

AN ABSTRACT OF THE THESIS OF

Lai Sheung Luk _____ for the M.S. _____ in _____
(Name) (Degree) (Major) Clothing, Textiles
and Related Arts

Date Thesis presented June 16, 1937

Title A Comparative Study of the Construction and Quality
of Silk Materials Purchased in China and the United
States

Abstract Approved _____
(Major Professor)

The question about the quality of Chinese silk has always been of interest not only to the manufacturer and consumers in China but also to people who are wearing and dealing with silk all over the world. Judging of silk fabrics by means of the feel and on the basis of sales information has been realized an inadequate and unreliable method. Hence, a more objective method of determining the quality of silk fabrics is desirable for everyone concerned with silk.

Cognizance has been given to the use of scientific methods of textile testing in the United States. How far the tests are applicable to Chinese silk fabrics is not known. In this comparative study of both American and Chinese fabrics under the same methods of testing it was found that the American method of finding the amount of metallic weighting was unnecessary for Chinese fabrics.

Fifty fabrics, 29 from China and 21 from the United States, were bought. The commercial standards of "woven dress fabric" promulgated by the United States Department of Commerce, the United States Bureau of Standards, and the Standards of the American Society for Testing Materials were adopted. Test methods of this study consisted of tensile strength test, resistance of yarn slippage, shrinkage after dry cleaning, color fastness, and metallic weighting content test.

The findings indicate the difference in qualities demanded of silk fabrics in both countries. First, the width of Chinese fabrics varied a great deal, the most common being 27-30 inches; while those of the United States were wider, the popular width being 39 inches. Second, more brocades were found in the Chinese silk market, while there is more demand for plain weaves in the United States. Third, the colors of the Chinese silk fabrics were found more pure and there was a variety of different shades and tints that are more or less neutralized in the American fabrics.

The results of this study show that of the 29 Chinese silk fabrics tested all except three were composed of pure cultivated worm silk. The tensile strength of 11 fabrics in the warp and 18 in the filling rated below 30 pounds, which seems rather low in comparison with all the studies and findings in regard to American silk. Seventeen fabrics did not show any yarn slippage warp-wise at the seams, and 24 were not affected filling-wise. The percentage of shrinkage was not more than 5 per cent in any case. None were affected as to color by perspiration and dry cleaning, and only three fabrics changed color slightly when a hot iron was applied. Only one sample contained more than 10 per cent weighting.

The tests made on the 21 American silk fabrics showed that the information given by sales persons concerning the composition of fiber was accurate. Only five fabrics in the warp and eight materials in the filling registered tensile strengths of less than 30 pounds, a result which is lower than those found by others. Seven fabrics in the warp and 19 in the filling did not pull at the seams. Shrinkage from dry cleaning was very slight. The shortcoming of these fabrics seemed to be in the resistance to spotting. Eleven out of 21 fabrics were either slightly or greatly affected by perspiration. No change was noted in the commercial dry-cleaning process. All but one was affected under the hot pressing test. Four fabrics were found to be weighted with more than the legitimate amount of metallic substance. Two of them, however, were specified as weighted silks at the time of the purchase.

It may be concluded from this study that the facts about qualities of silk fabrics cannot help manufacturers to prosper their trade nor can they help the consumers to get more service out of their dresses. Facts are helpful in so far as they are adapted to the purpose and needs of the individual. Also, this points to the need of further study and working out of different sets of standards and specifications for various types of silk fabrics.

A COMPARATIVE STUDY OF THE CONSTRUCTION AND QUALITY
OF SILK MATERIALS PURCHASED IN CHINA
AND THE UNITED STATES

by

LAI SHEUNG LUK

A THESIS

submitted to the


OREGON STATE AGRICULTURAL COLLEGE

in partial fulfillment of
the requirements for the
degree of

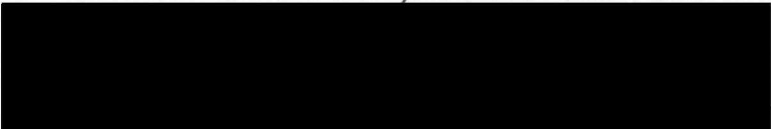
MASTER OF SCIENCE

June 1937


APPROVED:




Professor of Clothing, Textiles and Related Arts
In Charge of Major



Head of Department of Clothing, Textiles and
Related Arts



Chairman of School Graduate Committee



Chairman of College Graduate Council.

ACKNOWLEDGMENT

The author wishes gratefully to acknowledge the kind assistance of her Adviser, Professor Edith Rhyne, of the Department of Clothing, Textiles and Related Arts in the preparation of this thesis.

Table of Contents

	<u>Page</u>
Introduction	1
Why this Study is Being Made	1
Historical Development of Silk in China . . .	3
A Brief Historical Account of Silk Culture .	3
Historical Account of Silk Culture in the United States	10
Research Studies on Silk Fabric Testing in the United States	23
Methods of Procedure	31
Results of the Study	33
Conclusion	44
Summary of Tests	47
Charts with Materials used for Tests	50
Bibliography	101

A Comparative Study of the Construction and
Quality of Silk Materials Purchased in
China and the United States

Introduction

Why This Study is Being Made. On account of the importance of silk as one of the major fibers and the general acceptance and demand of silk material for many uses including household textiles as well as wearing apparel, it was decided by the author that this is a subject of much significance.

With comparatively little or no work having been done in China on the quality of material in relation to consumer demand, it was considered of value for the author to develop some basis for her judgments before returning to China.

One of the objectives of this study is to develop an understanding and skill in making simple tests which might be applied in the textile laboratory for the potential buyer or the results of which might be used by adult groups. Cognizance has been given to the use of scientific methods of textile testing in the United States. This will not only bring to silk manufacturers,

importers, exporters, and retailers in China the newest methods of determining the quality of silk fabrics but also afford the author the acquisition of skill and technique which she can use in the future when the demand is developed for such work.

It is only through a study of the silk industry in this country and China that an understanding of its present conditions and problems can be possible. Nations are at the present time becoming interdependent.

Historical Development of Silk in China

A Brief Historical Account of Silk Culture in China. The origin of silk is lost in antiquity.

Legend tells us that silk culture started in China 2698 years before Christ. It was not until Justinian's reign, about 550 A. D., when two monks succeeded in concealing some silk cocoons in their staffs, that the entomological origin of the fiber in the West was established. So, from that time on Southern Europe was developing a silk industry. Greece, Italy, and Turkey were the first countries to try the culture, but the secret spread to Spain, Portugal, and France.

The earliest silk fabrics were found by Sir Aurel Stein*. From considerations suggested by the site and circumstances of their discovery, Sir Aurel Stein inclined to place them in the first century B. C.

Many samples of old Chinese silk fabrics were found after the T'ang Dynasty, the period of arts of

*Kendrick, A. F., Chinese art, p. 39. During Sir Aurel Stein's third Central-Asian expedition in year 1914 earliest Chinese silk weavings were unearthed in a cemetery site, now found on the route opened out for the silk trade with the West by the Chinese late in the second century B. C. and finally closed early in the fourth century B. C. after losing much of its traffic by the discovery of an easier route two centuries earlier.

all kind in China, and are now available in European museums. Two contrary comments are usually noted upon these old specimens. First, in the eyes of Westerners Chinese textile designs seem singular, peculiar, and grotesque. Second, there are always elements of foreign influences that can be traced in Chinese textile designs.

The demand for Chinese silks increased greatly during the sixteenth and the seventeenth centuries when there was much intercourse between China and Europe. All through this time, strange as it may seem to us now, the Chinese had been able to meet the enormous European demand without regarding foreign styles as anything more than a veneer to be applied merely to articles for export.

Today perhaps this age of textiles is past. This may be explained by the changes that are going on in China. In the first place, foreign influences are at work in all lines of Chinese art and industry, owing to political and economic reasons. Next, since the establishment of the Republic in 1912 symbols have ceased to have the same meaning as they had for many centuries. For example, the five-clawed dragon is no longer restricted to the use of the Son of Heaven or for the royal family, nor does white necessarily mean mourning.

The Silk Industry in China. Conditions of soil and labor in China make production of raw silk one of the major activities. Although large steam filatures are now found along the coast in the larger cities, the silk industry in China is in the hands of the peasantry.

There are two central raw silk markets in China, namely, Shanghai and Canton. Shanghai is the port which serves the whole of the northern producing district just as Canton does the southern district. The exports from Shanghai are larger and embrace a wider variety of raw silk classification than those of Canton.

With everything in China's favor in the way of territory and cheap labor, one wonders why there is such a lack of progress. In the first place, one factor in the way of any real growth in China's export trade in raw silk is the silver basis to her currency. The fluctuation of the values of a silver currency from \$.50 to above \$1.25 and finally back again, places an almost insuperable barrier in the way of any real growth in her export trade. Secondly, in 1930 the price of raw silk, as it was mentioned before, was at its lowest during the present generation. Filatures could not make any profit; as a result it was reported in 1934 that only 20 filatures were running instead of 94 five years before that time. The third reason which worked against the

expansion of the silk industry in Central China was the government restriction placed on cocoon hongs. It was supposedly for the purpose of protecting the home silk weavers from unemployment due to lack of raw materials for their looms that there was passed a law in 1913 prohibiting further cocoon buying stations in the interior. Its direct result was the forced stagnancy in filatures silk exports in the last decades as shown by the customs statistics.

The raw silk product in the Chinese filatures is divided into three qualities. The first quality is consumed chiefly in America and one-third of the second in France and Britain. Two-thirds of the second and third quality are consumed in Japan. The Japanese manufacture this raw silk into Pongee or Japanese Fuchow and export it to America.

There are no statistics available concerning the consumption of silk fabric in China, but there is evidence that demand for silk has turned more than ever to cheaper textiles. The large supplies of cheaper Japanese silk made available during the recent years, the sale of which was facilitated by the favorable yen exchange rates, are a decided factor in affecting the demand for silk in China. So far no encouragement has been given to existing or proposed enterprise in China

in the rayon trade, presumably for fear of harming the old-established worm-silk trade.

Attempts at Improvement in Sericulture. Interest in modernizing China's silk industry was first evidenced by the American silk industry toward the development of a raw silk source in China. Besides the International Committee for the Improvement of Sericulture in China*, the Chinese Nationalist Government has made a definite move to expand the silk industry in China. Steps have been taken toward this goal such as encouragement, demonstration work, and experiment stations throughout China.

Testing Agencies. Every raw silk export firm maintains its own inspection department, where silk is received, stored, and inspected before shipment. The inspection laboratory usually consists of equipment, and quality of testing equipment varies widely among the Shanghai exporters from a fully equipped and up-to-date testing laboratory to very simple quarters con-

*The Silk Association of America inaugurated two years ago a movement to increase the production and further improve the quality of the raw silk grown in China and the countries of Central Asia and the Levant. Funds have been collected from members and a portion spent in a contribution to the International Committee of Sericulture and in erecting a silk building at Lingnan University at which Chinese silk farmers are taught improved methods of sericulture.

taining one winding frame and several quadrants. The two most extensive tests are sizing and winding, usually made according to European methods. The methods of inspecting and testing raw silk in the various laboratories are different, depending upon the requirements of the consumer. Each inspector tests the silk according to his methods and experience gained over a period of years in handling the various kinds of silk. Therefore, visual inspection plays a very important part among the Chinese silk inspectors, as mechanical silk testing has not been greatly popularized in the Shanghai market. Inspection for color, clearness, and feel is made visually with the aid of the hands.

