

STUDY ON JUTE AND MESTA IN INDIA



सत्यमेव जयते

COMMITTEE ON NATURAL RESOURCES
PLANNING COMMISSION
NEW DELHI

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FOREWORD

Among the cash crops, jute occupies the foremost place being the largest earner of foreign exchange for the country. The jute industry employs about 2 lakh workers which form a significant proportion of the total factory labour in India. The cultivation of this crop being confined to the Eastern Zone, the economy of this region in particular is closely linked with the development of this fibre. The immediate need is to step up yield per acre and improve the quality of the fibre through intensification of development measures and provision of adequate retting facilities. Stabilization of prices and the assurance of minimum remunerative prices for the growers are, however, essential pre-conditions for the achievement of this objective. These aspects of the jute problem have been emphasised in the successive Five Year Plans. Along with jute, attention has also to be devoted to the development of mesta which is being increasingly used by the mills in the production of jute manufactures.

The present study focusses attention on the various problems connected with the development of jute and mesta. It contains useful recommendations which merit close consideration of the concerned State Governments. As far as possible, these recommendations deserve to be implemented in the Third Plan. Those which cannot be put into effect during this Plan may be formulated as schemes for implementation during the Fourth Plan period.

M. S. THACKER

December 15, 1963

Member (Education)

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INTRODUCTION

The task of preparing the first draft of the study on 'jute' was assigned to Shri S. M. Roy, Director of Economic Research, Indian Central Jute Committee. It was considered by the Working Group at meetings, held on 11th to 13th September, 1963, and 14th and 15th October, 1963.

The study provides a historical background of jute cultivation, its varietal distribution, soil and climatic conditions in jute growing areas, and agricultural practices etc. It deals with the place of jute in the cropping pattern and demarcates compact jute belts of varying degrees of productivity. It also makes a classification of the important jute regions, according to their yield in relation to the competing crop paddy, and draws specific attention to certain areas where yield per acre is low and quality of the fibre poor.

The most important part of the study is a review of the development measures taken in the First and Second Plans so as to ascertain where the measures have succeeded and how much they have contributed to productivity, and also where they have failed and the lessons that can be learned from them. The study also contains a review of the performances of improved varieties of jute, and a resume on the research on fertiliser trials, breeding, cultural practices, plant protection and retting during the two Plan periods. The growth of demand for jute, the scope for development of mesta along with jute, and the importance of marketing and minimum remunerative prices for the growers have also been highlighted.

The study incorporates useful recommendations on the future programme of development of jute and mesta in the country, and has suggested a more rational and efficient allocation of resources in land and fertilisers etc. from the point of view of productivity and quality of the fibre.

This study is the outcome of the joint efforts of a study team, the personnel of which is indicated on the next page. I would particularly like to mention the contribution of Shri S. M. Roy and Dr. V. Nath, Deputy Secretary, Planning Commission, who have done the major work for this study. I also take this opportunity of expressing my gratitude to all the members of the Study Team for their cooperation.

M. S. RANDHAWA

Adviser (Resources)

December 15, 1963

STUDY ON JUTE AND MESTA IN INDIA

Study Team

1. Dr. M. S. Randhawa, Adviser (Resources), Planning Commission.
2. Dr. S. M. Sikka, Additional Agricultural Commissioner, Indian Council of Agricultural Research.
3. Dr. S. P. Raychaudhuri, Senior Specialist (Land Resources), Planning Commission.
4. Dr. V. Nath, Deputy Secretary (Resources), Planning Commission.
5. Shri R. S. Nakra, Assistant Chief (Resources), Planning Commission.
6. Shri B. N. Sinha, Secretary, Indian Central Jute Committee, Calcutta.
7. Shri P. D. Dixit, Chief Jute Development Officer, Indian Central Jute Committee, Calcutta.
8. Shri S. M. Roy, Director of Economic Research, Indian Central Jute Committee, Calcutta.
9. Dr. K. T. Jacob, Director, Jute Agricultural Research Institute, Barrackpore.
10. Shri E. A. R. Banerjee, Indian Jute Mills Association Research Institute, Calcutta.
11. Shri G. C. L. Joneja, Jute Commissioner, Calcutta.
12. Dr. S. W. Mensinkai, Principal, College of Agriculture and Research Institute, Krishinagar, Dharwar (Mysore State).
13. Dr. H. K. Nandi, Director of Agriculture, West Bengal, Calcutta.
14. Shri A. T. Sanyal, Joint Director of Agriculture, West Bengal, Calcutta.
15. Shri S. M. Ganguli, Research Officer, Indian Central Jute Committee, Calcutta.
16. Shri A. Majumdar, Marketing Officer, Indian Central Jute Committee, Calcutta.
17. Dr. T. S. Ghosh, Head of the Section of Mycology, Jute Agricultural Research Institute, Barrackpore.

CHAPTER I

GENERAL

Jute occupies an important place in the Indian economy. The approximate value of the total output of jute in terms of finished products is Rs. 180 crores in a year. The jute industry is the largest earner of foreign exchange for the country and accounts for over 60 per cent of the total hard currency earnings.

The jute industry is also a major employing industry. It employs nearly 2,00,000 workers, comprising roughly 8 per cent of the total factory labour in India. The industry's annual pay bill after the recent wage increase would add up to about Rs. 30 crores, excluding the cost of pensions, maternity leave and benefit, creches, canteen, schools, etc. Besides, indirect employment is provided to numerous intermediaries in the raw jute and gunny trade. The demand for raw material by the industry constitutes a major source of income for about 2 million agriculturist families in the jute growing States of India.

History

The early history of jute is not definitely known, nor is it clear whence the word 'jute' came. Some believe the plant and its use were known to man even in the remote ages and the word is an anglicised form of the Oriya word 'jhut' or 'jhot' meaning 'pat'. Rumphius (1743) mentions it as a principal pot-herb in Bengal. There are references to Jute in *Ain-i-Akbari* (1590) and books of Bengali literature of the 16th and the 17th centuries. The words 'pat' and 'patta-bastra' in old Bengali books point to the fact that the use of jute fibre was known even in ages past.

But the cultivation of the plant did not gain much popularity until the 19th century. In 1793, English traders first shipped 100 tons of jute to England from India to try, if it could be used as a substitute for flax and hemp. The mill-owners of Dundee found it a good substitute and further consignments were in demand on a moderate scale. Hand woven Indian jute goods had moreover acquired considerable popularity in Java, Borneo and America and the cottage industry continued to flourish till the middle of the 19th century when the power-loom product captured the market.

The year 1855 heralded a new epoch in the history of Indian jute industry, when the first Indian spinning mill was set up at Rishra in West Bengal. In 1859, a power driven factory with 192 looms was started at Baranagar near Calcutta. By the year 1885, the number of mills increased to twenty with a total of 6,700 looms, and the demand for raw jute was increasing rapidly. In the year 1885-86, it is reported that 897,863 tons of jute valued at Rs. 32,34,91,538 were exported from India.

Towards the end of the 19th century, when Germany turned to jute industry, there was additional demand for raw materials and many countries took to jute cultivation. Burma, Nepal, China, Formosa, Brazil, Argentina and several other countries started growing jute but without success and India continued to meet 98% of the total world requirement.

From 1875, the Indian hessian industry entered into competition with Dundee's. The quality had to be improved and new fields of utilisation of

jute had to be explored. In 1937, a Research Institute was set up in Calcutta to study the possible uses of the fibre.

With the expansion of exports, money began to flow into the country and the cultivators devoted themselves to the production of the crop vigorously. Lands that had hitherto remained uncultivated, came under this crop. It appeared as the first crop on many paddy lands, and in many cases ousted paddy.

Excessive production adversely affected the market price of jute. To stabilise jute prices, the Government of Bengal decided in 1937 to undertake propaganda for voluntary restriction of jute acreage and in subsequent years the restriction had to be enforced.

Position after partition

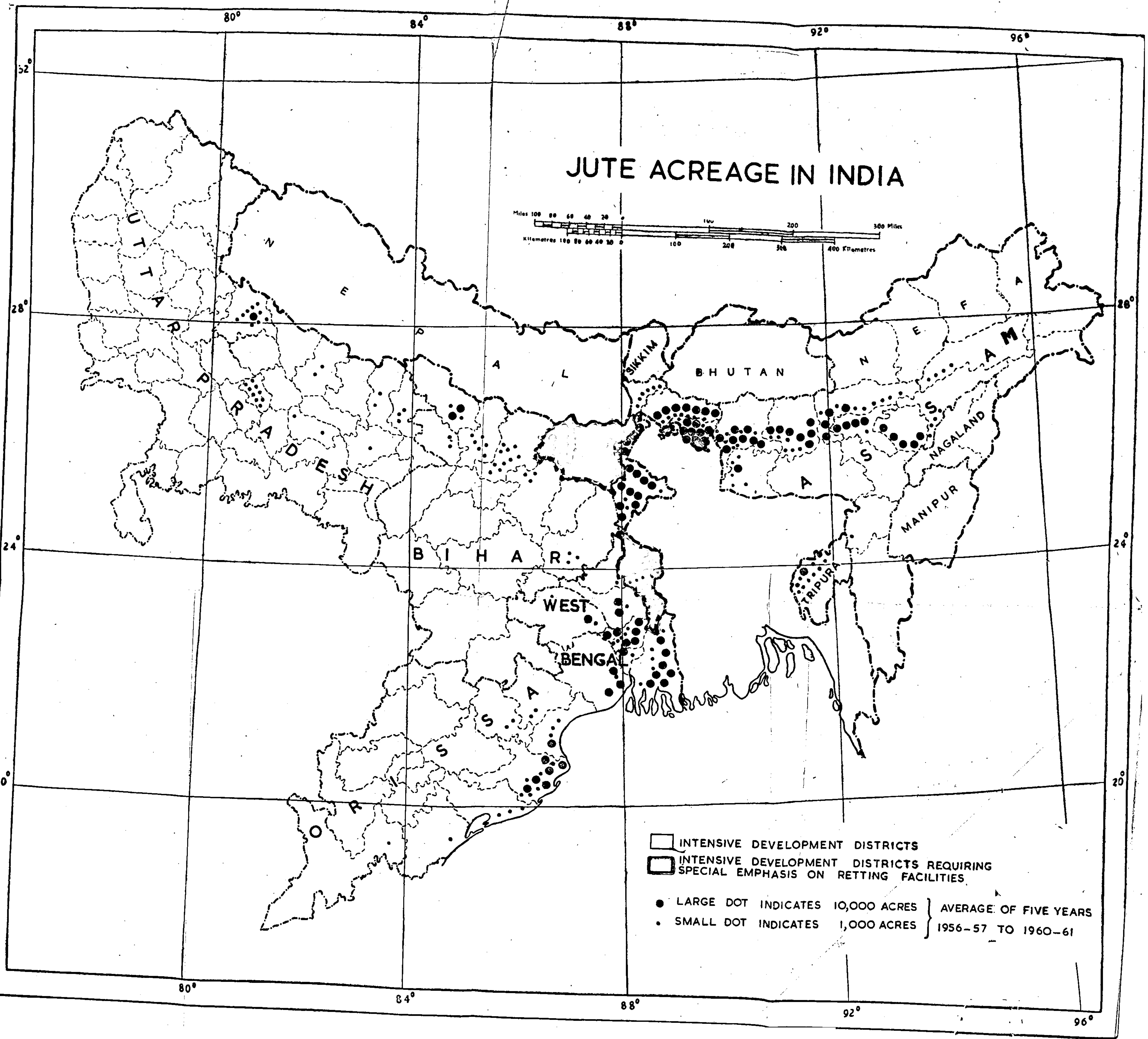
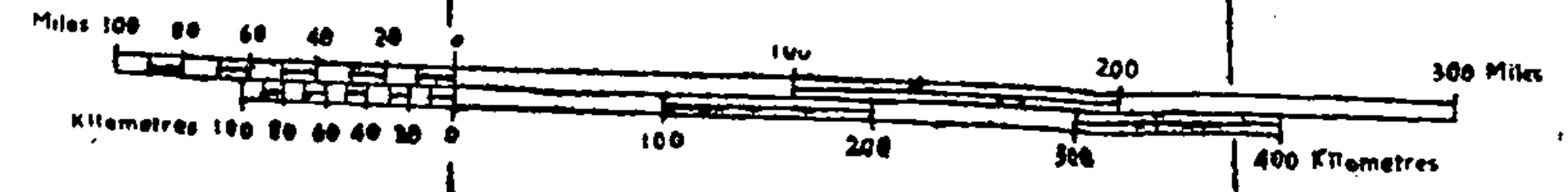
Before the partition of India, the bulk of the jute growing lands were in East Bengal (now in Pakistan), while the jute mills were in West Bengal in India. Partition deprived the Indian mills of the raw jute of East Bengal. As the figures for 1947-48 in Table 1 below show, 79% of the total production of jute was in the areas which went to Pakistan. India was not producing at the time, even half the quantity of jute required to feed her jute mills. Stepping up of jute production, therefore, became an imperative necessity. An all out attempt was made to increase production in the post-partition years, and exports of raw jute were totally banned in 1949.

Large number of cultivators who had migrated from East Pakistan after the Partition, had experience of jute cultivation. The scarcity of land in West Bengal compelled these migrants to clear up jungles and wastelands, and many of them were turned into valuable jute fields. Every attempt was made to increase the acreage under jute and to improve the quality under the patronage of the Government. As a result of this work production in India increased rapidly to the high level of 46.78 lakh bales in 1951-52. After that year, however, production has been subject to wide fluctuations from year-to-year, depending upon the demand and prices of jute and other factors. In 1954-55, the production was as low as 29.28 lakh bales, while it reached an all time record of 63.47 lakh bales in 1961-62. Production of jute from 1947-48 onward is given in Table 1 below. The average price of jute during each year has also been given to indicate the relationships between price and production. A detailed discussion of prices of jute and their influence on production is given in Chapter VI.

TABLE 1
Area, Production and Prices of Jute 1947-48 to 1962-63.

(1)	Area (‘000 acres)	Production (‘000 bales of 392 lbs. each)	Yield (bales per acre)	Prices (Assam Bottom) (Rs. per md.)
		(3)	(4)	(5)
1947-48	652	1,658	8,501	2.54
1947-48 Pakistan	..	6,843		
1948-49	834	2,055	2.46	39.36
1949-50	1,163	3,089	2.66	34.62
1950-51	1,411	3,283	2.27	54.33
1951-52	1,951	4,678	2.40	49.00
1952-53	1,813	4,592	2.53	24.12
1953-54	1,228	3,091	2.62	26.37
1954-55	1,243	2,929	2.36	26.69

JUTE ACREAGE IN INDIA



- INTENSIVE DEVELOPMENT DISTRICTS
 - ◻ INTENSIVE DEVELOPMENT DISTRICTS REQUIRING SPECIAL EMPHASIS ON RETTING FACILITIES
 - LARGE DOT INDICATES 10,000 ACRES
 - SMALL DOT INDICATES 1,000 ACRES
- } AVERAGE OF FIVE YEARS
 1956-57 TO 1960-61

Jute is grown in as many as 73 districts of the country but the major concentration is in the 13 districts listed in Table 3 below, which account for about 80% of the total production :

TABLE 3
Area, Production and Yields of Jute in principal producing districts

Name of the State	Name of the district	1961-62		Percentage (Col. 4 to Col. 3)	Production ('000 bales)
		Total area under cultivation (acres)	Net area under jute (acres)		
1	2	3	4	5	6
<i>West Bengal</i>					
	1. Murshidabad	1,005,200	174,900	17.3	463.5
	2. Coochbehar	439,400	153,300	34.8	459.0
	3. W. Dinajpur	633,800	152,600	24.0	321.9
	4. Nadia	670,300	139,300	20.7	416.5
	5. 24-Parganas	1,482,000	124,200	8.4	397.4
	6. Jalpaiguri	620,500	116,500	18.7	412.7
	7. Hooghly	593,800	106,600	17.8	422.1
		5,445,000	967,400	17.7	2,893.7
<i>Bihar</i>					
	1. Purneā	13,59,162	378,800	27.8	795.4
	2. Saharsa	5,77,167	113,900	19.7	253.9
		1,936,338	492,700	23.7	1,049.0
<i>Assam</i>					
	1. Goalpara	638,600	93,000	14.7	252.5
	2. Kamrup	1,248,455	86,000	7.8	223.6
	3. Nowgong	672,259	113,000	16.8	395.5
		2,559,314	292,000	13.1	871.6
<i>Orissa</i>					
	1. Cuttack	1,100,000 (1960-61)	73,314	6.6	167.6
	TOTAL	110,40,652	18,25,414 (80 % of all India)	15.2	4,982.2 (78.4% of all India)
	All India		22,80,000		6,347.0

