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国际黄麻组织



INTERNATIONAL JUTE ORGANISATION
ORGANISATION INTERNATIONALE DU JUTE

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CABLE : IJAYO, DHAKA

REFERENCE : IJO/350

18 December 1994

Sub: Project US/GLO/89/104 - "Regional Seminar on 'New Applications of Jute', jointly organised by IJO, and UNIDO/ICS", 5-6 December 1994, Dhaka, Bangladesh -
UNIDO CONTRACT NO. 73/107.

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Dear Prof. Graziani,

C 94/104

I am very glad to inform you that the above regional seminar on 'New Applications of Jute', jointly organised by IJO/UNIDO-ICS at Dhaka went off well, on the lines of the letter faxed to you (IJO/350 dated 24 October 1994) by Dr. S.R. Ranganathan, Consultant (Industry), IJO and also personal discussion you had with Dr. Ranganathan during his subsequent visit to Trieste in the first week of November 1994.

Programme Details

I enclose herewith a copy of the final programme (Encl: I) from which it could be seen that 12 invited papers were presented at this seminar by leading professional experts from Bangladesh, China, India, Singapore, Thailand and the United Kingdom.

Chief Guests

The seminar was inaugurated on 5th December 1994 by H.E. Mr. A.M. Zahiruddin Khan, Minister for Industries, Govt. of Bangladesh while the Chief Guest of the concluding session, on 6th December 1994, was H.E. Brig (retd.) A.S.M. Hannan Shah, Minister for Jute, Govt. of Bangladesh.

Participants

The number of invited participants who registered at this seminar was 71, excluding journalists, T.V. Media personnel and some senior staff of the Bangladesh Management Development Centre. The list of participants are given in Encl: II. You may see from the list of participants that delegates from Bangladesh; China; Egypt; India; Pakistan; Thailand; United Kingdom and officials from European Commission, Dhaka; Indian High Commission, Dhaka; and Indonesian Embassy, Dhaka attended the Seminar.

Documentations and Circulation of Papers

Eleven of the twelve papers presented were received well in advance and their copies were circulated to all participants at the first technical session on the morning of the 5th December 1994. In the address by Dr. S.R. Ranganathan, Consultant (Industry), IJO at the inaugural session, an overview of the four technical sessions i.e. (i) Jute Geotextiles; (ii) Jute composites and jute nonwovens; (iii) Jute based pulp and paper; and (iv) Jute based fabrics, soft luggage and decoratives - was presented (Encl: III).



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Six Sessions of the Seminar

Mr. G.L. Narsimhan, Country Director, UNIDO, Bangladesh, chaired the inaugural session and chairman for the four technical sessions were similarly carefully chosen in relation to the relevance of the subject of the session. The concluding session was chaired by me for summing up the two days seminar. At the concluding session, the recommendations of the seminar, session-wise, was presented by the session chairman/Dr. S.R. Ranganathan. There was considerable interest among the participants during the discussions since adequate time for the purpose was provided - both for presentation of papers and for the discussions of each paper as per details in the programme (Encl:I). All the papers and discussions thereof were of high professional quality and many suggestions for similar programmes were made at this well attended and well covered (Bangladesh Television and newspapers) seminar.

Despatch of the Documentation and Financial Details

The documentation has been compiled, as mentioned, for 11 of the 12 papers. The 12th paper by Dr. T.K. Guha Roy, Indian Jute Industries Research Association, India, was presented through slides but a written copy of the text of the paper has been requested for, on receipt of which the full documentation will be couriered to you separately.

Regarding financial matters all payments including air fare, honorarium and DSA have been settled for the authors from the advance of US\$5,600. Other bills have been collected and will be forwarded to you shortly after compilation and tabulation as required under the terms of the UNIDO contract and these bills have to be quickly settled from the release of the balance of US\$2,400/- from UNIDO.

I look forward to hearing from you soon.

Thanking you and with kind regards,

Encl: I, II and III as above

Prof. M. Graziani
ICS Training Coordinator
UNIDO/ICS Trieste,
FAX: 3940-224575

Yours sincerely,


(K.M. Rabbani)
Executive Director

- cc: 1. Mr. V. Koloskov
Contract Officer
UNIDO, Vienna, Austria
Fax: 43-1-2308272/2307355
2. Ms. Michela Dario
Secretariat of the ICS Seminar
of Jute, Via Grignano 9,
34014 Trieste, Italy
Fax: 39-40-224575
3. Dr. S.R. Ranganathan
Consultant (Industry)
IJO, Dhaka

Encl: 1

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**"REGIONAL SEMINAR ON NEW APPLICATIONS OF JUTE"
JOINTLY ORGANISED BY IJO AND UNIDO/ICS
5-6 DECEMBER 1994
VENUE: BMDC AUDITORIUM, 4 SOBHAN BAG
MIRPUR ROAD, DHAKA-1207**

PROGRAMME**INAUGURAL SESSION 5TH DECEMBER 1994****CHAIRMAN : MR. G.L.NARASIMHAN, UNIDO COUNTRY DIRECTOR, BANGLADESH**

08:30 REGISTRATION
09:00 ARRIVAL OF CHIEF GUEST - H.E. MR. A.M. ZAHIRUDDIN KHAN,
HON'BLE MINISTER FOR INDUSTRIES, GOVT. OF BANGLADESH
09:05 WELCOME ADDRESS: MR. K.M. RABBANI, EXECUTIVE DIRECTOR, IJO
09:15 ADDRESS BY DR. S.R.RANGANATHAN, CONSULTANT (INDUSTRY), IJO
09:35 INAUGURAL ADDRESS BY THE CHIEF GUEST
09:50 CHAIRMAN'S CONCLUDING REMARKS
10:00 TEA.

