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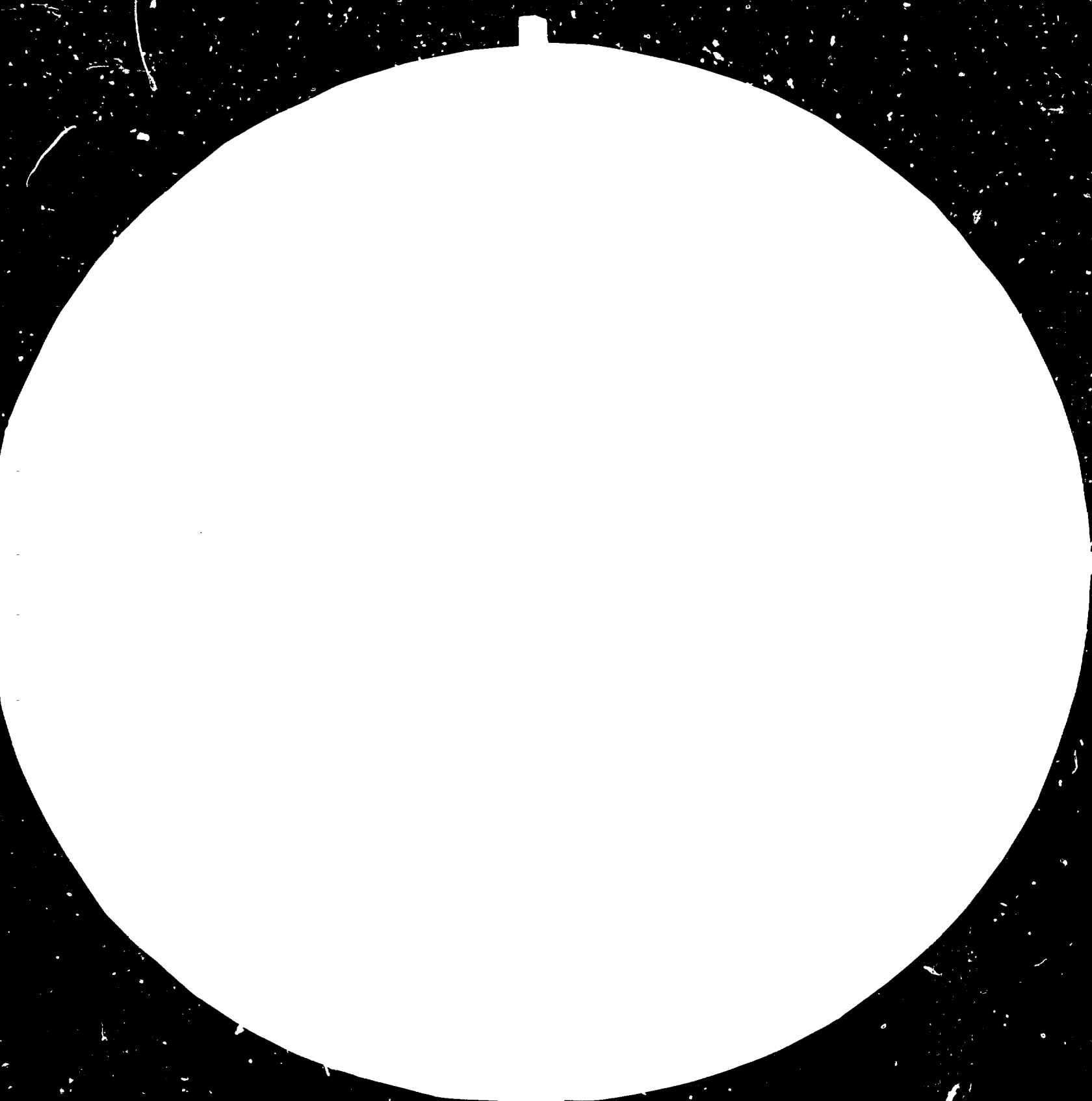
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13817

DP/ID/SER.A/510  
30 April 1984  
ENGLISH

JUTE PRODUCTS RESEARCH

DP/BGD/75/013

BANGLADESH.

Technical report: Spinning of Jute\*.

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

Based on the work of Boris N. Iliev  
Consultant in Textile Technology

United Nations Industrial Development Organization  
Vienna

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V.84-85391

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### Summary

Consultant on Textile Technology for the project DP/BGD/75/013/11-53/31.7.B Jute Products Research with the purpose of the project to assist the BJRI (TRW) to develop its physical and mechanical research programme in order to make an effective contribution to the technical problems of the jute manufacturing industry outlined the following main recommendations:

1. To the Government of the People's Republic of Bangladesh:

to develop rapidly the production of fine jute and jute type yarns and fabrics from them through extension of the current project and establishment of a new one which would have the purpose of providing the necessary guidance and assistance to the private and/or government jute manufacturing industry for accelerated implementation of the production of fine jute and jute type of products.