The Shanghai Bureau of Inspection and Testing of Commercial Commodities, Ministry of Industry, has recently established a raw silk testing department for the testing of raw silk, yarn, and fabrics. The raw silk tests include the conditioned weight test, boil-off test, evenness test, cleanness test, and winding tests. Yarns and fabric tests consist of moisture tests, weight tests, tensile strength tests, and fastness of color in yarn and fabric. More progressive reelers have shown their interest in the standardization of their raw silk grades. The test increasing most in popularity has been the conditioning test. It was reported the combined

volume of testing for the two years 1925 and 1926 was 11,658 tests, while for the year 1927 the total tests were 12,283 with the added advantage of showing a wider distribution for all kinds of tests.

Historical Account of Silk in the United States

A Brief History of the Attempt to Cultivate Silk in America. Silk culture commenced in the American Colonies when James I of England encouraged and compelled the colonists to supply cocoons or the raw silk to his manufactories in England. During the eighteenth century Georgia, South Carolina, Connecticut, and Pennsylvania had made considerable effort to promote silk culture but only with temporary success. In the latter part of the eighteenth century up to the nineteenth century the amount of silk made in the United States was not very great; it still was a domestic manufacture. In 1844 a general blight affected all the mulberry trees; the rearing of silk worms was abandoned throughout the United States. Hence, the attention has been turned from the cultivation of silk to the development of the manufacturing industry.

Silk Manufacture in the United States. Silk culture, with all its advantages, was generally abandoned as unprofitable after the "Multicaulis Fever" in the year 1844. As a consequence manufactories of silk goods were established one after another.

1. Importation. The increase or decrease in the figures of importation depends upon several factors:

war, style trend, protective tariff (for instance, the tariff of 1922 and 1930), increase of home production, inflation, transportation and new invention.

Raw Silk. The amount of raw silk consumed in the United States in the year:

1877 amounted to	1,182,750 pounds
1900	9,139,617 pounds
1910	22,319,778 pounds
1920	29,462,745 pounds
1930	82,778,903 pounds

The world's raw silk production amounted to approximately one hundred million pounds in the year 1931, which indicates that the United States consumes about 82 per cent of the world's total figure. Of the volume of the world production of raw silk Japan contributed 65 per cent, China 18 per cent, Europe 11 per cent, the Levant 2.5 per cent, and others 1.5 per cent.

Statistics show two facts, namely, demand for silk has increased greatly, judging from the volume of demand of the consumers. Secondly, silk is and probably will be the strongest tie between the United States and the Orient since the higher wages in the United States do not warrant the production of raw material for the manufacturing plants.

The price of the raw silk has fluctuated a great deal. Between the year 1877 to 1917 the price per pound of raw silk ranged from \$2.76 to \$4.61, but in 1919 after the signing of the Armistice, the price of raw silk went up as high as \$9.29 per pound on the average.

In 1930 raw silk had the lowest price during the present generation, the average price being \$2.00 per pound. It was a result of the business depression in America which started in 1929 coupled with Japan's return to the gold standard in January of 1930. As a consequence the use of Chinese and Italian silks increased during this period 35 per cent and 31 per cent respectively. The Chinese silk prices were particularly favored by the continuous drop in silver.

According to the statistics of 1880 the amount of spun silk imported was 19,325 pounds*. In subsequent years it was as follows:

1890	856,706 pounds
1900	1,650,177 pounds
1910	3,159,595 pounds
1920	2,082,229 pounds
1930	207,839 pounds

*Silk Association of America, 28th mid-year Report.

2. Production. Within the last years, progress in the industry is notable. The tendency toward goods of wider width is the first in the process of evolution that is traceable since the time when the American manufacturer put out goods 18 and 19 inches in width. The movement has been constantly for wider and wider goods, as prompted by necessity and utility, the widest width being 90 inches. Another important development in the staple broad goods has been the growth of the weighting process. It has been said weighting is used for the purpose of giving a desirable draping effect to the fabric, producing a high metallic lustre on the silk fiber and less expensive means to recover the loss of weight of silk due to degumming. It has gained much public favor as evidenced by the report in 1931 that "despite the tremendous decline in prices of raw silk, weighted crepes still represent the bulk of business." Lately keen competition between manufacturers has led them to place a great many goods on the market beyond the specification of the Bureau of Standards; that is, 10 per cent of weighting for colored silk and 15 per cent of weighting for black silk. Much stress has been given to the checking of such a tendency and action has been taken by the Silk Association of America to put a stop to the practice of overweighting.

3. Consumption. Because of the increased intense competition in the textile market and the tendency toward organized manufacture and frequent change of fashion, production of silk broad goods is becoming subservient to consumption and distribution. Without going into the explanation of economic laws, the relationship between production and consumption is obvious, as we understand when there has been overproduction of goods markets decline. The correlation of cost of production to the price at which goods are quoted for sale has a direct bearing on the problem of consumption. As competition increased, it became necessary for manufacturers to have a faster turn-over.

There are three factors operating in the field of consumption of silk broad goods today: namely, the style trend or style cycle, the advent of synthetic goods, and the quality of goods in relation to price.

Style Trend. The world war has brought about three important changes in the mode of living of women in the United States today. The employment of women outside their home gives social and economic independence with a consequent increase in the purchasing power of women and more active life among women. The result is there is a trend toward luxury fabrics. Then, the change in convention leads to a new mode of living

which makes a definite and new demand upon the manufacturers. The impairment of health and nerves which is an accompaniment of modern living has awakened the interest in health and hygiene, resulting in a demand for light weight and sports clothing. Finally, with all the scientific advances such as increased active purchasing power, the rise of movies, radios, and the automobile, widening of trade areas, and greater and more rapid spread of fashion information, individuality in clothing and standardization of costume are now being considered very much to be desired.

Style in the fashion field is expressed in four dimensions--material (fiber), weave, color, and design. All these style changes are induced by the following sources: commercial designers, foreign openings, fashion journals, resorts, foreign samples, style books, art museums, style juries. If the producers are less well-informed, overproduction of certain weaves, color, material, or design will be the result.

The Advent of Synthetic Textiles. From the consumer's standpoint worm silk is desirable for its length, strength, and fineness of filament, its elasticity, drapability, and cleaning properties. But, within recent years with the outstanding success accomplished in the rayon field, synthetic fabric, too is being ac-

cepted. The success has been due to the recent introduction of fine filament and the development of luster control, making possible the production of attractive, soft rayon fabric of high quality until today the consumer has difficulty in distinguishing the difference in appearance between worm silk and synthetic fabrics.

A comparison of silk and rayon consumption shows:

<u>Year</u>	<u>Silk (in pounds)</u>	<u>Synthetic (in pounds)</u>
1926	66,673,000	60,627,000
1927	73,317,000	100,022,000
1928	75,934,000	100,133,000
1929	82,433,000	131,329,000
1930	77,430,000	117,196,000
1931	79,118,000	157,357,000
1932	73,742,000	152,178,000
1933	62,390,000	206,773,000
1934	65,000,000	190,000,000

The increased consumption of synthetics has no doubt been due to the technological advances made by the rayon trade, but the shift of consumption of these fabrics principally is attributed to one factor--the amount of differential in the price of silk and rayon raw materials. The rayon textile trade has one advantage over the silk manufacturer; that is in being able to control the production of raw material and to avoid the extreme fluctuation in price. Between the years 1923-1934 the cost of rayon raw fiber went down steadily from \$2.80 to \$.60 per pound, with only two rises in

price each less than \$.20 in amount, while in the case of raw silk the price fluctuated from an average of \$8.65 to \$1.30 per pound, the highest being \$10.75 per pound.

Today a large percentage of dresses are made either in part or wholly of synthetic fabrics. This is evidence of the rapid progress made in marketing synthetic fabrics and of the increased confidence in such fabrics on the part of the ultimate consumers. Furthermore, in a study of the distribution of raw materials used in silk manufacture we find in the year 1929 59 per cent of the raw materials were silk (including raw, thrown, and spun silk), 28.6 per cent rayon, and the remaining wool and cotton, which indicates the amount of rayon fiber being used in all textile manufacturing plants and the entry of synthetics into the forefront of the textile competition.

Quality in Relation to Price. The increased popular acceptance of rayon fabrics has made necessary the production of low-priced silk goods for the manufacturer to keep up with his business. Therefore, this struggle for volume of low-priced goods drives the levels of quality downward. The practice of weighting the silk fabrics, building up in this way the weight required for use in the manufacture of dresses, is one

way to meet the need.

It has been increasingly difficult to make a fair profit on silk merchandise, for, since the adoption of the Textile Code in 1933, the net labor cost and number of employers are on the increase, while hours of labor per shift and consumption of silk are on the decrease¹. The only way to lower the price of any merchandise is to find some means to cut down the raw material cost, either to substitute a poorer grade of raw material or to mix silk with other textile fiber. A review of the average distribution of the manufacturing dollar reveals the following facts²:

Cost of raw material	41.26¢
Total direct labor	15.24¢
Dyeing and finishing	19.59¢
Other expenses	13.88¢
Overhead	<u>10.03¢</u>
Total100.00¢

As the cost and conditions of production are likely to remain constant, it is natural to expect that the cost of raw material affects the price of goods and the quality of the material used also determines the price.

¹Comparing July, 1933 and February, 1934; source from The National Federation of Textiles, Inc.

²Copeland, M. T. Production and Distribution of Silk and Rayon Goods, p. 25.

4. Standardization. Standardization of silk fabrics has operated both for the aid of the manufacturers and for the benefit of the retailer and the ultimate consumer in their buying and selling activities.

Manufacturers' Aids. To guide against the poor quality of raw silk imported into this country and the annoyance given to the American manufacturers by defective and insufficient twists, and to have raw materials meeting the requirements of the American silk manufacturers in the matter of a standard skein to meet their high-powered machinery, the "Standard American Silk Skein" was established in 1901. Shortly afterwards A Raw Silk Classification Committee was appointed by The Silk Association of America for the purpose of demonstrating and exhibiting to the representatives of silk producing countries the ways the American manufacturer wanted his silk reeled. For the last three decades conditioning of silk has been practiced in this country.

The United States Testing Company is the official testing station of the United States. The scope of standardization of raw silk includes conditioned weight (dry weight plus eleven per cent), boil-off tests (determination of amount of gum which boils off in a one per cent soap solution), fiber test, thrown silk and

rayon, soap and oil extraction test, scouring test, size tests, winding test, twist test, and raw silk cohesion and dye test. The effectiveness of standardization and the extent of work can be best understood by a study of the statistics of The United States Testing Company for the years 1927-1930 which reflect a steady growth of testing in this country¹.

<u>Name of Testing House</u>	<u>1927</u>	<u>1928</u>	<u>1929</u>	<u>1930</u>
Hoboken	63,088	67,388	116,170	112,084
Paterson	11,701	11,141	11,288	7,279
Philadelphia. .	10,701	13,956	18,569	13,582
New Bedford . .	5,427	4,965	3,561	4,027
Chicago	12,633	21,260	21,074	27,277
New York. . . .	22,430	24,715	23,970	27,079

Standardization of Fabrics. The National Bureau of Standards and The American Society of Testing Materials both have been setting up standards for testing fabrics. The purpose of The National Bureau of Standards is "to provide standard methods of testing woven dress fabrics from the standpoint of serviceability and a uniform basis for reporting results of tests, for the guidance of testing laboratories in order to eliminate confusion resulting from a diversity of testing methods."² The American Society of Testing

¹Annual report for 1930-1931, The Silk Association of America.

²Woven dress fabric testing and reporting, Commercial Standard, published by the United States Department of Commerce and National Bureau of Standards.

Materials, now engaged in the "promotion of knowledge of the materials of engineering and the standardization of specifications and the methods of testing," has placed in the hands of its Committee D-13 the study of tests and specifications for textile materials. The Committee was the means of bringing together representatives of the producers and users of the mechanical fabrics and of greatly stimulating the development of methods of testing these products.

