

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM

PROJECT WORK REPORT ON

“DESIGN DEVELOPMENT AND PERFORMANCE EVALUATION OF THROUGH RECIRCULATION DRYER FOR MAXIMUM RECOVERY OF PUPAE OIL FROM PUPAE: A WASTE BY- PRODUCT OF SILK REELING OPERATIONS”.

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SYNOPSIS

The present study is an outcome of series of special articles on **State Silk Stories** appeared at **Times of India, Vijay Karnataka** periodicals, highlighting Socio-Economic and Technological needs of **Sericulture & Silk Industry**. Continuous fall in price and sharp increase in costs of raising of cocoons have resulted closure of sericulture and silk processing industry to brink of collapse in the state. In the present globalised scenerio, to make Sericulture and Silk competetive, modernisation and removal of obsolete items (MODROB) and inefficient practices along with simulteneous indetification of byproducts/wastes generated during processing of acivities and adoption of new processes/ devices which can add values to these byproducts are to be put in practice.

Pupae is choosen as it is considered as unwanted item and discarded along road sides of silk reeling centres. At present pupae generated is transported to far off open sites and left for sun drying. This type of disposal has resulted in frequent birds and stray attacks, unhygienic and unhealthy environments at pupae disposal sites and has triggered frequent protests by nearby affected public. As a result pupae management has become a burning issue for the local governing bodies.

Literature search has revealed that properly dried pupae offers multiple benefits like (i) enhanced shelf life and monetary value to pupae wastes (ii) high quality pupae oil, a good source for biodiesel activities (iii) pupae meal, a new souce of high quality proteins. Justification of present work, assesment of pupae generated, potentials of pupae drying etc are discussed. In the present work modest efforts are made to devise and demonstrate new devices and processes which can add shelf life and economic value to pupae wastes.

Properties of pupae collected from a nearby reeling unit obtained are reported. Limitations and drawbacks of present practice of conventioanl pupae sun drying are analysed and discussed. A through and recyclye (T & R) drying which meets the pupae drying needs is selected, designed, developed and demonstrated in the present work. Specifications of typical dryer employed for present studies are presented. Process variables like pupae bed height (Z), hot air flow rates (G), Recycle Ratio (R) which influence the through and recyclye

type of drying are presented, some of the variables studied and typical results obtained are presented. Results of typical batch drying tests of pupae carried out under prevailing conditions are reported and discussed. From batch drying test data, drying rates (N) and moisture contents (X) variations obtained are presented and discussed. Typical plots obtained are presented. Dried pupae product thus obtained is sealed in air tight plastic bags and stored.

The dried product is ground in a grinder and is subjected to solvent extraction. Details of grinding operations and extraction studies conducted are discussed. The physico-chemical properties of pupae oil obtained are presented. To study the effectiveness of through drying, extraction studies were carried out with sun dried and tray dried pupae samples. Typical results obtained are presented. Samples of pupae waste dried pupae product, pupae oil, pupae meal obtained are presented.

As the present work deals with technology validation and demonstration, scale up studies techno-economic assessments have not been carried out. A scaled up version of dryer developed and field demonstration at work site is planned and proposed.