2. To the Management of BJRI (TRW):

to develop its Annual Research Programme giving preference to projects ordered or contracted by private or government jute mills and to projects for development of the technological methods for production of fine jute type yarns, blending jute with longer stapled natural and man-made fibres or filaments.

## 1. INTRODUCTION

### 1.1 Project background

In 1978 Jute Products Research Project Number DP/BGD/75/013 at the Technological Research Wing of the Bangladesh Jute Research Institute (BJRI, TRW) which comes within the United Nations Development Programme for Bangladesh, have been established. The project has the aim of providing assistance to develop the capability of BJRI (TRW) for technological research and development work related to the products of the jute manufacturing industry.

In implementation of this project six return visits of a Jute Technologist have been arranged to the Bangladesh Jute Research Institute (BJRI) and six Technical Reports dated December 1978, 1979, 1980, 1981, 1982 and 1983 have been submitted. As a result of three return visits of a Consultant on Dyeing and Finishing (Project DP/BGD/75/013/11-52) to the BJRI three Technical Reports dated February 1982, December 1982 and March 1984 have been submitted.

The Project Administrator has resided in Dhaka since taking his post in March 1979, and will continue to do so until the end of the project. He has assisted the Director of the BJRI (TRW) to implement the activities of the project, and has presented Progress Reports at six-monthly intervals, the latest report is dated March 1984.

In implementation of this project and realizing the recommendations of the Project Personnel laboratory equipment, spinning, weaving and finishing machinery have already been delivered to the Institute at a total cost of around 1.3 million U.S. dollars.

### 1.2 Official arrangements

The administrative details of the Project are as follows:

Title	: Jute Products Research
Number	: BGD/75/013/D/OI/3A
Date of Approval	: 19 September 1978

Starting Date

Estimated : May 1978  
Actual : October 1978  
Duration of Project : 2 years and six months  
First Revision : 4 years  
Second Revision : 6 years  
Third Revision : 6 years and 9 months  
Termination Date : March 1981  
First Revision : September 1982  
Second Revision : September 1984  
Third Revision : June 1985  
UNDP Input : 1,435,025 dollars  
Revision P : 2,927,212 dollars  
Revision Q : 3,045,311 dollars  
Executing Agency : UNIDO

In UNDP Project Document Number BGD/75/013/D/OI/37, titled Jute Products Research is specified that the project will require and make use of short term consultancy service in jute spinning and weaving technology where the Institute does not have the necessary competence to carry out the research and development work. On account of that Consultant in Textile Technology was appointed on 29 January 1984 and arrived in Dhaka on 1 February 1984 after one day briefing in Vienna. The mission lasted till the departing date from Dhaka on 12 April 1984.

The Consultant was attached to the BJRI (TRW) and worked in close contact with his counterpart Mr. S.A.K. Lodi, Chief, Mechanical Processing Division, BJRI.

The expert was supported by Dr. A.M. Bhuiyan, Director, BJRI Tech. Re. Wing (TRW) and by Mr. Conrado I. Diala, Project Administrator and also by Mr. Vicente C. Lavides, SIDFA, UNIDO, Dhaka.



### 1.3 Objectives of the mission

The object of the mission is assistancy to the BJRI (TRW) to develop its physical and mechanical research programme in order to make an effective contribution to the technical problems of the jute manufacturing industry. (Annex I)

## 2. Findings

### 2.1 Activities of the Consultant

During the mission the Consultant was able:

- 2.1.1 to study and analyse the organizational set-up, the Research Programme and the existing facilities of BJRI (TRW).
- 2.1.2 to visit several institutions and mills (Annex II).
- 2.1.3 to provide useful background information, on methods of assessing the physical characteristic of textile fibres especially in relation to the characteristics of yarns spun from them.
- 2.1.4 to offer guidance in drawing up work plans for appropriate research projects. (Annex III)
- 2.1.5 to demonstrate the applicability of part of the new technological methods, developed in Bulgaria, for spinning fine jute and jute type yarns tex 105 to tex 40 (count 3 to 1.3) and to demonstrate the applicability of these yarns for production of fabric for jeans suitings. (Annex IV).

As result of above activities some findings arose and they are stated below:

### 2.2 Organizational set-up of BJRI

The responsibility for carrying out technological research and development work for jute industry in the People's Republic of Bangladesh has been given to the BJRI. The Institute is located in Dhaka and administratively placed under the Ministry of Agriculture. Within the BJRI

there are three wings:

- Agricultural Research Wing
- Technological Research Wing
- Seed production and Development Wing

Each of the three wings has a Director, who is the Chief Officer. The implementation of this project is carried out in the BJRI (TRW) which has four research Divisions:

- Chemistry and Biochemistry
- Mechanical Processing
- Chemical Technology
- Physics and Testing

There are also Library and Workshop. Each division is divided into 2-3 Departments. The staff of BJRI (TRW) numbers 87 at present and includes 4 Chiefs of Division, together with 35 persons in the professional grades of Scientific officers or Technical officers.

