

## HISTORY OF SERICICULTURE IN FRANCE

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### ABSTRACT

The research carried out on French sericulture enabled us to know and understand the old techniques of this activity. In the past, silkworm rearing was exclusively reserved for women because they possessed the best breeding and hatching techniques of the butterfly eggs (*bombyx moris*) through the use of their chest. The spinning wheel, a wooden instrument, was used for a long time to spin the silk thread. From the 19th century, sericulture was widespread, the number of silk culture and educators increased considerably. Progressively, we have gone from small-scale production to mechanized production with high production costs. During this century, sanitary problems appeared in the silk culture, resulting in considerable losses which led to the disappearance of a large number of silkworm breeders. In the 20th century, sericulture activities proved to be good; the silk culture resume life and the textile industries are developing. In the 20th century, sericulture activities proved to be good; the silk culture resume life and the textile industries are developing. France sells silkworms and silkworm eggs in Europe, the United States of America and other countries around the world.

**Key words:** Sericulture, silkworm, cocoon, textile industry, France.

### INTRODUCTION

For several centuries, the world of French textile has experienced a remarkable revolution in the production of fabrics of all types and qualities. Counting these tissues would be a very tedious operation, without any real meaning, when we know that the national textile market presents products of diversified nature with ease. Silk, high quality fabric, embodying beauty is part of it. It is omnipresent, has a long life, a history, a presence in the spirit of the ancients, and seduces the new generations. The silk is obtained from the silkworm also called white mulberry<sup>1</sup> *bombyx*. These are the leaves of this tree which feeds the worm or the caterpillar. It is the breeding of this silkworm called sericulture, which became an agricultural activity in France and reached the stage of industrialization in the course of the 19th century, before occupying an important place in The French textile industry in the 20th century. The technique of silk production dates from 2500 BC. J.C and comes from China by the Silk<sup>2</sup> Road. She was a secret until 560<sup>3</sup>.

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<sup>1</sup>The Mulberry *Bombyx* is a butterfly native to northern China, raised to produce silk. The silkworm is its caterpillar. It is at the stage of caterpillar that the *bombyx* produces the precious fiber secreted into an abundant drool which, by hardening, is transformed into a single thread of raw silk with which the caterpillar is made into a cocoon. It is produced by specialized glands called *sericigenes*.

<sup>2</sup> The Silk Road designates an ancient network of trade routes between Asia and Europe. It takes its name from the precious merchandise which transited through it: silk. The Silk Road was a bundle of tracks through which many commodities passed, and which monopolized East-West trade for centuries. The oldest known traces of the Silk Road, as a channel of communication with the people of the West, go back to "2000 years before our era at least".

<sup>3</sup> China has long kept secret the production of silk fabrics for their superior quality and in order to sell them more expensive to other countries of the world.

Production began in Europe in the 6th century. In France, it began in the 13th century<sup>4</sup> but timidly and isolated by some peasants; this is not the time of popularization. Silk designates silk as well as the goods produced. It is also the place where it is produced or marketed. This wild fiber, out of the cocoon of an insect, of a butterfly has marked the spirits by its trade throughout the world and the times; This is why Edith and François-Bernard Huyghe (2006) wrote a pocket book entitled "the Silk Road or the Empires of Mirage" to mark this period in an unprecedented way. But according to Lamy (2010), although the silk trade was world-renowned, it posed a danger to many people on this route. And as for Biarnès (2008), seduced and amazed by this interminable road that for more than three millennia was the geopolitical axis of the world, entitled his book "The Silk Road, a Geopolitical History" Special significance and to recall the historical and geopolitical importance of this era. To better understand this activity, which attracted the attention of several farmers throughout the nations in general and in France in particular, we asked ourselves to organize our research on France sericulture. Economic, social and commercial issues arise naturally when we rediscover the activities that have been carried out in France by farmers, traders, manufacturers and intellectuals in the service of the nation. The following questions should be answered: What quantities of silk were produced and what was the France industrial consumption?

What quantities of silk have been made available to trade and industry in some other countries?

The problem thus defined instructs us on the objective of this research, which is to examine and understand, on the one hand, how the silk industry has worked in France for at least two centuries, and to highlight the way Whose production and marketing of silk fabrics contributed effectively to the France economy at that time. To understand the glorious period of sericulture in France, it is important to make a retrospective analysis of the historical and economic factors that have been used during these centuries. Understanding the history of the production, consumption and commercialization of this animal yarn between two centuries is a way of showing its importance and its commercial and economic role in French society. To conduct our research, we adopted the following methodology.

## METHODOLOGY

In order to provide answers to the above problems, we have researched libraries specializing in agricultural techniques, in the national archives, in the national printing works, and we have read reports on textile production in France d On the one hand, and we visited the documentation centers of the Ministry of Commerce and Industry in order to collect statistical, economic and commercial data relating to French sericulture and inherent activities. Customs reports and statistical data from the national printing press have contributed to the research. We used computer hardware to capture the data obtained, such as Word and Excel, to make the charts based on the information gathered in the data sheets that we have drawn up. The various researches have provided us with rewarding information which has been for us a gain and a contribution both considerable and remarkable. Although

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<sup>4</sup> The art of silk began in France from the 14th century, in Provence, but at the end of the middle Ages, France was still mainly supplied in Italy. It was Louis XI who made the decision in 1466 to produce on a large scale in France by wishing to do so in Lyon for the sake of his situation close to Italy and his annual fairs, but it was finally only under Francis I That the Lyon factory was established. In 1540, Lyon obtained the monopoly of the importation into France of "raw" bristles. In those years 12,000 people lived in Lyons weaving.

some documents are missing due to the various world wars (first and second war), those we consulted were of perfect utility. This work is essentially based on historical research and exclusively related to the textile industry: that of the silkworm. This is a historical overview of sericulture in France which traces the main lines of this activity which has participated actively for several centuries to the economy of France. To address the issue, we did not look at crops year by year, but rather the average crop of five years or ten consecutive years.

