

PREFACE

One of the important subsidiary occupations for agriculturists is sericulture. This village industry existed in the Province of Bombay as far back as 1823. It, however, gradually declined and practically died out in course of time. The main cause of its discontinuance was the lack of State assistance and stagnation in methods and organisation. The study of the history of this industry in the whole of India shows that the industry is at its best where it receives necessary help and encouragement from the State. Kashmir and Mysore can serve as examples in this direction, where the industry may be said to have been revived by State action from its ashes.

The question of re-introduction of sericulture in this Province has been engaging the attention of this Department for some considerable time. As a result of a preliminary inquiry it seemed that in some of the districts of the Province, the climatic and other conditions were suitable for the industry. With a view, therefore, to ascertain definitely the possibilities of re-introducing the industry, this Department submitted to Government a scheme to which Government were pleased to accord their sanction. The services of a Sericulturist from the Department of Industries and Commerce, Mysore, were secured on loan for carrying out a survey and if possible starting the industry. Mr. Ramanath, the officer in question, surveyed those districts which appeared *prima facie* suitable for the revival of the industry. The data collected and the observations made by him are now printed in this Bulletin. The views expressed in this Bulletin are those of the Sericulturist.

As a result of this survey it has been found that certain tracts in the Belgaum, Dharwar, Poona, Satara, Nasik, Ahmednagar and Surat districts are climatically as good as any of silk producing tracts in other Provinces, and there appears sufficient justification for trying out the Sericulturist's recommendations for the establishment of a sericulture farm at Belgaum. Government have accordingly been pleased to sanction this proposal and arrangements are being made to give effect to it. Further steps will be taken after the work at the farm has shown clearly that the introduction of the industry as a part-time occupation among agriculturists will be of definite benefit to them.

OLD CUSTOM HOUSE YARD :
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CONTENTS.

SECTION—	PAGE
I.—INTRODUCTION	1
II.—EXISTENCE OF THE INDUSTRY IN OLDEN TIMES—	
Condition of the Industry	1
Lefroy's remarks on the revival of the industry	2
Individual efforts towards the revival of the industry	3
The present condition of the industry	4
III.—THE PRESENT SURVEY—	
Climatic conditions	4
Tracts suited for Sericulture	5
Economic conditions	6
Marketing facilities	7
IV.—POTENTIALITIES	8
V.—RECOMMENDATIONS—	
General Remarks	9
A Central Farm	10
Location of the Farm	11
Functions of the Farm	11
Staff required	11
Functions of the Staff	12
Estimates for a Central Sericulture Farm	13
Programme of the work to be done	15
VI.—FUTURE OF THE INDUSTRY	15
APPENDICES—	
Appendix A showing statement of the provisional list of talukas selected for introducing sericulture as a cottage industry in the districts of Surat, Nasik, Ahmednagar, Poona, Satara, Belgaum and Dharwar, where a survey work was done by the Sericulturist, Department of Industries, Bombay	17
Appendix B showing places where mulberry plants, trees and hedges are in existence	18
Appendix C showing statement of the mean monthly values of maximum temperature, minimum temperature and relative humidity at 8 hours (local time) for five years, of Belgaum	20
Appendix D showing courses of study to be imparted to the students who are to be taken for being trained in sericulture	22
Appendix E—Map of the Province showing where the mulberry silk worms were reared before, where mulberry is in existence and where sericulture could be introduced	23

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POSSIBILITIES OF SERICULTURE INDUSTRY IN THE PROVINCE OF BOMBAY.

SECTION I.

INTRODUCTION.

The Department of Industries, Bombay, had, under its consideration, for many years, the question of re-introducing sericulture as a subsidiary occupation among the agriculturists of the Province. On the recommendations of the Department, the Government were pleased to sanction the engagement of a Sericulturist to carry out a preliminary survey regarding the possibilities and prospects of sericulture in the Province. On their requisition, the Government of Mysore placed my services at the disposal of the Director of Industries, Bombay, from 1st April 1939, and I reported myself to him for duty on the 4th April 1939 at Bombay. As ordered by the Director of Industries, I took up the survey of such districts of the Province as had possibilities for the introduction of sericulture therein. The present report is the outcome of the survey done by me for the above purpose. I surveyed 14 districts, viz. Belgaum, Bijapur, Dharwar, Kanara and Ratnagiri in the Southern Division; Ahmednagar, West and East Khandesh, Nasik, Poona, Satara and Sholapur in the Central Division, and Surat and Broach in the Northern Division of the Province. During the survey, I toured for 160 days and visited 133 places. About two months were spent in doing the preliminary work for starting a farm at Belgaum, such as inspection and selection of suitable sites and preparation of plans and estimates for the farm buildings.

SECTION II.

EXISTENCE OF THE INDUSTRY IN OLDEN TIMES.

Condition of the Industry.

2. A pretty long history could be written on the silk industry of this Province in the past. When the East India Company had the monopoly of private trade in India and when it was exporting the Indian Raw Silk from Bengal to Europe, it made strenuous efforts by all available means to increase silk production in other parts of India including the Bombay and Madras Provinces. When the monopoly was abolished and the trading activities were discontinued, it wound up silk business leaving this trade to private enterprise. Historical records show that the rearing of silk-worms was practised in this Province about 115 years ago. The industry was first introduced into the Karnatak as far back as 1823 from Mysore State. Worms were first reared at the Dharwar jail and by individual persons at Dharwar and Hubli. In 1829, the