For the benefit of the retailers there are the Retailers' Testing League, store testing laboratories, for instance, Macy's Bureau of Standards, Sears, Roebuck's Testing Laboratory, and the National Retail Dry Goods Association Laboratory, which is known as the Better Fabric Testing Bureau. The functions of these testing laboratories are to: 1. Analyze and compare offerings of manufacturers so as to ascertain relative value; 2, examine merchandise so as to determine its relative performance and durability; 3, censor all advertising statements relating to the composition, performance, and durability of the items so as to correctly inform the public; 4, examine customer complaints in order to determine the reason for the failure of merchandise; 5, collect and classify information developed for the purpose of setting up merchandise

specifications.

There has been a consumers' movement working actively in this country. First, the attempt to educate consumers. The Better Business Bureau, Consumers' Research, Inc., the American Home Economics Association, the Good Housekeeping Institute, and Women's magazines are now giving out textile information in order that the consumers may not be misled by some current advertising and also providing for the subscriber a service (supported through subscription by the consumer) consisting of unbiased, technical information and counsel on goods bought by the ultimate consumer. In some magazines there are reports on tested fabrics and advice given consumers in the making of a wise selection.

The second aspect of the consumers' movement is the promotion of the use of labels on merchandise. It has been suggested* that before labeling is widely accepted some kind of official promotional work should be established to: 1, determine what properties of the various types of fabrics are of first importance in consumer use; 2, develop machines and methods of testing

*Ruth O'Brien, Abstract of paper presented at the October, 1935 meeting of Committee D-13.

these properties; 3, establish minimum quality specifications for any class or grades which can be set up within those groups to advantage; 4, establish a practical and scientifically sound nomenclature for fabrics. The certified merchandise plan of the United States Testing Company means the giving out of quality seals to those goods that conform to the quality standards and specification of the company, and then by check testing at regular intervals assuring the maintenance of the quality and uniformity. This is not only an aid to the ultimate consumer but also a help to reliable manufacturers and retailers in pointing out to their consumers the merit of quality merchandise in both serviceability and money value.

Research Studies on Silk Fabric Testing in the United States

Not so many years ago persons engaged in the textile field in the United States recognized the lack of fundamental knowledge regarding its raw material and processes as one of the textile industry's more serious handicaps. New knowledge that may be applied in the development of new products must depend in large part upon fundamental research. There are three distinct groups now engaging in research of this kind. The

industrial group research indicates a preponderance of applied and development studies and rarely do any but the largest units of any industry feel warranted in undertaking fundamental research because of the indefiniteness of the possible rewards for the time and expense that may be involved. The educational group and commercial groups disclose a much larger number of textile researches that are essentially fundamental, yet few of these have been carried to definite conclusion*.

In the educational group the investigations reported by Home Economics Departments of Colleges and Universities are almost wholly scientific and testing research, yet a large percentage of the researches reported are of economic character because most of them have something to do with qualities of materials, garments, and household textiles that are of interest to the final consumer. Many of these studies contain valuable information for the manufacturer as to the qualities of textile products that best meet the needs of consumers.

*Survey of Textile Research in the United States,
U. S. Institute for Textile Research.

Besides there are the researches that are in progress in connection with silk fabric and wearability. Those studies which have already been reported are: first, "A Seven Year Series of Studies on Silk and Synthetic Fabrics" by Pauline Berry Mack; second, "Wearability of Silk Dresses 1931-1934" by Mary V. Whitlock; third, "Serviceability Tests on Fall and Winter Dress Fabrics" by Ethelwyn Dodson.

Dr. Mack's series of studies were begun in 1929 for the purpose of investigating the characteristics of silk and synthetic fabrics on the market and of the consumer's ability to select fabric on the basis of sales information and her own personal judgment. In regard to the characteristics of silk and synthetic fabrics on the market it was found that dresses bought for less than \$20.00 were invariably made of heavily weighted silk and therefore low in durability upon exposure to light and perspiration (except that color fastness was not related to the price of the dress), which meant the lower the price of the dress, the greater the amount of mineral weighting in the fabric, the poorer the fabric performed in the durability tests. The same correlation between weighting and durability has been found with silk yardage on the market, but the price per yard of the fabric was not an indication

of its weighting content or its durability.

The result of the tests of the consumer's ability to select fabric by means of judgment revealed that individuals with previous textile training have a percentage of accurate judgment no better than that of the random group or of the non-trained individuals, their chief source of error being in placing too many of the fabrics in the heavily weighted and in the low durability classes, while the group with no training in textiles are mistaken in the direction of placing too many fabrics in the pure dye and in the high durability classes. It was also reported that consumers cannot rely on the information offered by sales persons, as it was said, "Inaccurate sales information was given about the durability of most of the fifty silk dresses used in the study, and inexperienced advice was given about the cleaning or laundering of the garments."

This study found serviceability was one important demand that the average consumer would ask and look for. In the choice of 60,660 dresses bought by the 21,895 persons answering the questionnaires prepared by Dr. Mack, durability was a contributing factor in 62.1 per cent of the dresses and style in 58.1. Other factors such as becomingness and fit were also considered by many of the women. The question of why silk dresses are

discarded revealed that in 66 of 100 cases it was solely because the fabric was no longer wearable. The chief cause of loss in durability of the fabric studied seemed to be the presence of mineral weighting in the fabric. The price of the dress was no insurance of the quality of the fabric, and information received by the consumer in many was incorrect. The firmness of weave of the fabric and the workmanship of the garment were found to contribute to the durability of the garments.

Whitlock's study on the wearability of silk dresses was initiated to see what effect actual wearing had upon different silks, to see whether there was a great deal of difference in the amount of service received by different individuals, and to study the fabrics and characteristics of the individuals in relation to the amount of wear received. The silks in this study, for the most part, gave evidences of the same difficulties to the different individuals, whether they were hard or easy on their clothes. If fading, running colors, yarn slippage, or water spotting was a problem in one dress, it was a problem in all the dresses made from the same silk. Individuals who were hard on their clothes did not affect the fabric to a greater degree than those who were easy.

In comparing the conditions of the silk at the end of the study the percentages of weighting were too similar to account entirely for the great divergence in the condition of the weighted silks at the end of the experiment. Some of the silks were severely injured and some slightly. The tensile strength of both pure dye and weighted silks was affected by wearing. In most cases the yarns of the waists were weaker than those of the skirts. Yarn slippage was evident in the dresses even though the dress fitted perfectly or loosely and even though there was no undue strain on the silk. Fading was a serious problem rendering some of the garments useless in a very short time. Running of color presented some difficulties in the fabrics. Shrinkage was a serious problem in two of the eight silks. Water spotting was a problem in only one fabric but was a serious problem in that one. Perspiration presents a real problem in the serviceability of silk dresses, but the dresses of those who perspired freely were no more injured by perspiration than those who did not perspire freely. To be able to render satisfactory service to the consumer a silk should be high in tensile strength, have color fastness, resistance to yarn slippage, should have water spotting and shrinkage well controlled, have no undue tendering due to metallic weighting, discharge

dyeing or to any other factor.

Dodson's Serviceability Tests on Fall and Winter Dress Fabrics included 82 fabrics which were like those commonly seen that season in dresses selling for \$3.79 up or found on yardgoods counters at from \$.75 to \$5.00 a yard. Each fabric was tested according to the methods proposed in "Commercial Standard for Woven Fabric"* for tensile strength during cleaning, color fastness to light, to crocking, and to dry cleaning.

All the fabrics, with the exception of one piece of chiffon, were about 30 pounds in tensile strength in the warp and 20 pounds in the filling. From a tensile strength standpoint, these fabrics were said to have a highly satisfactory rating. In the 20 pure silk fabrics a crepe back satin rated 162.2 pounds warp-wise and 70.2 pounds filling-wise, while the lowest in this group of flat crepe was 86.5 pounds warp and 35.8 pounds filling. In weighted silk fabrics, the highest was 102.2 pounds warp-wise and 59.0 pounds filling-wise, while the lowest in this group was 54.4 pounds warp and 30 pounds filling. The result of slippage tests showed the 20 pieces of pure dye silk averaged 21.2

*Commercial Standard T S-2171, U. S. Department of Commerce and National Bureau of Standards.

pounds; the weighted silk 19.17 pounds. This again shows the greater the amount of mineral weighting in the fabric, the poorer the fabric performed in the durability test.

Shrinkage from "cleaning-dry"* for the 20 pure dye silks averaged 3.48 per cent in warp direction and 3.68 per cent in filling direction; the 20 weighted silks averaged 1.02 per cent in warp and 2.07 per cent in filling. When "cleaned-wet" the pure dye silk fabrics averaged a shrinkage of 8.10 per cent in warp direction and 8.67 per cent in filling direction; the weighted silks 3.93 per cent in warp and 11.57 per cent in filling.

The test for color fastness to light was based on minimum exposure of 20 hours in a FadeOmeter. Of the 79 fabrics tested in this way, 37 were fast color, 33 faded slightly, and 19 faded noticeably.

The results of these serviceability tests show why fabrics appearing and costing the same to the retailer as well as the consumer may vary in serviceability. The trend of this study would indicate that most of these fabrics should give satisfaction, except that a

*The difference between "cleaning-dry" and "cleaning-wet" is that in the "cleaning-dry" process this mixture (solvent to which soap and certain alcohols are added) is used without further additions while in the "cleaning-wet" process, water is added.

few of the fabrics should have a low serviceability rating. Upon comparing fabrics classified by fibers, it seemed to Miss Dodson that reasonable serviceability may be expected from fabrics whether pure dye or weighted silk, rayon, or acetate.

Method of Procedure

Method of Making Choice of Materials for Tests.

Fifty worm-silk samples were selected for the tests on the basis of the information given by sales persons in the silk stores of China and the United States with the help of an experienced silk dealer in China and the head of the textile department of a large department store in Detroit, Michigan. Fair representation of different colors and weaves were the two factors in making the choice of the silk fabrics of each country.

Twenty-nine samples of silk fabrics were bought in Canton, China, in November 1936. Of the 29 materials they were thus distributed as to weave: 5 brocades, 5 damask, 1 satin, 5 novelty, and 13 plain. In regard to color 6 were white, 1 pink, 1 of two colors striped, 3 navy, 3 green, 1 peach, 1 natural, 2 printed, 3 brown, 2 figured, 3 black, 1 beige, 1 red, and 1 blue.

Twenty-one samples of American silk fabrics were bought in Detroit, Michigan, in March 1937. Weaves

represented included 6 crepe, 5 satin, 5 plain, 1 cut pile, 2 damask, and 1 brocade. The colors were distributed as follows: 5 black, 4 white, 1 purple, 2 beige, 1 blue and white print, 1 peach, 5 blue, 1 green, and 1 red.

Methods of Making Tests for the Materials. The Commercial Standard CS59-36 in "Woven Dress Fabrics" promulgated by the United States Department of Commerce and the National Bureau of Standards on September 1935 and the American Society for Testing Materials Standards by Committee D-13 on textile materials published in 1936 were adopted for this study. The standards provide methods of testing with reference to tensile strength, color fastness, cleaning, shrinkage, and yarn slippage.

In the tensile strength test warp-wise and filling-wise strips were cut according to the specifications prescribed for the tests made on the Scott Tester, a motor-driven pendulum machine, and the results are recorded in pounds.

For the yarn slippage tests seams were first stitched with silk thread, then pulled and the degree of slippage shown at the seams both lengthwise and crosswise was recorded.

