World Academy of Science, Engineering and Technology
International Journal of Biological and Ecological Engineering
Vol:17, No:04, 2023

Cocoon Characterization of Sericigenous Insects in North-East India and Prospects

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Abstract : The North Eastern Region of India, with diverse climatic conditions and a wide range of ecological habitats, makes an ideal natural abode for a good number of silk-producing insects. Cocoon is the economically important life stage from where silk of economic importance is obtained. In recent years, silk-based biomaterials have gained considerable attention, which is dependent on the structure and properties of the silkworm cocoons as well as silk yarn. The present investigation deals with the morphological study of cocoons, including cocoon color, cocoon size, shell weight and shell ratio of eleven different species of silk insects collected from different regions of North East India. The Scanning Electron Microscopic study and X-ray photoelectron spectroscopy were performed to know the arrangement of silk threads in cocoons and the atomic elemental analysis, respectively. Further, collected cocoons were degummed and reeled/spun on a reeling machine or spinning wheel to know the filament length, linear density and tensile strength by using Universal Testing Machine. The study showed significant variation in terms of cocoon color, cocoon shape, cocoon weight and filament packaging. XPS analysis revealed the presence of elements (Mass %) C, N, O, Si and Ca in varying amounts. The wild cocoons showed the presence of Calcium oxalate crystals which makes the cocoons hard and needs further treatment to reel. In the present investigation, the highest percentage of strain (%) and toughness (g/den) were observed in Antheraea assamensis, which implies that the muga silk is a more compact packing of molecules. It is expected that this study will be the basis for further biomimetic studies to design and manufacture artificial fiber composites with novel morphologies and associated material properties.

Keywords : cocoon characterization, north-east India, prospects, silk characterization
Conference Title : ICAE 2023 : International Conference on Advances in Entomology
Conference Location : Rome, Italy
Conference Dates : April 13-14, 2023