TECHNICAL SESSIONS 5TH DECEMBER 1994**SESSION - I : JUTE GEOTEXTILES****CHAIRMAN: MR. S.M. APAZUDDIN, ADDITIONAL SECRETARY, MINISTRY OF
WATER RESOURCES, GOVT. OF BANGLADESH**

11:00 JUTE GEOTEXTILE SOLUTIONS FOR SURFACE AND SUBSURFACE
DRAINAGE - DR. S.D. RAMASWAMY, CONSULTANT, SINGAPORE
11:25 DISCUSSION
11:45 JUTE GEOTEXTILES AND THEIR SOIL EROSION CONTROL AND
STABILISATION MECHANISM - DR. A.B.M. ABDULLAH,
M/S. M.H. RAHMAN, M. KAMALUDDIN AND N.N. KHAN, BANGLADESH
JUTE RESEARCH INSTITUTE, BANGLADESH
12:00 INTEGRATED JUTE GEOTEXTILE REINFORCED EARTH STRUCTURES DESIGN
DR. M.Z. PRODHAN, ARCADIA PROPERTY DEVELOPMENT LTD., BANGLADESH
12:15 DISCUSSION
12:35 CHAIRMAN'S REMARKS
12:45 LUNCH

SESSION - II : JUTE COMPOSITES AND JUTE NONWOVENS**CHAIRMAN: DR. S.R. RANGANATHAN, CONSULTANT (INDUSTRY), IJO**

14:00 JUTE BASED POLYMER COMPOSITES
DR. N.L. HANCOX AND DR. R. DAVIDSON, AEA-TECHNOLOGY, UK
14:25 DISCUSSION
14:45 JUTE COMPOSITES FOR PACKAGING
MR. K.B. GUPTA, INDIAN INSTITUTE OF PACKAGING, INDIA
15:10 DISCUSSION
15:30 MANUFACTURE & POSSIBLE USES OF NONWOVEN JUTE - MR. A.S.M.
SHAHID, BANGLADESH JUTE MILLS CORPORATION, BANGLADESH
15:55 DISCUSSION
16:15 CHAIRMAN'S REMARKS
16:25 TEA

IJO - INTERNATIONAL JUTE ORGANISATION
UNIDO - UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
ICS - INTERNATIONAL CENTRE FOR SCIENCE AND HIGH TECHNOLOGY

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TECHNICAL SESSIONS (CONTINUED) 6TH DECEMBER 1994SESSION - III : JUTE BASED PULP AND PAPER

CHAIRMAN: MR. A.H.M. ABDUL HYE, SECRETARY, MINISTRY OF INDUSTRIES
GOVERNMENT OF BANGLADESH

- 09:00 PULP AND PAPER MANUFACTURING FROM GREEN JUTE
DR. AZIZUR RAHMAN, BANGLADESH CHEMICAL INDUSTRIES
CORPORATION, BANGLADESH
- 09:25 DISCUSSION
- 09:45 PROBLEMS AND PROSPECTS OF PULP AND PAPER MANUFACTURE
FROM KENAF
MR. S.K.MITTAL AND MR. SUBHASH MAHESHWARI, PHOENIX PULP
AND PAPER PUBLIC CO. LTD., THAILAND
- 10:10 DISCUSSION
- 10:25 CHAIRMAN'S REMARKS
- 10:35 TEA

SESSION - IV : FABRICS, SOFT LUGGAGE AND DECORATIVES

CHAIRMAN: MR. A.Z.M. NASIRUDDIN, SECRETARY, MINISTRY OF JUTE,
GOVERNMENT OF BANGLADESH

- 10:45 A STEP TOWARDS DIVERSIFICATION - FABRICS, SOFT LUGGAGE,
DECORATIVES
MR. S. PALIT, INDIAN JUTE INDUSTRIES RESEARCH ASSOCIATION,
INDIA.
- 11:05 DISCUSSION
- 11:15 NEW APPLICATION OF JUTE - START UP IN CHINA
M/S. XIE ZHENGYUAN, FANG TAISHENG, MA CUIHONG & JIN QINGSU
CHINA ZHEJIANG JUTE RESEARCH INSTITUTE, CHINA
- 11:30 DISCUSSION
- 11:40 CHEMICAL PROCESSING OF JUTE FOR DIVERSIFIED PRODUCTS IN
THE COTTAGE INDUSTRY AND JUTE MILL
DR. T.K. GUHA ROY, INDIAN JUTE INDUSTRIES RESEARCH
ASSOCIATION, INDIA
- 11:55 DISCUSSION
- 12:05 COMMERCIAL PROCESS DEVELOPMENT FOR BLEACHING & SOFTENING
OF JUTE
DR. MD. NURUL AMIN, BANGLADESH JUTE RESEARCH INSTITUTE,
BANGLADESH
- 12:20 DISCUSSION
- 12:35 CHAIRMAN'S REMARKS
- 12:45 LUNCH