Personal competent on both the theory and practice of jute mechanical and chemical technology are available in adequate numbers in all research divisions of BJRI (TRW).

Some administrative difficulties in implementation of the research achievements of BJRI (TRW) in jute and Textile industry, which are administratively placed under the Ministry of Industry, are observed and having in mind that the future development of jute industry will be in close connection with this of the Textile industry as whole conclusion may be drawn that the administrative place of BJRI (TRW) in the Ministry of Agriculture is not purposeful.

### 2.3 Research Programme of BJRI (TRW)

The research Programme of BJRI (TRW) is annual and for 1984 is still in draft. The form of the present Research Programme have been designed in 1981 and normally include 10 unchanged objectives each one

devided in 2 to 8 projects.

Initially designed Objectives are very ambitious and the individual research projects grouped under them, are developing year by year, with increasing orientation to the development of improved jute products, and to the technical improvement of the manufacturing processes of jute spinning and weaving.

The objectives and the individual projects are quite excessive on number (35 for 1984) and the scientific Officers, can not be able to execute them successfully and in sufficiently short time. It appears to be one of the main reasons, that a great number of projects are repeated year by year in the Annual Programmes and no one research result to be implemented in jute manufacturing industry.

In its present form, the Research Programme is lacking in several common characteristics of such programmes:

- the time limits
- the intended or agreed consumer of the results of the project
- the required funds
- the expected outputs of the project.

#### 2.4 Trial Production Facilities of BJRI (TRW)

BJRI (TRW) has a complete pilot mill with spinning, weaving and finishing departments. Fully equiped physical and chemical testing laboratories are available for any analytical work that may be required. BJRI (TRW) has adequate support facilities such as a well-stocked library, a central workshop and specialists in various technologies related to textile manufacture.

##### 2.4.1. Spinning facilities

The available equipment is generally adequate at the present time and the expected delivery of two drawing frames will complement

the existing conventional spinning facilities exceeding in capability the equipment available on the jute manufacturing industry. However, even with these implements, the production range remains conventional and limited to the spinning of jute yarns with maximum of tex 200. These yarns are used mainly for the production of packing materials, carpet backing cloth and other coarse fabrics.

In Jute Technologist's Technical Report dated December 1982 (Section 5) is stated "at the commencement of the Project research, into fine yarns, that is low count yarns, and the factors which determine how low a count can be spun, was thought desirable as this is a relatively unexplored area. At the time, however, suitable machinery for this purpose was not immediately identifiable, and procurement was left in obedience until such time as positive identification could be made".

It seems that the author of the above have been unaware of the fact that in Europe and particularly in Bulgaria technological methods have been already developed and patented for the production of production of fine jute and jute type yarns.

Jute fibres are similar in properties to flax fibres and possess high hygroscopicity, moisture regain and release, which are properties, determining the comfort in wearing the apparels. High quality jute fibres have natural lustre which gives an attractive appearance to articles made of them. These properties are not utilised when using jute fibres for production of articles for packing and technical purposes as well as for carpet backing cloth.

The new technological methods give possibility for producing yarns with thickness of 165 tex to 30 tex and finer. This enables the production of such new jute products as: furnishing fabrics, curtains, tablecloths, napkins, kitchen towels, dishcloths, bedlinen and fabric for summer suites, coats, skirts, shirts and so forth, where the specific properties of jute can be utilised with advantage.

By shortening jute fibres up to specified lengths, mixing the jute with other natural fibres like flax, wool, cotton, or with

man-made fibres and using a combination of machines in various spinning systems, fine jute and jute type yarns with a definite flax character on appearance and properties, can be obtained. Jute fibres processed on these way can substitute the more expensive natural (flax, wool, cotton) and man-made fibres.

The implementation of the newly developed technological methods in BJRI (TRW) respectively in jute manufacturing industry of Bangladesh is strongly desirable. However, the existing facilities in the spinning department of BJRI (TRW) are inadequate for the introduction of the new technologies.

Realising the above necessity it would be advantageous new inputs of equipment or know-how, and revision of date of termination of the project to be envisaged, or it might be appropriate to implement a new project, which would have the purpose of developing the new technological methods in BJRI (TRW), or directly in the jute manufacturing industry.

The two Drawing Frames, one incorporating an auto-leveler, which are expected in mid-1984 will form the basic link in a pilot line for trial production of fine blended jute yarns. Additional machines which may complete the Pilot line are as follows:

- 1) Cutting machine
- 2) Card for flax type man-made fibres
- 3) Comb machine for flax (or wool) fibres
- 4) Roving frame with frictional twisting
- 5) Ring spinning frame for woollen type fibres.

