

## Impact of high temperature on growth and development of Silkworm(*Bombyx mori* L.)

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In Sericulture several factors contribute in the growth and development of silkworm for the production of good quality cocoons in farmer field, such as biotic and abiotic factors is of vital importance. Among the abiotic factors, temperature play a major role on growth and productivity in silkworm, as the poikilothermic insect. To rear silkworms late age silkworm prefers relatively lower temperature than young age (Krishnaswami, 1994). Good quality cocoons are produced within a temperature. Increased temperature during silkworm rearing particularly in late instars accelerates larval growth and shortens the larval period. On the other hand, at low temperature, the growth is slow and larval period is prolonged (N. Suresh Kumar *et al.* 2003). The optimum temperature for normal growth of silkworms is between 20°C and 28°C and the desirable temperature for maximum productivity ranges from 23°C to 28°C. Temperature above 30°C directly affects the health of the worm. If the temperature is below 20°C all the physiological activities are retarded, especially in early instars worms become too weak and susceptible to various diseases (V. K. Rahmathulla, 2012).

Mubashar Hussain *et al.* (2011) found that the silkworm lines under stress humidity yielded low number of eggs even at standard rearing temperature (25±1°C). The variations in number of eggs occurred due to fluctuations of temperature and humidity and interaction with silkworm lines. The moths which were emerged from the larvae which were reared at standard condition showed better results for fecundity as compared to other combinations of temperature and relative humidity. Similarly, the performance of silkworm lines at different temperatures was observed i.e. lower numbers of eggs were produced at higher temperature and lower humidity level. Muhammad Naeem *et al.*, (2011) Analyzed silkworm larvae under natural conditions with little modification in the micro environment of the rearing rooms. This makes the larvae to strive for their survival against the stress environment depleting much of their energy resources in maintaining homeostasis ultimately influencing quantitative and qualitative traits adversely. It can be concluded that exposure of later age (4th and 5th instar) silkworm larvae to

variations in temperature and humidity (above  $25 \pm 1^\circ\text{C}$  and below 70% RH respectively) elicited low hatchability and pupation rate. The study also illustrated that higher larval mortality resulted when larvae were exposed to higher temperature (30 and  $35^\circ\text{C}$ ) and lower RH (55 and 65%). This implies that cocoon crops for seed purpose require optimum conditions of temperature and humidity during larval growth and development. N. Suresh Kumar and Harjeet Singh (2012) this study gives Unfavorable environment during rearing results in poor performance of parental lines. Exposure of seed cocoons to high temperature of  $35^\circ\text{C}$  in combination with low relative humidity results in decreased egg recovery and increased incidence of unfertilized eggs (Ayuzawa et al., 1972). The occurrence of unfertilized eggs was more common in summer as compared to other seasons (Biram et al., 2009). Larvae and cocoon exposures to  $35^\circ\text{C}$  or above results in poor performance of silkworm moths in relation to egg number and egg fertility and high temperature during rearing, cocooning, mating and oviposition induced unfertilized egg laying (Gowda, 1988). Rate of development and physiology of larvae may be influenced by high temperature which results in alteration in metabolism causing reduced egg yield, increased mortality and enhanced disease incidence due to the production of apyrene sperm which results in the production of unfertilized eggs. The apyrene production reduces at  $35^\circ\text{C}$  by 50% resulting in increased egg infertility.

finally output from silkworm mainly depends on favorable environmental conditions. During summer if the rearing temperature will fluctuate it directly affects the silkworm growth and development, mortality rate, pupation rate, egg fertility. At present condition there is a necessity of identifying temperature tolerance silkworm breeds.

## References

- Ayuzawa, C., Sekido, T.Y., Kazuhiro, Sakurai, Kurata,W., Yaginuma and Tokoro, Y., (1972.): Fecundity and fertility of silkworm under stress environment Agric. Tech. hand book of silkworm rearing, Fuzi Publishing Co. Ltd., Tokyo, Japan, pp. 225-235.
- Biram, S.N.M. and Gowda, P., (1987): Silkworm seed technology. In: Appropriate sericulture techniques (ed. M.S. Jolly). Central Silk Board, Bangalore, India, pp. 35-62.
- Biram, S.N.M., Tribuwan, S. and Beera, S., (2009): Occurrence of Unfertilized Eggs in the Mulberry Silkworm, *Bombyx mori* L. Universal Journal of Environmental Research and Technology 448 Kumar and Singh (Lepidoptera: Bombycidae). Int. J. indust. Ent., 18: 1-7.
- Krishnaswami S., (1994) A practical guide to mulberry silk cocoon production inTropics. Srramula Sericulture Consultants, Bangalore, India.
- Mubashar Hussain, Shakil Ahmad Khan, Muhammad Naeem and M. Farooq Nasir.,(2011) Effect of Rearing Temperature and Humidity on Fecundity and Fertility of Silkworm, *Bombyx mori* L. vol. 43(5), pp. 979-985.
- Muhammad Naeem, Mubashar Hussain, Shakil Ahmad Khan, Muhammad Farooq Bhatti and Muhammad Munawar., (2011) Studies on the influence of temperature and humidity on biological traits of silkworm (*Bombyx mori* L.; Bombycidae)



- N. Suresh Kumar and Harjeet Singh., 2012, Evaluation of the Reproductive Potential of Bivoltine Silkworm Hybrids of *Bombyx Mori L* under High Temperature and High Humidity and High Temperature and Low Humidity Conditions of the Tropics.
- N. Suresh Kumar, H. K Basavaraja, N.Mal Reddy and S. B.Dandin., (2003) Effect of High Temperature on F1 Hybrids Between Polyvoltine and Bivoltine Silkworm Races of *Bombyx mori L*.
- V. K. Rahmathulla, Management of Climatic Factors for Successful Silkworm (*Bombyx mori L.*) Crop and Higher Silk Production.

