

MAINE STATE LEGISLATURE

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DOCUMENTS

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THE LEGISLATURE

OF THE

STATE OF MAINE,

DURING ITS SESSION

A. D. 1836.

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1836.

SIXTEENTH LEGISLATURE.

No. 71.

SENATE.

REPORT.

RELATING TO THE RAISING OF SILKWORMS.

THE Joint Special Committee to whom was referred so much of the Governor's Message as "relates to raising of Silkworms, &c." have taken that subject into consideration and ask leave to

REPORT.

The aid of government in fostering, during their infancy, those arts which shall contribute to its wealth and strength when they shall become mature, is oftentimes necessary; and to bestow it, is always good policy.

The art of growing and manufacturing silk is one of those, which if we mistake not, has in its infancy, always required and always received this aid in countries where it now flourishes, and which has amply refunded the expense and bountifully repaid such parental care by the amount of business and wealth which it has created.

It is a kind of business which requires the exertions and labors of many individuals in order to make up an aggregate sufficiently large to produce a profitable amount. It is the encouragement, afforded to the labor of these individuals, which is necessary, in order that by their increase and multiplication, the total of produce when collected together, shall be larger and the profit and benefit more important.

The history of the Silk culture and manufacture is both curious and interesting. From the time when the first eggs of the Silkworm were brought to Europe by two missionaries from the Chinese Empire, concealed in the hollow parts of their canes, to the present moment, we see that in its *first beginnings* it has met with much neglect, if not with opposition; and that the strong arm of the Government in aid to the unconquerable perseverance of individuals, has been absolutely necessary to bring it forward and place it on a basis which would give it stability and permanence.

This probably arises from the fact, that people unacquainted with the business in its details, are exceedingly apt to receive a prejudice against it, from the diminutive and unostentatious appearance which it presents.

The feeding of a lot of small paltry caterpillars with leaves scattered over them by children, women and invalids, does indeed to a stranger, seem a childish if not a ludicrous employment. But as

“Grains of sands the mountains make,”

So the single thread of the paltry worm is a necessary component of the TEN MILLIONS of dollars worth which are annually imported into the United States from foreign countries.

It may be of use to enter into a brief and rapid detail of the process of cultivating and manufacturing Silk, from

the first hatching of the worm to the reeling of it in its raw state.

The first thing necessary for the successful prosecution of the silk culture, is to procure a sufficient quantity of food for the worm. The natural food for the worm is the leaf of the mulberry; to obtain this leaf the tree must be cultivated. The species most in use for this purpose are the white Italian Mulberry and the Chinese Mulberry.

The first kind is most generally in use at the present time. It is obtained either from the seed, from the cuttings, or from the layers.

1. *From the seed.* The white mulberry seed is obtained from Connecticut and from trees further south. In consequence of the people of this and other States having paid attention to the cultivation of this tree for a number of years, they now have them of an age and size sufficiently large to produce fruit, and of course seed in abundance. This seed is collected and deposited for sale at the several seed stores in operation in different parts of the country.

Having obtained the seed, the next operation will be to sow it. To do this successfully, the common operation is, first spade up a flat of good mellow loam, make it light and rich, as you would for the cultivation of carrots and beets. Early in May, or as soon as the ground is sufficiently warm to allow small seeds to vegetate, they may be sowed. Having prepared the ground, sow them in rows or drills as you would the above named seeds. They are generally from 15 to 30 days in coming up; they should be kept clear from weeds, and in the autumn it would be well to cover or strew around them some litter to protect them from frost, as the tender tips of the year old trees are liable to be killed. The trees are generally

allowed to stand in their beds in the nursery for two years, although they may be taken up and set out the second spring if necessary. There are various plans of cultivating them after being taken from the nursery. Some set them out in hedges, say a foot a part, so that they may form an excellent fence by the time they are six or eight years old. Others set them out in rows, say eight or ten feet apart, and the trees from three to five feet apart in the rows. This plan allows the passage of carts between the rows, and also that the land between them may be cultivated. It also places the trees sufficiently near to prevent their growing so large that it will be necessary to climb them for the leaves.