The total cost of the above equipment is not likely<sup>to</sup> exceed 400000 dollars.

#### 2.4.2 Weaving facilities

The weaving department is equipped with one Sectional Warping Machine, one Cone Winding Machine, one Gripper Loom and three Hand Looms.

The workers and the technical officers are skilled and competent. The existing facilities are sufficient for trial production of different kinds of fabrics with doubled yarns as warp, however, undoubled yarns can not be processed as warp due to the lack of Beamer and Sizing mach ne.

2.5 Demonstration of trial production of fine jute yarns and fabrics at BJRI (TRW)

After studying the existing equipment in BJRI (TRW) and in the visited textile mills, as well as the available raw materials and textile products, the consultant was able to carry out demonstrations of production of fine yarns and fabrics in the conditions of BJRI (TRW). The types of fine jute yarns were produced.

2.5.1 Yarn tex 70 (count 2) with fibres blend of 50% jute, 35% PAN and 15% wool ..).

Jute grade Bangladesh white C (BWC) and imported sliver with 70% polyacrylonitrile (PAN) fibres, and 30% wool fibres were used for production of this yarn. Initially the mixing of the jute sliver with linear density 20 g/m, processed on the existing machinery in the spinning department of BJRI (TRW), together with a PAN/W sliver with linear density 20 g/m, was done on high speed Drawing Frame in Valika Woolen Mills Ltd., Nasirabad, Chittagong during the visit of the mill. Additional doubling and drafting was performed on the Drawing Machines in BJRI (TRW).

The yarn was spun on Apron draft Spinning Frame with the maximum drawability 18 and twistability 320 twist per meter.

The produced yarn is with relatively small strength and high irregularity in strength and thickness, due to the fact, that with the existing spinning equipment the necessary cleaning, parallelising and blending of the fibres can not be achieved. In addition, the maximum number of twist 320 t/m, which can be obtained with the Apron draft spinning frame is insufficient.

Man-made fibres of woolen of flax type which are necessary for blending with jute fibres, are not manufactured in Bangladesh. In

case that the trial production facilities in BJRI (TRW) would be completed with the necessary machinery as stated above in paragraph 2.4.1, for the realisation of trial production of fine jute blended yarns on a larger scale would be necessary to have in BJRI (TRW) sufficient stock of Polyester, (PE), PAN and Rayon fibres woolen and/or flax type.

2.5.2. Yarns tex 100 to tex 40 (count 3 to 1.3) reinforced type with 50 ± 80% of jute.

Jute grade Bangladesh white B (BWB) processed in conventional jute technology as a sliver with respective linear density was blended and twisted with PE components on apron draft spinning frame.

The consultant was able to obtain from the third drawing frame jute sliver with linear density 0.6g/m suitable for spinning yarns with linear density tex 58 to tex 50. Slivers with lower linear density were obtained and used for spinning finer yarns, but the difficulties in processing of the jute slivers at that drawing frame and at the apron draft spinning frame are not acceptable. The produced yarns possess relatively high strength (15-18 CN/tex), but with high irregularity on thickness and lower resistance at rubbing (easily to be strapped). The reasons here are:

- the insufficient number of twists 320 t/m, instead the required minimum of 400 t/m.
- inappropriate pretreatment of the jute fibres.

2.5.3. Trial production of fabrics

Jute yarn reinforced type tex 58 and tex 50 with 60% jute and 40% PE was used as a weft for weaving fabrics on a hand loom and on the gripper loom in BJRI (TRW).

The obtained fabrics (annex IV) consists approximately 30% jute, 20% PE and 50% cotton are suitable for jeans type shirts and trousers.

2.6. Visits

During the mission visits were made to Bangladesh Jute Mills Corporation, coordinating the management of government owned jute mills and in addition to the Bangladesh Jute Mills Association representing private jute mills. At the two places the consultant presented an oral description at the recent developments of the jute technology in Europe and particularly in Bulgaria. The consultant also informed them about the recent trial production results at BJRI (TRW). As a result, both managements become eager to implement the new technological methods in the jute industry with the help of a new UNDP/UNIDO project.

The consultant visited also two scientific institutions and seventeen textile mills located in Chittagong, Dhaka and its suburbs, which are stated in Annex II.

In Bangladesh Council of Scientific and Industrial Research (BCSIR) the consultant was glad to find that an ambitious research team implement the technological method for production of fine jute type yarns blending jute with cotton or cotton type of man-made fibres. This method has been developed also in Europe and is one of the right ways for better utilisation of the jute fibres and their penetration in the cotton textile industry. Since the BCSIR objective is development of blended yarns from jute and cotton type man-made fibres, the main objective of the BJRI (TRW) ought to be blended yarns from jute and longer stapled natural or man-made fibres, which is more advantageous area, where the specific properties of the jute fibres may get best utilization.



