88	138	0	**0**	**1039**
1997	**306**	306	**0**	0	0	**0**	0	0	**944**	540	288	78	38	0	52 (Sfeira, Aleppo)	**1302**
1998	**336**	336	**0**	0	0	**0**	0	0	**880**	433	308	72	67	0	**0**	**1216**
1999	**288**	288	**0**	0	0	**0**	0	0	**723**	311	291	68	53	0	52 (Sfeira, Aleppo)	**1065**
2000	**270**	270	**0**	0	0	**0**	0	0	**631**	301	227	55	48	0	52 (Sfeira, Aleppo)	**953**
2001	**0**	0	**0**	0	0	**0**	0	0	**545**	249	220	46	30	0	**0**	**545**
2002	**112**	112	**0**	0	0	**0**	0	0	**278**	174	69	11	24	0	**0**	**390**
2003	**94**	94	**0**	0	0	**0**	0	0	**304**	171	115	9	9	0	**0**	**398**
2004	**70**	70	**0**	0	0	**0**	0	0	**218**	140	72	3	3	0	**0**	**288**
2005	**40**	40	**0**	0	0	**0**	0	0	**136**	96	40	0	0	0	2 (al-Sweida, al-Sweida	**178**
2006	**46**	no data	**0**	0	0	**0**	0	0	**24**	no data	no data	no data	no data	no data	**0**	**70**
2007	**37**	no data	**0**	0	0	**0**	0	0	**20**	no data	no data	no data	no data	no data	**0**	**57**
2008	**29**	29	**0**	0	0	**0**	0	0	**5**	2	3	0	0	0	**0**	**34**

Source: Ministry of Agriculture and Agricultural Reform 1980-2009.

As'ad and Othman factory is one of the surviving silk reeling factories in Syria. Although out of work today, it still bears signs of a glorious past: incentives' charts based on production sizes for the female workers (above) and silk remains (opposite).

Annex VI: Industrial reeling in Syria

Industrial reeling is done with machines and has stopped being practiced in Syria since the end of 2008 with the closure of the last operating silk reeling factory. It is differentiated from the traditional method of reeling on the Arab wheel, which was thoroughly investigated in the book.

The raw material for industrial reeling; cocoons, is thought to have always been locally produced rather than imported. There is data to back this assumption only starting in 1990 from the Syrian Central Bureau of Statistics (Central Bureau of Statistics 1991-2007). However, no available data counters it.

Overtime, the following silk reeling factories operated in Syria:

Ten private factories operated in 1913: One in Homs, three in Banias, one in Kafroun, three in Mashta al-Helou and two in Safita (Labaki 1984: 109).

Four private ones did in 1952: one in Oyoun al-Wadi, one in Mashta el-Helou and two in Homs (see map no. 2, p. 66).

In 1963, a public factory opened to reel for farmers for a fee and encourage them to increase the quantity and quality of their production (interview with Shafiq Othman on 8 August 2009).

Most of the private factories temporarily or permanently shut down between 1975 and 1980 due to the almost complete monopoly of the public silk reeling factory over purchase of cocoons, which has started in 1980, and its harassment towards them (al-Atrash 1996: 31, 33; Sa'oud et al. 2000a: 12; interviews with Shafiq Othman on 10 July and 8 August 2009, Walid Salem on 9 August 2009 and Jobran Jobran on 17 September 2009).

One private factory located in Oyoun al-Wadi marginally remained in operation and another, located at al-Dreikish, re-opened in 1994. However, these two factories closed in 2003 and 2007 consecutively (interviews with Shafiq Othman on 10 July 2009 and Jobran Jobran on 17 September 2009).

In October 2008, the last operating silk reeling factory in Syria (the public factory) closed (Memo no. 8716/1 by the Syrian Council of Ministers, dated 8 October 2008).

To portray a full picture, it should be noted that there are two types of reeling machines:

- a semi automatic one, which can be operated with poor quality cocoons, but relies on more labor than the automatic one, and

- an automatic one, which mechanizes the processes of searching for ends of cocoon filaments, picking ends, cocoon feeding to the reeling thread and separating dropped end cocoons during the reeling process (Lee 1999).

All of the Syrian factories used semi automatic reeling machines except for the public one, which was fully automatic. This piece of information comes in accompaniment to the idea that a fully automatic factory can process a much bigger load of cocoons per day than the semi-automatic one, and that if it doesn't; operating it becomes more costly than profit making. The public factory therefore, being fully automatic, needed to process most of the cocoons produced locally to make profit, which was probably the main reason behind its monopoly of local cocoon production through the 80s and 90s of the 20th century.