However, sericulture was initially done by peasants for several decades before some modern techniques came into being. It is therefore a double sericultural transition: the transition from a traditional breeding of the silkworm using only the majority of women, to a semi-traditional breeding with the intervention of the first machines, and finally a breeding Modern based on the use of sophisticated devices, with the industrialization of activity for mass production. The methodology thus established allowed us to orient our writing according to the following plan: before presenting the results of our research, we will situate the historical context of the sericulture and then we will give an overview of the quantities of silks harvested and consumed by the industries France for the manufacture of various textiles, and finally we will determine the quantities of silks sold abroad by France. This plan predestines us a priori toward three specific results in connection with the problem and in the respect of the objectives that we have set ourselves.

## RESULTS

### Traditional sericulture techniques

History teaches us that the techniques of silkworm culture were born in China. Europe has received it thanks to the Silk Road which has been the subject of several writings throughout the world. Before the modernization of silk production techniques, sericulture was done in a traditional way. The activity was exclusively for women (Zanier, 2007). The technique of hatching silkworm eggs was one of the most critically acclaimed among the peasantry but also among the thinking heads. Several authors have agreed that of all the sources of heat, which could be applied to eggs, the female breast was by far the best. According to Magino (1588, p. 25): "Women possess a specific heat which is the most suitable and most natural for the birth of silkworms." Levanzo (1564: 44) used similar terms: "intelligent women put eggs between their breasts, which make them fertile by lively and delicate warmth, which is considered the best adapted for the breast, hatching ". Among these authors is one of the fathers of modern entomology who shares this conviction by saying that silkworm eggs can hatch between feather cushions near the hearth but it is much more effective to hatch them the throat of women (Aldrovandi, 1602, p.286). Thus, women were required to carry eggs in their bags on their breasts or on their bellies so that the seeds receive human warmth. The eggs warmed up gradually, after twelve or fourteen days, hatch and produce small silkworms.

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educators to extract the silk thread. The educators remove the cocoons from their support and sort them: it is the decoration. The cocoons are subsequently placed in tanks, in cabinets or in barrels where they are smothered under a temperature varying between 70 and 80 degrees for at least eight days in order to completely eliminate the chrysalis<sup>5</sup> without damaging the cocoons. The silk is in the form of a loose wire whose length can reach 500 to 1000 m. The operator unites several of these threads to form a strand of raw silk. The raw silks are transported to racks or reels: it is the reeling which consists of removing the imperfections that are the corks, the marriages, and so on. In order to make the yarn correct without being intertwined and knotless. The unwinding is carried out by means of a spinning wheel<sup>6</sup> which the operator operates with the right or left hand as it is right-handed or left-handed and which carries the ratchet. The silk thread passes into the left or right hand of the operator, it makes a back and forth movement which distributes the silk in the reel.

This practice was universal until the beginning of the 20th century, despite the opposition and fierce condemnation of modern agronomists and scientists. At that time, in order to correct what appeared to be unjust and sectarian, the supposedly irrational and superstitious practices used by peasants in silkworm farms raised questions in the peasantry.

Thus, to remedy this situation, some landowners have tried to create men-led magnaneries employing exclusively men. These innovative initiatives were welcomed and hailed as a long-awaited action in sericulture. But these preliminary examples were not followed throughout the corporation later, the landowners again entrusted their magnaneries to the women. In the past, silkworm farming was carried out for a period of fifty days between the end of April and the beginning of June, thus avoiding the winter and summer periods which might create inconveniences, breeding. The production technique follows a natural cycle like humans and plants.

### **Silkworm Reproduction Cycle**

The process of reproduction of the silk thread by the caterpillar is a remarkable and very ingenious creation. The male butterfly and the female butterfly mate for several hours. After mating, the female lays eggs (seeds), within half an hour. After eggs are hatched, caterpillars are obtained which, reaching maturity at 30 days, seek a place to settle. Once settled in the habitat found, by means of abundant drops, the caterpillars secrete a precious fiber which, when hardened, is transformed into a raw silk thread with which the worm or caterpillar makes a cocoon. And after a life of two weeks, the caterpillar turns into a butterfly inside the cocoon. The incubation usually lasts between twelve and fourteen days, but the cycle (gestational) lasts about ten months without incubation. The whole process forms a circle. From the butterfly, eggs are obtained; the caterpillars come out of the caterpillars, and the latter produce cocoons. The illustrations below illuminate the process of the silkworm's reproductive cycle.

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<sup>5</sup> The chrysalis is the intermediate stage of development between the larva and the imago or adult.

<sup>6</sup> A spinning wheel is an old wheel-operated instrument operated by a pedal or crank and used for spinning wool.



Picture 1: the female butterfly, leaving the cocoon, already contains unfertilized eggs. He waits for the male for a possible mating so that the eggs are fertilized. Picture 2: the silkworms are laid and placed on mulberry leaves which they feed until their maturity. Picture 3: The cocoons are formed by a natural mechanism like any reproduction or human, animal or vegetable creature. Picture 4: The cocoon was opened a few days before the end of the second week to see how the caterpillar turned into a butterfly (*Bombyx mori*) inside the cocoon. On leaving the cocoon, the female butterfly already containing unfertilized eggs waits for a male butterfly to mate and activate the fertilization system.