3. Recommendations

A) To the Government

- 3.1 It is of great national interest for the People's Republic of Bangladesh, as the largest producer of jute in the world, to develop rapidly the production of fine jute and jute type yarns and fabrics from them. This development probably will double the currently engaged work force in the jute industry and will increase considerably the income from jute export. For achieving this target, it will be desirable:
- 3.2 To ensure sufficient support in the Third Five Year Plan 1985-90, for the accelerated development of the private and government jute manufacturing industry.
- 3.3 To propose extension of the current project, until BJRI (TRW) has fully completed its trial production facilities for the development of new jute products on the basis of fine jute and jute type yarns.
- 3.4 To request UNDP/UNIDO to establish a new project which would have the purpose of providing the necessary guidance and assistance to the private and/or government jute manufacturing industry for accelerated implementation of the production of fine jute and jute type products.
- 3.5 To place the BJRI (TRW) as a separate Research institute under the administrative management of the Ministry of Industry.

B) Recommendation to the Management of BJRI (TRW)

- 3.6 It is desirable the Annual Research Programme to be developed in such a manner, that the purposefulness and the orientation of the projects will be more responsive to the needs of the jute manufacturing industry.
- 3.7 It is advisable to give preference in the Annual Research Programme to projects ordered or contracted by private or government jute mills.
- 3.8 Specialists of the jute or textile manufacturing industry ought to be members of the research teams.

3.9 The implementation of a detailed work plan for realisation of product development product development projects, suggested by the Consultant, as given in Annex III, is advisable.

3.10 Since the BCSIR objective is development of Juton technology, the main objective of BJRI (TRW) ought to be "Development of the technological methods for production of fine jute type yarns, blending jute with longer stapled natural and man-made fibres or filaments".

Annex - I

JOB DESCRIPTION  
DP/BGD/75/013/11-53/31.7.B

Post title : Consultant in Textile Technology (spinning research fibre characteristics and their relation to spinning)

Duration : 2 months and 20 days

Date required : As soon as possible

Duty Station : Dhaka

Purpose of project : To assist the Bangladesh Jute Research Institute BJRI (TRW) to develop its physical and mechanical research programme in order to make an effective contribution to the technical problems of the jute manufacturing industry.

Duties : The consultant will specifically be expected to:

1. Provide background information on methods and techniques of assising the physical characteristics of yarns spun from them on different spinning systems;
2. Conduct small seminars to discuss the application of this information to the study of jute fibres and jute spinning systems;
3. Offer guidance in drawing up work plans for appropriate research projects.

The consultant will also be expected to prepare a final report, setting out the findings of the mission and recommendations to the Government on further action which might be taken.

Qualifications : Textile Technologist, with long experience in research and development work on the spinning of natural fibres on various spinning systems.