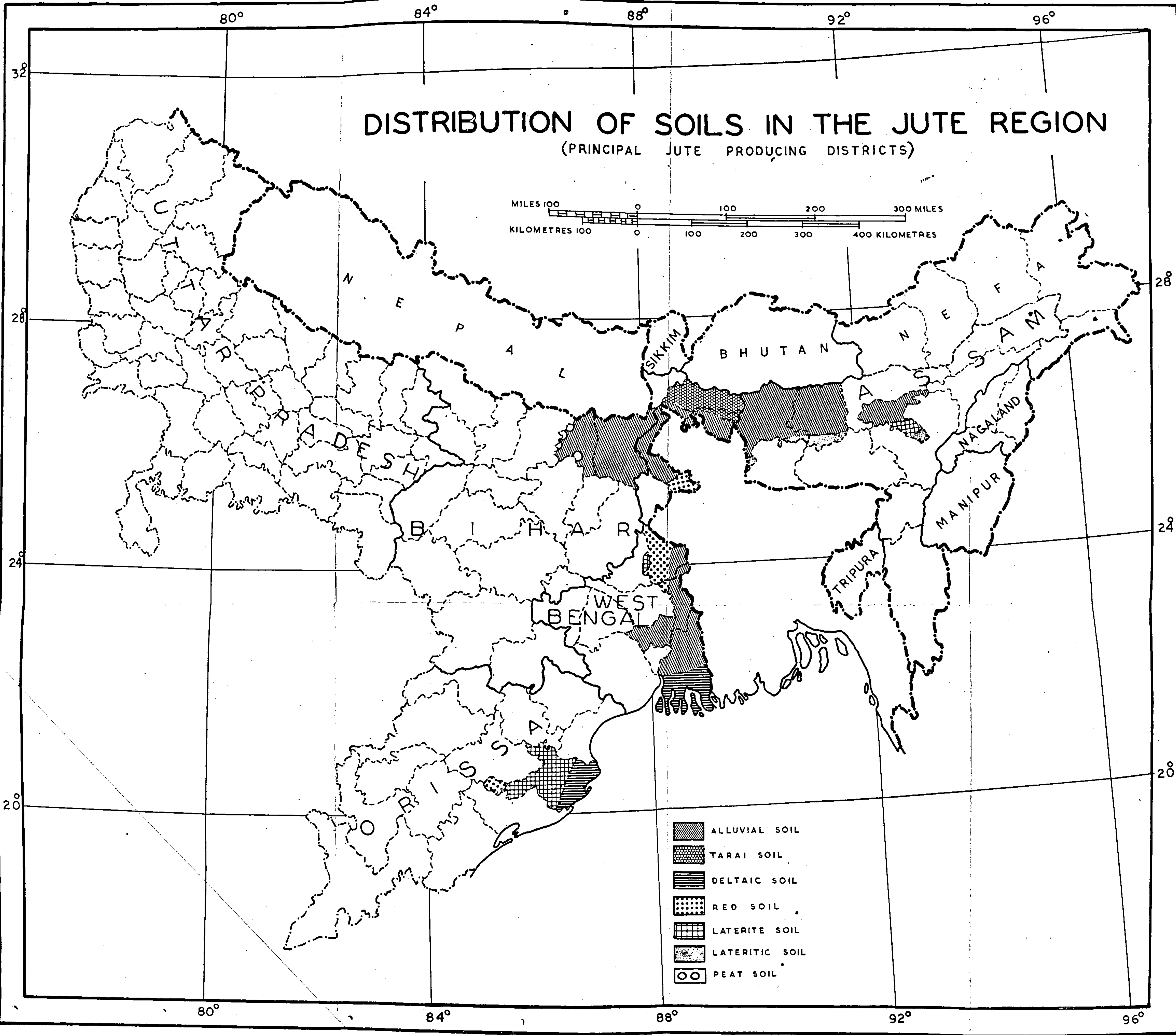
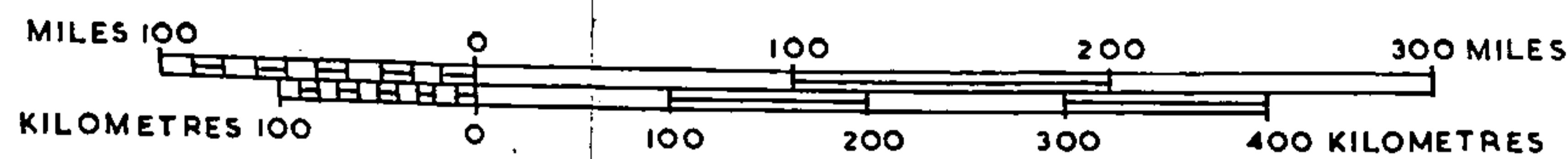
Varieties of Jute


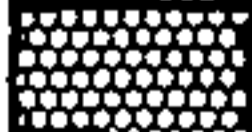


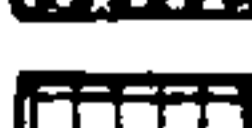
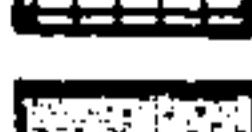

Jute is a tropical plant belonging to the genus *Corchorus*. There are about forty varieties of *Corchorus* of which two, viz., *C. capsularis* and *C. olitorius* are the best known for their fibres and are extensively cultivated. The two varieties are known by different names in different parts of India and Pakistan. They reveal remarkable differences in structure and other particulars. Some important points of difference are given below :

(i) *C. capsularis*.—The stem of the plant is light green or purple. It may or may not branch out. Roots are bushy and the leaves are bitter in taste. The fruits are round. The seeds are oval and chocolate coloured.

DISTRIBUTION OF SOILS IN THE JUTE REGION

(PRINCIPAL JUTE PRODUCING DISTRICTS)



-  ALLUVIAL SOIL
-  TARAI SOIL
-  DELTAIC SOIL
-  RED SOIL
-  LATERITE SOIL
-  LATERITIC SOIL
-  PEAT SOIL

and the fibre is generally white. The plant can stand waterlogging at a late stage and grows both on high and low lands. It is sown at least two months before the other variety.

(ii) *C. olitorius*.—The colour of the stem is light green or pink. The root system is deep and penetrating. The plants always branch out. The leaves are rough and tasteless. The fruits are elongated. The seeds are pyramid-shaped and bluish-black in colour. The plant cannot stand waterlogging and grows on high lands. It grows taller than the plants of the other variety. It is more susceptible to flood and drought and cannot withstand more than 15 inches of rainfall unless the land is well drained.

Distribution of varieties

The distribution of the two varieties of jute in the different States is shown in the following table:

TABLE 4
Distribution of *C. capsularis* and *C. olitorius* in the States of India

State	Capsularis p.c.	Olitorius p.c.
West Bengal	52.0	48.0
Bihar	72.0	28.0
Assam	87.0	13.0
Orissa	80.0	20.0
Uttar Pradesh	78.0	22.0
Tripura	97.0	3.0

About 75% of the total acreage under jute is covered by *C. capsularis*. This is primarily because this plant is sturdier than the other. All types of land, both high and low, suit this crop. It is sown early and when the monsoon sets in, and the pest attack begins in the months of June, July and August, the plant is big enough to withstand it. Besides, it has the advantage of reaching the market much earlier than the other variety. It matures early in June and July and cultivators get an opportunity of raising a second and sometimes a third crop on the same land. The *C. olitorius* as already stated is sown late. When the crop is harvested, the monsoon is over and many regions go dry. The retting and washing of *C. olitorius* fibre becomes a problem because when jute is steeped in muddy ditches, the fibre gets discoloured and does not fetch good price. All these considerations lead cultivators to choose the *C. capsularis* variety.

The largest acreage under *C. olitorius* is in West Bengal. Data on the relative yields of the two varieties appear to lend support to the general belief that *C. olitorius* is the better yielder of the two.

Jute is a tropical plant which needs a hot and moist climate. In the principal jute growing areas of India, the temperature varies from 45°F to 110°F, and the rainfall from as low as 40" in parts of U.P. to 80" and above in Assam. It does best in areas having between 50" to 70" of rainfall. In the jute growing areas of West Bengal, Assam and North East Bihar, preparation of land and sowing of jute starts with the pre-monsoon showers which begin towards the end of March in West Bengal and even earlier in Assam. The light rains in April and May alternating with periods of sunshine which are received in these areas before the onset of the monsoon are most helpful for the growth of the plant. Delay in arrival of the pre-monsoon showers causes delay in sowing of jute. This in turn does not permit sowing of transplanted paddy at the proper time in the monsoon

season in the double cropped lands, or jute has to be harvested long before its maturity, resulting in reduction in yield and quality of fibre. Excessive rainfall leads to waterlogging of fields, which in turn leads to lodging of the plants with reduction in yield and quality and abundance of weeds.

Soil

Soil is an important factor affecting the cultivation of jute. Jute grows almost on every kind of soil, but loamy alluvial soil suits it best. The deltaic regions of West Bengal, the Gangetic valleys of U.P. and Bihar, the Brahmaputra and the Surma valleys of Assam and the coastal regions of Orissa possess vast tracts of alluvial soil. In West Bengal, there are patches of slightly acidic soil. In Assam valleys, the soil is acidic and the acidity increases with the rainfall and heaviness of soil. The soils of Manipur and Tripura States are reddish clay and are of considerable depth. In Bihar, it is partly calcareous and partly acidic in nature. The jute growing tracts in Orissa vary from sandy to clayey and tend to be acidic. In the Tarai region of Uttar Pradesh, the soils are usually alkaline and sometimes sandy loams.

Drainage

Good drainage is essential for cultivation of jute. It has already been explained that the crop cannot tolerate water-logging at the early stage, and the *olitorius* variety cannot do it at any time; and yet it is a crop of the rains. It is obvious that unless the rain water finds an easy outlet, the crop is bound to suffer. It thrives well only in those regions where there is good rainfall, but where the rain water is drained off without obstruction.

Agricultural Practices

The agricultural practices may be described briefly as follows :

Preparatory tillage of land starts in the latter part of February. The land is first ploughed up five to eight times. The time required for ploughing depends on the type of soil, rainfall and whether animals or machinery are used. Normally an acre of light sandy soil requires about 12 hours, while hard clayey soil may take double that time for one ploughing.

Manuring is done after preparation of land. Generally, cowdung, farm-yard manure, oil cake, silt from old tanks or river beds, and ash of water hyacinth are used, and the quantity applied per acre depends on the capacity of the farmer. About 100 mds. of dung or farm yard manure per acre is considered quite sufficient. Use of chemical fertilisers is very limited as yet, though it has been found that 40 lbs. of nitrogen in case of *capsularis* and 20 lbs. in case of *olitorius* used at the time of top-dressing a month after sowing, yield good results. Bone manure does not increase the yield but improves the quality of the fibre.

Sowing in case of *capsularis* usually starts from March. The exact time of sowing depends on the rains and the situation of the land. On low marshy lands, it is done at the earliest opportunity so that the crop may be harvested in June before the rains set in full swing, flooding the low lying regions. Sowing on mid-lands and high lands can wait till the end of April. *Olitorius* plants are sown on high-lands. The operation begins from the end of April and continues till the end of May, and on rare occasions, till early June. Seed is usually broadcast all over the field, though experiments have shown that line-sowing with the help of seed drill raises the yield by about 9%; besides lowering the seed rate by nearly 29%.

The rate of seed used per acre is not the same everywhere. The seed rate depends on the type of jute, quality of seed, quality of the soil, method of sowing and the implements used in the operation. Normally when seed is broadcast, one acre of land requires about five seers of *capsularis* and three seers of *olitorius* seeds. But this is far more than what is actually needed. If line-sowing with the help of seed drill is practised, the seed-rate may be cut down by at least 50%. The farmers often use much larger quantities of seed than are required, as this practice is believed to suppress the growth of weeds; but the quantity used by them depends more on tradition than on actual requirements.

The next operation is weeding. It generally starts after the sixth week of sowing and may have to be repeated two or three times at intervals. Weeding includes thinning as well, which is of much greater importance under the broadcast method than under the line-sowing method of cultivation.

It takes about three to four months for the plants to mature. Harvesting on low-lying regions usually commences by the middle of June when the plants begin to flower. But the plant is harvested even earlier, before budding, if there is danger of flood or insects. Prematurely harvested crop yields short fibre with good glossy colour. The *olitorius* plants are harvested in August and September and in some regions such as the districts of 24-Parganas, Hooghly and Howrah in West Bengal, harvesting may continue up to October. Harvesting begins when the plants are in buds and continues till the end of the ripening of the fruits. Plants that are marked for seed-growing are allowed to remain on the field for about two months more.

After harvesting, the plants are tied in bundles and kept upright for two or three days for the leaves and branches to dry up. They are then taken to some pond or ditch and carefully steeped in water so that they may remain under water from two to four weeks. Early grown plants usually take less time than the late sown *olitorius*. After about 10 days, the steeped bundles are turned upside down and kept under water for some days more. When the fibres become loose, the plants are stripped, washed and dried. Generally one man can strip about 25 seers of fibre a day. Washing is a very important operation for, the colour and quality of the fibre depend on it. Late sown jute generally suffers from lack of sufficient water for washing, and does not get the same gloss and colour which the earlier crop does.

Yield

Yield depends on the fertility of soil, extent of manuring done, quality of seed, variety sown, care of the crop, especially weeding, stage of harvest and freedom from flood, drought, pests and diseases. Under favourable conditions, the yield may go up to 18/20 maunds per acre of fibre but the average yield is about 10 maunds per acre, under traditional methods. Improved agricultural practices have been found to have raised the yield in many cases by about 50%.

Cost of cultivation

In the studies on cost of cultivation which have been carried out by the Indian Central Jute Committee for the last 10 years, the cost of cultivation has been found to vary very widely in different centres of production and from year to year. However, the studies were based on a limited number of samples and could not therefore be considered fully representative.

Accordingly, a comprehensive scheme for collection of data on cost of cultivation on a representative sample of adequate size has been undertaken, from 1961-62. The results of the study when available will form the basis of accurate estimation of the cost of cultivation.

Under the studies conducted so far, labour is the biggest item in the cost of production, accounting on an average for 74% of the total cost. Bullock labour (13%); manure (7%) and seed (6%) are other major items.

CHAPTER II

LAND UTILISATION, PRODUCTION AND YIELD RATES

The area under jute forms a very small proportion (less than 1%) of the cropped area of the country. In the four eastern States of West Bengal, Assam, Bihar and Orissa, in which jute cultivation is concentrated, the proportion of land under jute varies from 0.9 per cent in Orissa to 7.4 per cent in West Bengal. In the 13 principal jute producing districts the variation in 1961-62 was from 6.6% in Cuttack to 34.8% in Cooch-Bihar. However, the proportion of land under jute is liable to wide fluctuations from year to year depending upon price and other factors. As will be seen from Table 1, the acreage under jute during the last five years has varied from 15.12 lakh acres in 1960-61 to 22.80 lakh acres in 1961-62. Similar variation occurs in all the principal jute producing districts as is shown by the figures of Appendix Table 2. There is substitution between jute and other crops especially paddy depending upon the prices of jute and paddy and other factors. The acreage under jute is subject to much greater variation with price than is the case with the other crops. In West Bengal, which is the major jute producing State, the substitution is between jute and aus (early) paddy and is largely the result of variation in the price ratio of these two crops. The cultivator shifts from aus paddy to jute or *vice versa* according as one or other crop is more advantageous to him. In parts of Bihar also, particularly in Champaran district, there is evidence of a relationship between area under jute and sugarcane depending upon the price factor.

Yield

The yield per acre of jute also varies greatly in different States and districts depending upon the local conditions of climate and soil, the available retting facilities and cultural practices. Variations in yields from year to year within the same area are due mainly to seasonal factors *e.g.* amount and distribution of rainfall, incidence of floods, pests and diseases etc. The price factor also has an influence because it is noticed that in years of higher prices, manuring and application of fertilizers is more intensive, inter-cultural operations are attended to more carefully, while in a year of low prices, these do not receive adequate attention. The variations in the average yield rates of jute in the jute producing States during the last ten years are shown in the following tables :

TABLE 5
Yield per acre of jute
1951-52 to 1962-63

State	(in bales)											
	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63
West Bengal	2.66	2.88	2.80	2.71	2.46	2.03	2.41	2.96	2.63	2.76	2.93	2.90
Tripura ..	2.50	2.42	2.53	2.42	2.50	2.76	2.89	2.64	3.00	2.73	3.00	3.00
Bihar ..	1.96	1.91	1.98	1.38	1.45	2.07	1.48	2.73	2.40	2.31	2.24	2.09
Orissa ..	2.40	2.29	2.19	2.21	2.21	2.01	2.21	1.78	2.83	2.61	2.67	2.57
Assam ..	2.51	2.92	3.14	2.66	3.30	2.95	3.40	3.06	3.34	2.72	3.12	2.08
U.P. ..	1.51	1.56	2.04	2.06	2.62	2.80	2.22	2.64	2.79	2.78	3.25	2.90
All-India ..	2.40	2.53	2.62	2.36	2.41	2.25	2.33	2.85	2.73	2.64	2.78	2.56

TABLE 6
Yield per acre of Jute

Season		West Bengal	Tripura	Bihar	Orissa	Assam	U.P.	All-India
Average 1960-61)	(1951-52 to	2.63	2.64	1.97	2.26	3.00	2.30	2.51
Average 1955-56)	(1951-52 to	2.66	2.47	1.74	2.24	2.91	1.96	2.46
Average 1961-62)	(1957-58 to	2.74	2.85	2.23	2.42	3.13	2.73	2.66

The coefficient of variation is the highest at 30.4% in U. P. and Bihar followed by Orissa 13.97%, Assam 9.87% and West Bengal 9.27%. The co-efficient is the highest in areas having low yields and is low in areas with high average yields.

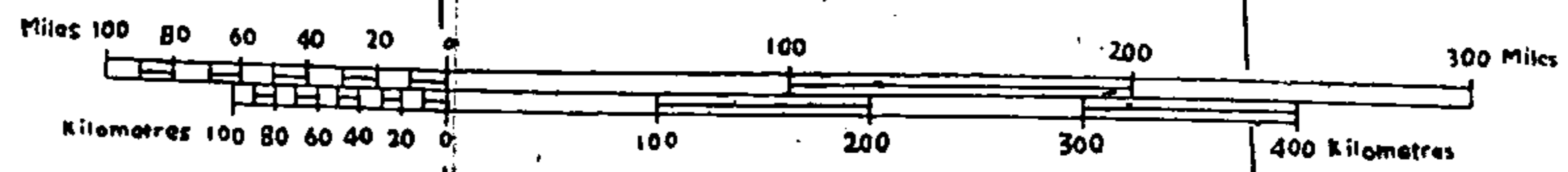
In the main jute producing districts the variation in yields is from about 2 bales per acre to as much as 4.0 bales per acre. The distribution of 17* selected jute producing districts according to yields of jute per acre is given in the following table :—

TABLE 7
Distribution of selected jute growing districts according to yields per acre.
(average of five years 1957-58 to 1961-62).