Government of Bombay seems to have given liberal encouragement to sericulturists and the industry seems to have been practised at that time in the districts of Dharwar, Poona and Bombay. By 1843, Dharwar seems to have had many mulberry tree plantations, and 35,820 bushes both in the jail compound and in the town, besides 1,400 mulberry trees (three to seven years old) at the station of Poona, and 50,806 trees (one to five years old) belonging to 317 individuals in thirty-six villages round Poona and a number of trees distributed in and around the suburbs of the Bombay City, and about 49,850 slips in the Government Nursery at Saswad, ready for distribution. Trees were also planted at Ahmednagar, Dhulia, Nasik, Kathiawar, Kaira, Ahmedabad, Bassein, Mahim, etc., and worms reared. For some time, the development was slow, as the work was almost exclusively in the hands of untrained men. In 1838, a Manchester broker (to whom some samples of silk produced at Poona were sent) seems to have opined that the Bombay silk was so good that it was readily saleable. In 1840, a firm by name Daniel & Co. started sericulture on a commercial scale and planted 25 acres of land in Junnar taluka of Poona district at a place called Narayangaon, about 55 miles on Poona-Nasik road and 16 acres of land in Purandhar taluka at Saswad about 20 miles from Poona. Mulberry plantations also existed at Kasimbagh, Vadgaon, Chinchore, Chas, Nannure, Sankora, Narayangaon, Harvi, Uthur, Hudapur, Dingora, Junnar, Manchar and Ausri. Silk reeling seems to have been done at different places between 1840 and 1845. The industry seems to have been at its best at that time as the Government is found to have sanctioned the construction of four rearing houses for the use of the rearers, and these were built at Poona, Kasimbagh and Vadgaon. Even loans free of interest seem to have been granted to mulberry-growers and silk-worm rearers. By 1848, the industry seems to have died. For, after 1849, the records throw no light on the condition of this industry. This failure seems to have been due firstly to the industry being managed by persons who had absolutely no practical experience in the management of silk-worms, secondly to the lack of timely supply of healthy and fresh silk-worm seeds, and thirdly to want of financial help. In 1865, the industry was revived in the Dharwar jail by the then Superintendent. In 1873, samples of raw silk produced at Dharwar were sent to Glasgow, London and France, and the experts of those places seem to have declared that the Bombay silk was even superior to that of Bengal. Stray experiments were made to revive the industry between 1849 and 1877 in some places.

Lefroy's Remarks on the Revival of the Industry.

3. Though it was clearly shown that mulberry could be grown well and good silk could be produced in the Deccan, nothing further was done there. Professor H. M. Lefroy, in his valuable report on an inquiry into the Silk Industry in India (Volume I, Chapter VII, pages 71 and 83), has suggested "that there is also a good area of Belgaum and Dharwar which is suitable for introducing sericulture in this Province ;

picking between the excessively wet outer area and too hot dry inner border. Mulberry silk culture has existed in Dharwar and there is no doubt it can be practised".

Individual Efforts towards the Revival of the Industry.

4. During my survey, I was able to gather the following information regarding the part played by this Province in sericulture :—

(a) Silk-worms were reared in and around Belgaum and Poona on a large scale about 80 to 90 years back and the silk is said to have been utilised by the local silk-weavers at Poona and at Shahapur near Belgaum. One Mr. T. P. Davar of Messrs. Boyce & Co., Belgaum, tells me that about twenty years ago his brother had mulberry plantation at Mazgaon about three miles from Belgaum, and he reared silk-worms with the help of a Bengali gentleman whom he had as his partner. His attempt was, however, abortive as the Bengali gentleman is said to have gone home abruptly. Then he got a Muslim rearer from Mysore, but he too left this gentleman in the lurch.

(b) About fifteen years ago, the Salvation Army seem to have successfully cultivated mulberry in Anand and Ahmednagar, and to have reared silk-worms for a period of about three years. Their failure, it is said, was solely due to want of finance.

(c) Mulberry silk-worms were reared, some years back, at Hangal (Dharwar) by one Mr. Narasinga Gowda, who had a few mulberry plants in his garden. Even now, some plants are found about that place. Mr. H. V. Gudi, the Shirastedar, who was in-charge for the Mamlatdar also, told me that while he was a student at the place, he had seen silk-worms being reared there.

(d) One Mr. Krishnchar Kolhar, a compounder in Dr. Kirloskar's dispensary at Dharwar, told me that about 15 years ago, he himself reared silk-worms at the place successfully and took 4 or 5 crops. He gave up the industry as he did not know what to do with the cocoons. He also said that besides himself, some others were also rearing the worms, but none of them knew the utility of the cocoons. Some mulberry trees are said to exist even now in the compounds of some houses.

(e) The Principal of the Training College, Dharwar, told me that many years back the students were given a practical course in silk-worm rearing. The Mali, who is even now in charge of the garden, said that there were many mulberry trees in the garden and the leaves were used in rearing silk-worms. It would appear that even at the High School, worms were reared and produced good cocoons. The rearing ceased when the grant for practising class was stopped. The hands working in the garden were reduced and no one took care of the plants.

(f) At Vir in Purandhar taluka, one Mr. S. B. Domal said that during 1922-23, his brother reared mulberry silk-worms in that place. It

seems that the leaves from the mulberry plants round the *pan-malas* were gathered and used and even cocoons were harvested. But as no one knew the process of taking out silk, the rearing could not be continued further. The eggs were got from the relatives of the rearers at Baroda and Kolhapur.

It will, thus, be seen from the above that the failure of the industry in this Province was due largely to lack of necessary knowledge and the necessary training and partly to want of adequate and timely financial assistance. To some extent, the failure may be attributed to wrong kind of worms being reared as the rearers had no knowledge of the influence of climate and humidity on the health of the worms.

The Present Condition of the Industry.

5. It is found that there is no silk-worm rearing done anywhere at present in this Province on scientific lines. The couple of rearings done by one Dr. Biwalkar at Lonavla Nature Cure Home, and by one Mr. R. A. Munshi of the Fruit Canning Works at Mahableshwar, are done as a hobby by gathering the mulberry leaves from trees which grow wildly at these places. No data are available with them regarding the temperature, humidity at the time of rearing, quantity of eggs and mulberry leaves used with corresponding yield of cocoons, etc., to find out how far the rearings are economically successful. As these two places are situated on the crest of Ghats, and as there is a rainfall of over 150 inches at Lonavla and of about 250 inches at Mahableshwar extending for nearly 5 months of the year, it is not possible to have rearings during the rainy season, but they may be had after the rains, i.e. from the middle of October to the end of May.

SECTION III.

THE PRESENT SURVEY.

Climatic Conditions.