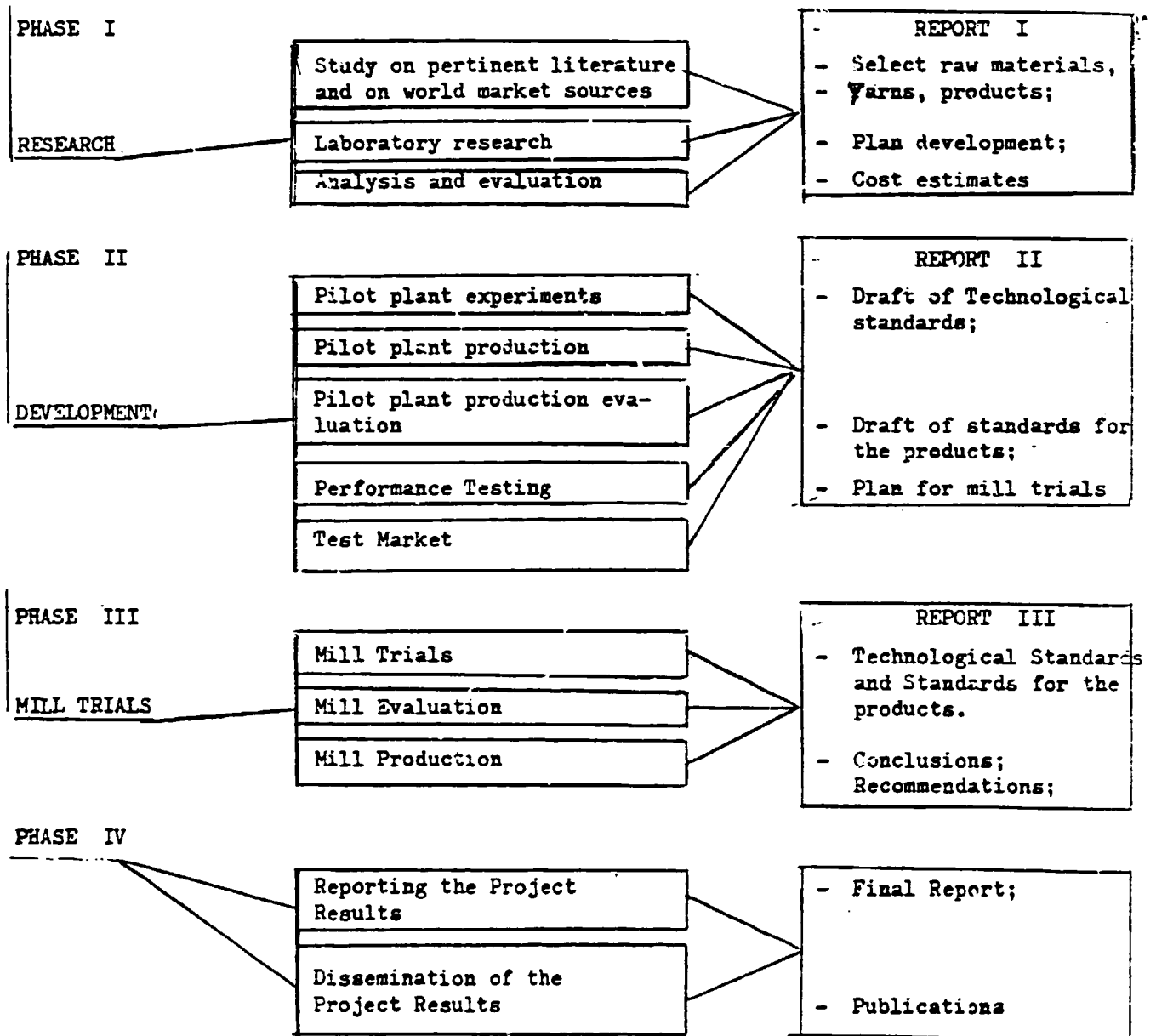
Annex II

List of the Visits

1. Bangladesh Jute Mills Corporation - Dhaka
2. Bangladesh Jute Mills Association - Dhaka
3. Bangladesh Council of Scientific and Industrial Research - Dhaka
4. College of Textile Technology - Dhaka
5. Ahmed Specialized Textile Mills Ltd., - Dhaka
6. Ahmed Fabrics Ltd. - Dhaka
7. Syntex Finishing Mills Ltd. - Dhaka
8. Narayangang Jute Fibre (B.D) - Narayangang
9. Ahmed Jutex Mills Ltd. - Narayanganj
10. Sarwar Jute Mills Ltd. - Narayanganj
11. Kerim Jute Mills - Dhaka
12. Kwality Jute Mills. Ltd., - Feni
13. Amin Jute & Carpet Mills, Sholoshahar, Chittagong
14. Baghdad-Dhaka Carpet Factory, North Kattali, Chittagong
15. Valika Woolen Mills Ltd., Nasirabad, Chittagong
16. Chittagong Textile Mills Ltd., North Kattali, Chittagong
17. Furat Karnaphuli Carpet Factory, Rangunia, Chittagong
18. Karnaphuli Jute Mills, Rangunia, Chittagong
19. Chittagong Jute Manufacturing Co. Ltd., Kalurghat, Chittagong
20. Pylon Industries, Chittagong