This tree flourishes well upon any soil that is sufficiently deep for it to plunge its roots down some extent, which it delights to do. A shoal soil with a stiff clay pan, which retains or holds water, is not suitable. A light sandy loam of moderate fertility suits it best, and it is found that the silk made from its leaves when growing in such soil, is much stronger and softer. The number of trees set upon an acre must vary according to the distance of the rows apart, and the distance the trees are placed in the rows.

2. *Cultivation by Cuttings.* This mode of cultivation is by taking pieces of the limbs or twigs, which are cut off any time between the falling of the leaf in autumn and the starting of the leaf in the spring. If these twigs be cut off in the autumn or winter, they should be buried in sand or kept in a situation where they shall not dry up.

In the spring they are put into the soil, which is pressed around them exactly as you put in the cuttings of the currant or the willow. Roots start out and the cuttings become a tree in due course of time. When first set out

they should be set in a somewhat shady place, for the full force of the sun might be injurious.

3. *Cultivation by layers.* This is effected by bending down limbs from the trees in summer, and burying a part of them in the ground. The part buried, may be kept down by pegs or short stakes; it will then throw out roots and when well rooted, it may be cut from the parent stock and then becomes an independent tree.

AGE WHEN THE TREES MAY BE PICKED.

The leaves should not be picked from the trees during the season in which they were transplanted. It would be better if they could stand three years before being cropped; but they oftentimes are cropped during the second year or season after they have been transferred from the nursery, and even the third year from sowing the seed. Some have adopted the plan of sowing the seed in beds and picking the leaves the succeeding summer, but the leaves are thought not to be so good, as from trees that are older.

DURATION OF THE WHITE MULBERRY.

The white mulberry when planted alone in a favorable situation, will grow to a large size. It is slow of growth and of course of long duration. Some in Europe are known to be three hundred years old; and there is nothing to lead one to suppose that they will be less durable in this country. In Maine they are found to flourish vigorously, the tips of the limbs only being killed by the winter, in consequence of their growing so late in the season that it does not harden its extremities sufficiently to resist the weather.

The roots however, are never killed by the frost, and the stripping them of their leaves seems not to injure

them to the degree that such a process would other trees.

CHINESE MULBERRY.

Within a few years past a new species of mulberry has been brought from China to France, called the Chinese mulberry or *Morus multicaulis*. These trees have been multiplied by cuttings to a great extent and are now introduced into almost or quite every State in the Union. They grow thriftily and have a very large succulent leaf.

The experiment in regard to their withstanding our climate is now being tried; but it is not yet certain, though some individual trees have been growing three or four seasons. A dry and moderately fertile soil is found to be better for them than a rich moist one.

HATCHING AND FEEDING.

Having obtained a sufficiency of food for the worm, it will then be time to commence feeding. The eggs of the silk worm should be exposed in some warm situation as soon as the leaves of the mulberry begin to put out and are as large as your thumb nail. They will soon begin to hatch. The worm at first is quite small, and it will be found advantageous to separate and put those of each day's hatching by themselves. This may be effected in the following manner. Take a sheet of paper, prick it full of holes with a large needle and lay it over the eggs which are hatching. Cover it with leaves of the mulberry and the worms will crawl up through and attach themselves to them. The paper may be taken off and a new one put on, or the leaves may be put upon the eggs and then picked off separately when the worms have got upon them. As before stated, it will be well to mark or set by themselves each day's hatching so that it may be remembered when they were hatched; for the following reasons.

The worm has several stages of its growth, or as they are called, ages. After feeding for a time and increasing its size, the skin, which does not expand and accommodate itself to the increased size of its body becomes too small. It must therefore, be thrown off.

During the operation of casting its skin, the worm seems to be sleepy and sick, holds up its head, and remains motionless—will not eat, or but very little, and therefore it is not necessary to feed them much while in this state. If, therefore, you have those worms of the same age together, you can, while feeding, pass those which are sleepy and feed those only which are not. Whereas, if the sleepy and the hungry are together, you cannot economize your fodder so conveniently as in the other case. Another reason why they should be kept separate is this; after they have passed through the shedding of the skin, or moulting, they are exceedingly greedy and require more food. As they increase in size the food should be proportionably increased.