6. The Province has been divided by nature into three distinct parts according to physical features. The first of these is the hilly portion in the West divided into high and low level tracts abounding in hills and ravines, and running parallel to the coast line for many hundreds of miles. The rainfall in this region is heavy and varies from 60 to 280 inches covering about 100 to 150 rainy days in the year. The second is the belt of land, transition tract, lying behind the first and having a moderate rainfall varying from 25 to 50 inches per annum almost equally distributed throughout the year, as in the eastern tracts of the Deccan and Karnatak, the South-west monsoon is greatly supplemented by the fall of the North-east monsoon which follows the close of the South-west monsoon, and has an elevation of 1,500 to 2,000 feet, or more, above the sea level. The third is the hot and dry area in the East with a meagre rainfall varying between 15 to 20 inches per annum. According

to the height above and the distance from the sea, the climate varies in different parts of the districts. Along the sea coast, the climate is excessively moist and rather hot. The mean maximum is high, as also the humidity and the rainfall are great. In the central belt, the climate is both pleasant and agreeable in general, excepting during the months of April and May, when the climate is hot. The mean temperature is 87° F., ranging from 52° F. in January to 101° F. during May. The nights are generally cool. In the East, especially in the months of April and May, the heat is considerable and oppressive. The mean temperature is 92° F. The temperature falls as low as 58° F. in January and reaches more than 110° F. in May. During the South-west monsoon, the fresh westerly breeze makes the climate a little agreeable in the months of July, August and September only and after the monsoon, the climate becomes again hot.

Tracts suited for Sericulture.

7. For the introduction of sericulture in this Province, the central belt of land, having a moderate rainfall, temperate climate and a favourable soil retentive of moisture, comprising the Western portions of the districts of Nasik, Poona, Satara, and Sangamner, Parner and Akola Talukas of Ahmednagar, and, the districts of Belgaum and, Dharwar and some talukas of Surat, are well suited. In the matter of temperature and humidity also, this tract seems suitable. The average temperature required for the rearing of silk-worms is between 70 and 80 degrees F., and the relative humidity between 50 per cent. to 80 per cent. inside the building. It is possible to get in these places a temperature ranging between 65 and 95 degrees F., and a relative humidity varying between 40 per cent. to 90 per cent. for many months in the year. For, according to the height above the sea level, and the distance from the Ghats, the climate varies a little in different parts of this region. During summer, the temperature in the months of April and May goes up to 100° F., or a little more, but though the heat is exhausting outside, it is not so trying inside the buildings. During the South-west monsoon, the westerly breeze makes the climate cool and agreeable. As in the combination of temperature and humidity, a certain amount of relative adjustment is possible and a slight variation in the one can be controlled by adjusting the other with proper care, worms can be successfully reared over a wide range of variation and hybrid races can be produced suitably for every season of the year.

The climatic conditions for silk-worm rearings in some parts of Konkan, where mulberry grows well, seem to be good during four or five months in the year from October to end of February (after the rainy season). It is suggested that an effort should be made in one area to rear the silk-worms in the West coast, preferably at Bombay City or Mahim (Thana District) where the annual rainfall is only between 60 to 80 inches. If the result of rearing is economically successful it should be extended to other similar centres.

In the districts of Sholapur, Bijapur, East and West Khandesh and Broach owing to the dry heat of the hot weather months, the shortness of the suitable moist cool period from July to February, and low rainfall, it is rather difficult to make sericulture an economic success.

A list of talukas climatically suited for the introduction of sericulture is given in the Appendix A.

Economic conditions.

8. Sericulture is possible only where labour is cheap, efficient and abundant. It is because of this reason that Japan and China have acquired predominance in this industry while in France and Italy, it is on the decline. Sericulture cannot profitably be conducted on hired labour and it will pay only as a subsidiary occupation for families whose members can cultivate mulberry and rear silk-worms. In a village having the silk industry, a large number of families finds such subsidiary occupations as plucking leaves, digging, weeding, pruning, not to speak of the several processes connected with rearing worms and reeling cocoons. Even the artisans find additional appointment in the manufacture of appliances required for the industry. It is, thus, an admirable subsidiary occupation for an agriculturist. Mulberry can be grown on small plots of land ranging from quarter of an acre to couple of acres either as a dry or an irrigated crop and it is the mulberry garden that is the principal investment in the industry and the other requirements are very few. The ryot's house can serve as the place of manufacture and his wife and children can supply the necessary labour. Since the worms are reared inside the house and are fed only a few times daily at long intervals, there is not much exertion. Parts of the Province, especially the districts singled out by me, are fitted for this cottage industry as the principal occupation of the people there is agriculture, as many boys and women are found without employment and as, except in some places where the handloom industry is carried on, there is no suitable subsidiary occupation whatsoever. The last Census Report of this Province for Deccan area is eloquent on this point. For, according to the figures for 1931, for every 1,000 persons the principal earners were 330, the working dependants were 38, and the non-working dependants were 632. When so much of labour is available and most of the bread-winners are found indebted to the money-lenders and Marwaris, it would be a blessing to the people if sericulture is introduced in this region. Mulberry plants and trees are found to grow luxuriantly as hedges especially round *pan-malas* (betel vine) gardens, in the talukas of Khed (Poona), Junnar, Purandhar, Haveli, Wai, Shirala, Walva, Karad and Chikodi. The mulberry plants and hedges have come up well though no care is bestowed upon them and serve the purposes of giving shade to the betel vine and of protecting it from the wind. If sericulture is started in these areas, the leaves could be turned to a profitable purpose and besides benefitting the owners, it will provide additional engagement to others.

Marketing Facilities.

9. It is clear from reports published from time to time that there is a very good market for silk in this Province, and if silk is locally produced, there is no doubt that it will find a ready market. For, the local silk handloom industry with about 6,000 looms as also the lace and embroidery industries consume annually raw silk worth several lakhs of rupees. All this silk is imported either from China or Japan or some other Provinces of India. Statistics tell us that out of a total annual consumption of about four million pounds of raw silk in India, the quantity produced in India itself amounts to only one and half million pounds.

During 1937-38, the raw silk produced in the several silk-producing centres in India was as follows :—

	Lbs.
Mysore State	8,00,000
Bengal	4,00,000
Madras	1,15,000
Kashmir State	2,50,000
Assam	10,000
Punjab	5,000
Bihar	1,000
Total ..	15,81,000

If these Provinces and States were to increase their produce by even 100 per cent., there would, yet, be a demand for raw silk from outside India. Approximate quantity and value of imports of raw silk only (excluding spun silk yarn) into India from foreign countries during the five years ending 1937-38 are as follows, according to the figures given in the Annual Statement of the Sea-Borne Trade of British Empire :—

Year.	Particulars.	
	Quantity. Lbs.	Value. Rs.
1933-34	2,379,197	71,74,284
1934-35	2,216,920	57,37,898
1935-36	1,616,864	43,42,239
1936-37	1,651,585	57,08,461
1937-38	2,227,340	85,91,107

There is, thus, a very great scope for the industry and Bombay Province is quite fitted to take up the industry and capture the market as certain tracts in this Province are climatically as ideal as any other silk-producing tract in India.