Fabrics were marked and sent to the dry cleaner for the shrinkage and color fastness tests. Observations were noted and measurements were taken after they had been cleaned. Shrinkages in the warp and in the filling were calculated separately.

The hot pressing test was made by placing a fairly hot iron on each sample silk fabric for 10 seconds, then removing it and comparing the sample with the original fabric. Acetic acid was used in the perspiration experiment. The samples were pressed before noting any change in color.

To find the amount of weighting, the specimens were first kept in a desiccator for 24 hours, then the samples were weighed separately on an analytic scale. The silk fabrics were charred above the direct flame before putting the ash in the electric oven under the heat of 550 degrees until all the organic matter was burned off. The residue was weighed and calculated as to the percentage.

Results of the Study

The Tensile Strength Test. The tensile strength of each fabric was determined in pounds both in the warp and filling direction. The following table shows how the 50 silk fabrics ranged in tensile strength.

Table A. Tensile Strength of American and Chinese Silks

Pounds	1-10		10-20		20-30		30-40		50-60		60-70		70-100	
	W	F	W	F	W	F	W	F	W	F	W	F	W	F
Chinese	1	2	4	7	6	9	5	3	2	1	2	1	3	2
American	0	1	1	4	4	3	2	4	7	5	1	3	3	0

Many factors enter into the strength of warp and filling yarns; namely, the fiber, the weave, and the amount of weighting. Just what part each plays is not always clear, but from the serviceability standpoint tensile strength is one of the best indications of the durability of the fabric.

In regard to the findings of the tensile strength of American silks, the results seemed lower than those found in Dodson's and Whitlock's studies. According to Dodson's tensile strength test, of the 82 silk and rayon (of which 20 were pure worm silk) with the exception of one piece of chiffon all were above 30 pounds in tensile strength in the warp, 45 ranging from 40-80 pounds and 32 above 80 pounds. As to the strength of the filling, none of the fabrics fell below 20 pounds, 13 ranged from 20-30 pounds, while 32 ranged from 30-40 pounds and 33 were between 40-80 pounds. Whitlock's study found that eight pieces of silk (two pure dye,

one spun silk, and five weighted silks) ranged between 50-90 pounds warp-wise and 20-80 pounds filling-wise.

In the present study, with the exception of two spun silks, one rayon-and-silk, one cotton-and-silk, all were worm-silk fabrics of which one would naturally expect a higher rating in tensile strength. Instead, five fabrics were found warp-wise and eight filling-wise below 30 pounds in tensile strength. Judging from the serviceability standpoint these fabrics could not be considered satisfactory.

In Table 1, under the column of tensile strength there are 10 samples that have differences of warp and filling tensile strength of not more than 10 pounds. These fabrics are very desirable from the durability standpoint. The weave of the fabric does not seem to have any significant bearing on these cases, since of these ten fabrics one is a pile weave, two crepe weave, three satin, two damask, and two plain weaves. Nor can the composition of fiber explain the balance of warp and filling strength, because both the silk-and-rayon and silk-and-cotton fabrics are included in the list. It may be that the silk fibers used in combination with other fibers are of cheaper grades, as such is often the case, so that in this way the warp and filling

strength are balanced.

The ten fabrics that have both or either warp or filling less than 30 pounds in tensile strength are rated as having the highest amount of metallic weighting content, ranging from 8-50 per cent. This result corresponds with the fact found in Dr. Mack's study of the effect of weighting in relation to durability.*

The findings in regard to the Chinese silk fabrics show that eleven of the total samples in the warp and 18 in the filling, about two-thirds of the whole group, are below 30 pounds in tensile strength, while the other samples range from 30-95 pounds. Comparing this result with that of the American fabrics, the tensile strength of the Chinese fabrics is lower on the average. One explanation may be given in connection with price of the materials. Although the prices of the Chinese fabrics are not known, the range of prices of the 29 samples seem wide, judged by the difference in grades of silks chosen. Samples of No. 5, 9, 15 are silks commonly used as lining of dresses which require only very light weight material. The price range of American fabrics is between \$1.49-\$5.95.

*Roberts, N. M., Mack, P. B. The effect of tin weighting on the nitrogen content and physical properties of silk, Jour. of Home Ec., Nov. 1929.

Considering the balance of warp and filling strength, there are 11 fabrics that have differences of not more than 10 pounds. One damask weave fabric has as much difference in the warp and filling strength as 22 pounds and 95 pounds, which is not desirable. No definite relationship has been noted between tensile strength and the weave of the fabric.

Yarn Slippage at Seams Test. In the warp yarn slippage test more than half of the Chinese fabrics showed no slippage at the seams. Only two were affected slightly, and ten pulled with the least stress. In the case of the filling yarn test, with the exception of five samples, the rest recorded no change. Of the American silks there was an even distribution of the warp yarn test cases; 8 easily slipped, 6 slightly, and 7 showed no slippage at all. Nineteen out of 21 filling yarn tests showed no pull at the seams.

Table B. Yarn Slippage at the Seams

Rate of slippage	Easy		Slight		None	
	W	F	W	F	W	F
Chinese fabrics	10	1	2	4	17	24
American fabrics	8	1	6	1	7	19

Table 1 shows that out of five fabrics that had satin weave four are recorded with yarn slipped either easily or slightly. The fifth did not pull on account of its twill cotton back. It was found that damask weave, combination weave, and spun silks and higher tensile strength materials had less tendency to pull at the seams. This serves to indicate the relation of weaves to durability of a fabric. Any fabric which showed pulling at the seams with the least stress would not be considered serviceable for garments that require much fitting and for persons who are inclined to be stout.

Shrinkage Test.

Table C. Shrinkage on Dry Cleaning

Amount of shrinkage	No shrink- age		.10"- .20"		.20"- .30"		.30"- .40"		.40"- .90	
	* W	F	W	F	W	F	W	F	W	F
Chinese	14	17	7	7	-	5	8	-	-	-
American	12	15	4	5	-	-	4	-	1	1

* Shrinkage in the warp calculated by the yard;
in the filling by the width.

According to the Commercial Standard specified for shrinkage it was found that both the Chinese and American fabrics under testing were within the 5 per

cent shrinkage allowance. It was further found that fabrics shrank more in the warp than in the filling yarn. Only four cases out of 29 of the Chinese fabrics and five out of the 21 American samples shrank more in the filling than in the warp yarns. The shrinkage of warp yarns would not be considered serious, since it could be taken care of by a little seam allowance in making up the garment. Even shrinkage due to dry cleaning (within 5 per cent allowance) should not be a complaint, since it could be taken care of in commercial dry cleaning and the garment pressed to original measurement.

Color Fastness Tests.

Table D. Color Fastness, Perspiration, Dry Cleaning, and Hot Pressing Tests

Type of test	Perspiration			Dry cleaning			Hot pressing		
	Fast	Fair	Poor	Fast	Fair	Poor	Fast	Fair	Poor
Chinese	29	-	-	29	-	-	26	3	-
American	10	6	5	21	-	-	19	2	-

There was no apparent change in color in any of the Chinese fabrics when dry cleaned and under the perspiration test. Only three of the total number of cases had slight change of color on the hot pressing

test. One heavily weighted Shantung was affected; one blue crepe, and one red colored silk had slight change of color.

Hot pressing affected two of the American fabrics; one spun silk sample turned slightly yellowish, and one heavily weighted beige satin crepe changed into a lighter color.

Spotting presented a problem in 11 out of the total number of the American silks. Either slight or heavy spotting was shown under the artificial perspiration test. The amount of weighting could not account for the cause, as one notices in Table 1 that samples No. 5 and No. 6 were supposed to be the same quality goods, the difference being only in color. But the results showed that there was no spotting shown on the black satin, while the beige one was spotted and there was a change in color of the fabric. According to Dr. Mack there is considerable difference in results when perspiration is applied to new fabrics from those obtained when it is applied to fabrics previously exposed to air and indoor daylight. All that the test indicates is that if a new fabric is affected by the spotting test it would be likely to give more trouble to the consumer after it has been worn for some time.

Color may have some effect on spotting, as there is no effect of perspiration on white material. Only three out of five black samples were affected, two blues out of the four; the rest were all affected more or less. What explains the difference in results of the Chinese and the American fabrics under this perspiration test? Maybe it is due to the use of different sizing material, as silk is universally given a final dressing as the last step in the finishing process. This indicates the possibility of further study on this subject.

The Weighting Test.

Table E. Percentage of Weighting

Percentage of weighting	No weighting	1%- 10%	10%- 20%	20%- 30%	30%- 40%	40%- 50%
Chinese	10	17	-	-	-	1
American	7	9	2	1	-	2

With only one Chinese material that had a weighting of 41 per cent, all the others contained less than 10 per cent. Twenty of them contained less than 5 per cent of weighting. No tests were made to distinguish the kind of weighting used.

According to the specifications of the United States Bureau of Standards, the allowance of metallic weighting for white and colored silks is 10 per cent, while for black it is 15 per cent. All the American samples were found to be within this limit with the exception of four cases. Under the 20 per cent-30 per cent group there was one black satin with a weighting content of 14 per cent, which is considered legitimate. One white crepe had 26 per cent weighting, one green plain silk 19 per cent, and two satins, black and beige, which were specified as weighted silks, had weightings of 43 per cent and 50 per cent respectively.

The effect of metallic weighting on durability of silk fabrics cannot be proved here in this study unless actual wearing of the fabric is counted upon. However, with the researches done on the effect of weighting on the physical properties of silk by Roberts and Mack* and Whitlock it has been proven that unweighted silks are superior to weighted silks from the durability standpoint.

-
- *1. Roberts, N.M., Mack, P.B., The effect of weighting on the air permeability of silk, Jour. Home Ec. June 1932.
 - 2. Roberts, N.M., Mack, P.B. A study of the effect of light and air in the physical properties of weighted and unweighted silk, Jour. Home Ec. Feb. 1932.
 - 3. Roberts, N.M., Mack, P.B. The effect of tin weighting on the nitrogen content and physical properties of silk, Jour. Home Ec. Nov. 1929.
 - 4. Clair, E.L. The effect of dry-cleaning on unweighted and weighted silk, Jour. Home Ec. Nov. 1929.

Width of the Fabrics. In Table 1 under width we find that 39" is the popular width for silks of the United states, with a total of 15 out of 21 fabrics. Next comes 36". Only one satin brocade has a width as great as 52 inches. The width of Chinese silk fabrics varies a great deal. Table 2 shows the narrowest one to be $20\frac{1}{2}$ " and the widest $38\frac{1}{4}$ ". The most common width is between 27"-30". The width of silk fabrics is governed by style mostly. The second factor is the availability of machines with wide reeds. The demand in the United States is growing for wider width material. What is a suitable width for Chinese dresses could not be used for making up American garments. If China is going to keep her silk fabric export trade, this is one thing worth considering.

Conclusion

The study has indicated that the quality of any silk fabric depends upon the composition of the fiber, the weave, the tensile strength, resistance to yarn slippage, the amount of shrinkage when dry-cleaned, color fastness, and the metallic weighting content. The results of this study show that of the 29 Chinese silk fabrics tested all except three were composed of pure cultivated worm silk. The tensile strength of 11 fabrics in the warp and 18 in the filling rated below 30 pounds, which seemed rather low in comparison with all the studies and findings of American silks. Seventeen fabrics did not show any yarn slippage warp-wise at the seams, and 24 were not affected filling-wise. The percentage of shrinkage was not more than 5 per cent in any case. None were affected as to color by perspiration and dry cleaning, and only three fabrics changed color slightly when a hot iron was applied. Only one sample contained more than 10 per cent weighting.