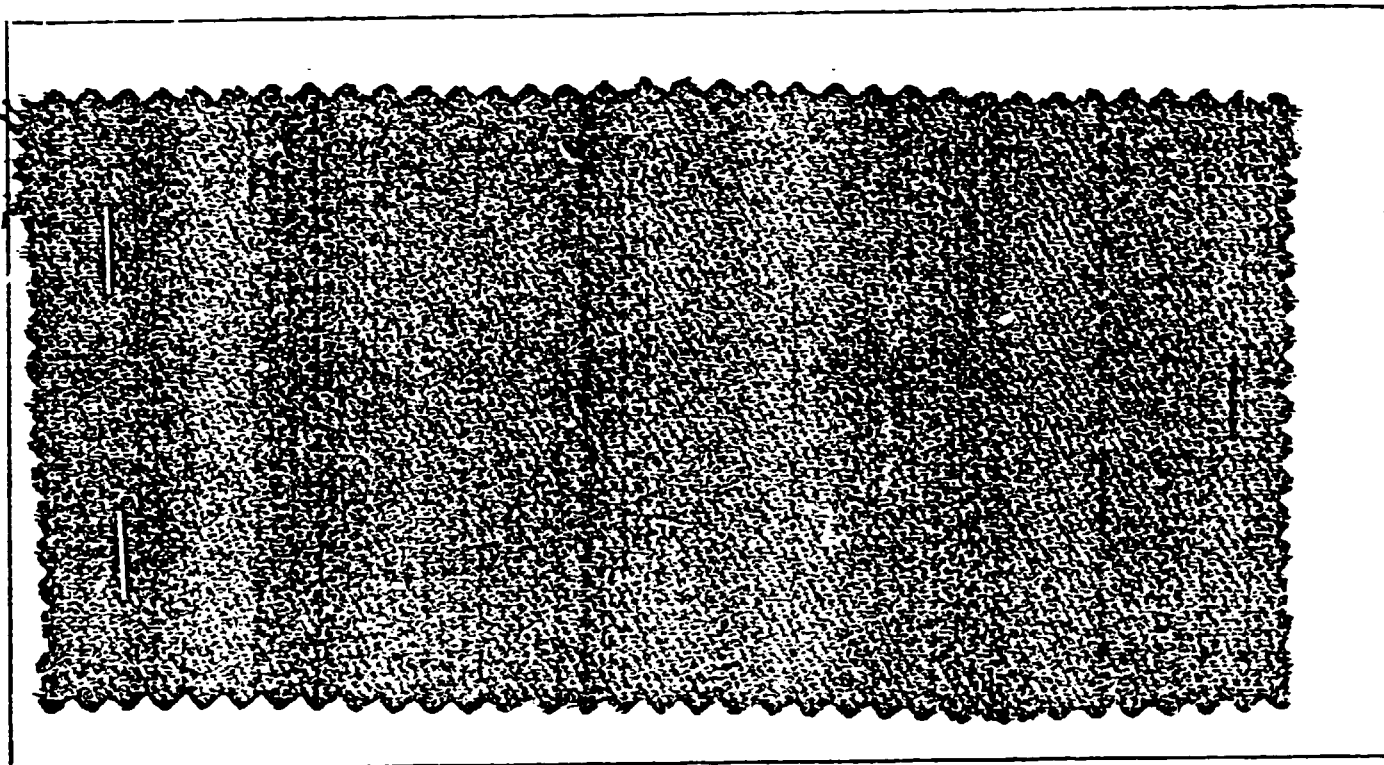
Annex III

Work Plan for realization of product development projects

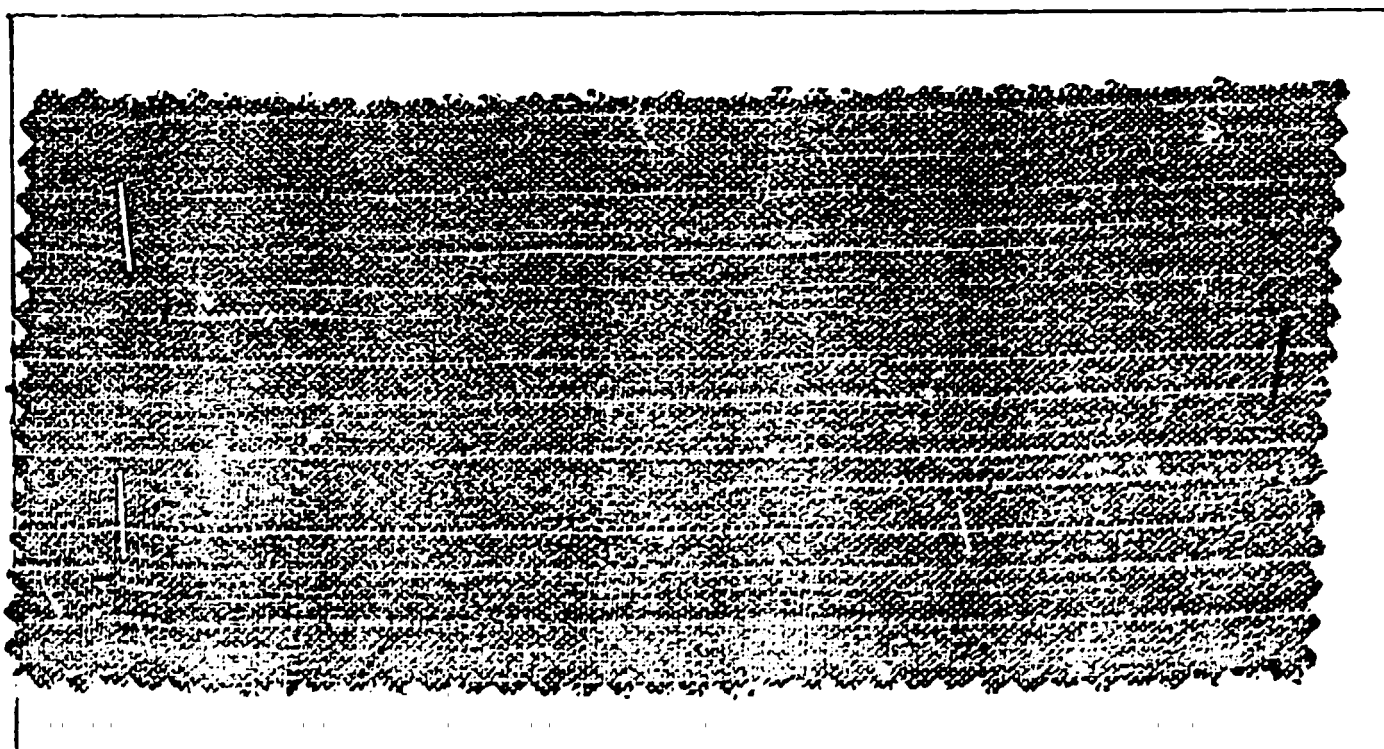


SAMPLES - 1

Jeans fabric 260 g/m<sup>2</sup>, 30% Jute, 20% PE, 50%C