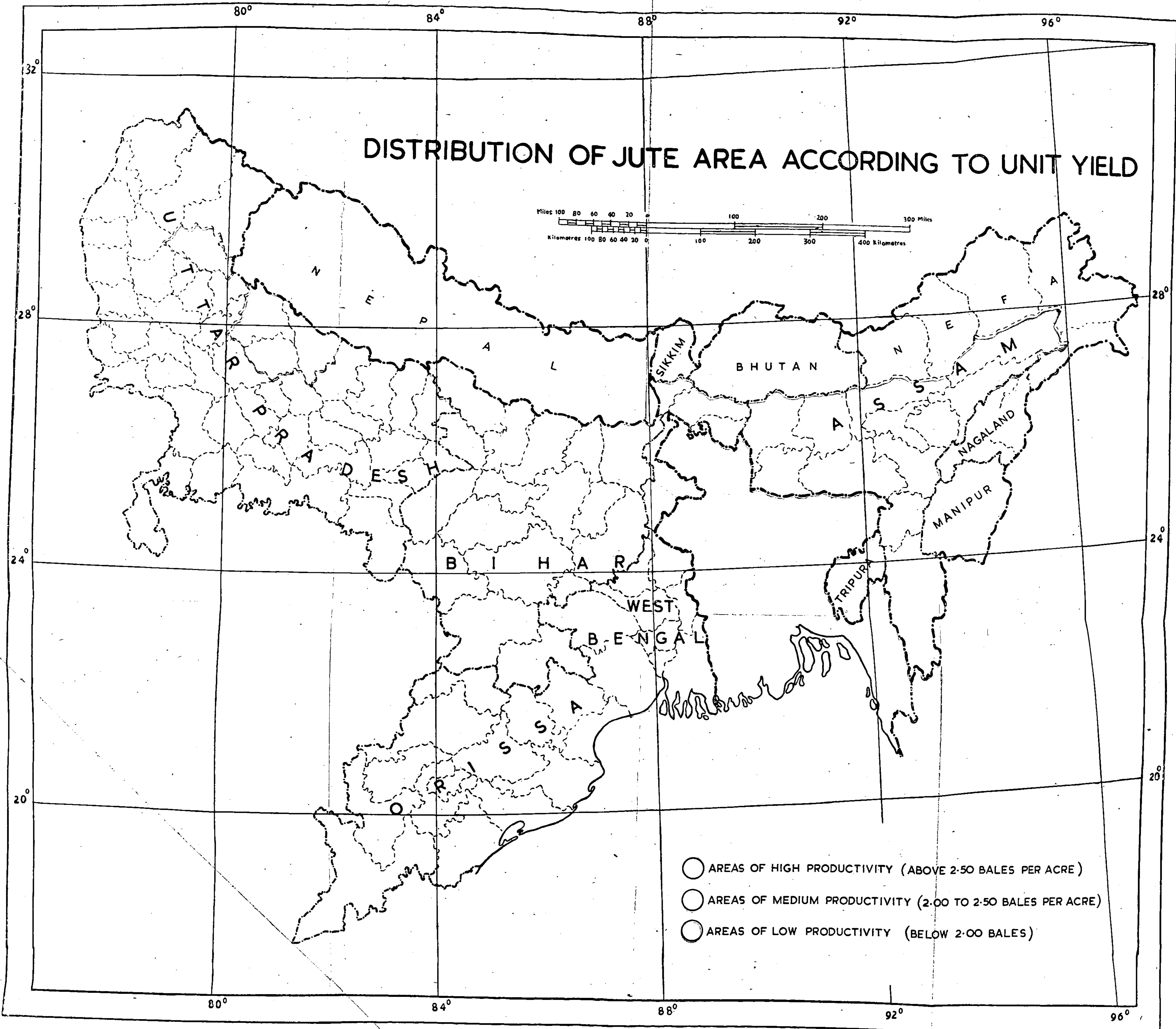
Yield per acre bales	Number of Districts	Average area under jute ('000 acres)	% of jute area to total area under jute	Names of districts	
A. Below—2.5	5	497	27.5	Bihar-1	Saharsa
				West Bengal-3	Murshidabad Malda W. Dinajpur
				Orissa-1	Cuttack
B. 2.5—3.0	7	612	33.9	Assam-1	Kamrup
				Bihar-2	Champaran Purnea
				West Bengal-2	24-Parganas Nadia
				U.P.-1	Lakhimpur Kheri
				Tripura-1	Tripura
C. 3.0 & above	5	474	26.0	Assam-2	Goalpara Nowgong
				West Bengal-3	Jalpaiguri Cooch Behar. Hooghly
TOTAL	17	1,583	87.4		

*13 principal jute producing districts plus Malda (West Bengal), Champaran (Bihar) Tripura and Lakhimpur Kheri (U.P.)

DISTRIBUTION OF JUTE AREA ACCORDING TO UNIT YIELD



- AREAS OF HIGH PRODUCTIVITY (ABOVE 2.50 BALES PER ACRE)
- AREAS OF MEDIUM PRODUCTIVITY (2.00 TO 2.50 BALES PER ACRE)
- AREAS OF LOW PRODUCTIVITY (BELOW 2.00 BALES)



Moreover it has been noticed that the areas which have high yields of jute also produce jute of the best quality and areas with low yields have produced fibre of the poorest quality. Thus, the districts in Category I above produce the best quality of the fibre while those in III and IV produce the poorest fibre. The best yields and quality of fibre are obtained from the three districts Hoogly, 24 Parganas and Nadia in which *C. olitorous* is the predominant variety. However, growing of *olitorous*, while it gives a high monetary return to the cultivator from the jute crop on account of both of high yield and good price of the fibre, has the disadvantage that it cannot be followed by paddy which is possible and is practised to an extent in case of *capsularis*. However, if varieties which have the high yields and quality of *olitorous*, and are also early maturing and can be followed by a crop of paddy, are evolved, additional yields of good quality fibre can be obtained, without detriment to the production of paddy. This is a most important problem for research because its solution will affect production and quality of the fibre in a large number of districts in which *capsularis* is the most important variety at present. Experiments along these lines have not been too successful thus far; but further work which is going on at present, holds promise of good results.

Extension of area under jute

In Chapter V after analysing the likely demand for jute, we have come to the conclusion that *about 80 lakh bales of jute* would be required by the end of the Fourth Five Year Plan. The share of these 13 districts at the rate of 80% of total production would be 64 lakh bales. If we assume that average yield in these districts can be increased up to 3.5 lakh bales, this production can be obtained from the acreage figure of 18.25 lakh acres which was under jute in 1961-62, and a slight increase in acreage to 20 lakh acres would take the figure to 70 lakh bales. An average yield of 3.5 bales per acre is not too high, when we consider that in three of these districts, the yield in 1961-62 was already 3.5 bales or higher and in another five it was between 2.90 and 3.50 bales. Accordingly, the major effort required in increasing anticipated production of jute to meet the anticipated increases in demand is to improve yields per acre, especially in areas like Bihar where these are markedly low. Large scale extension of jute acreage is neither necessary, nor is it desirable in view of its effects on production of paddy.

There are however certain areas in which extension of jute cultivation could take place without affecting production of paddy and in which such extension will bring about significant improvement in resource use and local farm economy. Chief among these are the areas which are receiving irrigation from canals and other sources like tubewells. The areas receiving irrigation from Hirakud canals in Orissa, the Kosi Canal areas in Bihar and the tubewell areas in West Bengal are examples. In all these areas, jute cultivation can be integrated into an intensive double-cropping pattern, which will improve the efficiency of resource use and the economic level of the cultivator without affecting production of food crops.

CHAPTER III

REVIEW OF DEVELOPMENT MEASURES

Development under First Plan

The partition of the country left the Indian jute mills in a difficult raw jute supply situation; only about 19 per cent of the total production of raw jute in undivided India having fallen to the share of the Indian Union. To tide over the acute shortage of the fibre, the internal supply was supplemented by heavy imports from Pakistan. But, the drive for increasing indigenous production was simultaneously intensified. Obviously, the easiest and the quickest way to achieve the objective was through extension of the acreage under jute and mesta. During the First Five Year Plan, the emphasis was placed more on extensive than on intensive measures to secure the desired increase in production.

That this approach yielded quick results is borne out by the fact that between 1948-49 and 1951-52, the area under jute increased from 8.34 lakh acres to 19.51 lakh acres, and production from 20.55 lakh bales to 46.78 lakh bales. Much of the additional production was however from marginal lands and was of poor quality and fetched low prices. The peak production in 1951-52 was the result of the abnormal high prices following the Korean War boom. It was not sustained and in subsequent years acreage and production fluctuated as indicated in Table 1; the figures at the end of the First Five Year Plan (1955-56) being 17.39 lakh acres and 41.98 lakh bales respectively. The Plan period also did not see any noticeable increase in the yield per acre which was almost the same in 1955-56 (2.41 bales) as it was in the beginning.

The area under mesta also increased steadily from 4.83 lakh acres in 1952-53 to 5.72 lakh acres in 1955-56.

The conditions created by increased production of low quality jute made it necessary for the Government of India to concentrate more on the improvement of quality than on mere expansion of production. Consequently, the Expert Committee on Quality of Jute, set up in February, 1953, under the Chairmanship of Shri K. R. Damle, made a number of recommendations mainly for improving the quality of jute. As a result of these recommendations, some progress was made in the excavation of new retting tanks and renovation of old tanks as also in the multiplication and distribution of improved seed.

Even so, the intensive development measures did not make much of an impact during the First Plan period. Only West Bengal, the most important jute growing State, made a small beginning in this direction and more significantly in respect of only one factor of production, viz., application of fertilizers.

Second Five Year Plan

The Second Five Year Plan sought to raise an additional output of 1.3 million bales so as to achieve a total production of 5.54 million bales at the end of the Plan period. This target was proposed to be realised through (i) further extension of area by 3.9 lakh acres, and (ii) intensive cultivation measures with the ultimate object of achieving an average yield of 3

bales per acre of good quality jute against an average of only 2.4 bales at the end of the First Five Year Plan. In regard to the extension of area it was proposed to undertake new cultivation in areas suitable for growing high quality jute with a shift in emphasis from quantity to quality of the fibre. The intensive cultivation measures proposed in the Second Plan included expanded use of fertilizers, setting up of seed multiplication farms, supply of improved seed to the cultivators, distribution of seed drills and wheel hoes, plant protection measures, and construction of new and renovation of old retting tanks, etc. The organisation of an extension service for demonstration of improved cultural practices was also an important item in the jute development programme.

The all-India targets and achievements of various developmental measures undertaken during the Second Plan period are indicated below :—

TABLE 9

All-India Targets and Achievements during the Second Five Year Plan Period

Items	Target (1960-61)	Achievement (1960-61)	Short-fall	
			Absolute	%
<i>Fertilizer</i>				
Area fertilized (lakh acres) ..	7.50 (or, about 50% of the area at the end of the Second Plan period)	2.78	4.72	} 62.92
Quantity distributed ('000 tons)	37.50*	13.91	23.59	
<i>Improved seed</i>				
Area covered (lakh acres) ..	5.25	1.44 (Govt.)** 10.70 (Natural spread)	3.81	72.60
Quantity distributed ('000 mds.)	40.38**	11.05 (Govt.) 82.33 (Natural spread)	29.33	72.60
<i>Line sowing</i>				
Area ('000 acres)	180.00†	29.96	150.04	83.36
No. of wheel hoes	30,000	N.A.	—	—
No. of seed drills	30,000	N.A.	—	—
<i>Plant protection</i>				
Area ('000 acres)	—	135.35	—	—
No. of sprayers	10,000	—	—	—
<i>Retting tanks</i>				
New	16,040	} 24,360.	2,612	21,748
Old	8,320			

*Estimated on the basis of requirement of 1 ton for 20 acres.

**On Govt. account only; estimated on the basis of a requirement of 1 Md. of seed for 13 acres.

†Estimated on the assumption that one seed drill can command 5 acres.

N.A.—Not available

The above table shows that except in the use of improved seed, in which it is claimed that 70% of the area was covered through natural spread, the achievement fell short of the target in case of all development measures. The area benefited by use of fertilisers came to only about 38% of the Plan target, and 18% of the total area under jute in 1960-61. The area under line sowing barely reached 15% of the target. The number of new retting tanks excavated and old tanks renovated was also considerably less than the target.

The year by year progress of areas benefited by different measures in the Second Plan period is given in the following table. Figures for individual States are given in Appendix Table 3.

TABLE 10
*Progress of intensive cultivation measures during the
Second Five Year Plan Period*

Year	Total area under jute ('000 acres)	Area benefited in ('000 acres)								Yield per acres (bales)
		Fertilizers		Improved seed		Line-sowing		Plant protection		
		Total	%	Total	%	Total	%	Total	%	
1956-57	1,908	128.60	6.74	31.06	1.63	7.66	0.40	40.17	2.11	2.25
1957-58	1,742	134.76	7.74	49.18	2.82	10.43	80.60	43.11	4.20	2.33
1958-59	1,811	276.80	15.24	75.32	4.16	14.32	0.79	187.12	10.33	2.85
1959-60	1,685	317.30	18.83	139.05	8.25	21.12	1.25	83.54	4.96	2.73
1960-61	1,512	278.20	18.40	143.69	9.50	29.96	1.98	135.35	8.95	2.63

It will be seen that the various developmental measures were progressively intensified during the Second Plan. Taking fertilizers first, it will be noticed that between 1956-57 and 1960-61, the estimated area under fertilizers more than doubled. State-wise, the performance was most impressive in Orissa though the area under jute in that State is relatively small. Among the other states, the distribution of fertilizers was the highest in West Bengal, though here also only about 25% of the area under jute was benefited.

In regard to improved seed distributed by the Government, the percentage of total area covered increased from 1.63 to 9.50. But it is well known that the seed, particularly the nucleus seed, distributed to registered growers and private seed multiplication farms is further multiplied and sold to the cultivators. They, in their turn, grow some seed along with fibre for their own use in the next season. In this way, the process continues and it is claimed that through natural spread about 75% of the total area has been covered by improved strains of jute seed. Of course, doubts have also been expressed as to how much of this so-called improved seed through continuous multiplication over years in unfavourable surroundings and because of admixture with inferior seeds, could ultimately retain its purity and improved character.

The progress of line-sowing, which alone is understood to give an extra yield of about 2 mds. per acre, can be said to be only nominal inasmuch as 2% of the area came under line sowing as against a target of about 12% fixed under the Plan. It was only in U.P. that the area under line sowing increased from 2.8% in 1959-60 to about 43% in 1960-61, largely due to the adoption of a device for sowing behind the plough. Plant protection,

made some headway particularly in 1958-59 when a tenth of total jute acreage was estimated to have been benefited by it. However, it is difficult to assess the adequacy or otherwise of the plant protection measures, they do on the extent of attack of pest and diseases, which it is difficult to forecast. Nevertheless, their incidence is so very common for a crop like jute that there is urgent need for further intensification of efforts in this field. It is common knowledge that the growers are ill-equipped for taking proper action themselves due to lack of both resources and training. Their reliance is made on the resources of the Government, and in years of widespread attack of pests and diseases, Government efforts alone are not sufficient to cope with the situation.

As regards retting, considerable difficulties exist in many parts of the jute growing States. Inadequacy of running water and suitable retting tanks is one of the factors responsible for the low quality of jute produced. The need for excavation of new retting tanks and re-excavation of old tanks was, therefore, emphasized, first by the Expert Committee on Quality of Jute set up in 1953 which recommended the excavation of 8200 new retting tanks, each measuring 100 ft. × 25 ft. × 6 ft. and the renovation of about half the number of old tanks by the end of the First Plan period. The Central Government agreed to give 50% of the expenditure as grants-in-aid to the jute growers limited to Rs. 150 for each new and Rs. 75 for each old tank. In the Second Plan, also emphasis was given to retting for improving the quality, colour and strength of the fibre and a much higher target of retting tanks was fixed. The programme of retting tanks was taken up in West Bengal, Assam and U.P. from the third year of the First Plan period and a year later in Bihar and Orissa. Since then an increasing number of tanks was either excavated or renovated, although the pace of progress slowed down towards the latter part of the Second Plan period particularly in West Bengal and Bihar. In Orissa, unfortunately no progress appears to have been made after the second year of the Second Five Year Plan. Generally speaking, the tempo of activity in this sphere was found to have lost its momentum towards the latter part of the Second Plan period.

The yield per acre of jute did not reveal any clear upward trend. It rose from 2.25 bales in 1956-57 to 2.85 bales in 1958-59; but thereafter declined to 2.73 bales in 1959-60 and further to 2.63 bales in 1960-61. But the fluctuations are due mainly to seasonal factors. Even the highest yield per acre recorded during 1958-59 was less than the Plan target of 3 bales per acre by 5%.

Third Plan

Target of production and achievement

The Third Five Year Plan had fixed a target of additional production of 22 lakh bales of jute so as to achieve a total output of 62 lakh bales by 1965-66. This target was proposed to be achieved by increasing the average yield to 3.5 bales per acre through further expansion and intensification of development measures initiated in the first periods of the two plans.

During the first year of the Third Plan period acreage under jute increased sharply under the stimulus of abnormally high prices, production exceeded the plan target, and reached an all time high of 63.47 lakh bales. The average yield per acre was also somewhat higher, at 2.78 bales. The next year of the Plan (1962-63) however witnessed a fall in area to 20.95 lakh acres and production to 53.67 lakh bales (following a decline in prices).

The yield per acre in this year was only 2.56 bales, the lowest since 1958-59. The fall in yield per acre is due partly to adverse weather conditions especially in Assam which experienced frequent floods and partly to lesser attention to improved cultivation practices e.g. the use of fertilisers, by the cultivators. The influence of the price factor which led to a sharp rise in production and application of inputs in 1961-62 and subsequent reduction in these in 1962-63 can be clearly seen from the figures of Table 11. Application of fertilisers in 1961-62 was almost double that in the previous year (25,300 tons as compared with 13,900 tons); but decreased to 18,200 tons in 1962-63. Similarly in case of retting tanks achievement in 1962-63 was much below that of 1961-62. The fall in this case was particularly noticeable in case of Bihar. Only in case of improved seed, progress was more steady and the area covered in 1962-63 was higher than that in the previous year. The area under jute sown in lines in the country increased from 30,000 acres at the end of the Second Plan period to nearly 48,000 acres in 1961-62 and further to 55,566 acres in 1962-63. In Tripura, Bihar and Assam, however, the rise was very significant though in the last State the area somewhat declined in the second year. The activities in respect of plant protection also were found to have been intensified in the first year of the Third Plan period. Though no precise information is available for the second year, it is understood that there was a mild attack of insect pest and diseases in almost all the States but these were controlled by the State Plant Protection Departments.

Among the various reasons for the non-fulfilment of the targets, mention may be made of the following :—

Fertilizers :

(i) In some years sufficient quantities of fertilizers were not available to meet the full requirements of the States, in other, the quantities that were allotted could not be lifted by the States because the demand had gone down with fall in price. Fertilizers were also not available at the proper time.

(ii) The machinery for distribution of fertilizers in the different States left much room for improvement. The credit facilities to the growers could not be provided in spite of the fact that loans were made available to the States by the Centre. Cumbersome procedure for sanction of taccavi loans and loans by the co-operatives acted as a disincentive to the cultivators to avail of loan facilities.

(iii) The demand for fertilizers decreased in years when the prices of jute went down.

(iv) Appropriate kinds of fertilizers could not be made available to the cultivators.

(v) The distribution points were not located within easy reach of cultivators.

Improved seed :

(i) A number of seed farms were established in the different jute growing States but the actual production of improved seed fell far short of the targets.