SECTION IV.

POTENTIALITIES.

10. As a result of this survey it has been observed that many of the talukas are climatically suited for the introduction of sericulture therein and a list of such talukas has been given (*vide* Appendix A). It has been pointed out that economic conditions favour the introduction of sericulture as a subsidiary industry owing to the availability of cheap labour and the absence of suitable subsidiary occupations for the agriculturist during his off season. Considered from the aspect of marketing facilities also, Bombay is well-fitted to take up the industry and to capture the silk market. Further, it will be seen from Appendix B, that a large number of mulberry trees exists here and there as hedges and plants in several gardens and these leaves could be profitably utilised to the advantage of the owners and the sericulturists.

11. At least a period of fifteen years is necessary to establish this industry in this Province. This period is necessary as people who are to take up this industry are illiterate and live in the interior villages. There is no doubt that with enough encouragement given by the Government and with the co-operation of the Revenue Authorities, the agricultural and the rural development associations and village panchayats, the industry could be established in about fifteen years on a sufficiently large scale to supply a portion of the demand of this Province and also to improve the economic conditions of the people who adopt it as their subsidiary occupation.

12. In these circumstances, the following forecast has been made (on the basis of fifteen years' programme) of the acres that might come under mulberry; the number of families that might be engaged in the industry; the additional earnings which might be expected per acre; the output of silk per acre and the money value of the silk produced.

13. The possible area that could be brought under mulberry would be about 3,000 acres at the end of five years, 4,500 acres at the end of ten years and 6,000 acres at the end of fifteen years. The number of families that might be expected to be engaged in the industry would be about 4,800 at the end of five years, 7,200 at the end of ten years, and 9,600 at the end of fifteen years. The probable additional amount that would be earned annually by the people engaged in the industry would be about Rs. 1,44,000 at the end of five years, Rs. 2,16,000 at the end of ten years and Rs. 2,88,000 at the end of fifteen years. The quantity of silk that might be expected to be produced in this Province each year would be about 45,000 lbs. at the end of five years, 81,000 lbs. at the end of ten years and 120,000 lbs. at the end of fifteen years. The money value of silk would be about Rs. 1,82,820 at the end of five years alloting Rs. 1,80,000 for silk and Rs. 2,820 for waste. At the end of ten years the money value will be about Rs. 3,29,060 alloting Rs. 3,24,000

for silk and Rs. 5,060 for waste. At the end of fifteen years, the money value would go up to Rs. 4,87,500 apportioning Rs. 4,80,000 for silk and Rs. 7,500 for waste.

14. The figures given above are on the analogy of the statistics obtained from the Mysore State. I have made the above forecast from my long experience in various capacities in the Department of Sericulture in Mysore. Each family cultivates about $\frac{1}{2}$ to $\frac{3}{4}$ of an acre of mulberry. The average income per family per month is about Rs. 4 and the production of silk is about 20 to 30 lbs. per acre of mulberry.

15. The probable expenditure to be incurred by Government in setting up silk farms and grainages and in engaging demonstration staff would be between Rs. 30,000 to Rs. 40,000 per annum at the end of five years, Rs. 45,000 to Rs. 55,000 at the end of ten years and Rs. 60,000 to Rs. 80,000 at the end of fifteen years.

SECTION V.

RECOMMENDATIONS.

General Remarks.

16. As raw silk is needed on a very large scale in this Province, it is worth while to revive the silk industry. Considered either from the physical condition of the various parts of the Province or the economic condition of the people sericulture is neither a new industry to the Province nor is it difficult to be revived. Three things require to be done immediately to introduce and develop sericulture in the Province. Firstly, a central farm should be started in a suitable place having experts who can train and send out sericulturists. Secondly, wide propaganda coupled with demonstration by trained staff should be done among the agriculturists to convince them of the advantages of taking up sericulture as a subsidiary industry and to show them that silk-worm rearing and silk-reeling are easy to learn and practise. Thirdly, a grainage should also be attached to the farm for producing healthy silk-worm seeds throughout the year for the supply of the same to the farmers at various centres. As regards propaganda, it can be done easily as the Province has traditions of having been once a silk producing Province and as there are signs of sericulture having been practised in the past. As mentioned by me before, even now mulberry trees exist here and there as hedges and plants in several gardens in some towns and villages. A list of such places is given in the *Appendix B*. The owners of the gardens themselves may take up silk-worm rearing by making use of the available mulberry leaves. The propaganda staff proposed to be employed for sericultural work may also conduct test rearings in the different centres

making use of the available mulberry leaves at the places. Till rearing of worms is picked up by the agriculturists, the staff will have to attend to the rearing work both night and day in the houses of the agriculturists.

From the existing mulberry trees that yield fruits, seeds can be prepared by collecting. The seeds can be sown in the nursery and seedlings raised both for use in the central farm as well for supply to intending sericulturists. Mulberry gardens raised with seedlings would be very good and this would avoid a large outlay on mulberry cuttings to be obtained from long distances for planting purposes in the beginning.

Silk reeling constitutes a separate section of the industry. Until such time as the ryots themselves are in a position to reel the cocoons and sell the raw silk, Government will have to come to their aid in getting their cocoons properly reeled into silk and arranging for the sale of the silk and other products. In the beginning, it would be necessary for the Department to buy all the cocoons, produce silk and sell even if it means loss to Government. As each sericulturist produces a small quantity of cocoons he would find it difficult to sell the same even if silk is reeled.

As it would take some time to start the farm at Belgaum and bring it into full working order, it would, perhaps, be advantageous if suitable people are selected and sent out to Bengal or Mysore to undergo training in sericulture so that they may be fitted for doing the development work in Bombay.

Such of the agriculturists who want to take up silk-worm rearing may be given short course practical training (6 weeks or so) in mulberry cultivation and silk-worm rearing in the central farm or demonstration farms to be established in the Province, as this would facilitate work in the villages.