The tests made on the 21 American silk fabrics showed that the information given by sales persons concerning the composition of the fiber was accurate. Only five fabrics in the warp and eight materials in

the filling registered tensile strength of less than 30 pounds, a result which is lower than the findings of others. Seven fabrics in the warp and nineteen in the filling did not pull at the seams. Shrinkage from dry cleaning was very slight. The shortcoming of these fabrics seemed to be in the resistance to spotting. Eleven out of 21 fabrics were either slightly or greatly affected by perspiration. No color change was noted in the commercial dry-cleaning process. All but one was affected under the hot pressing test. Four fabrics were found to be weighted with more than the legitimate amount of metallic substance. Two of them, however, were specified as weighted silks at the time of the purchase.

In the textile field the word "quality" is synonymous with durability. But in choosing silk fabrics "serviceability" would be an important thing to look for. Silk for formal wear does not require durability, and the reverse also is true. For example, in Table 1 under No. 10 the findings are as follows: velvet composed of rayon and silk, non-crushable, tensile strength 18 pounds warp-wise and 10 pounds crosswise, and a slight slippage of filling yarns at the seams. In this case should the consumer insist upon quality or serviceability? This serves to illustrate that it is important

for the manufacturer, retailer, and consumer to know the requirements of different types of fabrics in relation to their use and the needs of the wearer. The individual fabric reports were worked out with this purpose in mind.

This points to the need of further study and working out of different sets of standards and specifications for various types of silk fabrics.

TABLE 1. SUMMARY OF TESTS OF AMERICAN SILK FABRICS

NO.	PRICE	COLOR OF	WIDTH	TYPE OF	COMPOSITION	TENSILE STRENGTH		YARN SLIPPAGE		SHRINKAGE WHEN DRY CLEANED		COLOR FASTNESS			PER CENT
	PER YARD	FABRIC	INCHES	FABRIC-WEAVE		WARP IN LBS.	FILLING IN LBS.	WARP IN LBS.	FILLING IN LBS.	WARP PER YARD IN INCHES	FILLING PER WIDTH IN INCHES	PERSPIRATION	DRY CLEANING	HOT PRESSING	OF WEIGHTING
1	\$1.95	black	39	crepe	silk	62	41	slight	none	.18	none	unaffected	fast	unchanged	4.9
2	1.59	white	39	plain	silk	75	34	easy	none	.18	.20	unaffected	fast	unchanged	2
3	1.59	grayish purple	39	plain	spun silk	57	43	none	none	none	none	slight spotting	fast	unchanged	2
4	1.59	white	36	plain (rib)	spun silk	25	53	none	easy	.36	none	unaffected	fast	yellow	8.5
5	1.49	black	39	satin	silk	27	21	slight	none	.18	.20	unaffected	fast	unchanged	43
6	1.49	beige	39	satin crepe	silk	28	25	slight	none	none	.20	heavy spotting	fast	lighter	50
7	1.39	beige	39	crepe-de-chine	silk	42	14.5	easy	none	.18	none	slight spotting	fast	unchanged	0
8	1.95	printed blue	39	plain	silk	40	15	slight	none	none	none	heavy spotting	fast	unchanged	0
9	5.95	peach	52	satin brocade	silk	45	49	none	none	none	none	unaffected	fast	unchanged	6
10	2.95	blue	39	velvet	rayon and silk	18	10	none	slight	none	none	unaffected	fast	unchanged	0
11	1.95	white	36	damask	silk	46	43	none	none	none	.20	unaffected	fast	unchanged	0
12	1.95	blue	36	damask	silk	68	63	none	none	none	.20	unaffected	fast	unchanged	0
13	1.95	green	36	plain	silk	25	20	easy	none	none	none	heavy spotting	fast	unchanged	19
14	2.95	blue	39	crepe	silk	41	17	slight	none	none	none	heavy spotting	fast	unchanged	8.3
15	2.50	black	39	satin	silk	80	52	easy	none	none	none	slight spotting	fast	unchanged	3.6
16	1.95	black	39	satin	cotton and silk	75	42	easy	none	.72	.78	slight spotting	fast	unchanged	14
17	1.95	black	36	satin	silk	44	37	none	none	.36	none	unaffected	fast	unchanged	0
18	1.95	blue	39	plain	silk	32	36	easy	none	.36	none	heavy ring	fast	unchanged	18
19	1.95	blue	39	crepe	silk	44.5	58.5	easy	none	.36	none	slight spotting	fast	unchanged	7.3
20	1.59	white	39	crepe	silk	33	35.5	easy	none	none	none	unaffected	fast	unchanged	26
21	1.95	red	39	crepe	silk	67	37	slight	none	none	none	slight spotting	fast	unchanged	0

TABLE 2. SUMMARY OF TESTS OF CHINESE SILK FABRICS

NO.	COLOR OF FABRIC	WIDTH INCHES	TYPE OF FABRIC-WEAVE	COMPOSITION	TENSILE STRENGTH		YARN SLIPPAGE		SHRINKAGE WHEN DRY CLEANED		COLOR FASTNESS			PER CENT OF WEIGHTING
					WARP IN LBS.	FILLING IN LBS.	WARP IN LBS.	FILLING IN LBS.	WARP PER YARD IN INCHES	FILLING PER WIDTH IN INCHES	PERSPIRATION	DRY CLEANING	HOT PRESSING	
1	white	27 $\frac{1}{4}$	damask	silk	36	48	none	none	none	none	unaffected	fast	unchanged	7.3
2	white	30 $\frac{1}{4}$	damask	silk	22	95	none	none	none	none	unaffected	fast	unchanged	4.2
3	white	28	damask	silk	62	46.5	none	none	none	none	unaffected	fast	unchanged	10
4	white	27 $\frac{1}{4}$	novelty	silk and synthetic silk	20	20	none	none	none	none	unaffected	fast	unchanged	10
5	pink	20 $\frac{1}{2}$	plain		34	19	easy	easy	.18	.10	unaffected	fast	unchanged	0
6	stripe	27 $\frac{1}{2}$	plain	silk	8.5	32	none	slight	none	none	unaffected	fast	unchanged	7.7
7	navy	29	metallasse	silk	52	36	none	none	.18	.15	unaffected	fast	unchanged	0
8	green	27 3/4	crepe	silk	31	15.5	none	none	none	none	unaffected	fast	unchanged	0
9	peach	27	crepe	silk	9	5.5	easy	none	none	none	unaffected	fast	unchanged	0
10	white	29 $\frac{1}{4}$	crepe	silk	15.5	16	easy	slight	.20	.15	unaffected	fast	unchanged	0
11	white	27 3/4	crepe	silk	42.5	23	easy	none	none	.25	unaffected	fast	unchanged	0
12	natural	27 $\frac{1}{4}$	plain	wild silk	40	76	none	none	none	.28	unaffected	fast	slight	41
13	print	38 $\frac{1}{4}$	crepe	silk	24	16	easy	none	.36	none	unaffected	fast	unchanged	3.5
14	brown	27	crepe	silk	41	27.5	easy	none	none	none	unaffected	fast	unchanged	9.6
15	print	27 $\frac{1}{2}$	crepe	silk	11	9	none	none	.18	.28	unaffected	fast	unchanged	5
16	navy	29 $\frac{1}{2}$	novelty	silk	43	37.5	none	none	.36	none	unaffected	fast	unchanged	8
17	yellow green	23 $\frac{1}{2}$	crepe chiffon	silk	24	20	easy	none	.36	.24	unaffected	fast	unchanged	6
18	navy	31	novelty	silk and cotton	80	20	none	none	.36	none	unaffected	fast	unchanged	3
19	figured	27	damask		24	25	slight	none	.36	.27	unaffected	fast	unchanged	4.1
20	black	28 $\frac{1}{2}$	brocade	silk	85	53	none	none	.36	none	unaffected	fast	unchanged	0
21	beige	25	novelty	silk	52	19	none	slight	none	.12	unaffected	fast	unchanged	2

Table 2. SUMMARY OF TESTS OF CHINESE SILK FABRICS - Continued

NO.	COLOR OF FABRIC	WIDTH INCHES	TYPE OF FABRIC-WEAVE	COMPOSITION	TENSILE STRENGTH		YARN SLIPPAGE		SHRINKAGE WHEN DRY CLEANED		COLOR FASTNESS			PER CENT OF WEIGHTING
					WARP IN LBS.	FILLING IN LBS.	WARP IN LBS.	FILLING IN LBS.	WARP PER YARD IN INCHES	FILLING PER WIDTH IN INCHES	PERSPIRATION	DRY CLEANING	HOT PRESSING	
22	black	27	brocade	silk	34.5	25	easy	none	none	none	unaffected	fast	unchanged	2
23	red	28	brocade	silk	43	48	easy	none	none	none	unaffected	fast	unchanged	3
24	brown	27 $\frac{1}{4}$	crepe satin	silk	35	15	none	none	.18	.13	unaffected	fast	unchanged	2
25	blue	28 $\frac{1}{2}$	novelty	silk	63	28	easy	none	.18	.14	unaffected	fast	slight	2
26	black	28	brocatelle	silk	22	18	none	slight	none	none	unaffected	fast	unchanged	0
27	brown	23	plain	silk	16	22	slight	none	.36	none	unaffected	fast	unchanged	0
28	red	29 $\frac{1}{4}$	brocade	silk	79	69	none	none	.36	none	unaffected	fast	slight	0
29	figured	28	damask	silk	46	44	none	none	.18	.14	unaffected	fast	unchanged	0

Charts with Materials used for Tests

American fabrics . . 51-71 inclusive

Chinese fabrics . . 71-100 inclusive

Place of Purchase: Detroit, Michigan,
U. S. A.

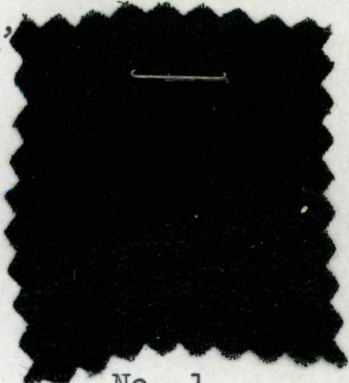
Name of the fabric: Sheersella

Weave: Crepe

Composition: Silk

Width: 39 inches

Price: \$1.95 per yard



No. 1

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: This fabric registered a tensile strength of 62 pounds lengthwise and 41 pounds crosswise.

Slippage of yarns at seams: Yarns slipped slightly lengthwise with no slippage crosswise.

Weighting: 5 per cent weighting.

Shrinkage test: This cloth shrank 1/18 inch per yard lengthwise when dry cleaned.

Color fastness tests:

1. Perspiration tests - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This is a serviceable fabric.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Pussy Willow Taffeta

Weave: Plain

Composition: Silk

Width: 39 inches

Price: \$1.59 per yard

No. 2

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: This cloth registered a tensile strength of 75 pounds lengthwise and 34 pounds crosswise.

Slippage of yarns: Yarns slipped easily lengthwise with no slippage crosswise.

Weighting: 2 per cent weighting.

Shrinkage: This fabric shrank 1/18 inch per yard lengthwise and 1/20 inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change of color.

Recommendation:

1. This fabric is not recommended for the making of under-garments on account of the slippage of yarns.
2. A bias seam is recommended, so as to give more elasticity to the garment.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Silk linen

Weave: Plain

Composition: Spun silk

Width: 39 inches

Price: \$1.59 per yard

No. 3



Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the lack of resistance to perspiration, as stated below.

Tensile strength: This fabric registered a tensile strength of 57 pounds lengthwise and 43 pounds crosswise.

Slippage of yarns at seams: No slippage.

Weighting: 2 per cent weighting.

Shrinkage test: No shrinkage at all.

