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## Effect of high temperature on silk production and its impact on livelihood of sericulture farmers in Maharashtra

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### Abstract

Climate change can cause both global and local alterations in agriculture and its allied sectors. Carbodioxide (CO<sub>2</sub>) is increasing day by day which have various effects at different tropic levels in ecosystems. Globally the CO<sub>2</sub> level has increased by 30% also the industrial revolution is increased by approximately 0.66°C in mean annual global surface temperature. High temperature results in decrease in the survival rate of the silkworm larvae and heat susceptibility increases with age. High temperatures ultimately reduces the cocoon weight and cocoon shell weight also. It has been observed that if the cocoon weight and cocoon shell weight is reduced markedly by the high temperatures, the cocoon shell ratio showed a high value. High temperatures thus affect the survival rate and cocoon character. The V<sup>th</sup> instar larvae at an early stage are more susceptible to high temperatures which help in identifying and producing the heat resistant silkworm races in extremely hot weather found in Maharashtra. Thus production of heat resistant varieties of silkworm has helped in the upliftment and development of the farmers of Maharashtra.

**Keywords:** Sericulture, silkworm, heat resistance

### Introduction

More than 60% of our country relies on



agriculture directly or indirectly on agriculture as a source of livelihood. In Maharashtra most of the farmers they are depending on farming which also includes sericulture. In adverse conditions during the silkworm rearing the farmer may get a low cocoon yield and also increase in number of cocoons with poor quality (Kato, M. et al., 1988). Now a day, depending upon the adverse conditions like high temperature, there is a high demand for breeding of heat resistant silkworm varieties. High temperatures thus affect the survival rate and cocoon character.

The present study will thus help in analyzing, identifying and producing the heat resistant silkworm races in extremely hot weather found in Maharashtra.

#### **Impact of high temperature on sericulture**

Agriculture is most vulnerable to climate change as it is highly depended on climate. The direct and indirect effect of climate change includes: direct effects from temperature, precipitation and the CO<sub>2</sub> concentrations and indirect effects through changes in soil moisture frequency of pest infestations and diseases caused by them (Intergovernmental Panel on Climate Change (IPCC), 2001). In the recent years it has been observed that in Maharashtra all the seasons have been extended by one month whether it is rainy season or winter or summer. Furthermore these seasons are not showing the average conditions rather in rainy season there will be high temperatures or once rain has started then there will be heavy rainfall or no rainfall. In summer there will be either rain or cool environment or extreme high temperature. All this is because of global warming. Maharashtra is expected to be most vulnerable state to climate change. The sericulture farms and plantation fully depend on rain and therefore they have been at the risk of vagaries of weather. Increasing temperatures and the climate changing patterns are of major concern for our sericulture industry jeopardizing

the livelihoods of more than two million people. The silkworms are vulnerable to variation in atmospheric temperature as the cocoon produced is mostly reared outdoors. The optimum temperature for rearing of silkworm ranges between 20°C to 28°C and desirable temperature for high productivity ranges between 23°C to 28°C. It requires 80 to 85% humidity level. Harsh climatic conditions are affecting silk production, which in turn affects its commercial production. High temperature i.e., temperature above 36°C and humidity above 90% influences all organic procedures and in turn affects the cocoon shell cover and the quality of silk thread obtained (Nagayasu, K., et al., 1986). The V<sup>th</sup> instar larvae at an early stage are more susceptible to high temperatures resulted in reduction in cocoon shell weight and cocoon weight that shows a high value of cocoon shell ratio. This help in identifying and producing the heat resistant silkworm races in extremely hot weather found in Maharashtra (Shirota, T., 1992). High temperature is one of the important factors causing environmental emphasis in the silkworm (Kato, M. et al., 1989).