### History of the sericulture of France

King Charlemagne, loving silk fabrics, imports it regularly until the 15th century when he realizes the sumptuous expenses that this generates for royalty. As a result of this reflection, he makes a salutary decision; Orders and promotes the production of silk in France. The region of Lyon is chosen as the capital of the silk. Under the advice of Olivier de Serres, Henri IV committed himself with great determination and zeal to the propagation of the silk industry in France. He ordered the creation in each parish mulberry tree and silk culture. At the end of this silky campaign, more than twenty thousand (20,000) mulberry trees are planted in the royal gardens. Sericulture grows everywhere in France, but especially in the south. The cultivation of the mulberry improves the living conditions of the peasants; the tree is called "the golden tree". Between the 18th and 19th century, the art of raising silkworms reached its peak in France. But despite the impressive, encouraging and salutary results, French production of silkworms has come to an end without an end. An important scourge strongly hits the world production of silkworms. This one did not spare that of France. It is the pebrine<sup>7</sup>. Apart from this disease which decimated crops, another scourge appeared around the 1870s by the opening of the Suez Canal, giving access to the French market for the Far East bristles. These include synthetic fibers that have very quickly supplanted silk in France.

Traditional manufacturers unable to adapt to Eastern competition, the silky French industry collapsed in the 1930s and despite several attempts to revive after the Second World War, there has never been a recovery. Since the 18th century, the manufacture of silk benefited from early mechanization thanks to Jacques Vaucanson<sup>8</sup>. In this period of proto-textile<sup>9</sup> industry coexist technically advanced spinning mills, capitalist type, and manual and domestic productions. In the middle of the century, silkworm rearing remained a seasonal activity carried out at home by an abundant rural labor force, predominantly female, but its income was twice as large as that of other agricultural activities. Millions of mulberry trees then invade the hillsides, and the houses grow silk culture. Similarly, the weaving of silk,

<sup>7</sup> Pebrine is a silkworm disease caused by a mushroom, the microsporidia *Nosema bombycis*, so named in 1857 by Karl Wilhelm Von Nägeli.

<sup>8</sup> Jacques Vaucanson: French inventor and mechanic.

<sup>9</sup> Christine Martella: Director of Archives, Heritage and Culture, Vaucluse County Council, Avignon, Provence-Alpes-Côte d'Azur and Luce-Marie Albigès: Curator, Archives Directorate of France; Give a historical context of the production of silk in the 18th (1845). They speak of a proto-textile industry to express the impossibility of exploiting sources written by the peoples themselves and the possibility of learning from writings emanating from other peoples.



carried out at home by the numerous craftsmen, extends in the countryside around Avignon to satisfy the demand: from 3000 trades in Avignon in 1810, to 7000 in the middle of the century, Occupying 15,000 people. To produce the raw material, the silk thread, in increased quantity, becomes possible thanks to the invention of the engineer Gensoul in 1807. The production of silk in France has had a particularly royal history. The technique of production was not born in the hexagon; it was imported from the Asian continent.

Before Lyon was named the silk capital, several other regions of France experienced sericulture. These include Montpellier, Avignon, Tours, Paris, Provence and Languedoc. At the beginning of the 14th century, Louis XI<sup>10</sup> invites Italian and Greek craftsmen to settle in Tours. They accepted the invitation and in 1546 Tours became a more important sericulture center than Lyon, Montpellier and Paris. The quality of silk and its constantly increasing demand at the national level prompted Henri IV to give a strong impulse to sericulture by popularizing the works of one of the eminent agronomists of that period (De Serres, 1843). The peasants welcome enthusiastically mulberry plants in the department of Ardèche. But beyond this region, a passionate of this culture, François Traucat<sup>11</sup> ordered to plant more than four million mulberry trees in Provence and Languedoc. To popularize sericulture, an intellectual campaign is initiated. Louis XIV demands that memorials be published on the culture of the mulberry tree and the breeding of the silkworm. In 1709, some farmers abandoned their field of chestnut trees and olive trees severely decimated by the winter cold in favor of the culture of mulberry and sericulture. Mulberry production is growing at a dramatic rate but statistics lacking at this period, there is no reliable regional publication. However, from 1760 to 1780 cocoon production amounted to about 7,000 tons per year. In 1852, more than sixty (60) French departments produced cocoons. In 1853 production reached 26,000 tons. Despite this intensification of production, the spread of silkworm diseases is observed in parallel because of the failure to comply with health prophylaxis. In 1856 cocoa production fell to 75,000 tons of cocoons.

## FRENCH SERICIC PRODUCTION AND CONSUMPTION

Sericiculture comprises two distinct branches: sericulture, which aims to produce healthy seeds, graining; the one that tries to produce cocoons. The first is a new industry. The seeds have been imported from Japan<sup>12</sup>. They were necessary for the feeding of the French silk culture<sup>13</sup>. Graining was a rural industry, founded on the application of somewhat scientific methods, which required a great deal of care and had to be conducted with particular and constant attention. Dry seeds are obtained from the silkworm breeds selected from French production and which are subsequently improved. Thus, the production of silkworms increased year by year, and France not only stopped importing seeds, but began to sell them to other silk producing countries. This self-reliance is achieved through the research and efforts of national producers. In 1886, France produced 8,300,000 kilograms of cocoons, which produced 675,000 kilograms of raw<sup>14</sup> silk. In 1887 the harvest was 8,575,000 kilograms of cocoons, giving about 700,000 kilograms of silk. These data, both economic and

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<sup>10</sup> Great king of France, poorly known but whom nevertheless ruled for 22 years.

<sup>11</sup> François Traucat: gardener from Nîmes (1554-1606).

<sup>12</sup> Ministry of trade and Industry, Standing Customs Values Commission. The textile industries in 1989.