Color fastness:

1. Perspiration test - Fair; slightly affected.
2. Hot pressing test - Good; no change of color.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is recommended for hard service.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Shantung

Weave: Plain

Composition: Spun silk

Width: 36 inches

Price: \$1.59 per yard

No. 4

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: This fabric registered a tensile strength of 25 pounds lengthwise and 53 pounds crosswise.

Slippage of yarns at seams: No slippage lengthwise but yarns slipped easily crosswise.

Weighting: 8.5 per cent weighting.

Shrinkage test: This cloth shrank 1/36 inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no effect on color.
2. Hot pressing test - Fair; the fabric changed to a slightly yellow color.
3. Dry cleaning test - Good; color unaffected.

Recommendation:

1. This fabric is suggested for sports wear.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Satin crepe

Weave: Satin

Composition: Silk

Width: 39 inches

Price: \$1.49 per yard

No. 5

Summary of the test: This fabric is reported as serviceable to consumer requirements except for the amount of weighting as stated below.

Tensile strength: This cloth registered a tensile strength of 63 pounds lengthwise and 21 pounds crosswise.

Slippage of yarns: Yarns slipped easily lengthwise with no slippage crosswise.

Weighting: 43 per cent metallic weighting.

Shrinkage: This fabric shrank 1/18 inch per yard lengthwise and 1/20 inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendations:

1. This fabric is not recommended for hard or long wear on account of high percentage of weighting.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Satin crepe

Weave: Satin

Composition: Silk

Width: 39 inches

Price: \$1.49 per yard.

No. 6

Summary of the test: This fabric, although a substantially constructed cloth, is reported as unserviceable to consumer requirements on account of its low tensile strength, for resistance to spotting, and high amount of weighting as stated below.

Tensile strength test: This cloth registered a tensile a tensile strength of 28 pounds lengthwise and 25 pounds crosswise.

Slippage of yarns at seams: Yarns slipped slightly lengthwise with no slippage crosswise.

Weighting: 50 per cent metallic weighting.

Shrinkage: This fabric shrank 1/20 inch crosswise and no shrinkage lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Poor; very heavy spotting.
2. Hot pressing test - Fair; color changed to lighter shade.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is not recommended for hard or long wear on account of high percentage weighting, low tensile strength, and ease of spotting.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Tru Hu, Crepe-de-chamois

Weave: Crepe

Composition: Silk

Width: 39 inches

Price: \$1.39 per yard

No. 7

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns and ease of spotting, as stated below.

Tensile strength: This fabric registered a tensile strength of 42 pounds lengthwise and 15 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise with no slippage crosswise.

Weighting: No weighting.

Shrinkage test: This cloth shrank 1/18 inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Fair; fabric showed slight spotting.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is recommended for hard wear.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Tru Hu Print

Weave: Plain

Composition: Silk

Width: 39 inches

Price: \$1.95 per yard



No. 8

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns and ease of spotting, as stated below.

Tensile strength test: This fabric registered a tensile strength of 40 pounds lengthwise and 15 pounds crosswise.

Slippage of yarns at seams: Yarns slipped slightly lengthwise with no slippage crosswise.

Weighting: No weighting.

Shrinkage test: No shrinkage.

Color fastness test:

1. Perspiration test - Poor; heavy spotting.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. The material is more suitable for a dress to be worn for spring and summer.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Satin brocade

Weave: Jacquard

Composition: Silk

Width: 52 inches

Price: \$5.95 per yard

No. 9

Summary of the tests: This fabric is reported as serviceable to consumer requirements where the material will be protected from soil.

Tensile strength: This fabric registered a tensile strength of 45 pounds lengthwise and 49 pounds crosswise.

Slippage of yarns at seams: No slippage each way.

Weighting: 6 per cent weighting.

Shrinkage test: This cloth did not shrink.

Color fastness tests:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This is a well-woven satin which can be used as a decorative household textile in a more expensive type of house.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Crushless velvet

Weave: Pile

Composition: Silk and synthetic

Width: 39 inches

Price: \$2.95 per yard



No. 10

Summary of the test: This fabric is reported as serviceable to consumer requirements except for the tensile strength, as stated below. Recommendation made for the use of this fabric should be observed.

Tensile strength: This fabric registered a tensile strength of 18 pounds lengthwise and 10 pounds crosswise.

Slippage of yarns: Yarns slipped slightly crosswise and no slippage lengthwise.

Weighting: 7 per cent weighting.

Shrinkage: The cloth did not shrink.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Crushability test: Unaffected.

Recommendation:

1. This fabric is more suitable for formal wear.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Damask

Weave: Jacquard

Composition: Silk

Width: 36 inches

Price: \$1.95 per yard

No. 11

Summary of the test: This fabric is reported as serviceable to consumer requirements except for shrinkage as stated below.

Tensile strength: This fabric registered a tensile strength of 45 pounds lengthwise and 43 pounds crosswise.

Slippage of yarns at seams: No slippage each way.

Weighting: No weighting.

Shrinkage test: This cloth shrank 1/20 inch per yard crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This is a serviceable fabric. Will withstand washing.

Place of purchase: Detroit, Michigan
U. S. A.

Name of the fabric: Damask

Weave: Jacquard

Composition: Silk

Width: 36 inches

Price: \$1.95 per yard

No. 12

Summary of the test: This fabric is reported as serviceable to consumer requirements except shrinkage as stated below.

Tensile strength: This cloth registered a tensile strength of 68 pounds lengthwise and 63 pounds crosswise.

Slippage of yarns at seams: No slippage each way.

Weighting: No weighting.

Shrinkage: This fabric shrank 1/20 inch per yard crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This is a very serviceable fabric.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Silk taffeta

Weave: Plain

Composition: Silk

Width: 36 inches

Price: \$1.95 per yard

No. 13

Summary of the tests: This fabric is reported as unserviceable to consumer requirements on account of its low tensile strength, ease of spotting, and the larger amount of weighting as stated below.

Tensile strength test: This cloth registered a tensile strength of 25 pounds lengthwise and 20 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise and with no slippage crosswise.

Weighting: 19 per cent metallic weighting.

Shrinkage: No shrinkage when dry cleaned.

Color fastness:

1. Perspiration test - Poor; spots easily.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is not recommended for serviceable wear, e.g., for making slips, blouses. The suggested use is for a formal dress.

Place of purchase: Detroit, Michigan
U. S. A.

Name of the fabric: Guernuy Crepe

Weave: Crepe

Composition: Silk

Width: 39 inches

Price: \$2.95 per yard

No. 14

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the resistance of perspiration as stated below.

Tensile strength: This fabric registered a tensile strength of 41 pounds lengthwise and 17 pounds crosswise.

Slippage of yarns at seams: Yarns slipped slightly lengthwise and no slippage crosswise.

Weighting: 8.3 per cent weighting.

Shrinkage test: No shrinkage.

Color fastness:

1. Perspiration test - Poor; heavy spotting.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is recommended for serviceable wear.

Place of purchase: Detroit, Michigan
U. S. A.

Name of the fabric: Satin crepe

Weave: Satin

Composition: Silk

Width: 39 inches

Price: \$2.50 per yard

No. 15

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns and spotting, as stated below.

Tensile strength test: This fabric registered a tensile strength of 80 pounds lengthwise and 52 pounds crosswise.

Slippage of yarns: Yarns slipped easily lengthwise and with no slippage crosswise.

Weighting: 3.6 per cent weighting.

Shrinkage test: No shrinkage.

Color fastness:

1. Perspiration test - Fair; color showed noticeable ring.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Detroit, Michigan
U. S. A.

Name of the fabric: Satin crepe

Weave: Satin

Composition: Silk

Width: 39 inches

Price: \$1.95 per yard

No. 16

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns and shrinkage as stated below.

Tensile strength test: This fabric registered a tensile strength of 75 pounds lengthwise and 42 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise and no slippage crosswise.

Weighting: 14 per cent weighting.

Shrinkage test: This fabric shrank 1/72 inch per yard lengthwise and 1/78 inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Fair; fabric showed a darker spot when wet.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Skinner's cotton
back satin

Weave: Satin

Composition: Silk and cotton

Width: 36 inches

Price: \$1.95 per yard

No. 17

Summary of the tests: This fabric is reported as serviceable to consumer requirements.

Tensile strength: This fabric registered a tensile strength of 44 pounds lengthwise and 37 pounds crosswise.

Slippage of yarns at seams: Yarns did not slip.

Weighting: No weighting.

Shrinkage test: This cloth shrank 1/36 inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. The material might be used as a lining material.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Heavy sheer

Weave: Crepe

Composition: Silk

Width: 39 inches

Price: \$1.95 per yard



No. 18

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for slippage of yarns, spotting, and shrinkage as stated below.

Tensile strength test: This fabric registered a tensile strength of 32 pounds lengthwise and 36 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise with no slippage crosswise.

Weighting: 8 per cent weighting.

Shrinkage: This cloth shrank 1/36 inch lengthwise and no shrinkage crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Poor; heavy spotting.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is not recommended for hard wear.

Place of purchase: Detroit, Michigan
U. S. A.

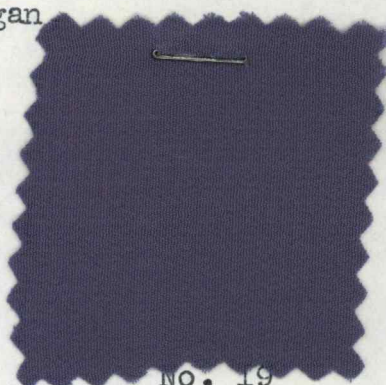
Name of the fabric: Heavy sheer

Weave: Crepe

Composition: Silk

Width: 39 inches

Price: \$1.95 per yard



Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns and spotting as stated below.

Tensile strength test: This fabric registered a tensile strength of 44.5 pounds lengthwise and 58.5 crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise with no slippage crosswise.

Weighting: 7.3 per cent weighting.

Shrinkage test: This cloth shrank 1/86 inch lengthwise with 1/36 inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Fair; color showed noticeable ring.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is not recommended for stout person on account of its slippage of yarns.

Place of purchase: Detroit, Michigan,
U. S. A.

Name of the fabric: Triple sheer

Weave: Crepe

Composition: Silk

Width: 39 inches

Price: \$1.59 per yard

No. 20

Summary of the test: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns and the amount of weighting as stated below.

Tensile strength test: This fabric registered a tensile strength of 33 pounds lengthwise and 35 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise with no slippage crosswise.

Weighting: 26 per cent weighting.

Shrinkage test: This cloth did not shrink when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is more suitable for formal wear.

Place of purchase: Detroit, Michigan
U. S. A.

Name of the fabric: Heavy sheer

Weave: Crepe

Composition: Silk

Width: 39 inches

Price: \$1.95 per yard

No. 21

Summary of the test: This fabric is reported as serviceable to consumer requirements except for lack of color fastness as stated below.

Tensile strength test: This fabric registered a tensile strength of 67 pounds lengthwise and 37 pounds crosswise.

Slippage of yarns at seams: Yarns slipped slightly lengthwise and no slippage crosswise.

Weighting: No weighting.

Shrinkage test: No shrinkage.

Color fastness test:

1. Perspiration test - Fair; color showed noticeable ring.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Fair; slight change in color.

Recommendation:

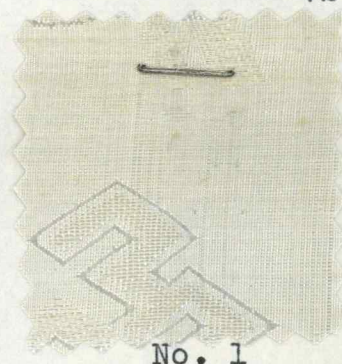
1. This is a very serviceable fabric.

