

JUTE
FIBRE TO YARN

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Preface

THIS book is intended mainly for students but it is hoped that it will also be of interest and value to those engaged upon the technical side of the industry. Briefly, the intention behind the book is to give an appreciation of the more important aspects of the raw material, to show the basic principles involved in converting the raw material into yarn, and to demonstrate how the machinery does this.

I am deeply indebted to Dr. H. P. Stout, Director of the British Jute Trade Research Association for his continued interest and assistance, and to the Council of the Association for permission to draw from their Research Reports. My thanks are also due to Mr. P. G. Anderson and Mr. G. C. Stevenson, who were kind enough to criticize the text in a most helpful and constructive manner; to Messrs. James Mackie and Sons Ltd, to Messrs. Fairbairn Lawson Ltd, and Messrs. Giddings-Lewis and Fraser Ltd for their ready assistance in providing technical data and photographs of their machinery. Help with proof-reading and the preparation of the index was given by my wife. For this and for her constant encouragement while the book was being written, I thank her.

Dundee, 1964.

R. R. ATKINSON

INTRODUCTION

*The Place of Jute in World
Textiles*

JUTE is second only to cotton in the world's production of textile fibres. It is estimated that in 1960 about 31 thousand million pounds of fibres were processed throughout the world, cotton accounting for roughly half that quantity and jute following with a consumption of nearly five thousand million pounds. Table I shows the relative proportions of the principal fibres used in recent years compared with the pre-war period. The most interesting feature of the Table is the decline in importance of some fibres and the growth of others as economic and technological changes take place.

TABLE I. TEXTILE FIBRE PRODUCTION†
(Individual figures are percentage of total)

	<i>Average</i> 1934-39	1957-58	1958-59	1959-60
Cotton	57.2	47.6	48.5	49.3
Jute and allied fibres	16.5	16.2	18.1	15.6
Wool (apparel)	7.4	7.0	7.2	7.1
Wool (carpet)	1.5	1.3	1.3	1.3
Rayon (filament)	4.8	7.2	6.2	6.7
Rayon (staple)	2.2	9.0	7.8	8.2
Other man-made fibres	—	3.0	3.0	3.9
Silk	0.5	0.2	0.2	0.2
Flax	1.0	0.8	0.7	0.6
Hemp	8.9	7.6	7.2	7.1
Total (million lb)	20,219	28,482	29,326	30,901

† Sino-Soviet bloc excluded.

The major sources of supply of jute lie within the Commonwealth, chiefly in India and East Pakistan. When the Indian sub-continent was partitioned in August, 1947, the main jute-growing area, East Bengal, was awarded to the newly created state of Pakistan while about three-quarters of the manufacturing capacity fell within the boundaries of

the Indian Union. Thus at that time Pakistan had ample supplies of fibre but few mills while India had more mills than she had fibre for. Each country began to make the necessary alterations to its economy, Pakistan developing Chittagong and Chalna, its ports on the Bay of Bengal, so that she could export her raw fibre more easily while, at the same time, every effort was made to set up new mills. India, on the other hand, expanded her acreage under jute cultivation to supply her mills, the export of jute cloth being a powerful currency earner and playing a vital part in the economy of the country.

Jute is grown on a large number of peasant smallholdings and it is rather difficult to arrive at an exact figure for the total acreage but it is estimated that since 1955 about 3,600,000 acres each year have been used for jute growing throughout the world, India and Pakistan between them accounting for some 3,000,000 acres. Jute is also grown in Burma, Formosa, China, Brazil, and Nepal, but at present their production is negligible compared with that of the sub-continent. Fibres allied to jute, such as kenaf and Congo jute, are grown in India, Thailand, and the Congo but again output is comparatively small.

In recent years the world's production of jute and its allied fibres has been running at a level of between 2 and 2.7 million tons annually, true jute accounting for about 80 per cent of this. Though some of the minor growing countries are trying to increase their output, one of the difficulties about successful jute growing on a commercial scale is that plentiful supplies of both water and labour are required. From time to time various types of mechanical harvester have been tried but none are, at the moment, capable of handling the large quantities involved.

The largest centre of the jute industry is the Calcutta area of India where some 70,000 looms produce about 1.25 million tons of jute goods annually. Pakistan follows next in importance with an annual output of some 250,000 tons which, it is planned, will increase to 360,000 tons by 1965. After these two countries, the United Kingdom has the largest industry, capable of producing about 160,000 tons of jute goods each year. The manufacturing emphasis in the U.K. differs from that in India and Pakistan; these last mentioned countries being mainly concerned with weaving cloth for sacking and bagging. In Great Britain about one-third of the output is yarn for the carpet industry, and the weaving of speciality fabrics is carried on in preference to sacking fabrics. The combined 'Common Market' countries

process some 280,000 tons of jute annually and here again the emphasis is on jute for special purposes. Other countries such as Brazil, Japan, and the United States have smaller manufacturing capacities used mainly for internal trade. India is the world's major exporter of jute cloth, sending large quantities to America for baling cotton and to Australia for grain and wool packing.

Jute has long been recognized as a cheap, strong, durable fabric eminently suited for sacks and bags and many other purposes. On a world basis about 80 per cent of all the jute manufactured finds its way into packing of one sort or another. The actual weight of jute used per ton of transportable material depends on local variations in sack dimensions, whether the goods are for export, whether the bag is returnable or not and so on, but typical figures for the weight of jute used to pack one ton of various products are

Flour	(hessian bags)	15 lb
Flour	(twill sacks)	41 lb
Potatoes	(hessian bags)	22 lb
Potatoes	(twill sacks)	46 lb
Beet pulp		24 lb

In certain cases the contents of the bag must be protected against contamination by the jute itself, by other products stored nearby, or by the atmosphere. For such uses the bag may be lined with paper or polythene bonded to the jute. Alternatively a loose liner of paper or polythene can be used and after transporting the commodity the liner may be taken out and the bag re-used. One of the advantages which a jute bag has over a paper bag is the fact that it has a good second-hand value and in most countries of the world there is a considerable trade in second-hand bags.

Jute is used in woven carpets as weft, warp, or pile, in tufted carpets as the backing material, in linoleum as backing, and in carpet underlays and felts. A general indication of the amounts of jute used in different floor-coverings is given below

Woven carpet (wool pile)	1.2 lb/yd ²
Woven carpet (jute pile)	2.0 lb/yd ²
Tufted carpet	0.9 lb/yd ²
Linoleum	0.6 lb/yd ²

One of the outstanding developments in the carpet industry in recent years has been the rapid growth of the tufted carpet section and now large quantities of jute are sold for the backing fabric of these carpets.

Jute is also used in smaller quantities in a host of other applications. Small domestic ropes, parcelling twines, horticultural twines are examples of its use as cordage. Roofing felt and damp courses often have a base-cloth of jute; in the upholstery trade jute is used for covering the underside of chairs and as webbing for supporting chair seats; tailors' interlinings are often made from fine jute cloth; jute yarns are used in the electrical and cable-making industries as packing for power cables or telephone and telegraph cables; jute may be used for filter cloths, boot and shoe linings, and tarpaulins. It has even had some vogue as a dress fabric.