CONCLUDING SESSION:

- CHAIRMAN: MR. K.M. RABRANI, EXECUTIVE DIRECTOR, IJO
- 14:45 ARRIVAL OF CHIEF GUEST: H.E. BRIG (RETD) A.S.M. HANNAN SHAH,
HON'BLE MINISTER FOR JUTE, GOVERNMENT OF BANGLADESH, DHAKA
- 15:00 WELCOME: DR. S.R. RANGANATHAN, CONSULTANT (INDUSTRY), IJO
- 15:10 PRESENTATION OF RECOMMENDATIONS OF THE SEMINAR BY THE
CHAIRMAN OF THE TECHNICAL SESSIONS
- 15:45 ADDRESS BY THE CHIEF GUEST
- 15:55 CONCLUDING REMARKS BY CHAIRMAN OF THE SESSION
- 16:00 TEA

Encl: II

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**REGIONAL SEMINAR ON NEW APPLICATIONS OF JUTE
JOINTLY ORGANISED BY IJO AND UNIDO/ICS
5-6 DECEMBER 1994, DHAKA, BANGLADESH**

LIST OF PARTICIPANTS

Name	Designation	*Organisation/ Country	Remarks
1. H.E. Mr. A.M. Zahiruddin Khan	Minister for Industries Govt. of Bangladesh		Chief Guest Inaugural Session
2. H.E. Birg (retd) A.S.M. Hannan Shah	Minister for Jute Govt. of Bangladesh		Chief Guest Concluding Session
3. Mr. Kamran T. Rahman	Member, E. Committee	BJMA, Bangladesh	
4. Mr. A.M.R. Chowdhury	Director, Marketing	BJMC, Bangladesh	
5. Mr. Shabbir Yusuf	Chairman	BJSA, Bangladesh	
6. Mr. M. Islam Khan	Vice-Chairman	BJSA, Bangladesh	
7. Mr. M. Abdullah	Head, Firm Mechanical	BARI, Bangladesh	
8. Mr. M.A. Matin		BCIC, Bangladesh	
9. Mr. M. Hoque		BCIC, Bangladesh	
10. Mr. S. S. Hossain	Sperintended Engineer	WDB, Bangladesh	
11. Mr. M.A. Sattar	Member (P)	WDB, Bangladesh	
12. Mr. S. Ahmed		WDB, Bangladesh	
13. Mr. N. Alam	Chief Engineer,	WDB, Bangladesh	
14. Mr. M.H. Rahman	Sr. Scientific Officer	BJRI, Bangladesh	
15. Mr. A.P.M. Rabbi	Chairman	FJML, Bangladesh	
16. Mr. H. Mazhar	Director	PCG, Pakistan	
17. Mr. S.Z.A. Eida	Manager (R&D)	PCJP, Pakistan	
18. Eng. N.F. Elbarnashawy		GJPC, Egypt	
19. Mr. S. Islam		BJMA, Bangladesh	
20. Ms. Salma Khan	Director General	BHDC, Bangladesh	
21. Mr. A.B.M. Shamsuddin	Management Councillor	BHDC, Bangladesh	
22. Mr. M.A. Ashraf	Programme Officer	FAO, Bangladesh	
23. Mr. Z.H. Razi	Econ. & Info. Officer	European Commission, Dhaka	
24. Dr. M. Waliuzzaman	Chairman	BCSIR, Bangladesh	
25. Dr. M. Hanif	Scientist	BCSIR, Bangladesh	
26. Mr. M. Mahmood	Managing Director	BUNCL, Bangladesh	
27. Dr. M. Humayun Kabir	Professo of CE,	BUST, Bangladesh	
28. Dr. A.M.M. Safiullah	Professor & Head of CE	BUST, Bangladesh	
29. Mr. Waseq Al Azad	Chairman	BCIC, Bangladesh	
30. Mr. M. Ischak	Second Secretary	Indonesian Embassy	
31. Mr. G. Pal	Attache (E&C)	Indian High Commission	
32. Mr. A.S.M. Serajuddin	Director (Tech)	BJRI, Bangladesh	
33. Mr. A.N.M.M. Rahman	Director	BJMA, Bangladesh	
34. Dr. M.M. Islam	General Manager (Tech)	BCIC, Bangladesh	
35. Dr. S. Rahman	Secretary	BCIC, Bangladesh	
36. Md. Aminullah	Manager, Production	BJM, Bangladesh	
37. Mr. C. Diala	Former Project Admn.	Jute Project, BJRI,	
38. Mr. S.M.K. Chowdhury	Chairman	AFDL, Bangladesh	
39. Eng. A.Q.M. Ali	Consultant	FPCO, Bangladesh	
40. Mr. S.H. Mansur	Dy. Project Manager	FAP, Bangladesh	
41. Mr. Abdul Mukit	A.P.S. to Minister	Min. of Industries, GOB	