(ii) The programme of multiplication of seed through the registered seed growers could not be implemented successfully. In most of the States,

TABLE II
Progress of jute development work during 1961-62 and 1962-63

State	Year	Fertilizers		Improved seed*		Area under line sowing		Area covered by plant protection measures		No. of retting tanks (old and new)
		'000 tons	% of total jute area covered	'000 mds.	% of total jute area covered	'000	% of total jute area covered	'000 areas	% of total jute area covered	
West Bengal ..	1961-62	17.91	31.31	1.60	1.82	14.00	1.22	250.00	21.85	1,800
	1962-63	9.17	17.08	1.80**	2.18**	14.50	1.35	—	—	1,800
Bihar	1961-62	2.00	7.08	8.80	20.25	7.54	1.33	20.00	3.54	1,187
	1962-63	1.44	5.87	8.81	23.38	7.32	1.49	—	—	431
Assam	1961-62	1.01	5.56	0.65	23.28	0.70	0.19	40.00	11.02	150
	1962-63	2.00	11.94	7.42	28.79	0.54	0.16	—	—	244
Orissa	1961-62	3.55	62.28	1.37	15.62	1.80	1.58	5.00	4.39	800
	1962-63	5.00	87.72	0.21	2.39	5.00	4.39	—	—	250
U.P.	1961-62	0.80	27.11	1.26	27.27	20.50	34.75	5.00	8.47	N.R.
	1962-63	0.54	20.77	1.80	45.00	25.20	48.46	—	—	N.R.
Tripura ..	1961-62	0.03	1.71	0.25	9.29	3.00	8.57	—	—	100
	1962-63	0.05	3.33	0.11	5.85	3.00	10.00	—	—	100
All India ..	1961-62	25.30	22.19	13.93	7.94	47.54	2.09	320.00	14.04	4,037
	1962-63	18.20	17.37	20.15	12.50	55.56	2.65	—	—	2,825

*Distributed by Government

**Another 15,000 mds. distributed by registered growers

N.R. Not reported

sufficient seed could not be procured from the growers for further distribution in spite of the subsidy of Rs. 20 per maund.

(iii) Production of jute seed does not fit in with the cropping pattern of the jute growers, as it does not release their lands in time for the second crop.

(iv) Sale of non-descript jute seed at low rates in the moffasil markets stood in the way of spread of improved jute seed. The cultivators had a tendency to purchase cheap seed which were readily available at hand.

Implements :

(i) The targets fixed for line sowing and intercultural operations could not be achieved as the number of seed drills was not adequate. The progress of line-sowing so far made was limited to the areas that could be covered by the seed drills supplied for demonstration purposes.

(ii) The cultivators were not able to purchase seed drills and wheel hoes on account of high price.

(iii) The seed drill manufactured were not up to the mark. The manufacturers used inferior and sub-standard materials in the manufacture of the seed drills.

(iv) The seed drills were not suited to different soil conditions.

(v) Very few seed drills could be sold on account of high price and defective construction of the seed drills.

(vi) In some States the sale of seed drills was entrusted to co-operatives which did not make sufficient efforts for their sale.

Retting Tanks :

(i) Allocations made for retting tanks were fully utilised in most of the States where subsidies were provided and the excavation of small retting tanks by individuals made some headway, but this did not touch even the fringe of the problem as the number of retting tanks sanctioned was quite inadequate.

(ii) The small cultivators could not make use of these facilities as they had no land of their own where they could excavate a small retting tank.

(iii) The Model Retting Tank Scheme in which excavation of community tanks for the small growers, tanks along canals and tube-wells were suggested, could not be implemented in the States due to lack of funds.

Plant Protection Measures :

(i) Loss due to insect pest and diseases has been reduced considerably by plant protection measures; but there is still scope for improvement. There are not enough of power sprayers and dusters easily available at convenient centres for immediate control of insect pest attacks when they appear in epidemic forms.

(ii) The cost of hand sprayers is prohibitive. They are not within easy reach of the cultivators who are anxious to purchase them for adopting plant protection measures themselves.

Administrative :

The Jute Development Staff under the Block Development Officers and the Jute Development Officer have no control in getting the Jute Development Programme executed through this staff. The Jute Development Officers in the different States, except in West Bengal, are Class II Officers and therefore cannot pull their weight with the other officers whose help and co-operation are necessary in the proper execution of jute development work.

The measures needed to remove these deficiencies are indicated in the Chapter IX.

CHAPTER IV

AGRICULTURAL RESEARCH

Large-scale cultivation of *Corchorus capsularis* and *C. olitorius* in India was started in the second quarter of the Nineteenth Century. It was encouraged by the growth of jute industry in England and later, in Calcutta. Researches on improvement of the crop, however, was started in the beginning of this century under the auspices of the Department of Agriculture, Government of Bengal.

Earlier work of Finlow and his school established the two improved strains, viz. Chinsurah Green (C.G.) and D-154 from *olitorius* and *capsularis* types, respectively. In 1932, Banerji determined the chromosome number of the two species.

With the establishment of the Indian Central Jute Committee in the late thirties, organised research for all round improvement of the crop was taken up by the Jute Agricultural Research Institute at Dacca and was later transferred to Nilgunj.

At present, most of the important jute growing States has a Jute Research Sub-Station, to deal with the regional problems, in collaboration with the Jute Agricultural Research Institute.

Since in jute breeding, a selected plant has to be kept for seed and, therefore, its fibre cannot be determined directly, it was necessary to base the criteria for selection on morphological characters like, plant height and basal diameter. Hence the evolution of improved strains both in *olitorius* and *capsularis* was more time consuming. The improved strains evolved were tested under varying agro-climatic conditions existing in the jute growing tracts and have been accepted by the jute growing States.

A. Breeding

(i) *Olitorius*.—The following improved *olitorius* strains have been evolved, whose average yield from 1956-58 are given below :

TABLE 12

Variety	Yield (md/acre)	Per cent on C.G.
JRO 753	21.42	127.7
JRO 632	21.35	127.2
JROX 7475	20.20	120.4
JRO 620	18.21	108.5
C.G.	16.78	100.0
P.	0.01	
C.D.	1.89	
S.E.	2.20	

From the above table, it will be seen that the improved strains viz. JRO 753, JRO 632 and JROX 7475 have given significantly higher yield than the standard variety C.G.

JRO strains 632, 753 and 620 have been tried in the jute growing States, the results of which are included in table below :

TABLE 13

Variety	Yield	W. Bengal*	Bihar	Assam*	Orissa	U.P.	Average
JRO—632	Mds/acre	20.02	18.68	20.39	22.86	18.42	20.47
	Quality	85.68	84.28	90.54	85.00	101.25	89.33
JRO—753	Mds/acre	21.29	18.21	20.05	24.15	20.05	20.75
	Quality	83.69	87.47	92.12	85.00	98.25	89.31
JRO—620	Mds/acre	19.72	19.86	19.35	22.69	16.64	19.65
	Quality	87.90	87.97	95.50	86.67	96.25	90.66
C.G.	Mds/acre	18.33	17.85	18.29	20.76	15.02	18.05
	Quality	83.56	86.63	85.10	82.17	93.25	86.14
Local	Mds/acre	17.66	17.59	16.65	18.64	14.88	17.08
	Quality	86.55	91.92	86.91	92.00	90.00	89.48

*Results of 1951—54 only.

The superiority of improved strains has been accepted in all the jute growing States.

(ii) *Capsularis*.—JRC-212 and JRC-321, the improved *Capsularis* strains, have been tested in the jute growing States. It has been found that JRC-321, which is an early maturing type may perform better than D-154, the standard variety, in rainfall tracts, where early harvest of jute is followed by transplanted paddy, while JRC-212, which is as late as D-154 in maturity, appeared to be more suitable for medium lands with late rainfall. In addition, JRC-212 not only is more resistant to stem-rot, but gave a higher yield than D-154, when the nitrogen applied was increased from 45 to 60 kg/ha.

B. Agronomy

Cultural

(i) Date of sowing

Date of sowing as manifest in edaphic and climatic conditions prevailing during sowing and growing period, has profound influence on the yield.

Under conditions prevailing in Nilgunj, late varieties of both *olitorius* and *capsularis* (JRC-632 and D-154) gave higher yield than early varieties (C.G. and Fanduk). Optimum period of sowing appears to be the first week of April for *capsularis*, while for *olitorius*, it is the last week of April. In general, April sowing is best.

(ii) Row cropping and spacing

Line sowing was found to increase the yield over broadcast sowing in general, but the differences were not always manifest at significant level in *olitorius* jute. *Capsularis* jute (D-154), on the other hand recorded a significant increase when planted in lines. An average increment of 14.95% (2") and 18.30 (3") was obtained over broadcast planting by sowing in lines

spaced 12" apart and thinning the line to leave 2"—3" distance between plants.

(iii) *Time of thinning*

Studies carried out in *olitorius* and *capsularis* jute during 1957-59, indicate that when the operation of thinning out the excess plants is done at the earliest opportunity (about 10-12 cms.), the highest yield of fibre is obtained in both *capsularis* and *olitorius*. This also reduces chances of leaf infection that leads to stem-rot.

(iv) *Interculture*

In experiments conducted between 1955 and 1958, it was observed that maximum average yield of 21.08 mds/acre, was recorded in plots receiving two weedings and thinnings, followed by 4 wheel hoeings.

In another set of experiments between 1958 and 1961, two early weedings and one thinning at 3 weeks recorded a maximum average yield of 25.92 mds/ acre. Larger number of weedings or thinnings were of little benefit and even reduced the fibre yield; lesser number was definitely deleterious.

(v) *Time (stage) of harvest*

In studies made during 1949-50, *capsularis* jute was harvested at eight different stages of growth. In general, harvest at later stages of growth yielded more fibre. Although the stage later than small pod gave higher yields, the fibre produced was coarser.

C. Manurial

(i) *Levels of inorganic nutrients*

In an experiment conducted from 1951 to 1956, with 3 levels of nitrogen (0, 20 and 40 lb. N/acre) and phosphate (0 and 40 lb. P_2O_5 /acre) and K, singly and in combinations, it was found that in *capsularis*, application of 40 lb./acre Nitrogen was optimum. P and K, singly, were not effective, but application of K with 40 lb. N ($N_2 K_1$) averaged the highest fibre yield of 24.54 mds. per acre, as against 16.53 mds., obtained without applying any fertiliser. This was followed closely by N_2 , and $N_2 P_1 K_1$ or $N_2 P_1$. Response of *olitorius* to P and K was similar to that of *capsularis*. It appears that 20 lbs. N alone was optimum for *olitorius*, under Nilgunj conditions.

Quality studies indicate that nitrogen application tends to deteriorate the quality, while potash and phosphate improve it.

(ii) *Proportion of organic and inorganic nitrogen*

The studies were started with *olitorius* and *capsularis* in 1951 and continued till 1954-55. A mixture of town compost and F.Y.M. at equal nitrogen levels was applied at 50% availability basis from organic source and full availability basis from ammonium sulphate, total being 30 lbs. available nitrogen per acre, from both inorganic and organic sources at various proportions (100, 67, 50, 33 and 0 per cent).

In the *capsularis* trial at Chinsurah in 1951-52, the responses were found to be significant, 100% nitrogen from inorganic sources giving the

highest yield 20.81 mds. per acre as against 15.34 mds./acre from control. The fibre yield decreased gradually along with the lowering of the proportion of nitrogen from inorganic sources. Similar trends were exhibited by *capsularis* at Nilgunj. In *olitorius*, however, the responses were not significant at either location.

(iii) *Time of application of ammonium sulphate*

First series of trial with *capsularis* and *olitorius* were started in 1950-51 and continued up to 1954-55. Application of fertilizer @ 30 lbs. N per acre (except in the first year when manuring was done at 20 lbs. N/acre) was made in one, two or three instalments, either before sowing or at 3 weeks age (1st weeding) or at 6 weeks age (2nd weeding). The treatment differences were not found to be significant.

Another study was started with *capsularis* jute in 1956-57 and continued for five seasons. 30 lbs. N/acre was applied in one, two or three instalments, as above, using five sources of nitrogen, viz., ammonium sulphate, ammonium chloride, urea, ammonium sulphate nitrate and Chilean nitrate. Application of the entire quantity of nitrogen in a single dose at the time of sowing was the most economical, averaging 24.98 md./acre, which is as good as three split applications—one at planting and the other two as top dressings (25.19 mds./acre), and two split applications, both as top dressing (25.03 mds./acre). Minimum fibre yields was recorded in the plots receiving full dose of nitrogen as top dressing, either at 3 weeks (23.76 mds./acre) or at 6 weeks (23.78 mds./acre). Sources of nitrogen, however, failed to be significantly different.

(iv) *Maximum potential studies on yield of jute fibre*

To study the effect of manuring with N alone or along with PK at various levels, two trials were taken up with *capsularis* and *olitorius* in 1959-60 and repeated in 1961-62. The treatment included application of 0, 20, 40, 60, 80 and 160 lbs. N/acre, either alone, or with half the quantity of each of P and K (i.e. $P \rightleftharpoons K = \frac{1}{2} N$). Applications of P and K, without dressing with nitrogen, depressed fibre yield. Nitrogen fertilisation alone was as good as its combination with P and K. In *olitorius* jute, optimum was reached with 20 lbs. application of nitrogen, while in *capsularis*, 40 lbs. was optimum. Any increment in application of nitrogen, beyond the indicated optimum resulted either in no increment of yield or too little to pay for the cost of the fertiliser.

(v) *Manure-cum-Variety*

In order to study the differential response of jute varieties to various levels of nitrogen fertilisation, one trial each, with *capsularis* and *olitorius*, was started in 1955-56 and 1957-58 (for *olitorius* only) and repeated till 1959-60 with the exception of 1956-57. Four varieties of each of *capsularis* viz. JRC-212, JRC-312, D-154 and local, and *olitorius* viz. JRO-632, JRO-620, C.G. and local, were fertilised with 0, 20, 40 and 60 lb. N/acre as ammonium sulphate, at the time of sowing.

Olitorius varieties were significantly different in their yield level, but exhibited similar response curves at various levels of nitrogen fertilisation; the optimum being around 20 lb. N/acre. In *capsularis* on the other hand, difference between varieties was not clear cut, while the yield of all varieties increased with increment in the quantity of nitrogen fertilizer up to

30 lbs. N/acre; the former was, however, contrary to previous findings, where variety JRC-212 gave the maximum yield of fibre.

Green Manuring

It is usually not possible to green-manure jute lands, as sowing time is practically the same for both. However in a double cropping programme with jute and paddy or wheat, the residual effect from green manuring paddy (or wheat in highlands) may be derived by jute in the next season. Green manuring was found to increase the yield of paddy by 24.5% over paddy without green manuring. These increments bore very little relationship to the quantity of organic matter produced by various leguminous crops, turned under as green manure. A short period of 10 days allowed for decomposition of green manure reduced the average yield of paddy to 24.56 md/acre, while a lapse of 40 days resulted in an average yield of 34.26 md/acre. The advantage of a longer period of decomposition was marked when less succulent crops like 'dhaincha' rather than soft-stemmed crops like cowpea, were grown for green manure. Besides this, paddy when green-manured with the non-fibrous portion of jute, but without fertilizer, also gave an extra yield of 3.5 mds per over control. It is further found that sunnhemp or Kalikalai may easily be sown at the time of 3rd or 4th interculture of jute and may be ploughed under when 35 to 55 days old. Yield of jute was not affected by this procedure, but the following paddy crop benefited from intercropped legumes.

For plots suffering from chronic stem rot or root rot, green manuring with 'dhaincha' every fifth year has reduced the incidence of disease effectively and also weeds, at least for the next two seasons.

Double Cropping

Jute can be grown as an earlier additional crop in low lying aman paddy lands, which are usually single cropped.

With regard to paddy, the date of transplantation seemed to be the most important factor affecting its yield and this has to be done between 16th and 30th August, at least in plains of West Bengal.

It was found that the late variety D-154 gave higher yield than the early maturing 'Fanduk' as the preceeding jute crop.

If irrigation facilities exist, it is possible to get increased fibre yield of the preceding jute crop by sowing early and it is also possible to get three crops within economic limits. If more stress is laid on the production of the foodgrain, the recommendation will be to sow jute as early as possible, excepting *olitorius* types, which should not be sown earlier than 15th April. Paddy as stated earlier, should be transplanted during the second half of August. The third crop a pulse (e.g. Khesari or lentil) has to be sown broadcast in the standing paddy field, when the land is still moist and the paddy crop is well advanced in growth, which is possible particularly in Gangetic Plain.

Retting

A number of investigations have been carried out on the retting of jute fibre. The important findings from the studies are as follows :—

(i) The optimum temperature for proper retting is 33-35°C. If the temperature is above 42°C, or below 20°C, the period of retting is

abnormally long and very little retting takes place. When retting period is prolonged, the fibre becomes dazed and weak.

(ii) 2 to 5 stems of Dhaincha (*Sesbania bispinosa*) or sunhemp (*Crotalaria juncea*), incorporated in jute bundles, reduce the retting period by about 4 days.

(iii) Covering materials like Shoti (*Curcuma zeodonia*), Kans (*Saccharum spontanium*), Screw-pine leaves (*Pandarus oderatissimus*), coconut leaves and jute sticks, are useful for giving a better colour to the fibre.

(iv) The jute bundles should be well below the surface of water (at least 15 cm below the water surface) and not too deep (not more than 60 cm. below the water surface) for proper retting.

(v) Clods of earth, banana stem, and fresh mango logs, should not be used as weighing materials; stones or concrete slabs are preferable.

(vi) Water hyacinth, Pistia, Lemna, Hydrilla etc. in the retting tank, give better colour to the fibre.

(vii) Shyamla (dark) colour of the jute fibre, obtained from some of the jute growing tracts can be removed by treatment with tamarind water (4 kg. ripe tamarind, free from shells, in about 6 kg. of water).

(viii) Retting in slow moving water is preferable, and gives fibre of good colour and lustre.

D. Diseases and pests of jute

Seedling blight, Stem-rot, Collar-rot and Root-rot, are the diseases caused to jute by the fungus *Macrophomina phaseoli*. The loss due to this fungus is estimated to be about 11% of the anticipated yield. In addition, diseases such as Anthracnose, caused by *Colletotrichum corchori*, Leaf mosaic, caused by a virus in *capsularis* varieties, Mildew (*oedium sp.*), Soft-rot and Die-back caused by the pathogens, *Sclerotium rolfsii* and *Diplodia corchori*, respectively, also affect the jute plants.

Among the pests, jute semi-looper (*Anomis saburifera*), is the most destructive and causes about 14% loss in normal years and about 50% under epidemic conditions. Of the three broods of the pest which appear in the jute season, the second is the most dangerous. Crops sown late, due to late rains, become more liable to damage. The other important pests, such as, indigo caterpillar (*Laphygma exigua*), hairy caterpillar (*Diacrisia obliqua*), jute apion (*Apion corchori*), jute stem girdler (*Nupsera bicolor*), tobacco caterpillar (*Prodenia litura*), yellow mite (*Hemitarsonemus latus*), burrowing cricket (*Brachytrypes achatinus*), nematode (*Meloidogyne incognita*), also cause considerable damage to the jute crop, under conditions which favour their infestations.

Control of Diseases

The control measures worked out for the diseases include :—

1. Pre-sowing seed treatment with organic mercuric compounds like, Agrosan GN on Ceresan, @ 10 gm/kg, for 10 minutes.

2. Raising the pH of the soil (to above 6.4) by the addition of lime (14 to 20 q/ha) according to the nature of the soil and application of potash @ 25 to 50 kg/ha, especially in the case of diseases caused by *Macrophomina phaseoli*.