About five days after hatching, they become torpid and cease eating. In this state they continue a day or two, when they cast the skin and come out with renewed vigor and activity, and take hold of their food with great avidity. On the 9th or 10th days they go through similar changes. On the 14th or 15th days they again undergo the same process and commence what is called the third age, and they cast their skin once or twice more. In about five or six weeks they leave off eating. By this time they have become large, have a greenish yellow color and a sort of semi-transparent appearance. Though very quiet before, they now begin to be uneasy, and commence wandering about in search of a place or corner to attach their cocoons firmly. By *cocoon* we mean the ball of silk which

the worm winds around itself for a protection while sleeping in the chrysalis state, as it is called, and changing from the worm to the *miller* or *moth* state. It is a yellowish ball about the size of a pigeon's egg. The worm, after finding a place which it likes, begins to emit a web or thread which it sticks on to the substance on which it is to hang. At first the threads are passed from one side to the other in a loose manner. These seem to be a sort of lashing or moorings, by which the cocoon is held in its place. After having spun a sufficient quantity for this purpose, it draws its thread into a smaller compass, and begins to enclose itself in an oval ball of thread, keeping itself within. After it has exhausted its store of silk, it lines the inside of the ball with a smooth, tough membrane, and then folds itself into the chrysalis state, in which it remains ten or fifteen days, when it becomes changed into an insect with wings, legs, &c. like other moths or millers.

When the worms are ready to spin, it becomes necessary to provide for them a convenient place or situation for this purpose. Some recommend arches of brush wood or broom corn placed over them into which they may creep and attach their threads to the small branches or twigs. The principal trouble with these is the following, the small twigs become entangled in the fibres of the cocoons which is thus filled more or less with them. The cheapest and best method, is to take small branches of the Oak or Beech, or some other tree or shrub which has a large leaf. Bind these loosely together and place them upon the table. The leaves as they become dry curl over and afford a convenient cavity for the worm to spin its cocoon in, and when they are picked out they are free from dirt or splinters. After the worms have done spinning, the cocoons should be collected together.

Those which are to be reeled should be separated from those that are not. As was before stated, the worm is inside and must be killed, for if allowed to come out, he pierces through one end of the cocoon, breaking off the thread and rendering it useless for reeling. Various means are adopted to accomplish this. The most ready and simple method is to put the cocoons into an oven, which is heated sufficiently hot for the purpose, but not hot enough to scorch the fibre of the silk, and to keep them there for sometime.

By cutting open one or two, it can be ascertained whether they are dead or not.

REELING THE SILK.

After the worms have been killed, the cocoons should be spread out in a dry airy room, for a time, lest they should suffer damage by moisture. When about to be reeled, the loose silk around them which is called floss silk, should be picked off and put by itself. This floss may be carded and spun in the same manner as tow or wool, and makes a strong, though coarser thread than the rest part of the cocoon. Having cleared the cocoon of floss, you should then put it into water about blood warm. Then take a small branch or bush and dipping it among them, the ends of the fibres will adhere to it, and are then collected together. As soon as the threads or fibres continue to come off without interruption, they are put upon a reel, as many as will make the thread of the required size, and wound off. The vessel of warm water should be placed upon a portable furnace or chafing dish of coals in order that it may be kept of uniform temperature. If the water becomes too warm, the silk will come off too fast and the thread will be uneven, and covered with burrs. If the water becomes too cold, the silk will

not come off easily, and the thread breaks or the cocoon is drawn up out of the water. The person who sits by the vessel must watch this and whenever a thread breaks or a cocoon is wound off another should be added in order to keep up the same size.

Varieties of Reels in use. Several kinds of reels are in use invented for the purpose. If neither of these can be obtained the common reel will answer. The best machine however, for this purpose is Brooks' Spinning Machine, invented by Mr. Adam Brooks of West Scituate, Mass.