* ACRONYMS (next page)

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42. Mr. Ataur Rahman	Spl. Correspondent	BSS, Bangladesh	
43. Mr. Mr. Siddiqui	Staff Correspondent	Financial Express, Bangladesh	
43. Mr. G.L. Narasimhan	Country Director	UNIDO	Chairman, Inaugural Session
44. Mr. S.M. Afazuddin	Additional Secretary	Min. of Water Resources, GOB	Chairman Tech. Session-I
45. Dr. S.R. Ranganathan	Consultant (Industry)	IJO	Chairman Tech. Session-II.
46. Mr. A.H.M. Abdul Hue	Secretary, Ministry of Industries, GOB		Chairman Tech. Session-III.
47. Mr. A.Z.M. Masiruddin	Secretary, Ministry of Jute, GOB		Chairman Tech. Session-IV.
48. Dr. S.D. Ramaswamy	Consultant	Singapore	Author
49. Dr. A.B.M. Abdullah	Director (Tech)	BJRI, Bangladesh	Author
50. Dr. M.Z. Prodhan	Managing Director,	APDL, Bangladesh	Author
51. Dr. H.L. Hancox	Scientist	AEA Technology, UK	Author
52. Dr. R. Davidson	Scientist	AEA Technology, UK	Author
53. Mr. K.B. Gupta	Professor	IIP, Bombay, India	Author
54. Mr. A.S.M. Shahid	Director (RQC)	BJMC, Bangladesh	Author
55. Dr. Azizur Rahman	Director (P&R)	BCIC, Bangladesh	Author
56. Mr. S.K. Mittal	Director	PPPCL, Thailand	Author
57. S. Palit	Head, Mechanical Divn.	IJIRA, India	Author
58. Mr. Jin Qingsu	Engineer	ZJM, China	Author
59. Mr. Xie Zhengyuan	National Project Leader	CZJRI, China	Author
60. Dr. T.K. Guha Roy	National Project Leader	IJIRA, India	Author
61. Dr. Md. Nurul Amin	National Project Leader	BJRI, Bangladesh	Author

IJO

62. Mr. K.M. Rabbani	Executive Director,	IJO, Dhaka/Bangladesh
63. Mr. A.J. Brown	Director (P&A)	IJO, Dhaka/Bangladesh
64. Mr. R.N. De	Sr. Officer, Market Promotion,	IJO, Dhaka
65. Dr. M.Z. Hogue	Sr. Officer, Agriculture	IJO, Dhaka
66. Dr. G. Mohiuddin	Project Leader	IJO, Dhaka
67. Mr. B.H. Khan	Administrative Officer	IJO, Dhaka
68. Mr. M.I. Khan	Protocol Officer	IJO, Dhaka
69. Mr. S.A. Azam	Statistical Officer	IJO, Dhaka
70. Mr. Nazimuddin	PS to Director	IJO, Dhaka
71. Mr. Sk. Jamal	Secretary, Industry Divn.	IJO, Dhaka

ACRONYMS

AEA	= ATOMIC ENERGY AUTHORITY
APDL	= ARCADIA PROPERTY DEVELOPMENT LTD.
BARI	= BANGLADESH AGRICULTURAL RESEARCH INSTITUTE
BCIC	= BANGLADESH CHEMICAL INDUSTRIES CORPORATION
BCSIR	= BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
BJRI	= BANGLADESH JUTE RESEARCH INSTITUTE
BJMA	= BANGLADESH JUTE MILLS ASSOCIATION
BJMC	= BANGLADESH JUTE MILLS CORPORATION
BJSA	= BANGLADESH JUTE SPINNERS ASSOCIATION
EMDC	= BANGLADESH MANAGEMENT DEVELOPMENT CENTRE
BSS	= BANGLADESH FANGBAD SANGSTHA
BUET	= BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY
CZJRI	= CHINA ZHEJIANG JUTE RESEARCH INSTITUTE
FAP	= FLOOD ACTION PROGRAMME

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FAO = FOOD AND AGRICULTURE ORGANISATION
FPCP = FLOOD PLAN COORDINATION ORGANISATION
GOB = GOVERNMENT OF BANGLADESH
GJPC = GENERAL JUTE PRODUCTS COMPANY
HJM = HUSSAIN JUTE MILLS
IJIRA = INDIAN JUTE INDUSTRIES RESEARCH ASSOCIATION
IIP = INDIAN INSTITUTE OF PACKAGING
IJO = INTERNATIONAL JUTE ORGANISATION
NJMCL = NORTHERN JUTE MANUFACTURING COMPANY LIMITED
PCG = PAKISTAN CRESCENT GROUP
PCJP = PAKISTAN CRESCENT JUTE PRODUCTS
PJML = PATUAKHALI JUTE MILLS LIMITED
PPPCL = PHOENIX PULP AND PAPER COMPANY LIMITED
UNIDO = UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
WDB = WATER DEVELOPMENT BOARD
ZJM = ZHEJIANG JUTE MILLS

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Encl: III

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REGIONAL SEMINAR ON NEW APPLICATIONS OF JUTE
JOINTLY ORGANISED BY IJO/UNIDO-ICS
5-6 DECEMBER 1994
VENUE: BMDC AUDITORIUM, 4 SOBHANBAG
MIRPUR ROAD, DHAKA

"NEW APPLICATIONS OF JUTE"
DR. S.R. RANGANATHAN
CONSULTANT (INDUSTRY), IJO

In the fast changing world all products in industry need to gear to the future needs and markets. Probably, in no other industry other than jute the traditional products such as jute packaging survived "unchanging" for several decades; specific examples are the "A" Twill, "B" Twill, Heavy Ceers, "L" Twill, Hessian, etc.