3. Preventive spraying of 1% copper oxychloride or $\frac{1}{4}$ % Bordeaux, at the base of the row of plants, for collar-rot.

4. 4 prophylactic sprays of 0.75% copper oxychloride during 3 to 6 weeks cropage, for stem-rot or 3 times in one week for Anthracnose in *capsularis*, when the disease starts.

For control of Anthracnose in *olitorius*, in addition to lime at 10 q/ha, and 20 kg of P_2O_5 /ha, nitrogen should not be used above 20 kg/ha.

5. Dusting of lime sulphur (3 : 1) controls Mildew, which is best applied at dawn, when the dew is still on the leaves.

6. Deep ploughing, clean cultivation, spraying of 1% Bordeaux, copper oxychloride or copper oxide, covering the field and the base of the crops, have been found to be effective in controlling soft-rot, both in *olitorius* and *capsularis*.

Control of pests

For the control of pests like Jute semi-looper, hairy caterpillar and Tobacco caterpillar, application of either Folidol E 605 @ 1 cc per 5 litres of water (parathion 0.01%) or Endrin 20% E.C. @ 7.5 cc per 5 litres of water (endrin 0.03%), at the rate of 350-500 litre/ha, are helpful. For 1 and 3, DDT 50% w.p. @ 50.75 gms per 5 litres of water (DDT 0.5%—0.75%), have also been found to be useful.

As a prophylactic measure against Jute apion, application of DDT @ 25 gms per 5 litres of water (DDT 0.25%) on seedlings, was beneficial. As a control measure, Folidol at the rate mentioned earlier, has been found to be effective.

The incidence of jute stem girdler can be checked by the application of Endrin. BHC 10% dust @ 14 to 17 mg/ha, have been found to be useful against Indigo caterpillar. Plants above 30 cms. in height, are not attacked by the pest and early sown crops are more liable to damage than late sown ones.

The burrowing cricket causes considerable damage to jute seedlings during prolonged drought in North Bengal and Assam. For controlling the insect in the field, Aldrin 5% dust @ 50 kg/ha is useful and when the plants are attacked, treating the holes either with Aldrin 30% E.G. @ 16.5 cc per 5 litres of water (Aldrin 0.1%) or BHC 50% w.p. @ 20 gms in 5 litres of water (BHC 0.2%), have been found to be beneficial.

Termites also can be controlled in the field with Aldrin dust. When the crop is infested, Aldrin E.G. or w.p. @ 1.25 kg in 2500-3000 litres of water/ha as a drenching spray has been found to be beneficial.

Capsularis varieties are more susceptible than *olitorius* varieties to mite attack. Dusting of lime-sulphur or spraying of Folidol, directed to the underside of the leaves is helpful in controlling the pest.

CHAPTER V

GROWTH OF DEMAND FOR JUTE

Jute in India is utilized for export in the form of jute goods and for internal consumption. Exports of raw jute are normally not allowed from India. It is estimated that of the total production of jute, about 95% is utilised for jute manufacture, the bulk of which is exported. Jute is India's foremost foreign exchange earner and the export markets constitute the very 'life-blood' of the Indian jute industry. In the context of our economic planning, promotion of export of jute goods has assumed a new urgency and significance.

The following table shows the exports of hessian, sacking and other types of jute goods from India during the last decade :—

TABLE 14
Export of Jute manufactures from India

Period (July-June)	Hessian	Sacking	Others	Total (000 tons)
1951-52	277.5	477.0	40.2	794.7
1952-53	324.4	317.7	33.7	675.8
1953-54	388.1	382.2	40.9	811.2
1954-55	364.8	454.1	43.2	862.1
1955-56	395.9	414.2	49.5	859.6
1956-57	422.1	392.3	49.1	863.5
1957-58	384.3	386.6	34.4	805.3
1958-59	452.2	327.8	49.0	829.0
1959-60	453.8	343.9	67.5	865.2
1960-61	382.4	308.2	73.7	764.3
1961-62	442.2	279.3	76.4	797.9
1962-63 (P)	590.1	286.1	79.2	955.4

Source : Jute & Gunny statistics; Annual summaries issued by the Indian Jute Mills Association.

(P)—Provisional.

Export of jute goods from India consists mainly of hessian and sacking. The pattern of trade in hessian and sacking, however, reveals opposite trends. While exports of hessian, despite annual fluctuations, are on the whole showing an upward trend (those in 1962-63 being the highest on record), exports of sacking are progressively decreasing, the figure for 1961-62 being the lowest in the last decade. Exports of 'other goods' which mainly comprise canvas, rope and twine, tarpaulins and bagging for raw cotton, constitute a small proportion of total exports of jute manufactures; but these exports are showing a steady upward trend. Total exports of jute manufactures, despite annual fluctuations, were on an average, higher in the Second Plan period than in the First.

Destination of exports of jute goods from India

(a) *Hessian*.—The pattern of India's foreign trade in hessian in the past has revealed that U.S.A., U.K., rest of Europe, Canada and Argentina

are the main importers. U.S.A. alone accounts for about 45% of the total shipment from this country:—

TABLE 15
Destination of Export of Hessian from India

Period (July-June)	('000 tons)							Total
	U.S.A.	Rest of Europe	Argen- tina	Canada	U.K.	Other coun- tries		
1957-58	170.1	26.2	56.9	33.8	31.5	65.8	384.3	
1958-59	209.0	37.3	60.3	37.5	42.2	65.9	452.2	
1959-60	182.6	49.5	61.1	40.5	34.4	85.7	453.8	
1960-61	176.1	50.0	15.9	36.8	31.6	72.0	382.4	
1961-62	203.5	63.2	28.3	40.5	28.7	78.0	442.2	

Source : Ibid.

The figures of hessian include exports of carpet backing cloth and the rising export of hessian in recent years is due in part to increase in the export of carpet backing cloth to U.S.A. Among other countries, while exports have shown a significant increase in case of U.S.S.R. and the East European countries there has been a steady decline in the offtake by Argentina. On the whole, however, imports of U.S.A. serve as the barometer of India's performance in the hessian trade.

(b) *Sacking*.—The main importers are the Far Eastern countries, Australia and the countries of Africa and Latin America. In recent years, imports by all these countries have shown a decline, mainly because of the in-roads of Pakistan into the export trade in sacking. This will be evident from Table 16 below :

TABLE 16
Export of Sacking from India & Pakistan

Period (July-June)	('000 tons)												Total
	Far East		Africa		Rest of America		Australia		Others		Total		
	India	Pakistan	India	Pakistan	India	Pakistan	India	Pakistan	India	Pakistan	India	Pakistan	
1957-58	67.4	12.1	107.6	45.9	75.9	2.2	69.5	—	66.2	13.6	386.6	73.8	
1958-59	67.8	4.9	67.7	41.8	61.9	7.5	69.6	17.1	60.8	19.9	327.8	91.2	
1959-60	132.7	13.7	60.5	55.2	40.8	18.0	44.4	24.4	65.5	21.9	343.9	133.2	
1960-61	63.1	16.2	68.3	38.0	61.5	24.2	59.6	30.1	55.7	20.4	308.2	128.9	
1961-62	46.7	16.4	86.8	59.9	47.2	38.1	35.5	31.4	63.2	8.0	279.3	153.8	

Source : Ibid.

Although the world demand for sacking has been maintained at a steady level since 1957-58, India's share in the combined export of sackings from India and Pakistan declined from 84% in 1957-58 to 64% in 1961-62 with a corresponding increase in Pakistan's share. With the advantages of cheaper raw material, low wage rates and export bonus scheme, Pakistan's export of sacking has expanded substantially and with the steady increase in Pakistan's productive capacity, there is an increased threat to India's export market of jute goods, particularly sacking. It is reported that Pakistan is engaged in installing 5,000 additional looms by 1965 raising the total number of looms to about 14,000 which will work on an average of 2½ shifts. These looms could produce an additional 30,000 tons of sackings a month which is more than India's average monthly export of sacking. This might, therefore, lead to a heavy reduction in India's export of sacking unless remedial measures are taken up in time. Apart from the loss of foreign exchange, the fall in the export of sacking poses a serious problem for the industry since the production per loom of sacking is more than double that of hessian.

(c) *Other goods.*—The upward trend in the export of 'other goods' is due mainly to increased demand for bagging for raw cotton by the U.S.A., tarpaulin by West Germany, canvas by Burma and rope and twine by Thailand. The extent of the increased consumption by these countries is shown in table 17. The increase in the demand for these goods along with fall in exports of sacking, point to the urgent need for diversification. The industry has already made some progress in this direction.

TABLE 17
Export of some non-standard goods from India

	Tons	
	1958-59	1961-62
<i>Bagging for raw cotton</i>		
U.S.A.	23,653	51,970
<i>Tarpaulin</i>		
West Germany	215	2,698
<i>Rope and twine</i>		
Thailand	1,151	1,480
Indonesia	575	1,271
<i>Canvas</i>		
Burma	90	133

Source : Ibid.

The output of jute manufactures other than hessian and sacking by the I.J.M.A. mills has shown a phenomenal increase from 28,800 tons in 1951-52 to 69,000 tons in 1955-56, 116,000 tons in 1960-61, and further to 144,000 tons in 1961-62. The jute mills in India have also taken up the manufacture of carpet backing cloth for which there is a strong foreign demand particularly in the U.S.A., and export of carpet backing cloth alone is expected to go up by 50,000 tons a year. The impact of this has been felt already in 1962-63. There is also the possibility for an increase in the export of other speciality goods for which there is a keen foreign demand.

Taking all these factors into consideration, it may be expected that despite a fall in the export of sacking, it should be possible to maintain the target of 9 lakh tons of jute goods export (which had already been reached in 1962-63) and even to exceed it by 1965-66.

Internal consumption of jute goods

The following table shows the internal consumption of jute goods since 1951-52 :—

TABLE 18
Production and Internal Consumption of Jute goods

Period (July-June)	Total pro- duction of jute goods	Internal consump- tion*	% of (3) to (2)
(1)	(2)	(3)	(4)
1951-52	983.0	147.0	14.9
1952-53	927.0	167.6	18.1
1953-54	900.0	116.7	13.0
1954-55	1035.0	137.6	13.3
1955-56	1139.0	190.0	16.7
1956-57	1065.7	179.0	16.8
1957-58	1096.8	198.0	18.1
1958-59	1082.7	220.0	20.3
1959-60	1117.8	248.3	22.2
1960-61	1094.3	274.1	25.0
	(E)		

*Despatches for internal consumption from mills reporting to I.J.M.A.
(E)—Estimated. *Source : Ibid.*

The above table shows that internal consumption of jute goods has been increasing at a fairly rapid rate. During the First Plan period, the quantity of jute goods cleared for home consumption by the I.J.M.A. Mills increased from 147,000 tons to 190,000 tons thereby recording an increase of more than 29%. To this may be added the quantity of jute goods cleared for home consumption by non-I.J.M.A. mills, figures for which are not available. During the Second Plan period, the increased production of foodgrains and agricultural commodities led to increased demand for packaging material. The increase in population and the rise in the standard of living also resulted in the expansion of jute requirements both for containers and household purposes and other non-packing uses. Technological research was also opening out new fields for utilisation of the fibre. As a result, the internal consumption of jute goods from I.J.M.A. mills increased from 190,000 tons at the end of the First Plan period to 274,000 tons by 1960-61, an increase of about 44%. If, to this is added, the quantity of jute goods cleared for home consumption by non-I.J.M.A. mills, the increase in internal demand during the Second Plan period would be about 50%.

Village consumption

Reliable figures about village consumption of raw jute are not available. It is, however, estimated in the neighbourhood of 2 lakh bales per year.

Total consumption of raw jute and mesta

On the basis of the above data, consumption of jute and mesta for export, internal consumption and village consumption since 1951-52 may be estimated as under :—

TABLE 19
Consumption of Raw Jute and Mesta

Period (July-June)	For export of jute goods	For internal* consump- tion of jute goods	(lakh bales)	
			Estimated village consumption†	Total
1951-52	47·81	9·20	1·00	58·01
1952-53	39·82	10·27	1·00	51·09
1953-54	47·08	7·05	1·00	55·13
1954-55	50·81	8·43	2·10	61·34
1955-56	50·46	11·60	2·30	64·36
1956-57	51·14	11·08	2·10	64·32
1957-58	46·77	11·96	2·08	60·81
1958-59	47·91	13·22	2·32	63·45
1959-60	50·68	15·12	2·00	67·80
1960-61	43·92	16·38	1·50	61·80
1961-62 (E)	45·80	16·84	2·00	64·64

*Includes estimates of consumption by non-I.J.M.A. mills.

†Estimated by I.C.J.C.

(E)—Estimated.

Source: Ibid.

As against the above levels of consumption, the supply of jute and mesta during these years was as under :—

TABLE 20
Supply of Raw Jute and Mesta

Period (July-June)	Opening stock	Crop production			Import from Pakistan	Total
		Jute	Mesta	Total		
1951-52	10·56	46·77	—	46·77	18·20	75·63
1952-53	11·58	46·05	6·82	52·87	13·25	77·70
1953-54	16·18	31·29	6·56	37·79	14·78	68·75
1954-55	18·42	29·28	10·18	39·46	12·46	70·34
1955-56	11·87	41·97	11·59	53·56	14·70	80·13
1956-57	14·59	42·88	14·78	57·66	6·46	78·71
1957-58	18·72	40·52	12·91	53·43	6·95	79·10
1958-59	18·09	51·58	14·88	66·46	3·40	87·95
1959-60	24·46	46·05	11·19	57·24	6·14	87·84
1960-61	16·50	39·82	11·31	51·13	4·13	71·76
1961-62	8·63	63·47	16·92	80·39	4·01	93·03

Source: Ibid.

The Third Five Year Plan period

It has been estimated that the internal consumption of jute goods may increase further by about 50% during the Third Plan period reaching 4 lakh tons in 1965-66. The level of exports of jute goods is also expected to increase to 9 lakh tons by that year. Village consumption of raw jute has roughly been estimated at 2.50 lakh bales. Thus the consumption require-

ments, in terms of raw jute and mesta, by 1965-66 work out at 77.38 lakh bales as against the actual consumption of 61.04 lakh bales in 1960-61 :—

TABLE 21

	(lakh bales)	
	Actual consumption 1960-61	Consumption requirement 1965-66
(i) Export of jute goods (in terms of raw jute and mesta)	43.92	51.84
(ii) Internal consumption (in terms of raw jute and mesta)	16.38	23.04
(iii) Village consumption	1.50	2.50
TOTAL	61.80 or say 80	77.38 lakh bales

Source: Ibid.

Targets of Production of raw jute and mesta

As against the requirement of about 80 lakh bales, the target of production at the end of the Third Five Year Plan has been fixed at 75 lakh bales of jute and mesta, comprising 62 lakh bales of jute and 13 lakh bales of mesta. The State-wise break-up of the target of production of jute as given in the Third Five Year Plan is shown below. Similar break-up has not been given in the case of mesta.

TABLE 22

Target of Production of Jute, State-wise

State	('000 bales)		
	Anticipated production in 1960-61*	Additional production in Third Five Year Plan	Estimated production at the end of Third Plan
Assam	813	400	1,213
Bihar	839	441	1,280
Orissa	261	400	661
Uttar Pradesh	89	30	119
West Bengal	1,987	840	2,827
Tripura	41	40	81
TOTAL	4,030	2,151	6,181

Thus the estimated production of 75 lakh bales of jute and mesta by the end of the Third Five Year Plan would be short of the requirement of 80 lakh bales by 5 lakh bales. However, in 1961-62 the production of jute and mesta exceeded the plan target and reached 80.39 lakh bales comprising 63.47 lakh bales of jute and 16.92 lakh bales of mesta. In 1962-63, the production of jute and mesta was lower, 68.89 lakh bales, of which jute accounted for 53.67 lakh bales and mesta 15.22 lakh bales. Considering the fact that production in the very first year of the Third Plan period exceeded 80 lakh bales, the achievement of that level of production again to meet the estimated requirement by the end of the Third

*Actual production of jute in 1960-61 was, however, 39.82 lakh bales.

Plan period may not present any difficulty, especially if development measures are intensified in the remaining two years of the Plan.

Progress of consumption

In 1961-62 (July-June), the export of jute goods from India was 798,000 tons as against 764,000 tons in 1960-61. The increase was the outcome of a combination of three favourable factors, reasonable prices of raw jute, abundant supply of the fibre due to record production of jute and mesta in 1961-62, and a strong world demand. The mills geared up their production apparatus by progressively unsealing the looms and increasing the working hours.

Internal consumption

The quantity of jute goods cleared by the I.J.M.A. mills for internal consumption increased from 274,000 tons in 1960-61 to 282,800 tons in 1961-62 and may reach 300,000 tons in 1962-63. This increase in consumption has been accounted for partly by hessian and partly by non-standard goods.

Judging from the increasing trend in internal consumption of jute goods and the prospect of additional demand on account of increased industrial and agricultural production under the impetus of planned development, it is expected that the internal consumption of jute goods at the end of the Third Five Year Plan may reach the target of 4 lakh tons.

Consumption requirement for the Fourth Five Year Plan

It is difficult to make any reliable forecast about the export demand for jute goods during the Fourth Plan period particularly because of the unpredictability of the various factors which influence world demand for jute goods.

According to a recent study on the trends of world demand of jute manufactures by the Food and Agricultural Organisation*, while the overall demand for jute packaging materials may remain or even decline in the next decade, particularly in U.S.A. and Western Europe, there may be a moderate increase in the demand for jute floor coverings. The decline in the use of jute packaging materials has been attributed to its displacement by bulk-handling methods and increased use of substitute materials, specially paper bags, and changes in the distribution methods to direct consumer-sized retail packing. The instability of jute goods prices has also, weakened the competitive position of this packaging material to some extent. However, the assessment made by the F.A.O. has not been fully accepted by the Srivastava Committee†. According to it, "the statistics of consumption of jute goods in the U.S.A. and the U.K. in recent years do not support the conclusions drawn about the estimated rate of technological displacement of jute by substitutes and bulk-handling. It may well be if the price of the hessian bag can be held stable for a long period at a level that makes it competitive (taking into account the re-use value) with the paper bag and its supply is assured, some markets lost by jute to paper can be regained".

*Trend: in World Demand for Jute Manufactures—F.A.O., 1960.

†Report of the Jute Committee, Government of India, Ministry of International Trade, 1963.

So far as floor coverings are concerned, there is an increasing demand for tufted carpets with jute backing and linoleum, but world consumption of other types of non-standard jute goods, particularly rope and twine, roofing felts, webbing, upholstery, etc., has not shown any significant increase in recent years. On the contrary, these goods face severe competition from synthetics.