Place of purchase: Canton, China

Weave of the fabric: Damask

Composition: Silk

Width: $27\frac{1}{4}$ inches



Summary of the tests: This fabric is reported as serviceable to consumer requirements.

Tensile strength: This fabric registered a tensile strength of 36 pounds lengthwise and 48 pounds crosswise.

Slippage of yarns at seams: No slippage each way.

Weighting: 7.3 per cent weighting.

Shrinkage test: This cloth did not shrink.

Color fastness:

1. Perspiration test - Good; no change observed.
2. Hot pressing test - Good; unaffected by heat.

Recommendation:

1. Fabric soft and lustrous if the gum is boiled off. Can be used in the gum or when boiled off.

Place of purchase: Canton, China

Weave of the fabric: Damask

Composition: Silk

Width: $30\frac{1}{4}$ inches



No. 2

Summary of the test: This fabric is reported as serviceable to consumer requirements as stated below.

Tensile strength: This fabric registered a tensile strength of 22 pounds lengthwise and 95 pounds crosswise.

Slippage of yarns at seams: No slippage of yarns at seams.

Weighting: 4.2 per cent weighting.

Shrinkage test: No shrinkage.

Color fastness:

1. Dry cleaning test - Good; no change of color.
2. Hot pressing test - Good; unaffected by heat.

Recommendation:

1. This cloth is not recommended for hard wear on account of the loose weave of the design.

Place of purchase: Canton, China.

Weave of the fabric: Damask

Composition: Silk

Width: 28 inches



No. 3

Summary of the tests: This fabric is reported as serviceable to consumer requirements.

Tensile strength: This fabric registered a tensile strength of 62 pounds lengthwise and 46.5 pounds crosswise.

Slippage of yarns at seams: No slippage of yarn at seams.

Weighting: 10 per cent weighting.

Shrinkage test: No shrinkage.

Color fastness:

1. Perspiration test - Good; no change in color or spotting.
2. Hot pressing test - Good; not affected by heat.

Recommendation:

1. This fabric is recommended for formal occasions.

Place of purchase: Canton, China

Weave of the fabric: Novelty

Composition: Silk and synthetic
filling

Width: 27 $\frac{1}{4}$ inches



No. 4

Summary of the test: This fabric is reported as serviceable to consumer requirements as stated below.

Tensile strength: This cloth registered a tensile strength of 20 pounds lengthwise and 20 pounds crosswise.

Slippage of yarns at seams: No slippage each way.

Weighting: 10 per cent weighting.

Shrinkage test: No shrinkage observed.

Color fastness:

1. Perspiration test - Good; no change noted.
2. Hot pressing test - Good; unaffected by heat.

Recommendation:

1. This fabric is suitable for dresses which are to be laundered often.

Place of purchase: Canton, China

Weave of the fabric: Plain

Composition: Silk

Width: $20\frac{1}{2}$ inches

No. 5

Summary of the test: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns and shrinkage as stated below. Recommendation for the use of this cloth should be observed.

Tensile strength: This fabric registered a tensile strength of 34 pounds lengthwise and 19 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily both ways.

Weighting: No weighting.

Shrinkage test: This fabric shrank $1/18$ inch per yard lengthwise with $1/10$ inch crosswise when dry cleaned.

Color fastness test:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change of color.

Recommendation:

1. This cloth is not suitable for wear on account of its low tensile strength, ease of slippage of yarns, and shrinkage when dry cleaned. However, it can be used as a lining for Chinese dress.

Place of purchase: Canton, China

Weave of the fabric: Plain

Composition: Silk

Width: $27\frac{1}{2}$ inches



No. 6

Summary of the test: This fabric is reported as serviceable to normal consumer requirements except for the slippage of yarns at seams. Recommendation should be observed.

Tensile strength: This fabric registered a tensile strength of 8.5 pounds lengthwise and 32 pounds crosswise.

Slippage of yarns at seams: Yarns did not slip lengthwise but slipped slightly crosswise.

Weighting: 7.7 per cent weighting.

Shrinkage test : No shrinkage.

Color fastness:

1. Hot pressing test - Good; not affected by heat.

Recommendation:

1. This cloth is more suitable for the use of lining which requires hard wear.

Place of purchase: Canton, China

Weave of the fabric: Metalasse

Composition: Silk

Width: 29 inches



No. 7

Summary of the tests: This fabric is reported as serviceable to consumer requirements as stated below.

Tensile strength: This fabric registered a tensile strength of 52 pounds lengthwise and 36 pounds crosswise.

Slippage of yarns at seams: No slippage each way.

Weighting: No weighting.

Shrinkage test: This cloth shrank $1/18$ inch per yard lengthwise and $1/15$ inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change in color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change of color.

Recommendation:

1. This fabric is recommended for serviceable wear.

Place of purchase: Canton, China

Weave of the fabric: Crepe

Composition: Silk

Width: 27 3/4 inches



No. 8

Summary of the tests: This fabric is reported as serviceable to consumer requirements.

Tensile strength: This fabric registered a tensile strength of 31 pounds lengthwise and 15.5 pounds crosswise.

Slippage of yarns at seams: No slippage at seams.

Weighting: No weighting.

Shrinkage test: No shrinkage.

Color fastness:

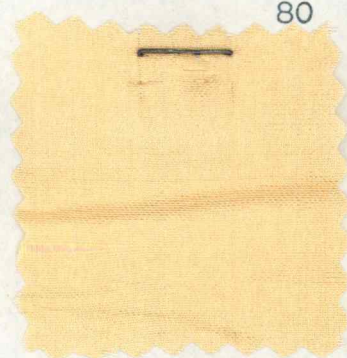
1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Crepe

Composition: Silk

Width: 27 inches



No. 9

Summary of the tests: This fabric is reported as un-serviceable to consumer requirements on account of its low tensile strength as stated below.

Tensile strength: This fabric registered a tensile strength of 9 pounds lengthwise and 5.5 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise and no slippage crosswise.

Weighting: .2 per cent weighting.

Shrinkage test: This fabric did not shrink when dry cleaned.

Color fastness tests:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; not affected by heat.
3. Dry cleaning test - Good; no change of color.

Place of purchase: Canton, China

Weave of the fabric: Crepe

Composition: Silk

Width: $29\frac{1}{4}$ inches

No. 10

Summary of the tests: This fabric is reported as unserviceable for consumer requirements on account of its low tensile strength, slippage of yarns, and shrinkage as stated below.

Tensile strength: This cloth registered a tensile strength of 15.5 pounds lengthwise and 16 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise and slightly crosswise.

Weighting: No weighting.

Shrinkage test: This fabric shrank $1/20$ inch per yard lengthwise and $1/15$ inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change observed.
2. Hot pressing test - Good; unaffected by heat.

Recommendation:

1. This fabric is not recommended for slips and clothes that have to stand hard wear.

Place of purchase: Canton, China

Weave of the fabric: Crepe

Composition: Silk

Width: 27 3/4 inches

No. 11

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: This cloth registered a tensile strength of 42.5 pounds lengthwise and 23 pounds crosswise.

Weighting: .2 per cent weighting.

Slippage of yarns at seams: This cloth slipped easily lengthwise and no slippage crosswise.

Shrinkage test: This fabric shrank 1/25 inch per yard crosswise.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This cloth is recommended for the making of slips if seams are sewed on the bias.

Place of purchase: Canton, China

Weave of the fabric: Plain

Composition: Wild silk

Width: $27\frac{1}{4}$ inches



No. 12

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the amount of weighting as stated below.

Tensile strength: This fabric registered a tensile strength of 40 pounds lengthwise and 76 pounds crosswise.

Slippage of yarns at seams: No slippage at seams.

Weighting: 41 per cent weighting.

Shrinkage test: This cloth shrank $1/28$ inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Fair; slightly affected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China
Weave of the fabric: Printed crepe
Composition: Silk
Width: $38\frac{1}{4}$ inches



Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: This fabric registered a tensile strength of 24 pounds lengthwise and 16 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise with no slippage crosswise.

Weighting: 3.5 per cent weighting.

Shrinkage test: This cloth shrank $1/36$ inch per yard lengthwise when dry cleaned.

Color fastness:

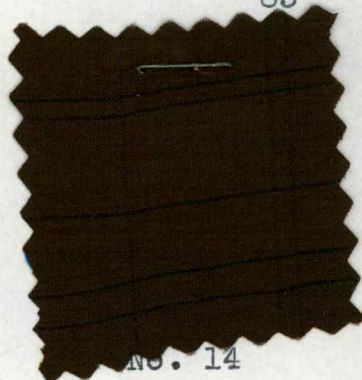
1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Crepe

Composition: Silk

Width: 27 inches



Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: This fabric registered a tensile strength of 41 pounds lengthwise and 27.5 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise and with no slippage crosswise.

Weighting: 9.6 per cent weighting.

Shrinkage test: No change observed.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Printed crepe

Composition: Silk

Width: $27\frac{1}{2}$ inches



Summary of the test: This fabric is reported as serviceable to consumer requirements except for the low tensile strength as stated below.

Tensile strength: This fabric registered tensile strength of 11 pounds lengthwise and 9 pounds crosswise.

Slippage of yarns at seams: Yarns did not slip.

Weighting: 5 per cent weighting.

Shrinkage test: The cloth shrank $\frac{1}{18}$ inch per yard lengthwise with $\frac{1}{28}$ inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Novelty

Composition: Silk

Width: $29\frac{1}{2}$ inches



No. 16

Summary of the tests: This fabric is reported as serviceable to consumer requirements as stated below.

Tensile strength: This cloth registered a tensile strength of 43 pounds lengthwise and 37.4 pounds crosswise.

Slippage of yarns at seams: No slippage.

Weighting: 8 per cent weighting.

Shrinkage test: This fabric shrank $1/36$ inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change of color.

Place of purchase: Canton, China

Weave of the fabric: Crepe

Composition: Silk

Width: $23\frac{1}{2}$ inches



No. 17

Summary of the test: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns at seams as stated below.

Tensile strength: This fabric registered a tensile strength of 24 pounds lengthwise and 20 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise with no slippage crosswise.

Weighting: 6 per cent weighting.

Shrinkage test: This cloth shrank $1/36$ inch per yard and $1/24$ inch per yard crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This is not a serviceable fabric, therefore more suitable for formal occasions.

Place of purchase: Canton, China

Weave of the fabric: Novelty

Composition: Silk and cotton back

Width: 31 inches



No. 18

Summary of the tests: This fabric is reported as serviceable to consumer requirements as stated below.

Tensile strength: This cloth registered a tensile strength of 80 pounds lengthwise and 20 pounds crosswise.

Slippage of yarns at seams: No slippage each way.

Weighting: 3 per cent weighting.

Shrinkage test: This cloth shrank 1/36 inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Recommendation:

1. This fabric is recommended for serviceable wear.

Place of purchase: Canton, China

Weave of the fabric: Damask

Composition of the fabric: Silk

Width: 27 inches



Summary of the tests: This fabric is reported as serviceable to consumer requirements except for tensile strength as stated below.

Tensile strength: This fabric registered a tensile strength of 24 pounds lengthwise and 25 pounds crosswise.

Slippage of yarns at seams: Yarns slipped slightly lengthwise with no slippage crosswise.

Weighting: 4.1 per cent weighting.

Shrinkage test: This cloth shrank $1/36$ inch per yard lengthwise and $1/27$ inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Brocade

Composition: Silk

Width: $28\frac{1}{2}$ inches



No. 20

Summary of the tests: This fabric is reported as serviceable to consumer requirements as stated below.