A Central Farm.

17. A farm equipped with the staff as proposed hereafter will be capable of attending not only to the introduction of sericulture in suitable areas in the Province but also to its expansion by doing intensive propaganda for some years. The farm will keep in close touch with the farmers, and secure for them their requirements, such as mulberry cuttings for their plantations, silk-worm seeds for their rearings and appliances for rearing and reeling. It will advise and guide them as and when necessary, procure for them such assistance as they may require from time to time and assist them generally in making their rearings a success. In course of time, it may become necessary to start one or

more such farms in other areas to cope with the development and expansion of the industry to larger or more distant areas.

One or more demonstration stations will have to be started in selected places on lands leased by the Government or on the lands of farmers willing to grow mulberry and agreeable to take up sericulture as a subsidiary occupation. The most profitable method of growing the best varieties of mulberry will have to be demonstrated in these stations. Also some model silk-worm rearing houses will have to be built of cheap and indigenous material with a view to induce the farmers to build such houses themselves.

Location of the farm.

18. The central farm and grainage can advantageously be located at Belgaum in Karnatak as it is the headquarters of the Southern Division as well as a district, as it is about 2,562 feet above sea level, as it has a temperate climate (*vide* Appendix C) with a moderate rainfall tending neither to excessive heat in the summer nor to excessive rain during the monsoon, as it has the advantage of having been once a silk-worm rearing and weaving centre and as, in fine, it has all the advantages to be an ideal research and experimental station guiding the various branches of the silk industry in the Province.

Functions of the farm.

19. The central farm will have to start with the following functions :—

(i) Mulberry cultivation and collection of correct data of cost of varieties suited to locality and of the best agricultural methods.

(ii) Experimental rearing of silk-worms, both pure and hybrid races.

(iii) Manufacture of seeds.

(iv) Special courses for training a staff for expansion work.

(v) Short practical courses for farmers to impart to them instructions in the various stages of the industry.

(vi) A section for reeling silk at the farm.

Staff required.

20. The central farm and grainage would require an efficient staff to satisfactorily discharge the work for which it is founded. The staff should consist of a Superintendent, two Inspectors and four Operatives to carry on the technical work and a Steno-typist and an Accountant for attending to ministerial and other kinds of work. There should also be a mobile staff consisting of two demonstrators and four

operatives whose duty will be to attend to any technical work in any part of the Province and to serve as substitutes for the technical staff at the farm in cases of sickness or leave.

Functions of the staff.

21. The functions of the officers will be as follows :—

(i) *Superintendent.*—He will be in charge of the central farm and grainage, will superintend the general work at the farm and institutions subordinate thereto and will exercise control over the rest of the staff.

(ii) *Inspectors.*—One of them will be in charge of the farm garden and the rearing section. Another will be in charge of the seed cocoons and the preparation of disease-free eggs. These Inspectors will control the work of the operatives under them and they will be responsible for the work entrusted to them.

(iii) *Operatives.*—One of them will look after the garden, two of them will look after the rearing section and another the grainage section. To these will be allotted the duty of carrying out all the operations required in the farm rearing and grainage sections and such other duties as may be assigned to them.

(iv) *The ministerial staff.*—They will attend to duties peculiar to their designations and carry on the work of correspondence and maintenance of accounts and the proper care of the records, properties of the farm and grainage.

(v) *Demonstrators.*—They will be entrusted with the work of demonstration as also the work of propaganda in the talukas. They will be mainly responsible for the propagandist work among the rearers in the taluka and for the spread of sound methods of mulberry cultivation and silk-worm rearing and reeling. For the present, they will be posted to selected centres where mulberry trees or hedges already exist so that they can show the utility of the mulberry leaves that could be had there. The reeling demonstrator will not only train the necessary staff in the technique but will also give reeling demonstrations wherever and whenever necessary.

(vi) *Operatives (Mobile).*—These will be subordinate to the demonstrators and will conduct the work of rearing in the farmers' houses, inspect their gardens and give them technical advice and help whenever required. They will also collect statistics and send reports which would, of course, be checked and verified and consolidated by the demonstrators.

Estimates for a Central Sericulture Farm.

22. I give below an estimate of recurring and non-recurring expenditure in connection with the starting of an experimental Government sericulture farm and grainage at Belgaum :—

Expenditure.		Rs.	Rs.
(1) Garden.			
<i>Non-recurring—</i>			
Cost of 5 acres garden of suitable ground at Belgaum with irrigation facilities for mulberry cultivation at Rs. 1,000 per acre	5,000		
Well, 40' depth, 8' diameter with pumping out-fit	2,414		
	—————		7,414
<i>Recurring—</i>			
Cost of labour per annum	680		
Cost of manure per annum	100		
Cost of appliances and implements per annum	50		
Cost of contingencies per annum	50		
	—————		880
(2) <i>Buildings and Equipment.</i>			
<i>Non-recurring—</i>			
Building for office, rearing rooms	8,321		
Latrine, store-room, watchmanned	2,740		
Furniture, microscope and other instruments	1,000		
	—————		12,061
(3) <i>Establishment Charges.</i>			
I. <i>Farm Staff.</i>			
<i>Recurring—</i>			
1 Sericulturist and Superintendent at Rs. 300 per mensem	3,600		
2 Inspectors at Rs. 50 per mensem	1,200		
4 Operatives at Rs. 30 per mensem	1,440		
2 Peons at Rs. 15 per mensem	360		
1 Accountant at Rs. 60 per mensem	720		
1 Stenotypist at Rs. 50 per mensem	600		
	—————		7,920
II. <i>Mobile Staff.</i>			
2 Demonstrators for propaganda at Rs. 50 per mensem	1,200		
4 Operatives at Rs. 30 per mensem	1,440		
	—————		2,640

(4) Other Charges.	Rs.	Rs.
I. Travelling allowance for the Sericulturist and staff including Mobile staff ..	1,560	
II. Farm expenses including Experimental Rearing and Grainage Sections, temporary labour, appliances and other incidental charges	2,000	
III. Demonstrations on farmer's plots and houses by mobile staff	1,500	
	—————	5,060
<i>Summary.</i>		
Non-recurring expenditure	19,475	
Recurring expenditure	16,500	
	—————	
Total ..	35,975	
	—————	
Say ..	36,000	
	—————	

The total cost of the proposed central silk farm and grainage would be about Rs. 36,000. Out of this, say Rs. 19,500 will be capital expenditure for the purchase of lands and construction of buildings, etc., and the remaining Rs. 16,500 will be recurring expenditure.