<sup>13</sup> The silk culture heated rooms in which the silkworm is raised. This term comes from silk culture silkworm in the South. Reed huts are placed on top of each other, where eggs of silkworms are placed. The heat brings forth the worms. Then the worms are fed with leaves of *Morus Alba*. In the past, there was a silk culture per house in the areas where silkworms were grown, and they were built near mulberry plantations.

<sup>14</sup> The raw silk: it is a raw silk obtained by the simple reeling of the cocoon. The raw threads are threads made with this raw silk. They have an unbleached color; both gray and beige.

commercial, are inscribed in the account of the ingenious initiative taken by certain men endowed with wisdom and science with intelligent practice always on the alert. At the end of the 19th century, France succeeded in creating a graining industry thus opening positive hope in the minds of the people. These satisfactory outcomes bode well for the future.

During this period, the price of silk had risen, that of the fabrics had followed the movement, the quantity of silk produced had significantly exceeded that of the previous five years, and the stocks of raw materials did not seem excessive at the end of 1886: Contributed to the hope of maintaining, and perhaps of raising all prices, and of an active and satisfactory period of business. At the end of 1887, the observation was almost contrary to expectations; the factory in Lyons has not been good, everything has been made difficult: export has somewhat weakened, prices have risen, instead of rising. Data on production in some years were missing. The results of silk production in the 19th and 20th centuries are less well known. Between the years 1878 and 1883, the production of silk was substantially equal every year, but it was from 1884 that it changed. From 1883 to 1886, it increased every year. The following diagram shows the annual production of silk and shows the years when it was the best. These were successively 1887 with a production of 2 647 000 kg and 1888 with 2 745 000 kg (figure 1). The diagram does not take into account the years 1878 to 1883 due to the conformity of production. Compared to previous years, the silk harvest has reached its peak.

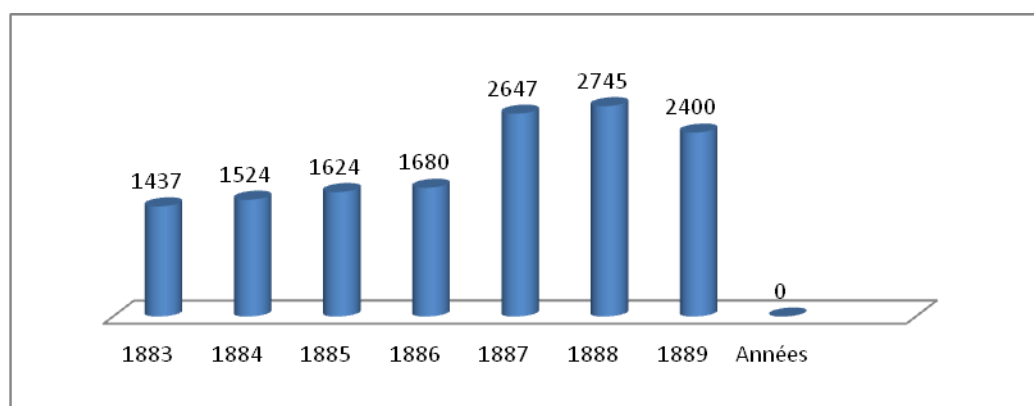


Figure 1: Evolution of silk production (1883-1889)

The production of silk during the first decade of the 20th century was treated with care, clarity and method in an excellent report prepared by the special commissioners in 1910<sup>15</sup>. The work done is as remarkable for the abundance and the safety of the documents as for the elevation of the views and the precision of the form. The spirit, dedication and frank collaboration of all the rapporteurs prevailed and yielded the figures and archived results. In order to better understand the evolution of the crops at the beginning of this century, the various people working in the institutions under the Ministry of Commerce, Industry and the Colonies, in agreement with the Standing Customs Valuation Commission, Textiles and foreign trade of France year by year (Figure 2). These data give information about the harvest of the first ten years of the 20th century.

<sup>15</sup> The commissioners in charge of special reports in 1910 are: MM. Louis GUERIN for the silks worked and worked silks; Émile CARRIERE, for cocoon silk and silkworm eggs; Victor MANDARD, for dyed silks and sewing silks; Charles DUMONT, for the silk wadding and the threads of schappe; BAUMLIN, for silk cloth; DELSAL, for gauzes, pancakes, muslins and artificial silk; Gabriel FOREST, for the ribbons. These reports were prepared under the direction of Mr. BAUMLIN, Chair of the Silk Committee.

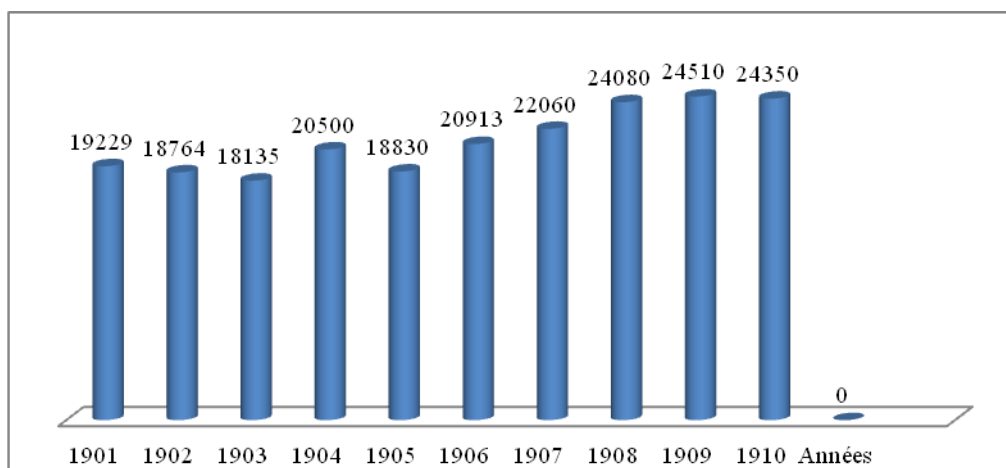


Figure 2: Evolution of silk production (1901-1910)

The annual crops presented by the stick diagram tell us about the quantities of silk harvested each year. In general, crops are increasing, although they have a meandering appearance. The years 1903 and 1905 give the low productions. They represent weak links. Seed boxes harvested, yields in cocoons per box, and prices related to cocoons are physical witnesses bringing economic and commercial information. Information is obtained from the Sericulture Statistics Department of France (Table 1).