New market developments, such as bulk packaging, changes in retail distribution, etc. as well as new materials such as the flat tape woven polypropylene, polyethylene, reinforced paper, films, textile nonwovens, etc. are competing successfully, in packaging, with the traditional jute packaging the world over - even in some of the developing countries such as China, India, etc.

The world jute scenario has significantly changed in the last two decades with developing countries having their share of jute and jute products of the world increased (from 52% to 80%) while the developed countries having their share reduced (from 48% to 20%).

There are, however, some silver linings amidst these dark clouds. Firstly, efforts in the past, in various R&D institutions, have at least scratched the surface and shown there is scope for improved traditional as well as diversified jute products. In this presentation, I will give an over-view of some of the more promising and new practical applications of jute which are expected to pick up in significant volume of market; this in fact is the objective of this regional seminar today and tomorrow where-in leading national and international experts, professionals would present their findings and result in this new applications of jute.

Jute Geotextiles

Geotextiles and geoengineering materials represent a fast growing market (20% per annum growth in the last two decades) which is estimated at 700 million sq.meters/annum. Currently, jute represents hardly 1% of this market, rest being synthetics, by and large. Jute, as the natural biodegradable material and with a high capacity (4 to 5 times its weight) for water absorption, is specially useful in selected applications of geotextiles such as soil erosion control (in mountain slopes, in the embankments of rivers/canals/road/railways etc.), as a reinforcement in temporary

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haul roads (project sites, rural roads in developing countries), in fabric form applications (holding wet concrete in the desired shape until setting), as a supersod (seed tape idea extension to blanket form), vertical drains (to conduct water vertically, to accelerate water drainage and to quickly strengthen soil), etc.

Currently jute geotextile is a heavy (500 gsm) open-mesh woven netting involving production and weaving of jute yarn of heavy construction i.e. grist of over 100 pounds (over 3000 tex) in which reject jute - very coarse grades of jute as well as jute waste and cuttings - could find an outlet; hence, producers of jute find geotextile products as waste outlets. Existing jute machinery, with minor adaptations for very coarse yarns, could manufacture these products and supply them in quantities. However, it should be emphasized that jute geotextiles and its proper usage is still not fully and properly established at the end of the potential users and hence, to borrow computer terminology - software (e.g. proper application of jute geotextiles to promote vegetation, water drainage, etc.) is required to supplement the hardware (e.g., jute geotextiles product). Since, woven jute geotextiles is a heavy product (500 gsm) scope exists for making lighter products, so as to cheapen the cost of the products itself as well as to reduce the otherwise heavy cost of transportation (amounting sometimes, to 30% of the landed cost for long distance transportation).

A new IJO project entitled "Technical Survey and Market Study of the Potential of Jute Geotextiles" has just begun to quantify results in some of the specific application of jute geotextiles to assist in tapping these potential markets for jute geotextiles. For example, field performance standards are currently being developed for an acceptable vegetation density for solid soils (e.g. clay or sandy soils) and for maximum sediment loss standards and hence any gap that may exist for jute geotextiles has to be bridged by such studies to exploit and sustain such large volume market potential for jute geotextiles.

Jute Composites

Fibers, as engineering reinforcement materials are well known and are commercially used in glass fibre/resin composites - engineering plastics used in aircraft body, boats, launches, tough walls, dividers, etc. The remarkable potential of jute fibre with a high strength, a high modulus and a low cost combination has not been recognised until recently for use in the composite applications.

Serious consideration of jute as a reinforcement for plastics can be traced to an FAO/UNDP initiative, which, in 1974, commissioned an International Study Group to make recommendations to improve the prospects for jute. One important recommendation from the Study Group was that the potential of jute fibre for plastics

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reinforcement (JRP) should be investigated. In 1978, the Commonwealth Fund for Technical Cooperation, at the request of the Government of India, placed a contract for a research, development, and market survey programme with the Harwell Laboratory of AEA Technology in the United Kingdom.

Apart from the Harwell programme, certain other experimentations involving use of jute in composites have been attempted, for example, in Holland, in the limited use of jute reinforcement in the manufacture of jute composites for mouldable interior car panels; in the USA, for research at the University of Wisconsin in the area of jute composites; in Bangladesh and India, limited production facilities exist for the manufacture of jute composites in some applications and involving thermo-setting/thermo plastic resins. It is possible that some of these manufacturing facilities could be used for the production trials of jute or kenaf based composite materials leading to indigenous test marketing of prototype packages. To assist in such activities it is worth noting that the Common Fund for Commodities (CFC), Amsterdam, Netherlands, in approved cases, can provide low interest loans to individual companies, especially in developing countries, to stimulate exploitation of innovative products such as jute composites, jute nonwovens etc. at appropriate stage of development.