The annual recurring expenses in the second year would be about Rs. 20,000 and would gradually rise up to Rs. 30,000 per year. For, after a year's work there will be a demand for both financial and technical help calling for more funds. No return could be expected during the first three years, as in addition to free demonstrations and technical advice, mulberry cuttings and rearing appliances, etc., will have to be procured and supplied gratis to the farmers and disease-free eggs will have also to be supplied free of charge to the rearers for some years from the farm. Provision has also to be made to give loans if necessary for mulberry cultivation. Even at the farm there will be no receipts inasmuch as everything will be spade work at first. It is only after the work is consolidated and people begin to evince interest in the industry that any receipts could reasonably be expected. If the industry has to be introduced in all the suitable areas of the several districts of the Province, in due course, four central farms will have to be started at different centres with some demonstration farms at selected places and a budget provision of about Rs. 1,20,000 would be required annually.

Programme of work to be done.

23. The introduction of sericulture is a question of time as the persons among whom it has to be introduced are conservative, very poor and mostly illiterate. The first requisite, viz. the bush mulberry plantation begins to yield leaves in five or six months after planting. As the first picking of leaves from a new plantation if used for rearings will not give successful results, it would take some time to come up to a stage when it could yield leaves fit for successful rearing. No scheme could, therefore, be thought of for less than three years if tangible results should ensue from the experiment.

The programme for the first two years will have to be as follows :—

Starting the central silk farm and planting the mulberry garden ; equipping the farm with the requirements of the different sections ; selecting the candidates for training and imparting instructions to them ; propaganda work through lectures and pamphlets advocating the advantage of adopting sericulture as a home industry ; helping the ryots to plant mulberry cuttings ; holding demonstrations in rearing wherever and whenever possible. Experimental rearings and grainage operations will have to be carried on to supply disease free layings to the rearers. Training will have to be given in reeling to such as are willing to take to that part of the industry.

In the third year, the programme of the work will have to be as detailed below :—

Intensive propaganda in selected areas by holding demonstrations on ryots' lands and in their houses with the help of trained staff, giving demonstrations in reeling in all possible places ; supplying disease-free layings to rearers in various localities ; consolidating the work and creating market facilities for the rearers and reelers.

The course of studies proposed to be imparted to persons to be trained for demonstration and propaganda work is given in detail in Appendix D and the training will have to be both theoretical and practical extending to one year.

SECTION VI.

FUTURE OF THE INDUSTRY.

24. The raw silk industry in its present form embraces agriculture, manufacture and commerce. The industry is characterised by the small size of the units engaged in production, consisting as they do of single households. In spite of a marked improvement in the methods of production, the industry still remains in the stage of semi-feudalism, retaining its earlier antiquated form. As a matter of fact, sericulture is practised in most cases by small farmers as a side line. Another characteristic of the silk industry is that it still remains in the stage

of handicraft, labour constituting the most important element. The industry, employing as it does a certain amount of machine power only for silk reeling as it is today, cannot claim the name of a factory industry in the modern sense of the word, and, in this respect, it may be differentiated from other textile industries, in which machine power is employed to a very great extent. As the price of silk has gone very low many doubt if there are possibilities of making the industry paying and if it is wise to introduce it into new areas. If they examine the prices of various other materials in the market, they will be convinced that the fall in the price of silk is due to world depression and is not peculiar to silk alone. It need not be emphasised that the central problem of the silk industry is that of price which depends, in its turn, upon the cost of production. With the recent advance in the mechanization of the manufacturing process, there has been a considerable reduction in manufacturing costs of raw silk. At the same time attempts are also being made for a reduction in the cost of production of the raw material, viz. cocoons as a result of further rationalization in the management of the industry. This reduction in the cost of production coupled with the recent improvement in the quality of raw silk due to mechanical inventions and also in the quality of cocoons owing to the utilization of superior silk-worm eggs, augurs well for the further development and future of the industry. There are people who say that the silk industry has no future as popular taste will remain many-sided. But, they forget that the silk has features possessed by no other textile fibre. If anything, silk will cease to be the aristocrat among fibres and will become a commodity within the reach of all. It will, therefore, be in even greater favour than now. In addition to the demand for pure silk from its ever-increasing circle of admirers, there is bound to be a great scope for mixed fabrics such as silk and cotton, silk and wool, and silk and rayon.

25. In conclusion, I thank the Director of Industries, for the free scope he was pleased to give me for conducting this survey in my own way and for the facilities he was kind enough to afford me therefor. I also thank the Collectors of Districts and other Officers of the Revenue Department who readily furnished me with whatever information they had and willingly gave me whatever help I sought. My thanks are also due to the authorities of the India Meteorological Department, Poona, for all the information which they promptly supplied me regarding temperature, etc., of several places in the Province, the doctors in charge of several hospitals for giving me their temperature records and also many non-official gentlemen who kindly gave whatever information they could. I have confined my report to sericulture alone as I could not collect in my tour sufficient data respecting ericulture. It is worth the while to conduct a special survey as to the possibility of introducing ericulture in such parts of the Province as abound in castor plants.

E. S. RAMANATH,
Sericulturist.

APPENDIX A.

Statement showing the provisional list of talukas selected for introducing sericulture as a cottage industry in the districts of Nasik, Ahmednagar, Poona, Satara, Belgaum, Dharwar and Surat, where a survey work was done by the Sericulturist, Department of Industries, Bombay.

CENTRAL DIVISION.

District.					Taluka.
Nasik	..	..	..	..	1. Nasik. 2. Niphad. 3. Chandor. 4. Kalvan. 5. Dindori. 6. Satana. 7. Sinnar.
Ahmednagar	..	..	..	..	1. Akola. 2. Sangamner. 3. Parner.
Poona	..	..	..	..	1. Junnar. 2. Ambegaon. 3. Khed. 4. Maval. 5. Haveli. 6. Purandhar. 7. Sirur.
Satara	..	..	..	..	1. Wai. 2. Patan. 3. Satara. 4. Koregaon. 5. Karad. 6. Shirala. 7. Walva. 8. Khanapur. 9. Khatav. 10. Tasgaon.