Table 1: Sericulture statistics of France from 1901 to 1910

Years	Number of Educators	Boxes of seeds of 25 grams hatched (boxes)	Cocoons harvested in kg	Cocoon yields to 25 grams seed box	Cocoons prices
1901	131 694	205 174	8 451 839	41 193	290
1902	128 199	198 427	7 287 541	36 728	350
1903	120 266	182 712	5 985 481	32 700	400
1904	125 244	183 443	7 825 485	42 659	280
1905	123 761	189 279	8 009 398	42 765	330
1906	122 694	178 303	7 520 477	42 178	355
1907	124 463	188 360	8 396 201	44 575	420
1908	123 804	187 073	8 409 299	44 941	320
1909	119 067	183 181	8 546 526	46 656	370
1910	114 383	178 719	4 269 709	23 890	330
<b>Average ten-year</b>	123 347	187 467	7 470 196	39 828	3 445

Source: Paris, National Printers

The cocoon harvesting data given by the sericulture statistics of France provided accurately and clearly the quantities of cocoons obtained annually. They are highlighted by a curve to better see and appreciate the behavior of the entire cocoon harvest during the first decade of the 20th century (fig.3). The number of educators varies from one year to the next throughout France. This variation affects both the quantity of cocoons produced and the quantity of seed boxes harvested. The ten-year survey produced by French serial statistics also took into account the different annual cocoon prices. It is easy to see that these prices change from one



year to another. However, in 1903 and 1907, prices were higher compared to other years. On the other hand, in 1904 there was a remarkable price reduction.

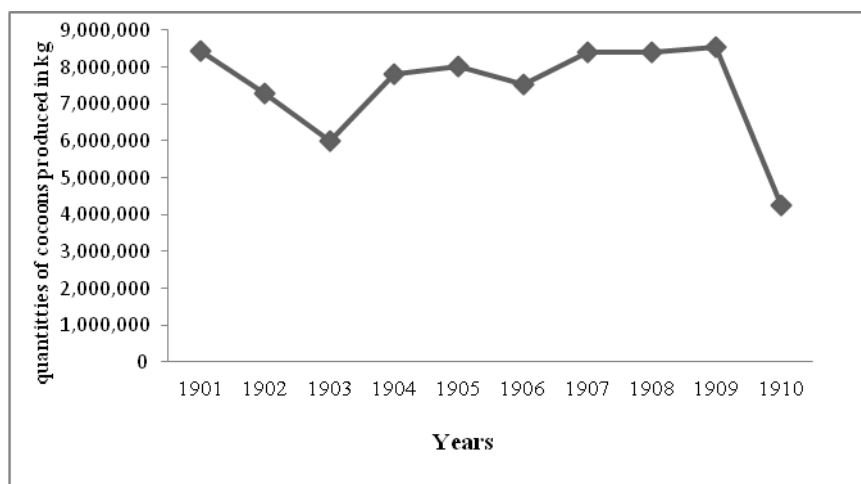


Figure 3: Evolution of cocoon production (1901-1910)

The general state of cocoon production is marked by three salient years that attract the attention of the researcher at first glance. It is 1901, 1903 and 1910. From the first year to the third, production is decreasing. It subsequently winds and decreases dizzily from 1909 to 1910.

### QUANTITIES OF SILK CONSUMED BY THE FRENCH INDUSTRIES

Large quantities of harvested silks are consumed in France. This is an internal consumption that involves domestic producers and consumers. In order to carry out this national endogenous operation, the harvested silks are used in various companies either for semi-processing or for fabrics in order to satisfy the national and international textile market. The consuming enterprises that are: the mills of spinning, milling, weaving; have been at the heart of sericulture. These factories spread across France used a strong and skilled workforce to work in the vision or line that the state had set itself in order to compete with the other silk producing countries. Some have produced finished seedlings; others have made finished products for immediate consumption. However, the final goal remains the same.

For these companies, it is a question of contributing to the national economy of France by marketing their products derived from silk subject to customs duties and taxes. Regarding the consumption of the 19th century, despite the efforts made by the competent services, documents relating to national consumption remain unavailable in the archives. However, one can rely on the meager information obtained to project itself into the unseen past of silk consumption in the next century. The consumption of the first ten years of the beginning of the 20th century presents annually, on a regular basis and with great clarity, the quantities of silk used at the national level by French industrial companies (Figure 4).