Technical and economic feasibility, therefore, seems to exist for substituting JRP for some timber products in rigid packaging applications such as for tea and fruits since this has been tried and tested on a limited basis in previous initiatives. In this and similar applications, the market potential for JRP appears impressive. World consumption of timber for sawnwood and panel products is in the order of 250 million to 300 million tonnes per annum. Annual world production of jute is 3.6 million tonnes so that penetration of even a small proportion of the timber products market could transform the prospects for jute. It is timely to pursue the evolution of acceptable substitutes for timber, especially in rigid packaging, involving jute; conservatively speaking, if only 1% of this timber consumption is used in timber packaging and, further, if 10% only of the timber packaging is substituted by JRP it would still mean an additional and lucrative market for jute (300,000 tons), i.e. 10% approximately, of the existing world market for jute. Even in one country, India, use of timber, in packaging outlet alone exceeds 1 million tonnes per annum and India has even started imports of wood for packaging! Markets exist, both national and international, for timber/plastic substitutes by rigid/semi-rigid packaging based on jute, moulded JRP panels for interiors of house/automobile/rail coaches, etc. This would indeed be a higher value and medium volume usage which could revolutionize jute economy.

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A recent IJO/CFC project "Improvement of Jute-Based Packaging and Jute Intermediates as Substitutes for Wooden/Plywood and Other Packaging Panels, etc." is to commence shortly and it is hoped that, through this project, IJO/CFC could ensure a commercial use of this application of new technology for jute.

Jute Nonwovens

Nonwovens, as the name implies, is wellknown as the direct sheet production technique from fibers without the need to spin, weave or knit, used traditionally for sheet materials. In textiles, nonwovens represent the relatively higher growth segment which, currently, exceeds, quantitywise, the textile fibre usage over that of the traditional woven and knitted textiles. In jute, extremely limited quantities of nonwovens are currently manufactured using, invariably, the needle punching technique for the production of medium weight (100 to 300 gsm) nonwovens from 100% jute fibers. Even in this outlet, only a few thousand tons per annum of jute nonwoven products are currently produced for marketing as a "jute felt underlay" - for carpets, cushion/bedding/furniture, etc. IJO/CFC project "Development of Nonwoven Products from Jute and Jute Blends and Test Marketing" currently being executed by the British Textile Technology Group (BTTG), Manchester, UK, has, in the last few years examined in-depth the role of nonwoven technology for jute and the applications suited to it. Even at the outset, BTTG realised that staple cut jute sliver, cut to a specific length of, say 90mm, could be the optimum to secure more uniform and better quality jute nonwovens. BTTG have also experimented with jute-rich blended nonwovens (non jute - synthetic fibre content is 15% - 30%, the balance of 85% - 70% being cut jute) using traditional textile nonwoven machinery - involving carding, cross-lay, stitch-bonding, needle-punching, oven bonding, calendering, hydro-entanglement or a combination of these machineries to produce wide ranging jute nonwoven products i.e. 50 gsm to 1000 gsm. Field trials have shown application scope for mulch-mattings for crop cultivation (example lettuces) mulch-mattings for other applications (weed control, landscaping, etc.) jute/synthetic floor covering, footwear, as form-work liner for concrete casting, and, applications in furniture manufacture.

It appears that jute nonwovens could have a further scope - in relation to jute nonwoven geotextiles as well as a base for jute composites, both being the subject of detailed study of two projects of IJO, commenced/commencing shortly.

Jute nonwoven technology thus appears to offer, as in textiles, a cost-effective, modern, and market oriented diversification of jute; however, more intensive production and marketing expertise have to be built to make them successful commercially, in the near future.

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Pulp and Paper

Jute/kenaf was, for long, being considered as a source of raw material from pulp and paper making, through, until recently it could not progress anywhere near commercial use. The pioneering efforts of Bangladesh in attempts to utilise green jute (whole jute plant - excluding leaves) is laudable and many countries in the region as well as outside this region are watching and following up, with the keen interest, the degree of commercial success for jute/kenaf in this large volume outlet. Apart from this, use of jute/kenaf fibre as a reinforcement material to the traditional wood based pulp and paper is also of significance as a new application of jute/kenaf. I am glad that we could manage to bring together here today the concerned and leading professionals who will present an up-date at this Seminar, with all the results and findings. The topics mentioned above indicate optimism in the use of jute/kenaf for this new application of pulp and paper and we wish them all success to reach commercialisation.

Fabrics, Soft luggage and Decoratives - Jute/kenaf as industrial and household textiles.

An old adage comes to my mind in this context "you can't make a silk purse out of hairs from sow's ear" - in precise terms, it means that silk is the finest of fibres family (one denier or less) while the hairs from sow's ear - female pig's ear - is a very coarse fibre (50 to 100 denier). Since the flexural rigidity or bending resistance (softness of feel) varies inversely as the square of diameter (or the fourth power of the diameter of fibre), in broad terms, the resistance to bending of the hair of sow's ear would be $(50 \times 50 = 2500)$ times more than that of silk fibre, i.e. $1 \times 1 = 1$).