Regionally, the greatest potential for increase in jute goods consumption in the next decade is in the developing countries of Asia and Africa, the Eastern European countries and the U.S.S.R. While the consumption of sacking in the developing countries of Asia and Africa will undoubtedly increase, there are two factors which may impede a proportionate increase in India's exports. Firstly, there is a desire on the part of a number of countries, *e.g.*, Egypt, Thailand and Cambodia to set up jute mills of their own so as to be self-sufficient in jute manufactures. Secondly, India is steadily losing ground to Pakistan in the export of sacking. However, the demand for non-standard jute goods including carpet backing cloth from India has shown a rapid increase. This upward trend may be maintained in the coming years also if there is increased emphasis on the diversification of the production of jute goods with a corresponding change in the order of priorities in the industries' rationalisation and equipment programme. Considering the potentialities of world consumption of jute goods and the various measures taken in India to step up exports, it is estimated that the export of jute goods from India may be around 11 lakh tons by the end of Fourth Five Year Plan.

As regards internal consumption, while estimates at this stage must necessarily be tentative, the Srivastava Committee considers that in the period 1966-71, an average annual increase in the internal consumption of jute goods should be planned at 40,000 tons raising the consumption level to 6 lakh tons in 1970-71. Thus the total demand for jute goods for export and internal consumption would be of the order of 17 lakh tons or about 98 lakh bales.

The estimate of consumption requirements framed by the Srivastava Committee appears to be quite realistic and may even turn out to be conservative. To this should be added the requirements for village consumption which may be placed around 3 lakh bales. The total consumption requirement for raw jute and mesta at the end of the Fourth Five Year Plan thus works out at just over 100 lakh bales.

A production target of 100 lakh bales of raw jute and mesta by the end of Fourth Five Year Plan means an increase of 20 lakh bales over the production in 1961-62. This increase will have to be achieved mainly by increasing the yield per acre through intensive development measures, though there may also be marginal increases in acreage especially in the irrigated areas (the Hirakud project area in Orissa, the Kosi irrigated areas in north Bihar, and the areas receiving irrigation from tube-wells and canals in West Bengal) which have a good production potential by introducing jute as an early sown crop, preceding paddy.

CHAPTER VI PRICES

The problem of jute prices is of fundamental importance to both the agricultural and the industrial sectors of the jute economy. Millions of growers engaged in jute cultivation lose confidence in adopting improved agricultural practices if the benefits of a better crop are neutralized by adverse prices. Therefore, unless the growers are assured of remunerative prices, they would not have the incentive to put in additional investment and labour to improve the quality and to increase the unit yield. Similarly, the industry faces a real difficulty in maintaining its competitive position in the world market if raw material of acceptable quality is not available at reasonable and stable prices. The problem of jute prices is therefore one of balancing conflicting interests and maintaining a price level which is remunerative to the cultivator and at the same time reasonable to the industry.

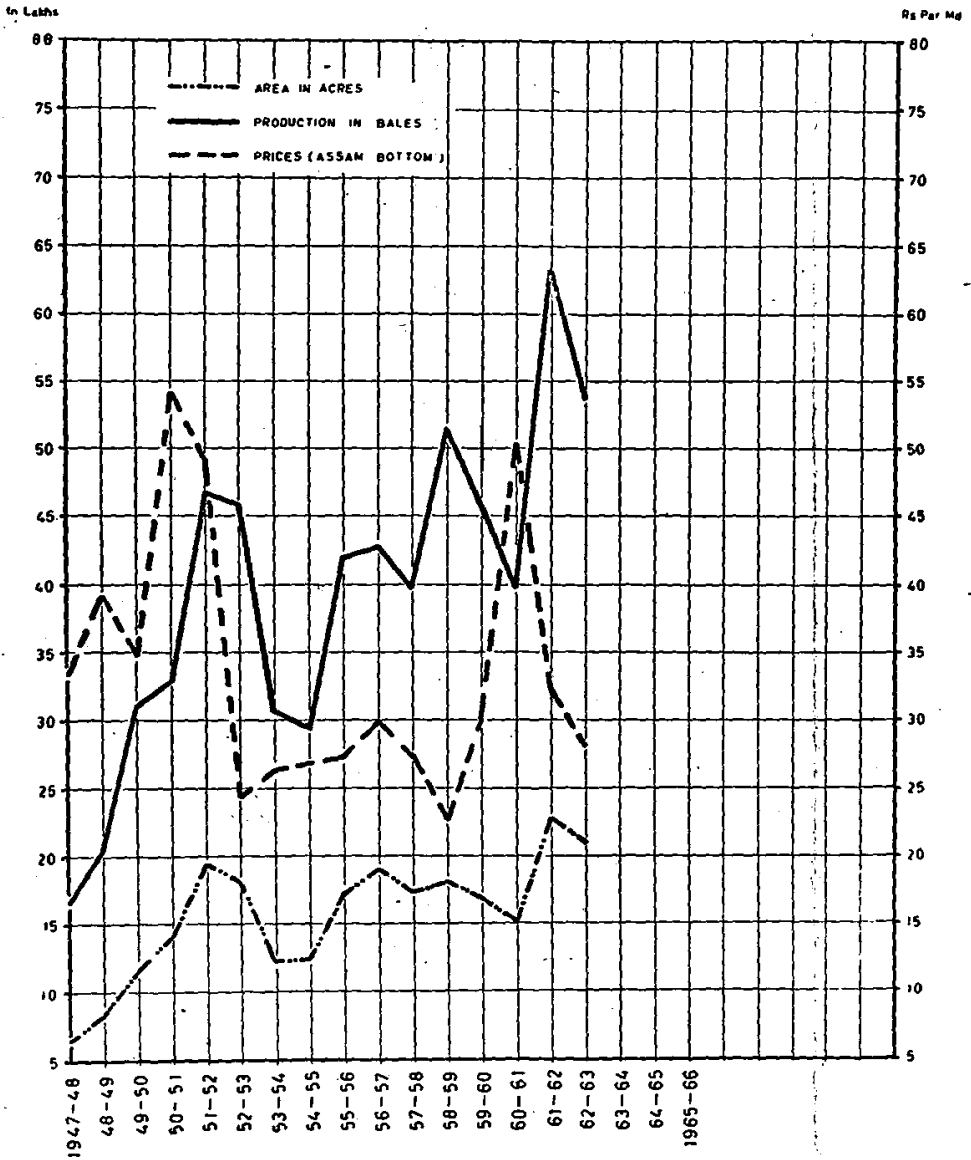
For a proper appreciation of the problem of jute prices and the pattern of price movement over time, a brief review of the price position since Independence and of the various measures taken from time to time to hold the price line is given below. The statistical data has been given in Table 1 on page 2. The relation between price and production of jute is also illustrated by the attached graph.

The partition of the country in August 1947 was followed by an acute shortage of supplies of raw jute and a sudden spurt in prices. Restriction on the export of raw jute through the imposition of export duty was the first step taken by the Govt. of India in November 1947 to conserve internal supplies and to put a curb on the soaring prices. The immediate reaction to this measure was a temporary suspension of business in Calcutta and consequent decline in prices. But shortly thereafter, the upward movement of prices was renewed.

The year 1948-49 witnessed a small increase in internal production of jute. But the supply was far short of demand. As a result, the mills' working hours were reduced and 12½ per cent of the hessian looms were sealed. To arrest the rise in prices, the Government of India suspended the export of raw jute till October 1948. The mills also decided to fix upper price limits for the purchase of raw jute. But these measures were not adequate to bring down the prices. As a further step in this direction, the Government of India, banned 'futures' operation in raw jute in August, 1948.

In 1949-50, the internal production of raw jute recorded a significant increase partly as a result of relaxation of the provisions of the Bengal Jute Regulation Act of 1940. However, internal supplies continued to be short and the irregular and inadequate flow of imports from Pakistan accentuated the shortage. The position was further aggravated by the devaluation of the Indian rupee in September, 1949. The paucity of raw jute led to a further reduction in the working hours of the mills. Also to conserve the available internal supply and to arrest the rise in prices, the Government of India adopted certain additional measures, such as, cancellation of free export of raw jute, banning of 'futures' in jute goods, enhancement of export duty in hessian from Rs. 80 to Rs. 350 per ton, and fixation of ceiling prices of raw jute and jute goods. Despite these measures, the upward movement of prices continued. An improvement in the raw jute supply was noticed.

JUTE-AREA, PRODUCTION AND PRICES



after the signing of the Indo-Pakistan Trade Agreement in April, 1950, but prices in the mofussil markets continued to pierce the ceiling.

The year 1950-51 witnessed a phenomenal increase in foreign demand for jute goods following the boom in the commodity markets caused by the Korean war. Notwithstanding a further increase in internal production in that year, prices of raw jute rose sharply and reached an all-time peak.

The acreage and production of jute had been expanding steadily under the influence of continued high prices. As figures of Table 1 on page 2 show, production had increased from 16.58 lakh bales in 1947-48 to a peak of 46.78 lakh bales in 1951-52. But this year saw the beginning of a downward trend in prices. The collapse of the Korean boom, record production of jute during the year, and the influence of the anti-inflationary measures adopted by Government were the main factors responsible for this decline. By 1952-53, prices had fallen so low that it was considered necessary to take measures to arrest the downward trend, instead of putting a curb on rising prices as had been done hitherto.

The sharp decline in prices in 1952-53 led to a shrinkage in the area under production of raw jute in the following year. As a result, prices in 1953-54 recorded a small increase which was continued in 1954-55 also partly due to the revival of world demand for jute goods, on the one hand and fall in internal production, on the other.

Towards the end of July, 1955, the decision of the Government of Pakistan to devalue her currency put that country in an advantageous position in the world market for jute goods. As a counter measure, the Government of India immediately abolished export duty on jute goods.

Between 1955-56 and 1959-60, prices of jute continued to be rather low, falling to an especially low level of 22.39 rupees per maund in 1958-59, when there was a large crop in a period of relatively low demand for jute goods. The recovery began in 1959-60. In 1961 the production of jute was abnormally low, the result of low prices in the previous two years and unfavourable weather conditions. This, accompanied by rising demand for jute goods and exhaustion of carry-over stocks led to a sharp increase in prices which reached a peak, similar to that of the Korean boom, in 1960-61. These high prices in turn were followed by a record crop in the following year (1961-62) which again brought down the prices. During 1962-63 production was considerably lower than in the previous year and the prices also continued to be somewhat lower; but the overall supply position in this year was more comfortable as a result of large carry-over stocks.

The Government of India has kept a close and constant watch on price movements and taken a number of regulatory measures to maintain prices within the desired limits. The Forward Markets Commission has re-introduced the minimum prices of jute at the preceding season's level. The I.J.M.A. has also introduced quota system of purchase by mills. The Jute Buffer Stock Association has purchased about 4 lakh bales of jute during 1962-63, as against 2.25 lakh bales in the preceding season. The Jute Commissioner under the Jute (licensing & control) order directed the mills to purchase certain minimum quantity of raw jute and asked the mills to maintain a minimum stock. From November 1962 to May 1963, such purchases amounted to 43.91 lakh bales.

The State Trading Corporation of India Ltd., was directed to purchase jute through the agency of the National Agricultural Co-operative Marketing

Federation Ltd., to assist the growers' co-operative societies to secure the minimum operational price for the farmer. Total purchases made by the STC amounted to about 0.80 lakh bales.

Even though purchase through Co-operatives started rather late in the season and the quantity purchased was rather small, being only about 1 per cent of the total size of the crop, the existence of a new purchase machinery at operational prices through the co-operatives had a salutary effect on the market.

As a result of all these measures, prices during 1962-63 did not show any sharp decline as was witnessed at times in the preceding season and though they were slightly below the TSD Minima at Calcutta market in the upcountry markets they were generally at or above the Calcutta parity rates and even exceeded the operational minimum levels.

The above review shows that the prices of jute recorded, a steady upward trend for the first few years after Independence, reaching an all-time peak in 1950-51 and remained high during 1951-52 under the influence of the Korean boom. This continuous rise in prices had the effect of steadily increasing internal production. Thereafter the prices remained rather low for a number of years but the last five years 1958-59 to 1962-63 have again seen marked fluctuations in prices.

Jute is predominantly an export commodity. Prices of raw jute exert an influence on the prices of jute goods but since the latter are influenced by competitive forces in the overseas markets, in the ultimate analysis, it is the price of jute goods that largely determines the price of raw jute. It will be seen from the Table 23 below, that the two sets of prices have shown parallel movements over time. As in the case of fibre, prices of jute goods also reached the peak in 1950-51 and remained very high in 1951-52 but declined sharply in the next year. Like raw jute, again, jute goods prices were subject to fluctuations from year to year, but the order of fluctuations was not so wide as in the case of the former. This, however, is not unexpected because while the supply of jute goods can be adjusted quickly to changes in demand, the same is not possible for raw jute. The greater instability in the prices of raw jute, stems from the fact that no change in its supply is possible during a season in response to change in demand.

TABLE 23
Prices of Raw Jute and Jute Manufacture

Season	Raw Jute		Jute Manufactures	
	Assam White Bottom (Rs. per md.)	Hessian (40×10 oz.) (Rs. per 100 yds.)	Sacking (B. Twills) (Rs. per 100 yds.)	
1950-51	50·87	71·44	188·44	
1951-52	49·00	64·75	204·12	
1952-53	24·12	14·75	101·12	
1953-54	26·37	45·00	104·06	
1954-55	29·69	45·06	117·75	
1955-56	27·25	39·87	110·12	
1956-57	29·91	42·62	113·79	
1957-58	27·08	40·86	107·27	
1958-59	22·39	41·20	94·84	
1959-60	30·41	42·76	112·70	
1960-61	50·47	55·49	167·97	
1961-62	33·51	53·72	134·47	

The sharp price swings in jute may be traced primarily to the responsiveness of supply to price changes. Studies have revealed that in the case of a cash crop like jute which occupies a small share of the cultivated area and competes with paddy, the response of acreage and consequent production to price changes is significant. In fact, the instability in the jute economy is largely due to a self-generating process resulting from an inelastic demand in the short run associated with a supply which is responsive to price changes with a time lag. The general trend as revealed in Table 1 has been that a high level of prices in one season is followed by an increase in acreage and production in the next season. This, in turn, induces a shrinkage in area and rise in prices again in the subsequent season, thus setting in a cyclical pattern of instability. For instance, following a bumper crop, prices in 1958-59 recorded a decline and the price of Assam Bottom in Calcutta went down to as low as Rs. 22.39 per md. This was followed by a reduction in area and production in two successive seasons and a gradual rise in prices which reached its peak in 1960-61. This process of prices in one season influencing the acreage in the following season and *vice versa* was repeated in next two years.

Looking back at the jute price policy in India during the fifties, one finds occasions when steps were taken to protect producers' interests and also when counter-measures were taken to safeguard the jute industry. The corrective measures, however, were more or less of an *ad hoc* nature designed to meet a particular situation caused by increased production and falling prices or, reduced production and rising prices. They are not part of any co-ordinated long-term price policy aimed at stabilising the prices. In fact, the abandonment of measures immediately after the recovery of the market was an evidence of the absence of any producer price policy, which is of fundamental importance in improving the quality and quantity of the fibre. A sound policy demands that minimum prices ought to be fixed and declared well in advance of the sowing season.

However, fixation of minimum remunerative prices has to take into account a number of factors which are peculiar to jute. First, there is the question of maintaining a normal parity between the prices of raw jute and paddy in order to avoid any undesirable diversion of acreage from one crop to another. Secondly, a fair relationship has to be maintained between the prices of raw jute and jute goods so that the cost of the raw material which forms about 60 per cent of the cost of production of jute goods, does not impair the competitive position of the Indian Jute Industry in the world market. Thirdly, the cultivators have to be assured of an adequate return for additional efforts and investment needed to step up production. Finally, the prevailing prices of raw jute in Pakistan also deserve careful consideration.

A beginning towards a producer price policy in raw jute through fixation of minimum prices has been made only during the last two years. The introduction of buffer stock operations and the extension of co-operative marketing are further steps which form part of this policy.

CHAPTER VII

MARKETING

Jute is a cash crop of which only about 3 per cent of total production is retained by cultivators for seed and about 2 per cent for domestic purposes like rope making. The remaining 95 per cent of production can be taken as marketable surplus.

The movement of jute from the producer to the consumer takes place in three stages. The first stage is from villages to primary assembling markets. 61 per cent of the marketable surplus is disposed of by growers at their own doors while 31 per cent is sold by them in the primary markets and *hats*. The second stage is from the rural areas to the secondary markets, viz., baling centres. Only a small percentage of growers bring about 4 per cent of the marketable surplus to these markets. The third stage is from the upcountry baling centres to the loose jute markets of Calcutta, the press houses of pucca balers and jute mills.

There are various types of functionaries in the jute trade between the growers and the jute mills. Each type has specific functions. *Farias*, *paikars* and *beparis* are peripatetic dealers who form the first link in the chain of intermediaries in the loose jute trade. They go from village to village, even from door to door for making purchases. They operate individually in many cases using their own capital. *Aratdars* or *balers* operate on a commission basis. Salaried men of the buyers also operate in the village and primary markets.

In the secondary markets, *kutch*a balers are the most important and powerful group of functionaries responsible for assembling, financing, processing, storing and transportation of the jute fibre. Functionaries in the terminal markets of Calcutta are (a) *aratdars*, (b) brokers (c) *pucca* balers and jute mills. *Aratdars* operate at the terminal markets in Cossipore and Shyambazar acting as agents of upcountry markets. Brokers are, however, functioning as middlemen engaged in sales and purchases of jute. Jute mills are the ultimate buyers of loose jute in Calcutta, and other mill stations. They usually obtain a major portion of their raw jute supply on the basis of forward delivery contracts.

At present the market mechanism is full of imperfections. The jute growers sell the fibre in a completely unassorted condition and estimation of grade outturn of individual lots by intermediaries often leads to an "under-estimation" of its value.

The weak financial position of the growers is exploited by middlemen, who advance them loans under the "*dad*an" system making it obligatory on them to dispose of the bulk of the fibre to creditor-dealers locally at a price which is well below the market rate.

Due to the absence of regulated markets, a large number of arbitrary deductions and allowances, both in cash and kind, exist in the jute trade which are ultimately borne by the growers. Also, a great diversity of weights prevails in the jute growing districts which adds to the difficulties and confusion of the growers. The situation is aggravated by the manipulation of weights in the markets.

In addition to this, unsatisfactory communication facilities in the rural areas compel the cultivators to sell in the villages to the peripatetic dealers who have the resources to effect transportation. The slow and primitive means of communication in rural areas, involving a time-lag between sales in villages and arrivals at baling centres, provides the peripatetic dealers with an opportunity of keeping a bigger margin in hand than is perhaps necessary to compensate them against any possible fall in prices when the jute is in transit. Lack of storage facilities in the villages is another disadvantage which compels the growers to sell the major part of their surplus within a few months of harvesting and thus receive low prices.