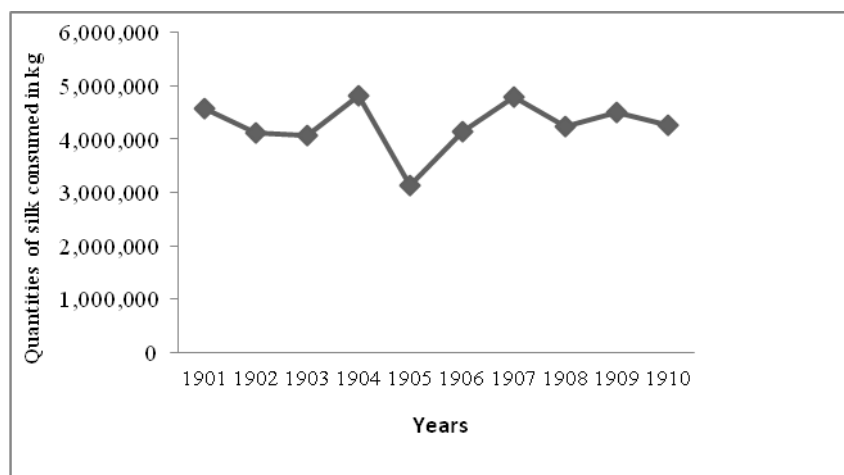


Figure 4 : Evolution of quantities of silk consumed during the period 1901-1910

According to the survey represented by the above curve, French industry employed 4,262,000 kg in 1910, as against 4,505,200 kg in 1909. The quantities produced and destined for French industry were higher in 1904 and 1907. However, these figures, although scandalous and exact, do not exactly represent the actual production or consumption of French industry. Some manufacturers and traders in bad faith still do not report quantities of silk received and consumed by their companies. However, the curve of the curve shows that the annual consumption of silks by French and similar industries does not reach five million kilograms during the first decade of the 20th century. It is almost similar over nine years (9); however, it had a low consumption of less than four million kilograms in 1905. Overall, the curve of the quantities of silk consumed presents a snake-like appearance. Looking at the consumption of the years 1904, 1905, 1907, and those of 1906, form V is obtained. 1905 represents the lower point and 1904 and 1907 represent the upper points. Silk was sold to both industrial and self-employed workers (artisans). The quantities of silks put up for sale in France during the seven-month period 1904-1910 were recorded in the annals of the Standing Customs Valuation Commission. Besides the spinning mills, which are major consumers of silk yarn, manufacturers of fabrics of all kinds for the local market also consume silk. However, the quantities of silk used by professional manufacturers throughout France cannot be known for lack of transparency and lack of a reliable information system. The majority of the surveys carried out by the customs authorities cannot be found.

## QUANTITIES OF SILK SOLD OUTSIDE FRANCE

### Marketing of silk in some foreign countries

In the 19th century, France exported large quantities of silk abroad. These exports represent a commercial and economic gain for this period. The quantities of silk sold are represented by a curve (Figure 6) which highlights the behavior of French sericulture in comparison with that of foreign countries.



Figure 6 : Evolution of silk export in kg in the decennial period 1887-1896

En Between 1887 and 1890, the quantities of silk sold abroad increased each year. Beginning in 1891, they dropped dramatically to 3,312,834 kg. The decline continued in 1893 with an export close to 2,697,296 kg. From 1895, exports increased before stabilizing in 1896. These sales produced monetary revenues represented by a curve (Figure 7), highlighting annual revenues from 1887 to 1896.

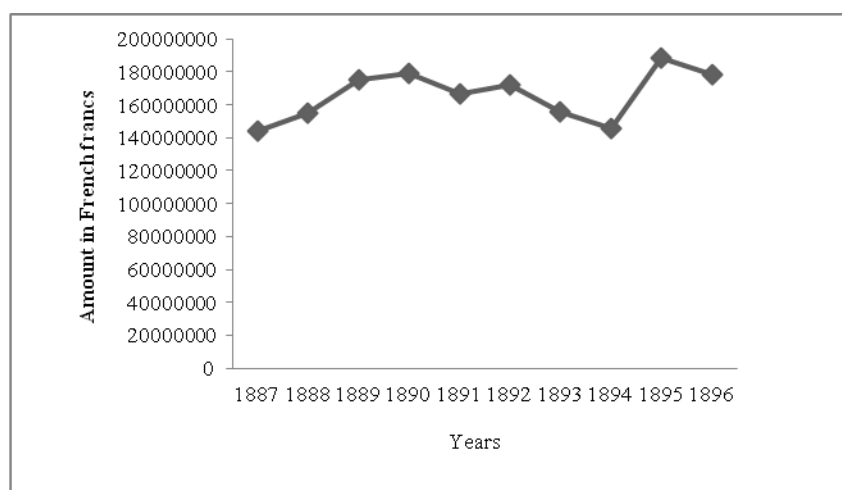


Figure 7 : Evolution of silk prices in the decennial period 1887-1896

In 1887, the sale abroad reported to France 144,070,000 French francs. Revenue grew each year until 1896, although the sales curve has a snaked pace with decreases in monetary terms over a few remarkable years. These were successively the years 1893 and 1894. Overall, sales were increasing throughout the period. The decade ended with 178,346,600 French francs registered in 1896. In 1895, foreign demand for silk products, addressed to educators and the French textile industries, was known thanks to information from the customs services. France has supplied several countries of the world. The main customers were largely European, but the United States was also large. It is mainly the silk fabrics made in France, judged to be of better quality that has been solicited throughout the world. In Africa, Egypt was the only officially known country, having placed silk orders in France.

There have certainly been other countries whose names have remained silent for unknown reasons. France officially had ten (10) customers and unofficial customers around the world. Hundreds of tons of silk have been sold to these customers. The financial equivalent

generated annually by this trade expresses the importance of sericulture and attests the desire and the profound desire of the French educators to mark their presence on the world market of silk. There is no question of peasants or other people who have marketed illicitly, fraudulently their product to earn money. The figure below (Figure 8) shows only the national data obtained during the search.