SOUTHERN DIVISION.

Belgaum	..	..	..	..	1. Belgaum. 2. Gokak. 3. Khanapur. 4. Hukeri. 5. Chikodi. 6. Sampgaon. 7. Parasgad.
Dharwar	..	..	..	..	1. Dharwar. 2. Kalghatgi. 3. Hangal. 4. Kod. 5. Bankapur. 6. Hubli. 7. Karajgi.

NORTHERN DIVISION.

Surat	1. Olpad. 2. Surat. 3. Mandvi. 4. Bardoli. 5. Chikhli. 6. Jalalpore.
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APPENDIX B.

During the survey work, the Sericulturist found mulberry plants, trees and hedges at the following places.

1. *Bombay City* At many bungalows in the Fort, City and Suburbs.
2. *Nasik* At the High School and in the compounds of several bungalows.
3. *Satana* (Nasik District) .. Found mulberry as stray trees here and there while touring.
4. *Ahmednagar* Some trees in Wadia Park and bungalows.
5. *Sangamner* Taluka Office, Sub-division office of the Assistant Engineer.
6. *Akola* Learnt that there are many big trees at Bunderdhara.
7. *Narayangaon* (Poona District). Some trees here and there.
8. *Khed* (Poona District) .. As hedges round the *pan malas* (betel vine yards) in the place. There were some big trees grown luxuriantly also along the hedges. There are about 20 gardens. Almost all of them have mulberry.
9. *Sasvad* (Poona District) .. Some stray trees here and there.
10. *Vir* (Poona District) .. All around the *pan malas* (betel vine yards) in the place along the hedges. The plants were well grown and had some good trees.
11. *Parinche* (Poona District) .. All round the *pan malas* (betel vine yards) as hedges. Some good well grown trees also were found.
12. *Poona* In many bungalow compounds as trees and hedges. In the poultry farm and Modi Baug attached to the Horticultural Gardens as hedges. In the Agricultural College farm and Ganeshkhind gardens. In the hostel of the Scottish Mission at Rasta Peth.
13. *Talegaon* In some compounds of the bungalows.
14. *Lonavala* In the compounds of many bungalows and Dr. Bivalkar's Sanitorium.
15. *Satara* At Shahu Maharaja's palace; in some private houses. In some places in the suburbs of Satara.
16. *Wai* At some private gardens in the place.
17. *Surur* In and around *pan malas* at the place.
18. *Koregaon* The Mamlatdar of the place gave information that some stray trees are existing here and there. Round the *pan malas* at Arvi, an interior place.

APPENDIX B—contd.

19. *Karad* Round the *pan malas* at Kole village.
20. *Islampur* (Satara District) .. At the local hospital, around the *pan malas* in the town, at Peth and Kamari village. Mulberry plants and hedges were also found round a banana plantation close to the town. The Mamlatdar said that in the *pan malas* at the following places, mulberry is being grown as a hedge:—Retredharan, Aithwade Budruk, Osarde and Yellur.
21. *Shirala* At one *pan mala* in the town. The Mamlatdar of the place gave information that mulberry is being grown as a hedge in the *pan malas* at the following places in the taluka:—Padali, Punwat, Bhatshirgaon, Wakurde Khurd, Rile, Shirashi, Ingrul, Takari, Nigade, Bambuwade, Mangale and Kapri.
22. *Belgaum* Found mulberry in the back yards of dwelling houses, in the premises of the railway staff quarters, in the farm and bungalow of Mr. T. P. Dawar; in the estate of Rai Saheb V. V. Shirgaonkar.
23. *Gokak* At the Arabhavi Agricultural Canal Farm growing as a hedge.
24. *Dharwar* In the compound of some bungalows and in the Agricultural farm.
25. *Chikodi* Round the *pan malas*.
26. *Hubli* In some bungalows on the Hospital Road.
27. *Ranebennur* In a private garden.
28. *Hangal* In private gardens.
29. *Mahableshwar* In the estate of Mr. R. A. Munshi, and in the compound of some bungalows.
30. *Godhra* (Broach and At the Rangwala Garden and Shah Alum Panch Mahals District). Masjid.
31. *Surat* In the compounds of some bungalows.
32. *Mandvi* Found some well grown trees.
33. *Bardoli* In the Gandhi Ashram both as a hedge and small trees.
34. *Jalalpore* Some plants in the backyard of houses.

Statement showing the mean monthly values of maximum temperature, minimum temperature and relative humidity at 8 hours (local time) for five years.

APPENDIX C.

BELGAVM.

(Height above sea level 2,562'.)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1934	83.5	89.4	93.5	95.6	95.8	82.4	76.0	74.9	78.5	85.7	81.5	81.4
1935	83.6	89.8	93.4	95.7	96.7	84.0	76.3	77.7	78.0	83.7	83.9	83.9
1936	85.3	85.4	94.3	97.0	94.5	80.2	76.7	76.0	80.0	85.1	82.4	83.8
1937	84.7	87.7	94.2	92.2	93.5	84.2	75.5	77.2	80.1	82.9	84.9	82.6
1938	86.8	89.7	94.9	95.4	91.7	78.6	76.1	78.7	79.4	81.4	82.9	82.3
1934	58.0	59.7	61.9	67.2	67.8	68.7	67.8	67.5	65.4	66.5	58.6	57.2
1935	58.7	59.3	63.5	65.4	69.0	68.7	68.0	66.9	64.7	66.5	59.5	60.0

Mean Maximum Temperature.

Mean Minimum Temperature.

MO-1 Bk Qc 7-3

Average Rainfall .. 50.137.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1934	68	52	49	71	67	86	94	95	92	69	56	33
1935	60	50	39	53	71	85	92	94	93	81	57	61
1936	59	68	46	57	73	88	93	92	91	75	75	58
1937	49	56	37	59	66	83	95	91	88	77	55	60
1938	53	46	48	59	72	91	94	94	93	81	65	58
1934	57.0	57.4	64.4	66.7	70.2	67.6	68.2	67.0	67.4	67.0	64.2	59.1
1935	57.2	59.6	64.0	66.7	68.2	69.1	68.0	66.4	66.7	65.0	62.1	57.3
1936	59.1	59.1	65.9	68.5	68.4	68.0	67.3	67.7	66.1	64.2	60.5	58.0
1937	57.4	59.7	61.9	67.2	67.8	68.7	67.8	67.5	65.4	66.5	58.6	57.2
1938	58.0	59.3	63.5	65.4	69.0	68.7	68.0	66.9	64.7	66.5	59.5	60.0

Mean Relative Humidity at 8 hours (local times).