Finally, the absence of any independent source of market intelligence for growers results in inequality of knowledge between buyers and sellers, which is taken advantage of by the former.

With all these disadvantages confronting the grower, it is no wonder that he does not always receive a fair return for his produce in the marketing process. Establishment of regulated markets and formation of well-organised growers' cooperatives could lead to the removal of the market deficiencies and help the grower in realising a fair price. Unfortunately, the progress of cooperative marketing of jute in India has been very slow. Cooperative marketing societies have begun to be formed only during the last 3 years and in 1962-63, they were estimated to have marketed only about 1 per cent of the total jute crop. Except in Orissa, no direct link has been established by the marketing societies between credit and marketing. The major marketing function of these societies has therefore been to serve as commission agents of the cultivators. Outright purchases are also made in some cases, but to a small extent.

Establishment of regulated markets can also go a long way in removing the various frictional defects which arise out of existing market practices. The benefits which will accrue from the establishment of the regulated markets are :

- (i) provision of cheap storage facilities to growers;
- (ii) assurance of fair deal between buyers and sellers;
- (iii) elimination of illegal allowances and deductions;
- (iv) reduction of market charges to the minimum;
- (v) supply of market information; and
- (vi) quick settlement of disputes.

But unfortunately, there are no regulated markets for jute in any State except at about five centres in Orissa. Even in States like West Bengal and Assam where the Regulated Markets Act has been passed, implementation has hardly made any progress. The major jute markets in these States should be converted into regulated markets by extension of the Act within a period of three years.

The main factors responsible for slow progress of co-operative marketing societies were found to be irregularities in business management, weak credit structure, insufficient working capital, lack of interest by members, lack of warehousing and grading facilities, absence of baling plants, superior bargaining position of peripatetic dealers, etc. Considerable efforts are, therefore, necessary to remove the existing weakness in cooperative societies and to promote marketing of jute through cooperatives on a substantial scale. Some of the important steps necessary to achieve these objectives are indicated below,

COOPERATIVE MARKETING

Area of operations

(i) All important secondary markets should be covered by the co-operative marketing societies either by organising new societies or extending the area of operation of the existing ones. The headquarters of each marketing society should be located in the secondary market. The societies should have an institutional link-up with the primary markets or weekly 'hats' which should be covered by well-organised village service co-operatives. In the initial stages, the areas of operation of each marketing society should be delimited in such a way as to cover only those villages whose produce ordinarily arrives in the relevant market centre where the society is located.

(ii) Efforts should be made to ensure that all primary credit societies are affiliated to marketing societies. At the same time attempts should be made to enrol a large number of individual growers as members of the marketing societies. This will enable the societies to have an effective liaison with jute growers.

(iii) Since the ultimate consumption of jute takes place at terminal markets at Calcutta, there is need for suitable co-operative organisations to facilitate the ultimate disposal of jute handled by co-operative marketing societies. In this connection, the National Agricultural Co-operative Marketing Federation should continue to work as a Central organisation of the Apex Co-operative Marketing Societies of different States and the jute handled by it may be sold to the S.T.C. or the mills or both, according to the needs of the situation.

Operational Practices

(iv) An ideal business practice would be to replace the existing system of outright purchases by the method of payment on the average pool price. This system is prevalent among the cotton marketing societies operating in Gujarat. If extended to jute, the co-operatives in the jute growing States would collect the fibre from members, grade it, thereafter pool the produce, and bale it and dispose of it in the best possible market. The members would be paid average pool price on the basis of the quantity and grade of jute supplied by them. However, the above business practice cannot be adopted in the case of jute immediately, unless arrangements are made for the grading of the produce in the various primary markets. At present, grading and baling of jute are possible only in the secondary markets but the growers have very little direct contact with these. It will naturally take some time to induce the growers to bring their produce to the secondary markets. Secondly, the growers are used to the system of outright spot payment and it may be difficult to win them over to a system of payment on average pool price over a short period of time.

For the present, therefore, it may be necessary to allow the co-operative marketing societies to function on the basis of outright purchases. With increasing contact between growers and co-operatives, it should be possible to inspire the growers to have the necessary confidence in the co-operatives so that they may give the produce for sale in the terminal market on a pooled basis.

Credit

(v) The co-operative credit structure is generally weak and there is no proper linking of credit with marketing. It is, therefore, not surprising that

in West Bengal more than 50 per cent of jute is disposed of by growers under the "dadán" system. Development of co-operative marketing depends to a large extent, on strengthening and revitalising of the co-operative credit structure and linking of credit with marketing. The members of credit societies should be required to execute agreements in favour of the co-operative marketing society at the time production loans are advanced. These agreements will bind the members to sell their produce to the extent the loans are incurred through the marketing society.

Finance

(vi) Lack of adequate finance is a major problem of the co-operative marketing societies. In the first place, the share capital of the marketing society is low. In West Bengal, a co-operative marketing society has, on an average, a share capital of only Rs. 15,000, half of it raised from members. The share capital, needs to be raised partly through enlargement of membership and partly through an increase in Government's contribution to share capital. Secondly, the co-operative marketing societies have not been able to attract sufficient deposits. Although raising deposits is primarily the function of primary societies, it may be worthwhile for co-operative marketing societies, also to mobilise deposits particularly in view of the fact that considerable revolving funds are needed for jute marketing and a number of procedural difficulties are involved in raising funds from the State Bank of India or other banking sources.

(vii) As for pledge finance, the present policy of the State Bank of India to advance up to 60 per cent of the value of jute after keeping back a margin of 40 per cent and of the estimation of the value of jute, not at current market price but at a lower price, needs reconsideration. Although the provision of pledge finance in regard to a commodity like jute, which is subject to wide price fluctuations, is attended with a number of risks, it should normally be adequate for the State Bank of India to pay 60 per cent of the prevailing market price and keep a margin of 40 per cent against the value of jute estimated at the prevailing market prices.

Storage

(viii) Of late, cooperative marketing societies have built their own godowns with the assistance of the Government, and have also hired storage accommodation. But in certain cases, no storage accommodation is available with the societies in the secondary markets. It will be necessary to provide such storage accommodation to marketing societies.

Grading

(ix) Villagers have to sell unassorted jute in the villages and markets for want of proper grading facilities. Marketing societies are not equipped effectively to undertake grading. Training in grading is going to be organised by the Indian Central Jute Committee to the representatives of the State Governments and the co-operatives marketing societies. Peripatetic grading parties shall also be organized to train the growers in the art of grading. States Governments like West Bengal which have got grading units may also assist the marketing societies by providing them with the service of these. Further, to protect the interest of the growers and to obviate the difficulties arising out of disputes relating to grading of jute between the sellers and the buyers, it is necessary to lay down standard grade specifications which will

be acceptable to all concerned. The Report of the Expert Committee which has been set up recently under the chairmanship of Jute Commissioner may be awaited in this connection.

Baling

(x) Marketing societies are not generally provided with baling plants. It is necessary that the societies in the initial stages, should receive assistance for establishing *kutcha* baling plants.

Management

(xi) The defect of weak management needs to be removed by attracting the right type of persons, with adequate managerial ability and also through stricter supervision of the working of the societies.

Market Intelligence

(xii) There is no independent source of market intelligence for growers who have to rely on peripatetic dealers for price information. The existing arrangements of broadcasting price intelligence through radio stations do not appear to be adequate as the form in which price information is broadcast does not help the growers in taking the correct decision regarding time and place of disposal. Further, the coverage is also inadequate. There is need to extend radio facilities in villages where they do not exist at present. The farmers should be informed not only of prices prevalent in the primary markets but also those in the secondary and terminal markets. Similarly, they should be informed of prices of different grades of jute, price trends and the supply and demand-position of jute and jute goods. The derivative prices payable to the growers at upcountry markets and villages should be fixed in such a way that the best possible return is assured to the grower. These derivative prices should be announced at the beginning of the season and wide publicity should be given to them.

CHAPTER VIII

MESTA

Mesta has been known as a fibre crop in India since ancient times. It has been cultivated particularly in the Deccan for production of fibre for domestic consumption. But the area under the crop remained very limited until after Independence. The acute shortage of jute after independence led to rapid expansion of the area under the crop as increase in production of jute alone was not sufficient to meet the demands of the jute mills. The increases in the area and the production of mesta between 1953-54 and 1961-62 are shown in the following table :—

TABLE 24

States	1953-54		1961-62	
	Area (^{'000} acres)	Production (^{'000} bales)	Area (^{'000} acres)	Production (^{'000} bales)
Andhra Pradesh	138	292	138	276
Assam	3	9	16	27
Bihar	17	16	196	323
Gujarat & Maharashtra	159	146	118	133
Madhya Pradesh	25	21	21	15
Madras	4	7	(a)	1
Mysore	87	87	52	56
Orissa	17	34	29	58
Punjab	1	2	1	1
West Bengal	12	36	340	715
Tripura	—	—	40	100
TOTAL	463	650	951	1,705

(a)—Not determined.

It will be seen that while the acreage has doubled, the increase in production has been even more rapid. The largest increases have been in the principal jute growing States, particularly, West Bengal and Bihar.

Mesta is a hardy plant which can be grown under a much wider range of climatic and soil conditions than is the case with jute. Whereas jute is grown either in alluvial lowlands or highland soils of high fertility, mesta can be grown also on highlands soils of low fertility. It is grown also as a mixed crop with maize and along the borders of cane fields in Bihar. Adverse weather conditions such as drought or excessive rainfall immediately after sowing, which spoil the jute crop, do not affect the mesta crop so much. Moreover, the crop does not require as much care after sowing as does jute. In case of the latter, if inter-cultural operations and weeding are not done at the proper time, the crop will fail; but this is not the case with mesta. As a result, the cost of cultivation of mesta is much less than that of jute. Finally, mesta also has an advantage over jute in respect of time of retting. While the jute crop has to be submerged under water for retting immediately after harvest, in case of mesta the crop can be harvested and left for some time until sufficient water is available for retting.

The low cost of cultivation, convenience of retting, and adaptation to a variety of soil and climatic conditions have helped in increase in the area under mesta in recent years.

The chief disadvantage of mesta is that the fibre is coarser than jute. But it has good strength and is useful for manufacture of sacking. Its price is also lower than that of jute. The difference is generally between Rs. 2.50 to Rs. 3 per maund in comparison with white jute and Rs. 4 to Rs. 4.50 per maund in comparison with *tosha* jute. It is estimated that the jute industry uses in a number of its manufactures, mesta fibre to the extent of 25 to 30 per cent. The recent increase in acreage and production of mesta is due to the demand for the fibre and the ease with which the crop can be cultivated. No systematic effort has been made to increase area or production by the Departments of Agriculture. It will be seen also from Table 24 above, that the yield per acre of mesta is about 1.5 bales in most States. It is possible to increase it to 2.5 or even 3 bales with proper manuring, introduction of improved seed and adoption of other improved practices. It is, therefore, necessary to have a research and extension programme for improving the quality of fibre and increasing the yields per acre. Multiplication and distribution of improved mesta seed are also necessary.

Review of Research

There are two species of mesta : *Hibiscus cannabinus* and *Hibiscus sabdariffa*. The word mesta is now being used by traders and cultivators to denote both the species and this usage should be continued.

Hibiscus cannabinus : Systematic classification and selection work was initiated by the Howards in Pusa (Bihar), in the early years of this century. Improved strains I.P. 3 and I.P. 6 were evolved. The work was continued by Deshpande in New Pusa, Delhi. Later on, work on the crop was also taken up in different States e.g. Madras, Madhya Pradesh and West Bengal. In recent years, the Jute Agricultural Research Institute has also taken up research work on mesta. A brief review of the work done by it is given below :—

(1) An exhaustive collection of cultivated types of mesta was made. 246 types were obtained. Most of these were indigenous. But a few types were also obtained from U.S.A., Nigeria and Russia. Improvement of the crop was attempted mainly by the pedigree method. The first improved selection from indigenous material was M.T. 15. Later on, M.T. 102, M.T. 128, M.T. 129, and M.T. 150 were selected from exotic types. Another promising strain, H.C. 583, which is significantly superior to M.T. 15, has been selected during the Third Five Year Plan period.

Successful crosses were made between *Hibiscus cannabinus* and *Hibiscus radiatus*. Promising selections have been made from this crop. Valuable information has also been obtained regarding pigmentation of leaf and flower characteristics and their patterns of inheritance, which will be useful for further breeding work.

All attempts at inter-specific crosses between *Hibiscus cannabinus* and *Hibiscus radiatus* resulted in sterile seeds. However, the Dharwar School of Genetics has sometimes back reported successful hybridization of the two species and the results are being watched with interest.

Agronomic experiments conducted for determining the proper time of sowing have indicated that sowing during the last week of April gives the best

results. A seed rate of 15 lbs. per acre was found superior to other rates, and highest yield was obtained by application of 16 lbs. of nitrogen per acre.

Hibiscus sabdariffa

Selection work was started from 102 samples collected from different parts of the country. R.T. 1, R.T. 2 and R.T. 26 are the high yielding strains evolved from this material. Results of varietal trials of these types along with N.P. Sab 5 from J.A.R.I. are given below :—

						(yield in mds. per acre)		
						1959-60	1960-61	1961-62
1.	R.T.2	..	..	..	..	18.14	8.83	16.93
2.	N.P. Sab. 5	..	..	..	..	16.91	10.92	19.27
3.	R.T. 26	..	..	..	..	16.29	8.97	17.24
4.	R.T. 1	..	..	..	..	15.75	8.96	17.13
5.	R.T.I. NB	..	..	..	..	14.13	7.15	16.42
	C.D.	..	..	..	..	2.00	1.82	1.81
						5(%)	(1%)	(1%)

Inter-varietal crosses were made to study pigmentation and leaf character. It was found that red pigment was completely dominant over green and lobed leaf was also dominant over partially lobed leaf.

The non-bristled strain evolved by the J.A.R.I. is already in demand. It is also being crossed with high yielding types for further improvement.

The mesta crop is highly susceptible to foot and stem rot disease by *Phytophthora parasitica*. Two early roguing of infected plants followed by a spray of 0.75 per cent copper oxychloride preparation was found to check the disease appreciably. Liming also helps to reduce incidence to some extent in fields where the pH. is below 6.8.

REFERENCE

Rumphius, G.E., Herbarii Ambionensis, 1743, 5 : 213.

CHAPTER IX
RECOMMENDATIONS

General

Action to be taken by

1. Jute is grown in 73 districts in India. Out of these, 13 districts (Table 3) account for 80 per cent of the total area and a similar proportion of production of the crop. In view of this concentration of the crop in these districts intensification of development measures in them will give much better results than dispersal of efforts over all the jute-growing districts. Accordingly, it is recommended that an intensive jute development programme, similar to the Package Programme, should be taken up in these districts. With such a programme, it should be possible to produce 70 lakh bales of jute from about 20 lakh acres in these districts by the end of the Fourth Five Year Plan.

Ministry of Food and Agriculture and State Governments.

In the other jute-growing districts also, the minimum programme of development which should be more intensive than the work done at present should be carried out.

2. In four of these districts, Murshidabad and West Dinajpur in West Bengal and Purnea and Saharsa in Bihar, inadequacy of retting facilities is a major factor in lowering output, as well as in reducing the quality of fibre. In these districts special efforts will have to be made for improving retting facilities, in addition to the development measures taken in all the other jute development districts.

Do.

Target of production

3. The Third Plan target of production of 75 lakh bales of jute and mesta was exceeded in the first year of the Third Plan (1961-62), when production was over 80 lakh bales (63.5 lakh bales of jute and about 17 lakh bales of mesta). This was a year of record production; production in 1962-63 is lower, being estimated at about 69 lakh bales. However, on present indication, no difficulty is anticipated in reaching the Third Plan target. The target of production for the Fourth Plan is expected to be placed at 100 lakh bales consisting of 80 lakh bales of jute and 20 lakh bales of mesta. It should be possible to obtain the additional production required to meet this target through increases in yields per acre in the

Do.

Action to be taken by

existing jute growing lands in the 13 intensive development districts and elsewhere, and through extension of jute cultivation in areas like those receiving new irrigation facilities e.g. the Hirakud project area in Orissa and the tubewell irrigated areas in West Bengal. Addition of jute in the cropping pattern on these irrigated lands will not only not reduce the production of paddy but will, with proper soil management practices, even increase it. It is not necessary to divert any area from paddy to achieve the Fourth Plan target of production, and steps should be taken to ensure that no large scale diversion takes place.

DEVELOPMENT MEASURES

Improved Seed

4. Use of improved seed is essential for increasing the yield per acre as well as for improving the quality of jute. It is necessary that the entire area under jute in these 13 districts is saturated with improved seed as early as possible. This can be done by producing and distributing to cultivators one-tenth of the total seed requirement annually. For this quantity, the cultivators can multiply their own seed and cover the entire area with improved seed in the next season.

Ministry of Food and Agriculture and State Governments.
 5. A well-planned programme for multiplication of jute seed in the drier regions, preferably outside the jute growing zone, should be taken up and a target of producing 20,000 maunds of seed annually should be fixed. Seed grown in the drier region has better germination qualities. Moreover, with concentration of multiplication outside the jute growing area, the possibility of admixture with poor quality seed will be eliminated and pure seed of high germinating quality will become available. In experiments carried out in Pakistan, 6 to 7 maunds of seed per acre have been produced in Sindh. Similar efforts can be made in areas like Rajasthan and others where irrigation facilities are becoming available.

Ministry of Food and Agriculture and Indian Central Jute Committee.
- The above quantity of seed can be produced on 4000 to 5000 acres of land. The State farms e.g. those at Suratgarh and Jetsar in Rajasthan and Rudrapur in U.P. are particularly suitable for production of the required improved seed.
6. A Seed Act should be promulgated to ensure use of seed of certified good quality. Seed should be allowed to be sold only by authorised seed dealers and the present practice of sale of non-descript seed at the village 'hats' etc., should be

State Governments

Action to be taken by

stopped. The seed should be sold in sealed packets of one kilogram each. Sale of such certified improved seed should be subsidized as it is necessary to keep seed prices low, so that the cultivators have an incentive to purchase such seed. The cost of production of improved seed would be very small in comparison with the returns from the scheme in the form of improved yields.

Retting

7. The quality of the jute fibre as also yields are influenced greatly by availability of retting facilities. In order to help the maximum number of growers to avail of adequate and proper retting facilities, more emphasis should be given to excavation of community retting tanks; and tanks along canals and around tube-wells in which water can be periodically replaced, as suggested in the Model Retting Scheme. Excavation of such tanks should be taken up by the State Governments through the community development blocks, and Central assistance in the form of long-term loans should be made available for them. Management of the community retting tanks should be entrusted to the Gram Panchayats. Cultivators who use these tanks should have to pay a small charge which will go towards the cost of their maintenance and repayment of loans. The Jute Field Assistants and other extension staff should train cultivators in the art of retting and extraction of fibre at the community retting tanks.