However, thanks to the innovative efforts of scientists and technologists through physico-chemical modification of fibres, the coarse jute/kenaf fibres could be modified to possess a very soft feel and handle instead of being very stiff and hard - an important requirement for many industrial and household textiles application such as for soft luggage, carpet yarns, textile grade outerwear such as denim, waistcoat, overcoat, etc.

Similarly application of jute in industrial and household textiles requires attractive, fast and economic colours as well as acceptable whiteness and luster. Here again, science and technology in terms of modifications of jute and kenaf has overcome the traditional deficiencies in terms of appearance and poor ranges of colour for jute/kenaf products. The three National Project Leaders (NPL) of Bangladesh, China and India associated in the current IJO/CFC Project (Improvement of Physico-Chemical Properties of Jute/Kenaf Fibre, Yarns and Fabrics for the Production of Value Added and Diversified Products) as well as some other authors who have completed R&D in this application will present their results and findings in a series of four papers in the fourth technical

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session of this seminar. I hasten to mention that these results and findings above are not merely laboratory curiosity. These are indeed industrial scale-up experiences wherein mass production trials in the shop floor have taken place for market potential assessments so that these are in a suitable stage for further commercial exploitation by industry, in appropriate products; some of the potential products are illustrated by the authors concerned though the full potentials are larger, to be exploited by the genius of enterprising businessmen in industry.

Well Mr. Chairman, Ladies and Gentlemen, with so much of information results and findings awaiting to be presented in this seminar by specially invited and eminent professionals, I should not take more time in this presentation since you will be hearing more details in full in the expositions of today and tomorrow at this seminar. I, therefore, end with the fervent hope that new applications of jute/kenaf leading to jute diversification has come of age and has come to stay. It is up to us to utilise them, improve and expand them, to ensure a good future for the golden fibre - JUTE.

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CONCLUSIONS AND RECOMMENDATIONS

SESSION I : JUTE GEOTEXTILES

CHAIRMAN : MR. S.M. AFAZUDDIN, ADDITIONAL SECRETARY
MINISTRY OF WATER RESOURCES, GOVERNMENT
OF BANGLADESH

In this session the two lead papers were presented by (a) Dr. S.D. Ramaswamy, Consultant, Singapore and (b) jointly by Dr. A.B.M. Abdullah, Bangladesh Jute Research Institute along with Dr. M.Z. Prodhan, Arcadia Property Development Ltd., both of Bangladesh.

1. CONCLUSIONS

Various research programme were undertaken to study the properties of jute geotextiles and the effect of its application in solving different soil and water related problems. Results obtained with jute geotextiles were satisfactory. Considering different properties and advantages, jute geotextiles may be used as erosion control materials and as fibre drains, separators, filters and reinforcing elements. ~~Some of the~~ geotextile applications of synthetic geotextiles could be successfully carried out by jute geotextiles in a cost effective and eco-friendly manner.

2. RECOMMENDATIONS

For R&D Organisations/
Institutions

: More field trials should be carried out in various locations to assess practical feasibility and suitability of the product for the various applications. Past and proven results shows that biodegradability of jute is not a hindrance (and in some cases may be advantage) in the three proven areas of drainage, filtration and erosion control. However, more work, including field trials would be needed before jute geotextiles is confidently advocated for usage in the "reinforcement" applications of geotextiles, where longer life (even up to 100 years, in some cases) is expected in applications for reinforcement of dams, bridges, etc.

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- For Member Countries of IJO :** Details of R&D results and field trials highlighting the valuable findings so far should be disseminated to the member countries through IJO for the benefit of the IJO member countries. However, countries should encourage usage of jute geotextile in the proper areas of drainage, filtration and erosion control. Bangladesh being one of the leading countries in jute, usage of jute geotextiles may be made mandatory in the above proven areas.
- For IJO Secretariat :** To keep records of R&D developments as data bank for use in future communications and for further R&D work and studies for project and temporary haulage roads and rural roads reinforcement. Where shorter life span of jute would suffice in the applications (say up to 5 years) and no criticality of resultant damage exists, treated jute geotextiles with bitumin, etc. may be considered. IJO may consider promotion of jute geotextiles in such usages, after due completion and results of the current IJO project related to Jute Geotextiles development.

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CONCLUSIONS AND RECOMMENDATIONS**SESSION II : JUTE COMPOSITES AND JUTE NONWOVENS****CHAIRMAN : DR. S.R. RANGANATHAN,
CONSULTANT (INDUSTRY), IJO**

In this session three lead papers were presented. The first one relating to jute composite material development was presented by Dr. N.L. Harcox, supported by Dr. R. Davidson of ARA Technology, UK. The second one was on application of jute composites for packaging and was presented by Prof. K.B. Gupta, Indian Institute of Packaging, India. The third one was on the subject of jute nonwoven development, manufacture and applications was presented by Mr. A.S.M. Shahid of Bangladesh Jute Mills Corporation.