Mean Relative Humidity at 17 hours (L.S.T.).

Not Available.

APPENDIX D.

Courses of study to be imparted to the students who are to be taken for long courses training at the proposed Government Central Silk Farm and Grainage at Belgaum (Department of Industries, Bombay).

I.—MULBERRY CULTIVATION.

General knowledge regarding production of plants, care of mulberry garden including tillage, manuring, irrigation, grafting, pruning, gathering leaves, etc. Farm practice. General idea of meteorology. Principal diseases of mulberry plants.

II.—REARING OF SILK-WORMS.

General idea about the life cycle of silk-worms. Anatomy and Physiology. Incubation and hatching of eggs. Collection of hatched worms. Feeding, change of beds and care of the worms in the different stages.

Diseases and their characteristics. Precautions for confining the spread of disease. Suitable appliances for spinning cocoons by ripe worms. Gathering, stifling, drying, storing and packing of cocoons.

III.—REARING HOUSE.

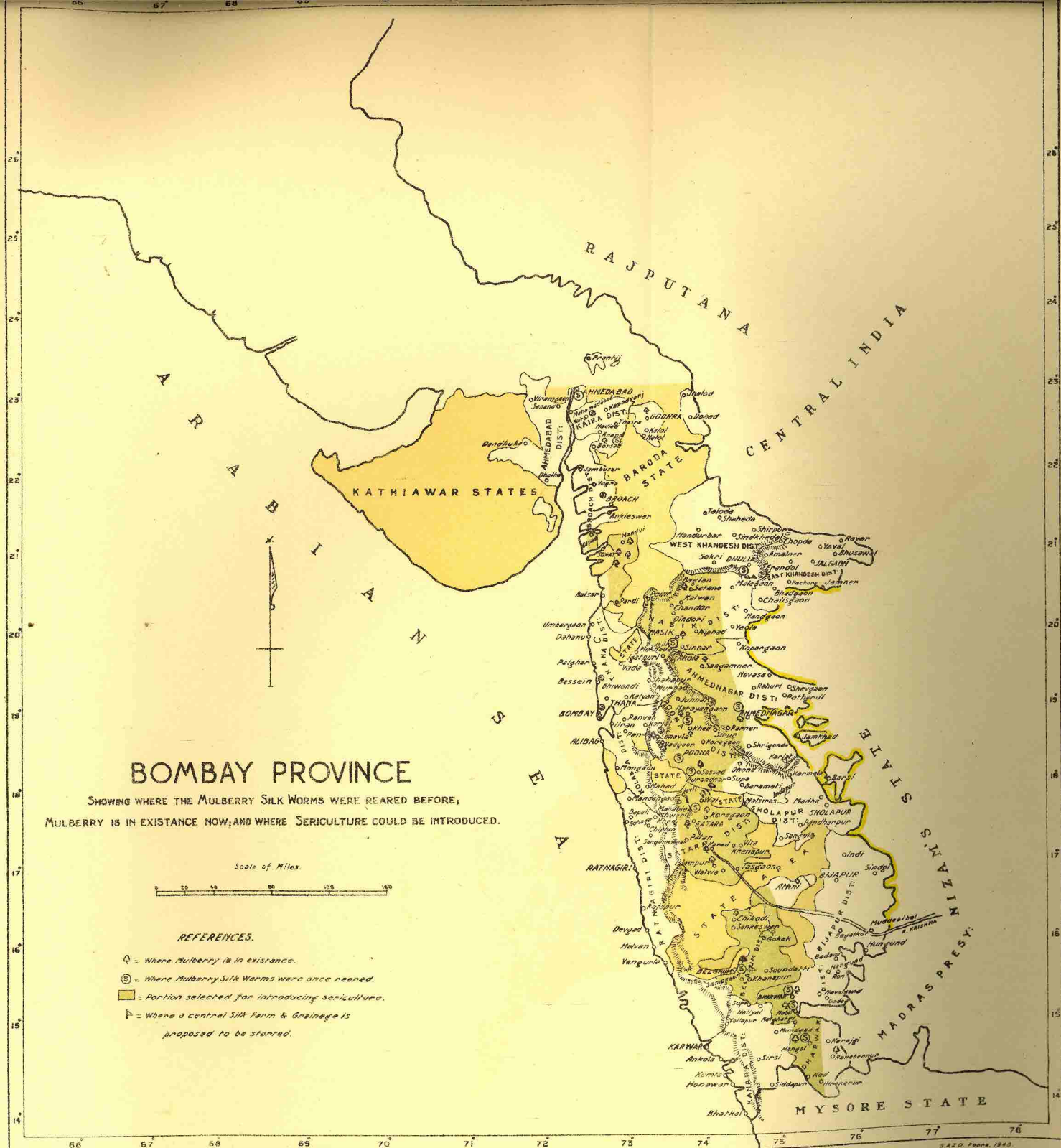
The best conditions for a rearing house and its appurtenances. Appliances for the rearing. Temperature and humidity in the rearing house and controlling them. Hygiene and disinfection of the rearing house.

IV.—PREPARATION OF SEED.

Cellular system. Selection of cocoons for seed. Emergence and pairing of moths. Microscopic examination of moths, washing and cleaning seeds. Storage of seeds. Packing for despatch.

V.—SILK REELING.

Sorting of cocoons. Separating the double cocoons. Steaming, cooking and reeling of cocoons. Cleaning of silk, skeining and packing. Examination of raw silk and testing. Preparation of silk waste.



BOMBAY PROVINCE

SHOWING WHERE THE MULBERRY SILK WORMS WERE REARED BEFORE,
 MULBERRY IS IN EXISTENCE NOW, AND WHERE SERICULTURE COULD BE INTRODUCED.

Scale of Miles.



REFERENCES.

- = Where Mulberry is in existence.
- ⊙ = Where Mulberry Silk Worms were once reared.
- = Portion selected for introducing sericulture.
- △ = Where a central Silk Farm & Grainage is proposed to be started.