#### **Silk production and livelihood of farmers**

Sericulture is an agro based labour intensive and export oriented cottage industry. It involves the rearing of silk producing organisms to obtain silk. It provides employment for the Indian women and men equally. India is the second largest producer of silk in the world. China, Brazil, India, Korea and Japan are foremost countries contributing for the raw silk production. All the activities are associated and inter-linked with one another such as plantation, maintenance to feed the silkworms, silkworm rearing to produce the silk cocoons, reeling, and yarn making, weaving and processing of fabric (Ahmed, S.A. and Rajan, R.K. 2011). Nearly 10 million silkworm rearers and 0.5 million industrial workers are present in the world (Seidavi, A., A. et al., 2005). In India the cultivation of silkworm rearing plantation is



spread over 22 States, covering 172000 hectares across 54000 villages operating 258000 handlooms and 29340 power looms (Dewangan S.K. et al., 2011a). It can provide employment to 11 persons per Kg of raw silk (Ramalaxmi, C.S., 2007). Tropical tasar silkworm, *Antheraea mylitta* is reared in most of the places in India along with Maharashtra. One of the place in Maharashtra is Central Tasar Research and Training Institute (CTR TI), Basic Seed Multiplication and Training Centre (BSMTC) Dawadipar, Bhandara which provides employment to most of the tribal and the people of that village for income generation.

Sericulture involves most of the natural resources and helps in the socio-economic upliftment of livelihood, employment and generation of income (Malik, M.S., et al., 2008). Sericulture thus is involved in raising the economic status of farmer community and also helps in earning foreign revenues (Thapa, R.B. and K.B. Shrestha, 1999). Sericulture is the only cash crop which provides frequent and attractive returns in the tropical states in the country throughout the year (Dewangan S.K. 2013). On the basis of following data it has been observed that the opportunities and employment in this sector is increasing day by day. During 1977-78 the people worked with sericulture farming was just 38.08 Lakh (Hanumappa, H.G., 1993), During 1990-91 60 Lakh people were engaged in Sericulture activity (Singhvi, N.R., et al., 1996), in 2009-10 this activity was increased to 68.17 Lakh persons (Ganie, N.A., et al., 2012). The average annual income per hectare was 40,000/- which has increased to an average income of 67296/-/hectare/year through sericulture farming (Dandin, S.B., 2008). According to the MNREGA (Mahatma Gandhi National Rural Employment Guaranty Act.) job card holder population must receive 100 days employment in a year where as sericulture provides 151- 200 days i.e., 63%. It was found that the annual income was doubled. Thus involves the

improvement of long term feasibility and a good output in adverse climatic conditions.

### Conclusion

High temperature results in decrease in the survival rate of the silkworm larvae and heat susceptibility increases with age. It has been observed that if the cocoon weight and cocoon shell weight is reduced markedly by the high temperatures, the cocoon shell ratio showed a high value. High temperatures thus affect the survival rate and cocoon character. The V<sup>th</sup> instar larvae at an early stage are more susceptible to high temperatures which help in identifying and producing the heat resistant silkworm races in extremely hot weather found in Maharashtra. This type of production of heat resistant silkworm races helps in getting a good value for cocoons during the hot weather conditions found in Maharashtra region and as a result the farmer is reaping a decent profit. Thus production of heat resistant varieties of silkworm has helped in the upliftment and development of the farmers of Maharashtra.

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## APMC ACT IN INDIA

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### Abstract

Presently, markets in agricultural products are regulated under the Agricultural Produce Market Committee (APMC) Act enacted by state government. There are about 2477 principal regulated markets based on geography and 4843 sub-market yards regulated by the respective APMCs in India. Effectively, India has not one, not 29 but thousands of agricultural markets. India need a national common market for agriculture commodities by making the agricultural produce market committees APMCs just one among many options available for the farmers to sell their products.

### Introduction

This Act notifies agricultural commodities produced in the region such as pulses, edible oilseed, fruits and vegetable and even chicken, goat, sheep, sugar, fish etc., and provides that first sale in these commodities can be conducted only under the aegis of the APMC through the commission agents licensed by the APMCs set up under the act.

The typical amenities available in or around the APMCs are: auction halls, weigh bridges, shops for retailers, canteens, roads, lights, drinking water, post-office, bore-wells, police station, warehouse, farmers amenity center, tanks, water treatment plant, soil-testing lab, toilets blocks, etc. Various taxes, fees/charges on the conducted this all are notified under the Act.

**Essential Commodities Act, 1955 vs APMC Act**

The scope of the Essential Commodities