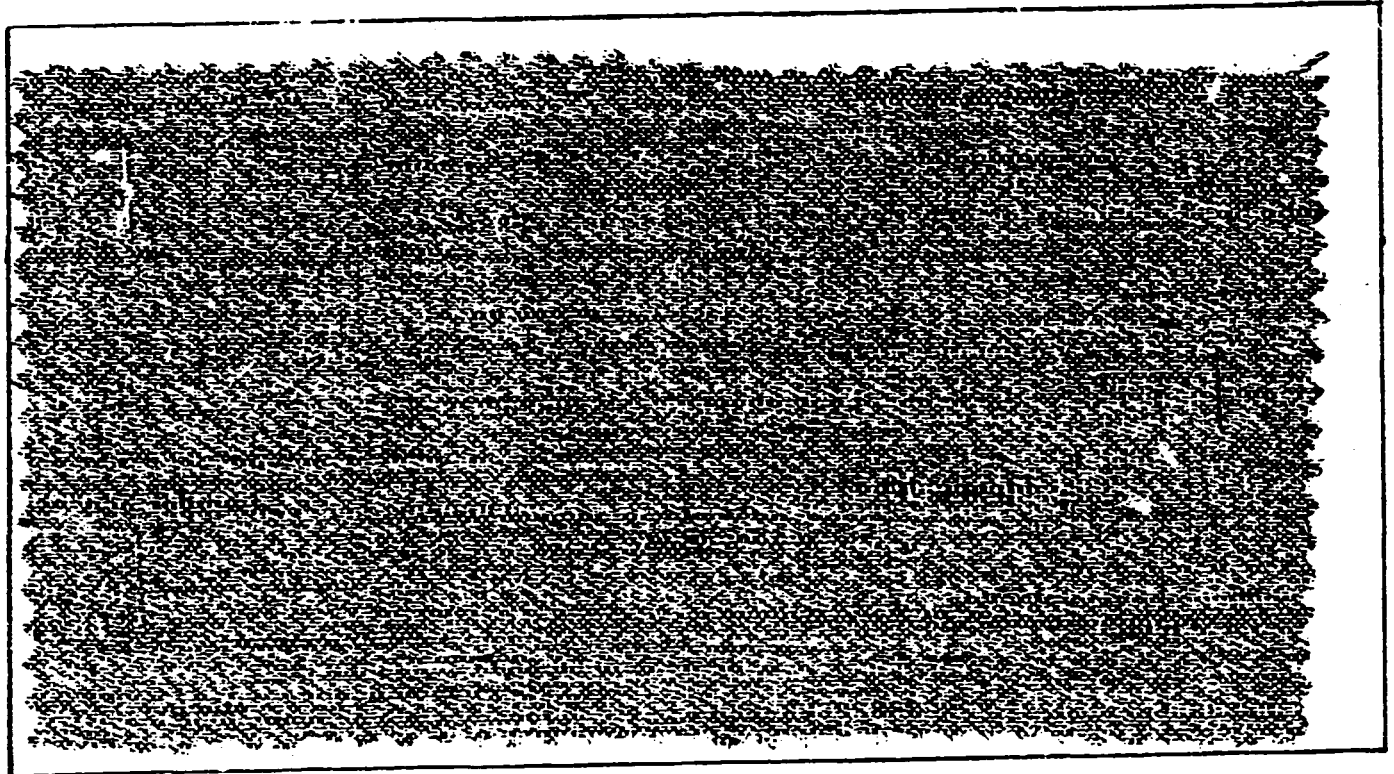


Jeans fabric 225 g/m<sup>2</sup>, 40% Jute, 20% PE, 40% C



SAMPLES - 2

Dyed fabric 190 g/m<sup>2</sup>, 40% Jute, 60% PE



Bleached fabric 190 g/m<sup>2</sup>, 40% Jute, 60% PE