Tensile strength: This fabric registered a tensile strength of 85 pounds lengthwise and 53 pounds crosswise.

Slippage of yarns at seams: No slippage.

Weighting: No weighting.

Shrinkage test: This fabric shrank $1/36$ inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Novelty

Composition: Silk

Width: 25 inches



No. 21

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: This fabric registered a tensile strength of 52 pounds lengthwise and 19 pounds crosswise.

Slippage of yarns at seams: Yarns did not slip lengthwise but slipped slightly crosswise.

Weighting: 2 per cent weighting.

Shrinkage test: This fabric only shrank 1/12 inch per yard crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; color not changed.

Place of purchase: Canton, China

Weave of the fabric: Brocade

Composition: Silk

Width: 27 inches



No. 22

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: The cloth registered a tensile strength of 34.5 pounds lengthwise and 25 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise and no slippage crosswise.

Weighting: 2 per cent weighting.

Shrinkage test: No shrinkage.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Brocade

Composition: Silk

Width: 28 inches



No. 23

Summary of the test: This fabric is reported as serviceable to consumer requirements except the slippage of yarns as stated below.

Tensile strength: This fabric registered a tensile strength of 43 pounds lengthwise and 48 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise and no slippage crosswise.

Weighting: 3 per cent weighting.

Shrinkage test: No shrinkage.

Color fastness:

1. Perspiration test - Good; no change in color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change of color.

Recommendation:

1. This fabric cannot be successfully worn by every individual or for every occasion on account of the brightness or intensity of color.

Place of purchase: Canton, China

Weave of the fabric: Crepe satin

Composition: Silk

Width: $27\frac{1}{4}$ inches



Summary of the tests: This fabric is reported as serviceable to consumer requirements as stated below.

Tensile strength: This fabric registered a tensile strength of 35 pounds lengthwise and 15 pounds crosswise.

Slippage of yarns at seams: No slippage.

Weighting: 2 per cent weighting.

Shrinkage test: This cloth shrank $1/18$ inch per yard lengthwise and $1/13$ inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; not affected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Novelty

Composition: Silk

Width: $28\frac{1}{2}$ inches



No. 25

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: The fabric registered a tensile strength of 63 pounds lengthwise and 28 pounds crosswise.

Slippage of yarns at seams: Yarns slipped easily lengthwise and with no slippage crosswise.

Weighting: 2 per cent weighting.

Shrinkage test: This cloth shrank $1/18$ inch per yard lengthwise and $1/14$ inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Fair; with slight change of color.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Brocatelle

Composition: Silk

Width: 28 inches



No. 26

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the yarn slippage as stated below.

Tensile strength: This fabric registered a tensile strength of 22 pounds lengthwise and 18 pounds crosswise.

Slippage of yarns at seams: Yarns did not slip lengthwise and with slight slippage crosswise.

Weighting: No weighting.

Shrinkage test: No shrinkage.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Plain

Composition: Silk

Width: 23 inches



No. 27

Summary of the tests: This fabric is reported as serviceable to consumer requirements except for the slippage of yarns as stated below.

Tensile strength: This cloth registered a tensile strength of 16 pounds lengthwise and 22 pounds crosswise.

Slippage of yarns at seams: Yarns slipped slightly lengthwise with no slippage crosswise.

Weighting: No weighting.

Shrinkage test: This fabric shrank 1/36 inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Place of purchase: Canton, China

Weave of the fabric: Brocade

Composition: Silk

Width: $29\frac{1}{4}$ inches



No. 28

Summary of the tests: This fabric is reported as serviceable to consumer requirements as stated below.

Tensile strength: This fabric registered a tensile strength of 79 pounds lengthwise and 69 pounds crosswise.

Slippage of yarns at seams: No slippage of yarns at seams.

Weighting: No weighting.

Shrinkage test: This cloth shrank $1/36$ inch per yard lengthwise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Fair; slight change of color.
3. Dry cleaning test - Good; no change in color.

Recommendation:

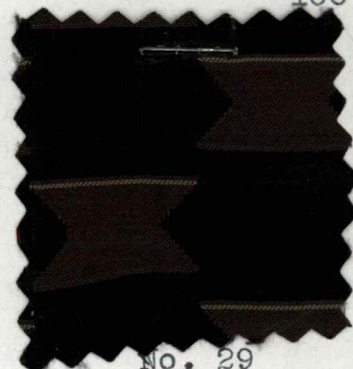
1. This is a very serviceable fabric.

Place of purchase: Canton, China

Weave of the fabric: Damask

Composition: Silk

Width: 28 inches



Summary of the tests: This fabric is reported as serviceable to requirements.

Tensile strength: This fabric registered a tensile strength of 46 pounds lengthwise and 44 pounds crosswise.

Slippage of yarns at seams: No slippage each way.

Weighting: No weighting.

Shrinkage tests: This cloth shrank $1/18$ inch per yard lengthwise and $1/14$ inch crosswise when dry cleaned.

Color fastness:

1. Perspiration test - Good; no change of color.
2. Hot pressing test - Good; color unaffected by heat.
3. Dry cleaning test - Good; no change in color.

Bibliography

I. Books

- Barbour, Greeley and McElrath. The silk culture in the United States, 1844.
- Brockett, L. P. The silk industry in America-A History of silk prepared for the Centennial Exposition, Silk Association of America, 1876.
- Buchanan, R. E. The Shanghai raw silk market. The Silk Association of America, 1929.
- Chittick, J. Silk manufacturing and its problems, 1913, revised.
- Copland, M. T. Turner, W. H. Production and distribution of silk and rayon broad goods, Textile Foundation, 1935.
- Darby, W. A. Silk, the queen of fabrics: a survey of the broad silk industry from the raw material to the finished product, 1922.
- Flemming, E. An encyclopaedia of textiles, New York, E. Weyhe, 1927.
- Fry, R. and others. Chinese art, London, B. T. Batsford, Ltd., 1935.
- Gracier, R. Historic textile design, New York, C. Scribner's Sons, 1923.
- Gould, G. Chinese rugs, Washington, D. C. Woodward and Lothrop, 1926, 2nd ed.
- Hess, K. Textile fabrics and their uses, J. B. Lippincott Co., 1936, rev.
- Heusser, A. H. The history of silk dyeing industry in the United States, Paterson, N. J., 1929.

- Hunter, G. L. Decorative textiles, J. B. Lippincott Co., 1918.
- Manchester, H. H. The story of silk and Cheney silks, Cheney Brothers, 1924.
- Mathews, J. M. Textiles, J. Wiley and Sons, 1913.
- Posselt, E. A. Technology of textile design, McGraw-Hill Book Co.
- Reath, N. H. The weavers of hand-loom fabrics, Philadelphia, the Pennsylvania Museum, 1927.
- Silcock, A. Introduction to Chinese art, London, Faber and Faber, Ltd., 1936.
- Thompson, E. B. Silk, Ronald Press Co., 1918.
- Thompson, E. B. The silk department, Ronald Press Co., 1918.
- Thurstan, V. Decorative textiles and tapestry, Ditchling and London, Pepler and Sewell, 1934.
- Warren and Cheney, The romance of design, Page and Co., New York, 1926.
- Wingate, I. Textile fabrics, New York, Prentice-Hall, 1935.
- Woodhead, H. G. W., Editor. China year book, University of Chicago Press, 1934.

II. Magazine Articles

- Bach, R. F. Pageant of silken splendor, Arts and Dec. 18:14-15 F. 1923.
- Brakley, G. A. Silk our strongest Oriental tie, Asia 17:110-1 Ap. 1917.
- Barsy, P. Silk weighting with catechu and logwood, Tex. Wor. Mr. 1936.

- China as a source of supply of raw silk for the United States, Ex. W.N.S. 31:11 Ja. 2, 1926.
- Chittick, J. Story of silk, Mentor 10:12-18.
- Chittick, J. Silk exchange-future market for raw silk similar to that for cotton, Tex. W. 64:2267, O. 1920.
- Clair, E. L., March, D. B. Effect of dry-cleaning on unweighted and weighted silk, Jour. H. Ec. N. 1929.
- Crawford, M. D. C. Worm that turned the world, Arts and Dec. 19:11-13, F. 1923.
- Douty, D. E. Yankee movies and Chinese silk, Nations Bus. 14:35-7, Jl. 1926.
- Edgar, R. The effect of salt on silk, Jour. H. Ec. N. 1936.
- Freedman, E. The testing of merchandise by department store, Jour. H. Ec. Sept. 1930.
- Goldsmith, J. A. Chinese silk situation, Tex. W. 64:76, Jl. 1923.
- Great increase in our silk importation, Lit. Dig. 57:96-7, Ap. 1918.
- History of sericultural industry in China, Melliand, 3:334, Jl. 1931.
- How the silk business has grown in the country, Lit. Dig. 61:146-8, Ap. 5, 1919.
- Huber, C. J. Modernizing China's silk industry, Tex. W., 66:2175, O. 18, 1925.
- Intelligent control of production urged as aid to silk industry, Tex. W. 75:470-1, Ja. 26, 1929.
- Kissell, M. L. Earliest known figured silk-two thousand years old, Int. Studie, 94:32-5, N. 1929.
- Nelson, F. Silk of the seres, House and Dec., May, 1927.

- Powell, J. B. Chinese silk industry, Asia, 17:742-7
N. 1917.
- Roberts, N. M., Mack, P. B. The effect of weighting on
the air permeability of silk, Jour.
H. Ec., J. 1932.
- Roberts, N. M., Mack, P. B. The study of the effect of
light and air in the physical properties
of weighted and unweighted silk, Jour.
H. Ec., F. 1932.
- Roberts, N. M., Mack, P. B. The effect of tin weight-
ing on the nitrogen content and phys-
ical properties of silk, Jour. H. Ec.,
N. 1929.
- Silk sizing versus actual consumption, Ray. Tex.,
Ap. 1936.
- Silk's romantic story, Arts and Dec., 18:81, F. 1923.
- Silk culture-America's great opportunity, Illus. W.
32:404-5, N. 1919.
- Silk in the United States, Fortune, 11:176-178,
Mr., 1935.
- Spafford, W. E. Outlook for China as a producer of
raw silk, Tex. W. 71:1105-6, F. 5, 1927.
- Southard, Changes in solubility and absorption spectra
of silk fibroin caused by tin weight-
ing, Jour. H. Ec., N. 1929.
- United States silk and rayon industry, Tex. Col. 57:34,
Ja. 1935.

III. Publications and Reports

- A.S.T.M. Standards on textile materials prepared by
Committee D-13 on textile materials
published by the American Society for
Texting Materials, 1936.
- Annual Reports. The Silk Association of America, 1918-
1931.

B.F.T.B. Consumer serviceability testing reports by
Better Fabrics Testing Bureau, Inc.
1935.

Freedman, E. Consumer yardsticks, Macy Bureau of
Standards, Mr. 1936.

Leonard, D. D. The story of silk, reprinted from
Natural History, Mr. 1935.

Saville, D., Dodson, E. Serviceability tests on fall
and winter dress fabrics, United
States Testing Company, 1934.

Shanghai Bureau of Inspection and Testing of Commercial
Commodities, Yarn and Fabric Testing
Service.

Shanghai Bureau of Inspection and Testing of Commercial
Commodities, Raw Silk Test Methods and
Procedures.

Survey of textile research in the United States, 1931.

The Silk Association of America. Sericultural develop-
ment in China, 1928.

Woven dress fabrics testing and reporting, Commercial
Standard cs57-36, United States Depart-
ment of Commerce and National Bureau
of Standards.

Whitlock, M. C. Wearability of silk dresses 1931-1934,
The National Federation of Textiles,
Inc., Mr. 1936.