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JUTE RESEARCH AND DEVELOPMENT (DEVELOPMENT AND PROMOTION OF DIVERSIFIED END-USES OF JUTE), INDIAN JUTE INDUSTRIES RESEARCH ASSOCIATION (IJIRA), CALCUTTA

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INDIA

Technical report: Second mission*

Prepared for the Government of India
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Pronoy K. Chatterjee,
expert in chemical softening of jute fibres

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Vienna

* This document has not been edited.

This mission took place from 13 December 1989 to 17 January 1990.

EXECUTIVE SUMMARY

The progress of work has been reviewed with respect to the initial recommendations*. Two mills were visited to plan the scale-up pilot plant work on softening and upgrading of jute. Based on the result of laboratory work and the economic considerations, the initial program has been prioritized as follows: Treatments with specified decomposable chemicals to effect the modification of lignocellulosic bonds, preparation and application of JBO based microemulsion, mechanical shearing for refining root ends with specialized equipment, microcrimping technology to impart elasticity and extensibility and the application of debonding agent to never dried jute fibers (if possible). In order to expand the utilization of jute in new market place, further considerations should be given to the following areas: Hydrophilic fibrous structure with jute as a component for disposable absorbent products, incorporation of superabsorbency in jute, primarily for specific geotextile usages.

A lecture was given on potential usage of jute in absorbent products at a seminar organized by Textile Institute (Manchester), Calcutta Section.

INTRODUCTION

The scientific and technological progress on various topics described in the previous report* was reviewed with Dr. S. R. Ranganathan, Director of IJIRA, Dr. A. K. Mukherjee, Head of Applied Chemistry Division of IJIRA and their staff scientists assigned to the project. Recommendations and planning for the future work have also been discussed as described in this report.

Two mills were visited along with Dr. A. K. Mukherjee; the New Central Jute Mill at Budge Budge and Reliance Jute Industries at Kankinara. The former, having good mini jute plant, is being used for intermediate process scale-up and the latter as a pilot plant for IJIRA-UNDP project is involved in full scale mill trials. At the pilot plant of Central Jute Mill a scale-up

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*Refer Report on First Mission, 22nd October through 19th November, 1988

trial was conducted on softening and upgrading using one of a series of selected chemicals.

During the past year the principal scientist assigned to the project spent three months on a training program in the United States which somewhat impeded the laboratory experimentations. However, the remainder of the year very perceptible progress has been made in certain specific areas which helped to channel the future direction.

As a special note, the writer has had a chance to briefly interact with the textile minister of Central Government of India, Jute Commissioner, Managing Directors of a few Jute mills and independent consultants. A presentation was also made by the writer at a special inauguration meeting of Textile Institute (Manchester), Calcutta section on a potential new usages of jute fiber through an emerging technology "absorbency".

The following is a slightly elaborate outline of the recommendations described in the executive summary.

RECOMMENDED TECHNOLOGIES

1. Decomposable Chemicals to Modify Lignocellulosic Bonds

   Among a list of chemicals attempted so far ammonium nitrite has been found to be the most promising one in softening the jute. It also changes the color to golden yellow. Laboratory experiments were repeated and the result was successfully reproduced at the new central Jute mill. Further exploratory and scale-up work is planned. This approach is recommended to expand with chemicals that are used to pretreat wood before defibration or pulping.

2. JBO Based Microemulsion

   Microemulsions, in general, are very stable and they would facilitate more effective plasticization of jute fiber. A list of selected locally available surfactants have been prepared and techniques of preparing microemulsions have been provided for immediate future work to develop a suitable JBO based microemulsion.

3. Mechanical Shearing for Softening Root Ends

   Refining and softening of hard root ends of jute could be achieved by passing them through the annular space between a cup and cone set-up, each rotating at a high speed in opposite direction. Such a mill could be easily fabricated in India. This concept has been commercially used by Honshu Company in Japan for defiberization of pulp board. For handling textile fibers appropriate modifications would be needed.

4. Application of Microcrimping Technology

Microcrimping, a new technology, applicable to fabric yarn or fibers, would impart additional quality to jute fibers or fabrics. Dr. A. K. Mukherjee has made the correspondence with an equipment manufacturer in U.S.A. Samples will be mailed soon for exploring the full potential of this technology.

5. Debonding Agent to Never Dried Jute Fibers

Once the jute fiber is dried it undergoes an irreversible change which contributes to the hardening of root ends. It is therefore recommended that a chemical treatment with debonding agent on specific surfactants be made prior to drying the jute, i.e., at the retting stage. However the practicality of such an approach must be evaluated first.

6. Hydrophilic Fibrous Structure with Jute

Jute fiber or jute in combination with other cellulosic fibers can be made hydrophilic with a modest research effort. Such a material can easily find its place in many disposable products. It would have potential economic advantage. A new project is recommended to develop this area.

7. Incorporation of Superabsorbency in Jute

Quite an extensive discussion has been held on how to impart superabsorbency to jute which will be beneficial to its application in many areas including geotextiles. Many simple and practical techniques have been discussed. It is recommended that further work be continued in this area.

FOLLOW-UP VISIT

Depending upon the progress of the work, the next visit could be scheduled either the end of this year or early next year.