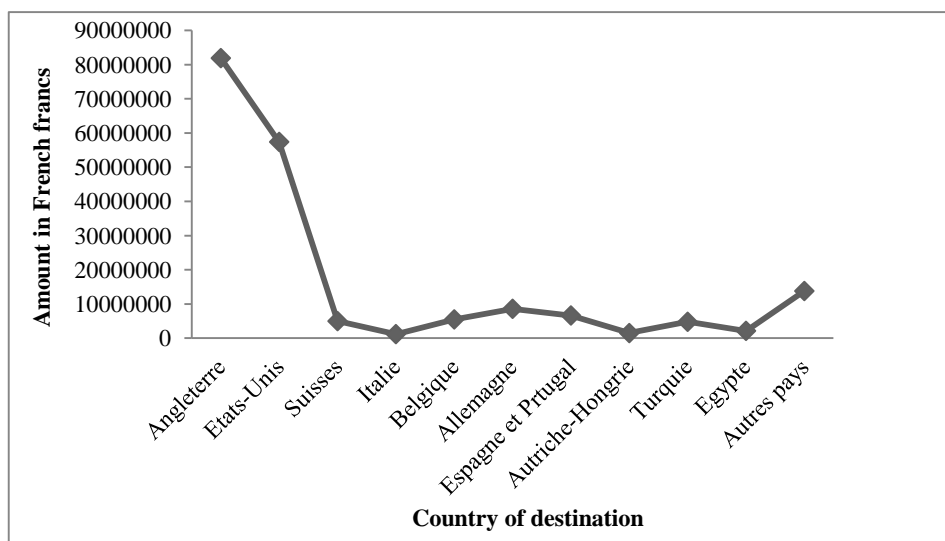


Figure 8 : Evolution of exports of silk fabrics by destination countries in 1895

The financial equivalent of England's orders was larger and larger than the orders of other countries; Followed by that of the United States of America. Orders from all other countries did not exceed ten million francs. Italy was the smallest customer in financial value. In 1896, England increased its consumption without failure. This increase reflects a parallel growth relationship; the more English consumption increases, the more the quantity of silks sent by France to that country increases. While exports to England increased in 1895 and 1896, this was to the benefit of mixed silk fabrics, particularly of mixed wool silk. Foreign trade from France to England was good not only because of the regularity of orders placed by England but also because of the intermediate or intermediate consumption of its colonies, to which the dental country regularly resells a part of the goods. The acts of commerce being regular between the colonizing country and the colonized countries, the supplier, France has obtained fair, relative and motivating profits. This situation has elevated it to the rank of a major silk producer in Europe; And Lyon, one of the great cities of this country, has been recognized as the capital of silk and silk in this century. The same is true in 1896; the equivalent of silk sales to the same recipients clearly indicates that the market value of the silks delivered to England during the year is higher than in other countries (Fig. 9) Europe and the United States of America.

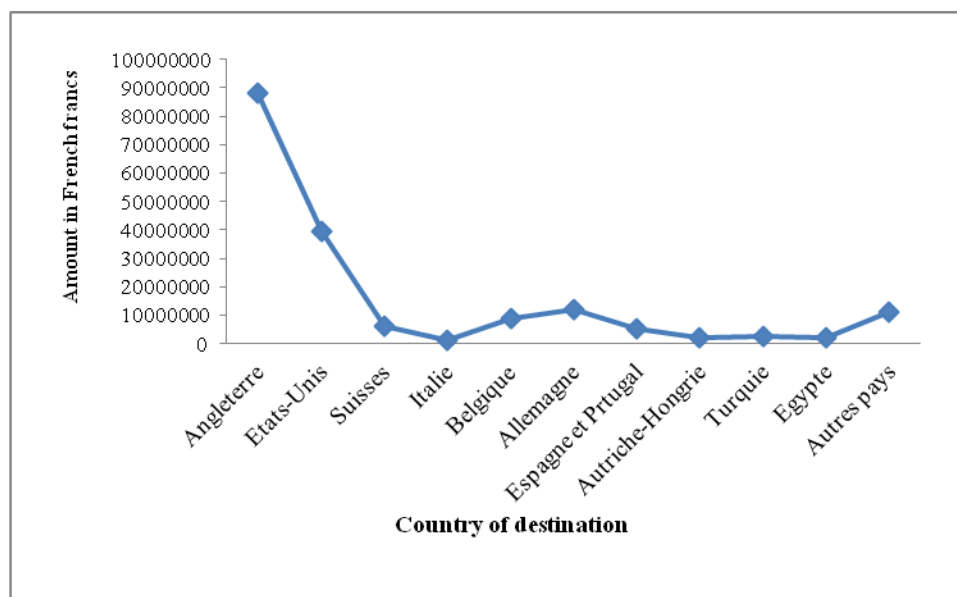


Figure 9 : Evolution of exports of silk fabrics by destination countries in 1896

The curve of the sale of silks abroad in 1896 presents the same appearance as that of 1895. It is easy to see that England still remains the country which has placed more orders than the other countries of Europe and the States -United States which have significantly reduced their silk consumption during this period, outside Austria-Hungary which has significantly increased its silk quantities. From the 20th century onwards, France committed itself to delivering silkworm eggs to foreign countries (Table 2), thus opening its activities to other European and Asian markets. These new countries which intervened in their international trade circuit, agreeing to buy the silkworms consolidated France's trade balance.