When reeled from the cocoon, the silk is called *Raw Silk*. If it is wished to make it into thread it will be necessary to *double* the fibre already used. This operation is called *tramm*ing. After being *trammed* or *doubled* it must be *twisted* and this operation is called *throwsting*. As a general rule however the term *throwing* or *throwsting* silk means *double and twisting*, and if no machine be at hand to do this with, it can be done in the common way of performing such operations on woolen or cotton yarn. But by Mr. Brooks' machine, the operation can be done at the same time, that the reeling from the cocoon is going on.

Cleansing. When the silk comes from the cocoon, it is covered with a kind of gum, which must be got rid of. This is easily effected by boiling it in strong soap suds.—The silk may be put into a kettle and boiled, or first put into bags and then boiled. This will cleanse it of the gum and render it white, soft and pliable.

SAVING THE EGGS FOR A FUTURE CROP.

In order to ensure a succeeding supply of worms for another year, it will be necessary to lay by a number of cocoons, corresponding to the quantity of eggs wanted. These cocoons should be firm or hard and of the largest and best kind. After taking off the floss they may be

strung on a string and placed in a darkened room until they are hatched. This last operation, however, is not absolutely necessary. They may be laid upon the table which is covered with newspapers. After ten or fifteen days from the time of spinning there comes out of the cocoon a whitish grey moth. Some cocoons send out males and some females, these should be allowed to pair. They never fly about nor eat any thing, but after they have deposited their eggs they die. The eggs are glued on to the paper, being very thickly placed together. These papers may be rolled up and put away in some dry but cool place where they shall not be frozen. Freezing the eggs does not prevent their hatching, but for some cause or other it is thought to produce a hatching much earlier than the leaves can start for their food.

NECESSARY FIXTURES, &c.

Some convenient room or house is necessary to keep the worms in, while feeding. Unless it is designed to go largely into the business, it will not be necessary to construct a building on purpose. In Connecticut we are informed that they are frequently fed and kept in barns. But in Maine we should recommend some room where a fire can be lighted occasionally, not only for the purpose of raising the temperature, should there be any long or cold storms, or for the purpose of creating a circulation of the air, and thereby ventilating the room.

It is necessary that a uniform temperature be kept, for the less check there is in this respect, the shorter will be the time necessary to feed.

Under ordinary circumstances, six weeks are about the time required for the growth of the worm, but if the weather should be cold and cloudy and the temperature of the room should be suffered to sink too low, the time of com-

ing to maturity will be prolonged. Hence the reason why it is well to have the conveniences of warming the apartment, if necessary.

The common method of keeping the worms is, by placing them upon tables or shelves made of rough boards covered with newspapers. A very economical plan is, to take a number of boards of a convenient length; put into them four short legs, say a foot in length, and then place them one above the other. The legs of the lower table should be put into vessels of water in order to prevent mice from climbing up and getting among them, as they are very destructive—cats are also fond of the worms, as are also ants, spiders, &c. and they should be protected from them. By using a sufficient number of these tables a large amount may be fed in a small space.

These worms may be fed by placing the leaves upon them and carefully removing the litter every day or two. If however it is desired to go into the business more largely and a building is to be built, 24 feet square, is recommended as very convenient for the size of the same, as allowing twelve tables, six feet long and three or four feet wide, and giving ample passage way around them. Four or more tiers, one above the other, may be had in a single story. Every one, however, can calculate the size and plan such an establishment as his wishes or circumstances will allow. As a general rule, perhaps two square inches of space to each worm would not be too much, as they should not be too crowded. The more cleanly they can be kept, the better. Some put them upon what are called *hurdles*, which are frames covered by a coarse net work of slats of wood or basket work. Sometimes they are made of rattan, and sometimes of common twine netting. An inch and a half or two inches below, are placed draws which

will receive the litter as it falls through the meshes of the netting or wickerwork. These draws may then be taken out and emptied without troubling the worms at all. This, though the most expensive, is the best mode.

AMOUNT OF LEAVES NECESSARY FOR A POUND OF SILK; AND MISCELLANEOUS FACTS.