1. CONCLUSIONS

- a. Jute based thermosetting and thermoplastic polymer composites have been made in the laboratory and pilot plant production and test marketing using jute fibres, felts and fabrics as well as packaging of fruits, flowers, tea, etc. Development work is underway to reach commercialisation in selected applications in various programmes.
- b. Jute rich nonwovens have also been developed and evaluated for specific applications in horticulture/agriculture, floor covering, footwear, building, filtration and furniture industries and using standard textile nonwoven machinery with minor and practical adaptations. Costing and test marketing completed. Limited production of jute nonwovens are available. Scope for further expansion for commercialisation.

2. RECOMMENDATIONS

- For R&D Organisations/
Institutions** : As the performance of nonwovens and jute composites have been found to be satisfactory necessary programmes may be undertaken for large scale production of nonwoven and jute composites and their use in specific fields.
- For IJO Member Countries** : IJO member countries should use the existing manufacturing facilities of paper based packaging as well as paper based laminates for the production of jute reinforced plastics and jute composites involving thermo setting/thermoplastic resins for trial production and for test marketing of proto-type packages prior to larger scale commercialisation.

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IJO member countries may encourage entrepreneurs in their respective countries to come forward for establishing jute based nonwovens as well as jute based reinforced products for commercialisation.

For IJO Secretariat

: IJO may launch new jute products promotion, particularly after securing encouraging results also in the specific applications of the newly started IJO project on "Development of Jute-Based Packaging and Jute Intermediates as Substitutes for Wooden/Plywood and other Packaging Panels, etc."

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CONCLUSIONS AND RECOMMENDATIONS

SESSION III : JUTE BASED PULP AND PAPER

CHAIRMAN : MR. A.H.M. ABDUL HYE,
SECRETARY, MINISTRY OF INDUSTRIES
GOVERNMENT OF BANGLADESH

This session on jute based pulp and paper had presentation of two lead papers. The first was by Dr. Azizur Rahman, Bangladesh Chemical Industries Corporation on "Pulp and paper manufacturing from green jute" while the second one was presented by Mr. S.K. Mittal of Phoenix Pulp and Paper Public Co. Ltd., Thailand on "Problems and Prospects of Pulp and Paper Manufacture from Kenaf".

1. CONCLUSIONS

- a. Jute/kenaf fibre was found suitable for high grade paper and some countries, notably, India, China and Thailand are experimenting it.
- b. Pulp and paper has also been produced from green jute adopting Soda-AQ Sulphate and Neutral Sodium Sulphite process. This pulp is being used in manufacturing various grades of paper such as writing (printing/industrial) paper, newsprint and industrial paper in large scale experimentation.
- c. Kenaf has also been found to be most promising raw material for pulp and paper manufacture, commercially, in Thailand, but as an alternate source of raw material for pulp and paper. Many other countries including China, India, Korea and even USA, Australia, etc. appear to be interested in this area.

2. RECOMMENDATIONS

For R&D Organisations/
Institutions : Considering growing demand for pulp and paper and increasing consciousness regarding forest resources and environment, efforts should be made to use annually renewable jute and kenaf as raw materials for the production of pulp and paper.

Commercial exploitation of these raw materials requires special attention regarding availability storage, selection of improved process and technology.

For IJO Member Countries : Jute/kenaf producing countries of IJO may set up jute/kenaf based pulp and paper mill for commercial production and

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marketing, after convincing themselves of economic and operational viabilities.

For IJO Secretariat

: IJO, in due course, may consider measures for promoting the use of jute based paper in the member countries.

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CONCLUSIONS AND RECOMMENDATIONS

SESSION IV : FABRICS, SOFT LUGGAGE AND DECORATIVES

CHAIRMAN : MR. A.Z.M. NASIRUDDIN
SECRETARY, MINISTRY OF JUTE,
GOVERNMENT OF BANGLADESH

In this session on jute based fabrics, soft luggage and decoratives, four papers were presented. The first one was on "A step towards diversification - fabrics, soft luggage, decoratives" by Mr. S. Palit, Indian Jute Industries Research Association, the second was on "New Application of Jute Start Up in China" by Mr. Jin Qingshu, Zhejiang Jute Mills, China, the third was on "The cottage industry and jute mill" by Dr. T.K. Guha Roy, Indian Jute Industries Research Association and the fourth was on "Commercial Process Development for Bleaching and Softening of Jute" by Dr. Md. Nurul Amin, Bangladesh Jute Research Institute.

1. CONCLUSIONS

In various research laboratories considerable work have been done on the pilot production and test marketing of jute based fabrics, soft luggage, shopping bags, decoratives and upholstery.

2. RECOMMENDATIONS

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| For R&D Organisations/
Institutions | : | Experience of some countries show these products to be marketable in terms of price and quality. So proper steps should be taken for commercial production and marketing of these non-conventional products. |
| For IJO Member Countries | : | Member countries should make all out effort to appraise the consumers about these products and their markets and promote the same, in a country - specific manner. |
| For IJO Secretariat | : | IJO may collect all information about R&D activities on the jute based non-conventional products for the above and make the information available to the member countries for further development and use of the products. |