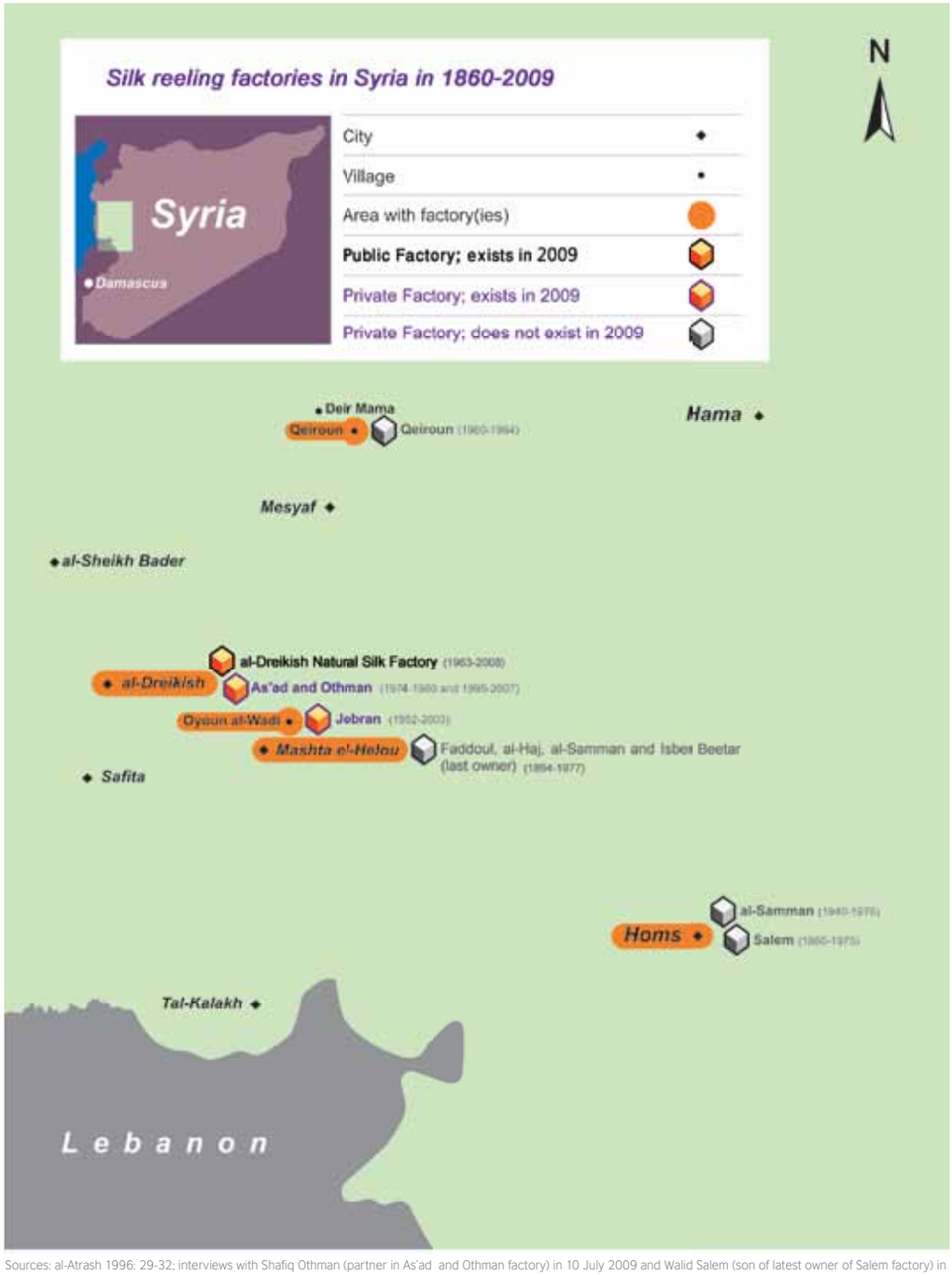
As for processes that accompany industrial silk reeling, drying cocoons was managed by the factories, while the procedures of throwing silk yarn and dying it were outsourced.

Both of these processes, dying of silk yarn and semi-industrial throwing, were practiced in 2009 towards imported natural and artificial silk to be woven in Syria.

Table 9: Potential and working powers of silk reeling factories in 1999

Factory Name	Location	Potential Power (kg)	Working Power (kg)	Use of Available Power (%)
Al-Dreikish Natural Silk Factory*	al-Dreikish	33,000	3,000	9.09%
As'ad and Othman Factory	al-Dreikish	7,000	2,500	35.71%
Michael Jobran Factory	Oyoun al-Wadi	7,000	1,500	21.43%

* The Public Factory. Source: Sa'oud et al. 2000b: 80.



Sources: al-Atrash 1996: 29-32; interviews with Shafiq Othman (partner in As'ad and Othman factory) in 10 July 2009 and Walid Salem (son of latest owner of Salem factory) in 9 August 2009; Memo no. 8716/1 by the Syrian Council of Ministers, dated 8 October 2008; al-Naddaf Maps, Map of Syria, Governorates of Hama, Lattakia and Tartous, al-Naddaf Maps, Aleppo. Map by: Georges Dahdouh, Style Art for Design.

