Lesson Plan: Climate Impacts on the Silkworm Life Cycle

As an **Undergraduate** teacher of **Biological Sciences or Agricultural Sciences** , you can use this set of computer based tools to teach about **mulberry silkworm rearing, silk production** and the economical impact of climate change on the **sericulture industry**. This lesson plan will allow you to teach about the life cycle of the mulberry silk worm, *Bombyx mori* and their artificial rearing for commercial silk production and its management.

This Lesson Plan would further help in better learning and understanding the process of silk production and the impact of climate change (such as temperature changes due to global warming, relative humidity fluctuations, CO_2 levels and other environmental changes) on silk productivity.

Thus, the use of this lesson plan allows you to integrate the teaching of a climate science topic with a core topic in **Biological Sciences and Agricultural Sciences.**

Use this Lesson Plan to help the students to understand and find answers to:

1. Discuss the economic importance of *Bombyx mori ?*
2. What is the role of temperature, humidity, photoperiod and other climatic factors on the life cycle of silk worm and silk production?
3. What are the steps involved in the production of silk?
4. What are the challenges of silkworm rearing for the sericulture industry in relation to climate change?

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Want to know more about how to contribute? Contact us.

About the Lesson Plan

Grade Level	Undergraduate
Discipline	Biological Sciences; Agricultural Sciences
Topic(s) in Discipline	Life Cycle, Life Cycle of Silkworm, Sericulture, Mulberry Silkworm, Bombyx mori
Climate Topic	Climate and Agriculture; Climate and the Biosphere
Location	Global
Access	Online/offline
Language(s)	English
Approximate Time Required	1 hr 30 mins

Contents

1.	Video (5 mins)	A video to introduce the life cycle of a silkworm from eggs, to worms, to cocoons, to either silk moths or silk. This can be accessed here.
2.	Video (7 mins)	A video to detail the process of artificial rearing of mulberry silkworms as practiced in India. This can be accessed here.
3.	Reading (10-15 mins)	A reading that states what the management and climatic factors are for successful rearing of silkworm crops and for higher silk production. This can be accessed here.
4.	Classroom/Laboratory activity (40-50 mins)	An optional hands on guide for laboratory rearing of silkworms. This can be accessed here.

Step-by-step User Guide

(Here is a step-by-step guide to using this lesson plan in the classroom/laboratory. We have suggested these steps as a possible plan of action. You may customize the lesson plan according to your preferences and requirements.)

1	Introduce the topic through this video	Use this video titled, “Silkworm Lifecycle: worm to cocoon” by Jonathan L. to teach the life cycle of silkworm from larvae to cocoon-the stage of silk production. This video shows the detail of feeding and development of the larvae to moult into the cocoon which is the stage when it secretes the silk fibre for pupation. This can be accessed here.
2	Further explain this topic through this video	Use this video titled, “Silk worm farming in India: how your silk is made” by WildfilmsIndia to teach the process of artificial rearing of silkworm in rearing houses for commercial silk production. Through the case study of Indian silk rearing practices, teach your students about sericulture and the role of a silkworm at different stages of its lifecycle. Silkworms are soft bodied, slow-moving and relatively fast growing insects that go through four stages of development - egg, larva, pupa and adult. The pupa is what the silkworm changes into after spinning its cocoon before emerging as a month. This can be accessed here.

3	Demonstrate how it is related to Climate Change through this Reading	This reading is titled, "Management of climatic factors for successful silkworm (*Bombyx mori*) crop and higher silk production: A review" by Rahmathulla, Central Sericulture Board, Mysore, Karnataka, India. It can be used for discussing the role of temperature, humidity, photoperiod and various other environmental factors on the growth and development of silkworm. This includes embryonic development of eggs, cocoon yield, weight, nutritional indices of larva, reproductive potential of adult moths and post cocoon parameters. This reading highlights the care needed during cocoon formation and future strategies for the management of climatic conditions. This can be accessed here.
4	Classroom/Laboratory activities (45-50 mins) (optional)	This optional hands-on technique for rearing silkworm in a laboratory is titled, "Techniques of Rearing Silkworm" by the Central Silk Board, Ministry of Textile, Government of India. It can be used to extend the understanding of the process of sericulture for silk production. Use these activities to enable the students to understand the life cycle of silkworm and the importance of maintaining appropriate rearing conditions for proper growth and development of silkworm in order to increase silk productivity. The detailed technique describing the rearing rooms, rearing conditions, rearing equipment and the rearing techniques can be accessed here.

Learning Outcomes:

The tools in this lesson plan will enable students to:

1. Learn about the life cycle of the Mulberry silkworm, *Bombyx mori*.
2. Learn the process of silkworm rearing and silk production.
3. Discuss the effect of climate change and its implication on silk production and sericulture industry

Additional Resources

(If you or your students would like to explore the topic further, these additional resources will be useful.)

1.	Video	Use this video by Noal Farms to show the silkworm rearing for silk production, from larval feeding on mulberry to cocoon harvesting and silk reeling as additional information. This can be accessed here.
2.	Reading	Use this additional reading resource by Prof. P. Tzenov, President, BACSA, which gives a worldwide perspective of the impact of climate

		change on sericulture in different regions (both temperate and subtropical) having different climatic conditions. This can be accessed here.
3.	Reading	Use a reading book resource titled 'Introduction to Sericulture' by Ganga describing the general outline of the sericulture process as an additional resource. This can be accessed here.
4.	Classroom/Laboratory activity	A video resource by Dr. Ishrat V. Shaikh, showing hands on rearing technique of silkworm for silk production.Use this for laboratory activity of silkworm rearing. This can be accessed here.

Credits / Copyrights:

1.	Video, "Silkworm lifecycle: worm to cocoon"	By Jonathan L, YouTube.
2.	Video, "Silk worm farming in India: how your silk is made"	By WildFilmsIndia, YouTube.
3.	Reading, "Management of Climatic Factors for Successful Silkworm (Bombyx mori L.) Crop and Higher Silk Production: A Review"	By **V. K. Rahmathulla,** Psyche: A Journal of Entomology, 2012.
4.	Classroom/Laboratory Activity "Techniques of Rearing Silkworm"	By SILKS - Sericulture Information Linkages And Knowledge System, Central Silk Board, Ministry of Textile, Government of India, Bagalkote, Bangalore, Karnataka, India
5.	Video "How Silk is Made - Silk Processing Making From silkworm - Silk Farm Harvesting"	By Noal Farm, YouTube.
6.	Reading "Climate changes and chemicals – the new sericulture challenges"	By Prof. P. Tzenov, President of BACSA-Black Caspian sea and Central Asia Silk Association, 8th BACSA INTERNATIONAL CONFERENCE. Sheki, Azerbaijan. "CLISERI" 2017
7.	Reading Book "Introduction to Sericulture"	By Ganga
8.	Video "Silkworm Rearing Techniques"	Dr.Ishrat V. Shaikh, Abeda Inamdar Senior College, Pune. YouTube