Table 2: Exports of silkworm eggs (kg) to other countries

Countries of destination	1906	1907	1908	1909	1910
Italie	11 476	12 945	10 070	9 500	11 544
Turquie	7 983	8 406	6 470	5 360	7 952
Russie	1 958	1 500	1 360	1 400	2 796
Grèce	394	689	697	720	572
Espagne	1 140	1 272	1 065	1 520	1 076
Égypte	2 268	2 795	2 891	1 680	-
Indes anglaises				1 200	1 284
Suisse				960	1 434
Other countries				-	112
Totals	25 219	27 607	22 553	22 340	26 680

Source : Paris, National sprinters



## DISCUSSION

Many historical evidence shows that women have played a dominant role in the production of silk all over the world and that they have been the best educators. Some authors assert that traditional sericulture was long done by them; Chézy (1805) and Dozy (1961). These findings are the same according to the results obtained in the chapter dealing with the traditional techniques of sericulture. The results obtained from the work fall into three categories: production, consumption and marketing. These economic aggregates were analyzed in a purely historical context. We speak of a historical overview because it is impossible to treat in a scientific article of a few pages, all the literature concerning the French sericulture which spreads over several centuries. As far as the production of silkworms is concerned, it can be seen that the 19th century has already announced the behavior of sericulture activity with a production of 1 437 000 kg in 1883. In 1889 it is equal to 2 400 000 kg; an increase of 963,000 kg in six years. Despite this notable increase, it is important to note that the 1888 production is 2,745,000 kg, so there is a production decrease of 345,000 kg between successive years. In 1901, at the beginning of the 20th century, customs records published 19,229,000 kg of silks produced and in 1910, 24,350,000 kg, and an increase of 5,121,000 kg over the decade. The annual increase is equal to 512,100 kg. It represents a notable gain for foreign trade.

For educators (Table 1 and Figure 3), the number of teachers varies from one year to the next. In 1901, there were 131,694 educators known officially throughout France. In 1910 they increased to 114,383, a decrease of 17,311 educators. In 1901, 8,451,839 kg of cocoons was produced and in 1910, 7,470,196 kg of cocoons was produced. These decreasing results relate to the number of educators who declined during the year. The same logic is observed with respect to the boxes of seeds of 25 kg hatched. The higher the number of boxes hatched, the higher the cocoon yield at the 25 kg seed box. In 1901, the production of cocoons was equal to 8,451,839 kg; in 1910 it increased to 4,269,709 kg; There is a relative decrease of 4 182 130 kg. However, despite this decline, the last three successive years (1987, 1988 and 1989) had a fairly fair production of cocoons before it declined in 1910. From the above, it can be deduced that the Quantities of cocoons produced relate to the number of educators.

In terms of consumption, the information obtained is meager despite all the efforts made during the research in order to answer the questions. Nevertheless, the results obtained during the 20th century illuminate our curiosity somewhat. During the first decade, the quantities of silk used by the national textile industries are well known. They are strictly variable from one year to the next. In 1901, 4,579,700 tons were consumed; in 1910, the quantities of bristles consumed reached 4 262 000 kg (fig.4). However, in 1904, French companies used 4 812 000 kg; this suggests that either the quantities used by French industries are not officially known, or there is instability in national consumption.

Thanks to a fairly large production of silks from French industries, at the end of the 19th century, the French State opened its products to foreign trade. In 1895 the value of goods sold to England amounted to 81,900,000 francs, those sold in the United States amounted to 57,400,000 francs, and the quantities sold to other countries whose names are not known , Are 13,800,000 francs (fig.8). In 1896, England bought 88,200,000 francs of silk from France. France sold 39,500,000 francs of silk in the United States and the other countries bought silks for 11,000,000 francs (fig.9). There is a fairly significant financial downturn between the two years. At the level of England, the main customer of France, the loss is equal to:  $(8,200,000 \text{ f} - 81,900,000 \text{ f} = 6,300,000 \text{ f})$ . The financial loss on the sale of silks to the

United States amounts to:  $(54,400,000 - 39,500 = 17,900,000)$ . It is higher than that of England. The financial downturn is also felt by other clients; It is equivalent to:  $(13,800,000 - 11,000,000 \text{ f} = 2,800,000 \text{ f})$ .

From the 20th century, France has diversified its products and has had other customers all over the world. Instead of sending only the silk already worked by French companies, the State has decided to sell semi-finished products abroad, such as eggs made of silkworms. There were eight recipient countries that were the loyal customers supplied by the French companies from 1906 to 1910. The quantities of goods delivered to these countries vary each year according to the demand made by the country concerned. From the production to the sale, the French industries have been able to maintain on the European market as long as possible especially during the last century.

## CONCLUSION

The objective of the research carried out in 2016 on French sericulture was to understand the progress of this activity, which was internationally renowned. Indeed, sericulture has been practiced in several countries of the world for a single reason; the production of yarn to weave fabrics of any kind. This silk thread, of a quality that is said to be better, has revolutionized the agricultural world, the peasantry, and has occupied an important place in the textile industries. In order to carry out this historical work, it was necessary to carry out fundamental research based exclusively on documentary research in archives difficult to find. This is one of the first difficulties we have faced. Although traditional techniques have been appreciated by all the scientists of these periods, it must be emphasized that the use of women's bodies as an instrument of breeding is unsatisfactory even if they have been preferred for a long time compared to men who have been marginalized for unexplained reasons. From spinning silk yarn to weaving, it is women who are involved in all French gold magnaneries, it would be nice to admit men slowly, which would make it possible to rapidly popularize the activity and develop it in all regions of France.

Today, although silk production is not really known by present generations, it has its place in the manufacture of silk fabrics and the demand for silk fabric is strong on the textile market. This easily confirms the beauty, durability and quality that are recognized. For this reason, from the 19th to the 20th century, French industries improved their production techniques by creating sophisticated machines enabling access to mass production. These new techniques have increased domestic production and subsequently sold their silk products abroad. We have given a general historical overview of silkworm breeding by treating this topic, in order to understand how silk thread has been produced in past centuries. But our wish is that this theme will one day be the object of a doctoral thesis so that the author can deepen his research and bring more results that can enlighten the minds of the enthusiasts of the history of science and technology.

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