Annex VII: Exports of Syria's cocoon industry in 1990-2006

Table 10: Exports of the cocoon industry in 1990-2006 (in kg)

Year	Cocoons suitable for reeling	Silk waste	Year	Cocoons suitable for reeling	Silk waste
1990	0	11,000	1999	0	60,000
1991	0	0	2000	0	0
1992	0	0	2001	0	0
1993	0	0	2002	0	0
1994	0	0	2003	0	0
1995	0	4,000	2004	0	2,000
1996	0	0	2005	0	0
1997	504,000	18,000	2006	2,000	0
1998	97,000	0			

Source: Ministry of Agriculture and Agricultural Reform 1980-2009. Averages of production per year were calculated by dividing the quantity produced upon the number of cartons reared in each Administrative Area, then calculating the average for each year. Averages of Administrative Areas that were unrealistic by a large margin (e.g. 200 kg per carton) were excluded from calculating the average of that year, in addition to entries that gave a 0 production per a number of cartons.

After comparing figures in the table above to the records of cocoon production of the Ministry of Agriculture and Agricultural Reform in 1979-2008 (Ministry of Agriculture and Agricultural Reform 1980-2009), it was noticed that the export figures of cocoons suitable for reeling amount to 1200% of the total cocoon production for the year 1997, to 106% of that in 1998 and to 67% of that in 2006.

Detailed amounts of cocoon production could be found in Annex III.

Waste silk exports are thought to have been accumulated for several years and exported in bulks. Therefore, the data above could be correct.

Annex VIII: Hand-spinning of waste silk in Syria

Spinning is the process of twisting together and drawing out massed short fibers into a continuous strand (Emery 1994: 8-10). Locals use the term 'spinning [*ghazil* غزل]' for both throwing and spinning, but differentiate between them when asked in detail.

Spun silk [*kheit qaz* خيط قز] (differentiated from the reeled raw silk [*kheit harir* خيط حرير]) has an irregular structure (Kalter, Pavoloi & Zerrnickel 1992: 203) and is only useable on a handloom, and not with hooks (interview with Eid al-Hasan and Hourieh Hasan on 20 August 2009).

A spindle [*maghzal* مغزل] is employed to produce the yarn and silk is then removed from it onto spools via a process similar to that used with thrown reeled silk (mawsara at-tayyar) (see 'Syria's reeling craft in 2009: Production: Equipment', p. 29).

Produced hand-spun silk used to be collected by a mediator and sold to handloom weavers in Hama and Homs, where the thread was mainly employed in the creation of the traditional items of hatta [حطّة] and toab qaz [توب قز] (interview with Adel Bitar on 1 August 2009), and some of these were dyed by women using the plangi technique.

The raw material for spun silk is waste silk, which is constituted of cocoons that are not suitable for reeling. Waste silk was never industrially spun in Syria. However, poorer locals did spin by hand, mostly acquiring the raw material from operating silk reeling factories through mediators.

In the process of hand-spining, cocoons get boiled and dried and the pupae are removed if present, then the remaining silk is hand-spun in a way similar to hand-spinning wool.

In Syria, no more hand-spinning of waste silk was done for money in 2009, although the knowledge still exists. Years earlier, the craft used to be practiced by poorer women who were mostly unable to work outside of their private homes in the land, and the main producing village was Deir Mama, Mesyaf (interview with Adel Bitar on 1 August 2009).

The remaining hand-weaver of spun silk in Syria (Adel Bitar), whose wife practices dying with the plangi technique (see p. 68), has not received yarn from Deir Mama (through the mediator) for several years and now uses spun-silk that he has in stock (interview on 1 August 2009).

Added to women being more able to work outside of their homes and demand driven problems similar to those faced by the silk reeling craft, the practice of waste silk hand-spinning had disappeared as an economic activity mainly because of the unavailability of its raw material; waste silk, which has been caused by the following reasons:

- The decrease of availability of defective cocoons, which goes in line with that of overall cocoons (there are 3 kg of defective cocoons for every 32 kg of good ones) (Sa'oud et al. 2000: 82).

- Reeling on the Arab wheel, which became the only remaining method to process cocoons in Syria after October 2008, produces less waste silk than factories do.

- Reelers in 2009 either threw away cocoons that were unsuitable for reeling or sold them to a lady that does decoration works with them (interviews with Ismail al-Hajj Mu'alla on 1 June 2009 and Hourieh Hasan on 20 August 2009).

Hand spinning of silk is not practiced in Syria as an economic activity anymore

Plangi patterns are used to decorate some of the textiles produced with hand-spun silk. Those textiles are normally made into combinations of red, yellow, indigo, dark brown and black colors (Kalter, Pavoloi & Zerrnickel 1992: 203).

Plangi [sarsara صرصرة] is a knot and dye technique in which a woman dyes the fabric with one color, creates knots on it (using strong cotton yarn) to form the design or pattern she wants, dyes the knotted fabric with another color and finally releases the cotton knots to have the desired patterned fabric.

Syria has produced cocoons, silk yarn, and silk handicrafts for centuries; all of which are threatened today.

This book portrays the status quo of the Syrian silk craft, in addition to presenting a problem analysis and recommendations to save it.

ISBN 978-87-993346-0-5