Ministry of Food and Agriculture and State Governments.
8. Consideration should be given to re-introduction of the scheme of grant of subsidy on excavation of individual retting tanks which was being given in the Second Plan period; but which was withdrawn later.

Do.
9. There are large numbers of burrow pits along the roads, canals and railways which are commonly used by the cultivators for retting purposes. These should be deepened so that more water can be stored in them.

Do.
10. Use of boulders, stones and cement concrete slabs to replace mud clods, banana stems and raw mango wood which are commonly used as weighting materials by the cultivators should be encouraged. The superiority of these materials in improving the colour, lustre, and strength of the jute fibre should be demonstrated to cultivators and their manufacture for demonstration and sale to cultivators should be taken up at the block level. In the initial stages, the sale of these concrete slabs should be encouraged by giving a 50 per cent subsidy.

Ministry of Food and Agriculture and State Governments.

*Fertilizers**Action to be taken by*

11. Use of chemical fertilizers is another very important factor in increasing yields. It is estimated that with judicious application of fertilizers the yields in the principal jute-growing districts can be increased by at least 33 per cent by the end of the Fourth Five Year Plan. At present, only nitrogenous fertilizers are being used and their consumption on the jute crop is estimated at 25,000 tons (in 1961-62). But in order to obtain the desired increase in production 1.5 lakh tons of nitrogenous fertilizers, 45,000 tons of phosphatic fertilizers and 30,000 tons of potash fertilizers must be applied to the jute crop. Availability of these quantities of fertilisers should be ensured.
- Ministry of Food and Agriculture and State Governments.
12. Distribution and sale of fertilizers should not be entrusted to one organisation *i.e.* cooperatives. It is necessary to make this departure from the all-India pattern, because the cooperative movement is particularly weak in the jute growing States, and reliance on it alone will prove to be a serious impediment in extending use of fertilizers for jute cultivation. Distribution of fertilizers through private trade channels should, therefore, be allowed. Moreover the distribution arrangements should ensure that there is an adequate number of distribution points in the jute growing areas, and fertilizer is made available within easy reach of the cultivators. Arrangements should also be made to ensure that fertilizer reaches the retail distribution points well ahead of the sowing time *i.e.* by December or January. Recently, distribution of seed and fertilizers through the departmental agency in addition to distribution through cooperative societies has been introduced in certain States like U.P. Consideration may be given to introduction of similar system of distribution in the other jute producing States also.
- Ministry of Food and Agriculture, Ministry of C.D&C., and State Governments.
13. Short-term taccavi loans should be available for purchase of fertilizers in the intensive jute production districts, on the lines of similar facilities in the package programme districts. The existing procedure for distribution of taccavi loans is lengthy and time-consuming and special steps should be taken to shorten it. The aim should be to ensure that a fertilizer loan is sanctioned within a week. The revenue staff in these States should be suitably strengthened to meet the increased load of work.
- Ministry of Food and Agriculture and State Governments.

14. Application of balanced fertilizer mixtures (NPK) gives better response than application of nitrogenous fertilizers alone. It also improves the quality of fibre and checks incidence of disease. Use of such balanced fertilizer mixtures should be encouraged and the extra cost of producing these should be given as subsidy. *Action to be taken by* Ministry of Food and Agriculture and State Governments.
15. Spraying of urea can increase yields at considerably lower cost than application of the fertilizers to the soil. In order to encourage this practice, supply of sprayers should be made available by the Block authorities. *Do.*
16. *Improved implements* While improved seed drills suitable for the local soil conditions are available in certain jute growing districts, in others no such drills have yet been evolved. Work on evolving seed drills for these districts should be immediately taken up by the State Agriculture or Agricultural Engineering Departments. State Governments.
17. Manufacture of seed drills should be entrusted to reliable firms and a very careful control of quality should be exercised. Standard specifications should be given for materials and each implement should be tested after manufacture and stamped. This work should be done by the State Department of Agriculture through a special unit, if necessary. A sufficient number of seed drills should be kept in the C.D. Blocks and with the Jute Field Assistants. These should be available for hire, so that even those cultivators who cannot purchase drills can make use of them. In view of the high price of seed drills and other implements like wheel hoes, a 50% subsidy should be given for their purchase. Credit for purchase of seed drills and wheel-hoes should also be made available on the same lines as those suggested for fertilizers. For cultivators with larger holdings, the multi-line bullock drawn seed drill should be introduced and its sale popularised by giving subsidy and loans, as for other implements. *Planning Commission and State Governments.*
18. Where suitable drills are not available, simple devices for sowing behind the plough should be encouraged. Hand rakes for thinning, wheel-hoes for weeding, and other intercultural operations should be popularized. *Do.*
19. *Administration* In the 13 intensive jute development districts, the pattern of staffing for jute development work, should be similar to that adopted for the intensive development areas selected for other commercial crops like cotton. *Ministry of Food and Agriculture, Ministry of C.D. & C. and State Governments.*

20. At the State level, jute development work is under the charge of a Joint Director of Agriculture in West Bengal and Jute Development or Assistant Jute Development Officers in the other States. It is recommended that Joint Directors of Agriculture should be appointed also in Bihar and Assam, and a senior Deputy Director should be appointed in Orissa for this work.

Action to be taken by
Ministry of Food
and Agriculture and
State Governments.

Research

21. Variety-cum-fertilizer trials should be conducted in important jute growing areas on the fields of cultivators using the recommended varieties and at only three levels of nitrogen coupled with P and K in each case.
22. Precise information regarding nitrogen requirement both with ammonium sulphate and urea as the source and phosphate and potash requirements with single superphosphate and muriate of potash as sources respectively, should be obtained for recommendation for use in important selected areas.
23. Research should be undertaken to explore possibilities of extending jute cultivation both in irrigated areas such as those in Orissa and West Bengal and in rainfed areas in North Bihar and North Bengal as a crop preceding transplanted paddy.
24. A jute research station should be established in North Bengal to undertake research on applied aspects based on regional requirements.

State Governments.

Indian Central Jute
Committee & State
Governments.

Do.

Govt. of West
Bengal.

Communication

25. Improvement of communications in the rural areas is of the utmost importance for ensuring that the cultivators get an adequate return for their crop. A programme of improvement of communications, especially, roads, similar to that undertaken in the sugarcane mill areas should be taken up.

State Governments.

MARKETING

Regulated markets

26. There are no regulated markets in jute except at a few places in Orissa. The absence of standardization in market practices and weights has led to a large number of arbitrary deductions and allowances which are ultimately borne by the growers. Steps should, therefore, be taken for the establishment of regulated markets in all the jute

Do.

Action to be taken by

growing areas and for locating these markets within easy reach of growers so that sales in villages are progressively discontinued.

Co-operative markets

27. The structural weakness in the jute market stems from the inability of the growers to compete with the buyers on an equal plane. In order to improve the growers' bargaining position, co-operative societies should be organised on a large scale. Equipped with adequate finance, transport, storage, grading and baling facilities, these co-operatives can go a long way in building up a strong sellers' organization to match the powerful buyers' organization and in ensuring an economic price for the cultivator.

Ministry of C.D. & C. and State Governments.

Prices

28. The success of development efforts which aim at increasing production and quality of fibre is closely linked with the assurance of remunerative prices to the cultivators because unless the cultivators are assured of an adequate return they will not put in the additional effort and investment required. The benefits of the existing price support scheme are not being availed of adequately by the growers especially in the districts located at a long distance from Calcutta because rates in the markets of these districts are often quoted much below the Calcutta rates, the difference being more than what is justified by the cost of transport and other marketing expenses. It is, therefore, essential that along with minimum prices payable at Calcutta, the derivative prices payable to growers at various up-country markets are also fixed. From this year (1963-64), derivative prices have been announced at the beginning of the season. This practice should be continued. Secondly, wide publicity should be given to these derivative prices so that the ignorance of the cultivators is not exploited by the middle man.

Jute Commissioner.

MESTA*General*

29. For the sake of uniformity and in deference to commercial usage the name 'Mesta' should be adopted for both *Hibiscus Cannabinus* and *H. Sabdariffa (roselle)*. The two species may be differentiated by initials H.C. and H.S. respectively.

The Indian Central Jute Committee and State Governments.

30. *Research*

- (i) Mesta H.C. types have lost ground due to diseases and have been replaced by H.S.

Indian Central Jute Committee.

Action to be taken by

types. Attempts should be made to breed types in both *Hibiscus cannabinus* and *Hibiscus sabdariffa*, which are resistant to diseases, particularly, anthracnose, foot rot and stem rot.

Indian Central Jute Committee.

- (ii) With a view to combine qualities of *Hibiscus cannabinus*, particularly its early maturing character with yield potentials of *Hibiscus sabdariffa*, inter-specific crosses should be attempted and suitable selections made. Soil exhaustion studies should be undertaken with *Hibiscus cannabinus* and *sabdariffa* and jute under a common cropping programme. Do.
- (iii) Comparative economics of cost of cultivation of jute, *Hibiscus cannabinus* and *Hibiscus sabdariffa* should be worked out under different agro-climatic regions. Do.
- (iv) Simple manurial trials with N, P and K should be conducted on cultivators' fields to work out the manurial schedules for different types of soil on which the crop is grown. Do.
- (v) The existing Jute Research Outstations in U.P., Bihar, Assam and Orissa and the one such station recommended for West Bengal should undertake work on mesta also. Do.

30. Extension

- (i) No systematic programme for multiplication and distribution of improved seed of mesta has been undertaken so far. It is suggested that improved strains, R.T. 2 for H.S. and H.C. 583 should be multiplied for production of seed in the drier zones of West Bengal, Andhra Pradesh and Bihar. Attempt should be made to grow them also in Mysore and Maharashtra. Indian Central Jute Committee and State Governments.
- (ii) Till such time as precise recommendations regarding fertilizer application become available, application of bulky manures along with 30 kilogram of nitrogen per hectare in the form of ammonium sulphate or urea should be encouraged.

APPENDIX TABLE—1

Area, Production and Yields of Jute Average (1957-58 to 1961-62)

Name of the District	Area (000' acres)	Production (000' bales of 400 lbs. each)	Yield (Bales per acre)
<i>West Bengal</i>			
1. 24-Parganas	87.3	253.7	2.83
2. Nadia	90.0	243.2	2.61
3. Murshidabad	134.6	316.2	2.34
4. Jalpaiguri	90.1	294.1	3.20
5. Malda	60.4	115.4	1.92
6. West Dinajpur	129.6	302.3	2.32
7. Cooch Behar	118.9	366.3	3.08
8. Hooghly	74.7	295.3	3.83
9. Other districts	78.9	222.5	2.83
	864.5	2409.0	2.76
<i>Bihar</i>			
10. Champaran	23.7	51.6	2.55
11. Saharsa	100.4	250.1	2.39
12. Purnea	296.1	626.8	2.51
13. Other districts	31.6	69.4	2.23
	451.8	946.3	2.42
<i>Assam</i>			
14. Goalpara	88.6	274.2	3.07
15. Kamrup	73.4	198.9	2.71
16. Darrang	39.8	139.0	2.97
17. Nowgong	102.3	360.1	3.47
18. Other districts	24.0	76.0	3.16
	328.1	1028.2	3.04
<i>Orissa</i>			
19. Cuttack	72.7	164.2	2.16
20. Balasore	12.2	27.3	2.26
21. Sambalpur	0.3	0.6	2.01
22. Puri	2.9	6.5	2.20
23. Other districts	4.4	15.9	2.40
	92.5	214.5	2.20
<i>U.P.</i>			
24. Kheri	19.31	52.2	2.75
25. Sitapur	8.84	23.9	2.75
26. Bahraich	6.39	17.3	2.75
27. Nainital	0.46	1.1	2.75
28. Other districts	11.18	32.4	—
	46.20	126.9	2.75
29. Tripura	22.2	63.8	2.8

APPENDIX TABLE—2

Fluctuations in Jute Acreage and Production—Principal Producing Districts

Area: Thousand acres

Production: Thousand bales of 400 lbs. each

Districts	Area					Production				
	1957-58	1958-59	1959-60	1960-61	1961-62	1957-58	1958-59	1959-60	1960-61	1961-62
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
<i>West Bengal</i>										
24-Parganas	81·8	103·7	63·7	62·9	124·2	212·7	305·9	126·1	216·4	397·4
Nadia	68·8	87·1	80·9	74·0	139·3	144·5	256·9	214·4	183·5	416·5
Murshidabad	118·8	133·2	127·8	118·2	174·9	168·7	351·6	306·7	290·8	463·5
Jalpaiguri	72·0	90·9	83·4	87·6	116·5	224·6	290·9	281·9	261·0	412·4
West Dinajpur	93·0	123·8	168·2	110·7	152·5	185·7	393·0	359·0	252·0	321·9
Cooch-Behar	113·4	119·0	108·6	100·4	153·3	345·9	442·7	332·3	251·0	459·9
Hooghly	67·2	77·6	63·0	58·9	106·6	239·9	262·3	203·5	248·6	422·1
<i>Bihar</i>										
Saharsa	161·3	94·8	61·9	70·1	113·9	276·1	265·2	277·4	159·1	272·7
Purnea	251·1	311·7	291·5	247·2	378·8	327·5	830·9	555·3	588·9	831·4
<i>Assam</i>										
Goalpara	90·0	90·0	92·0	78·2	93·0	331·7	277·2	316·9	180·8	264·4
Kamrup	70·0	75·0	68·0	68·0	86·1	246·6	201·0	155·4	164·4	227·1
Nowgong	100·2	95·0	110·5	93·0	113·0	318·8	345·6	434·8	285·5	415·6
<i>Orissa</i>										
Cuttack	74·7	74·7	52·2	73·3*	88·4*	164·2*	134·4	125·2	176·0*	221·1*

*Provisional

APPENDIX TABLE—3

Progress of intensive cultivation measures during the Second Five Year Plan period by States.

Year	Total area under jute ('000 acres)	Area benefited in ('000 acres)								No. of retting tanks (old & new)	Yield per acre (bales)
		Fertilizers		Improved seeds		Line-sowing		Plant protection			
		Total	%	Total	%	Total	%	Total	%		
<i>West Bengal</i>											
1956-57	720	120	16.67	10.40	1.44	2.00	0.28	34.00	4.72	2,133	2.03
1957-58	759	120	15.51	20.80	2.74	4.50	0.59	53.00	6.98	2,188	2.41
1958-59	876	200	22.83	20.80	2.37	5.30	0.61	150.00	17.12	1,826	2.96
1959-60	824	200	24.27	29.90	3.63	7.00	0.85	80.00	9.71	1,487	2.63
1960-61	720	180	25.00	13.00	1.81	12.00	1.67	134.00	18.61	1,495	2.76
<i>Bihar</i>											
1956-57	665	—	—	1.98	0.30	1.97	0.30	4.50	0.68	745	2.07
1957-58	477	5.30	1.11	14.30	3.00	2.00	0.42	6.80	1.43	983	1.48
1958-59	455	10.66	2.34	15.64	3.44	2.50	0.55	7.40	1.63	900	2.27
1959-60	399	20.50	5.14	66.57	16.68	2.37	0.59	1.72	0.43	764	2.40
1960-61	363	26.00	7.16	83.04	22.94	2.64	0.73	—	—	659	2.35
<i>Assam</i>											
1956-57	355	—	—	5.33	1.50	0.38	0.11	0.41	0.12	179	2.95
1957-58	322	0.26	0.08	6.50	2.02	0.31	0.10	3.81	1.18	164	3.40
1958-59	323	40.00	12.38	9.93	3.07	0.36	0.11	4.32	1.34	170	3.06
1959-60	334	20.00	5.99	10.40	3.12	0.78	0.23	0.82	0.25	164	3.34
1960-61	299	20.00	6.69	11.69	3.90	0.12	0.04	1.35	0.45	163	2.72
<i>Orissa</i>											
1956-57	91	7.00	7.69	2.12	2.33	1.58	1.74	—	—	900	2.01
1957-58	94	5.20	5.53	4.36	4.64	0.60	0.64	7.00	7.45	900	2.21
1958-59	99	17.16	17.33	4.42	4.46	0.67	0.67	25.00	25.25	—	1.78
1959-60	75	67.50	90.00	6.83	9.10	0.77	1.02	1.00	1.33	—	2.83
1960-61	100	45.00	45.00	10.15	12.09	1.10	1.31	—	—	—	2.37

<i>U.P.</i>												
1956-57	56	1.60	2.86	11.18	19.96	1.73	3.08	1.26	2.25	412	2.80	
1957-58	71	3.60	5.07	2.85	4.01	3.00	4.23	2.50	3.52	*	2.22	
1958-59	36	7.74	21.50	23.66	65.72	5.30	14.72	0.40	1.11	1	2.64	
1959-60	33	9.00	27.27	24.05	72.88	9.20	2.79	—	—	184	2.79	
1960-61	32	7.20	22.50	24.19	75.60	13.60	42.50	—	—	173	2.87	
<i>Tripura</i>												
1956-57	21	—	—	0.05	0.25	—	—	—	—	150	2.76	
1957-58	19	0.40	2.11	0.38	2.00	0.02	0.11	—	—	106	2.89	
1958-59	22	0.40	1.82	0.87	3.95	0.20	0.91	—	—	115	2.64	
1959-60	20	0.30	1.50	1.30	6.50	1.00	5.00	—	—	122	3.00	
1960-61	15	—	—	1.63	10.87	0.50	3.33	—	—	122	2.73	

*In U.P. instead of 50% grant-in-aid, taccavi loans were given for construction of retting tanks and other operations, viz., steeping, retting and stripping. The figures for new tanks actually excavated with taccavi loans are not available.

**PUBLICATIONS OF THE COMMITTEE OF NATURAL RESOURCES,
PLANNING COMMISSION**

- (1) Committee on Natural Resources, Organisations and Problems proposed for Study (1962).
- (2) Natural Resources of India (A brief statement) by M. S. Randhawa (1963).
- (3) A Coordinated Study of Organisations concerned with the Surveys of Natural Resources, *e.g.*, The Survey of India, Geological Survey of India, Soil and Land Use Surveys, Forest Surveys, Cadastral Surveys and Town Planning Surveys (1963).
- (4) Study on Wastelands, including Saline, Alkali and Waterlogged Lands and their Reclamation Measures (1963).
- (5) Study on Cotton in India (1963).
- (6) Study on Groundnut in India (1963).
- (7) Study on Utilisation of Urban Wastes (1963).
- (8) Study of Coconut in India (1963).
- (9) Survey and Utilisation of Agricultural and Industrial By-products and Wastes (1963).