In calculating the profits of the silk culture, certain data must of course be taken to found the calculation upon; but as every tree does not afford the same amount of leaves, nor is every acre of land alike fertile, an approximation is all that can be made. As a general rule, it may be taken as a fact that 21 lbs. of leaves are necessary to make 1 pound of cocoons—that it will take about 300 cocoons to weigh one pound, and three thousand to make a pound of Raw or Reeled Silk. A tree at the age of five years, will yield 12 lbs. per season. At this rate, if an acre contains 2000 trees, there might be fed from this acre, 342,600 worms, which would yield about 114 lbs. of Raw Silk.*

Cocoons are sometimes sold by the bushel, and from 2,500 to 3,000 of them make a bushel; but 8 lbs. are often considered a bushel when bought by weight instead of measuring.

When we take into consideration the extent of our State, the diversity of its soil, the rapid increase of our population, and consequently the demand which is daily being made for something that shall adapt itself to this wide space and variety of soil, and at the same time afford a light but pleasant employment to the young, the weak and least productive classes, we cannot hesitate to pronounce

* It must be evident to every one that calculations must vary in this as in every other crop, according to circumstances.

the culture of Silk to be the very thing which this combination of circumstances calls for. This article, is one which finds its way into every family and is considered essential in some shape or other to their comforts, however poor and humble they may be. It is one also which ministers to the gratification of the rich and the affluent. Hence the immense call for it, and hence the fact, that the United States afford one of the finest markets for the Silks of Europe and Asia.

Besides the increase of population which must proportionably increase the call for this article, the ingenuity of our fellow citizens is daily making some improvement or new invention which will also make a further supply of it absolutely necessary.

The fact that it is now substituted for fur in the manufacture of hats, must substantiate this assertion.

If therefore it is, as your Committee firmly believe, a produce which can be easily and abundantly grown by our own people,—if it is one which by a little fostering care of the State, will become one of its richest staple products, adding to the objects of our industry and enterprise, multiplying our comforts, and our wealth, and increasing our power, certainly it must be our duty to give it all the legislative aid which its present state of infancy and helplessness requires.

ALEX. McINTIRE, Chairman.

• **STATE OF MAINE.**

IN THE YEAR OF OUR LORD ONE THOUSAND EIGHT
HUNDRED AND THIRTY-SIX.

AN ACT to encourage the culture of silk within
this State.

SECT. 1. *Be it enacted by the Senate and*
2 *House of Representatives in Legislature as-*
3 *sembled,* That for every pound of cocoons
4 which shall be raised within this State, the
5 person who shall raise or cause to be raised
6 said cocoons, shall receive a bounty of five cents
7 from the Treasurer of the town or plantation,
8 wherein said cocoons shall be raised; and for
9 every pound of silk which shall be reeled from
10 cocoons raised in this State, the person who
11 shall reel or cause the same to be reeled, shall
12 receive from the Treasurer of the town or plant-
13 ation in which the same shall be reeled, fifty
14 cents.

SECT. 2. *Be it further enacted,* That before
2 any person shall be entitled to receive the boun-
3 ties herein provided, he, she or they, shall prove
4 to the satisfaction of the said Treasurer of the
5 town or plantation in which such cocoons shall

6 be raised, or silk reeled, that the same was rais-
 7 ed or reeled, or caused to be raised or reeled by
 8 him, her or them, as the case may be, and the per-
 9 son so presenting the same to the said Treasur-
 10 er for the purpose of receiving said bounty, shall
 11 make oath or affirmation, that no bounty had
 12 been received by any person for the cocoons
 13 or silk so presented for a bounty.

SECT. 3. *Be it further enacted,* That the
 2 Treasurer of the several towns and plantations
 3 may keep an account of the money by them
 4 paid out by virtue of this Act, and present the
 5 same, verified by their oath or affirmation, to the
 6 Legislature for allowance, and the Legislature
 7 after being satisfied of the correctness of such
 8 account, shall allow the same, and authorize
 9 the payment thereof from the Treasury of the
 10 State.

STATE OF MAINE.

In SENATE, March 22, 1836.

Ordered, that 1000 copies of the foregoing Report and Bill be printed for
 the use of the Legislature.

[Extract from the Journal.]

Attest,

WILLIAM TRAFTON, *Secretary.*