

C H A P T E R - 4

JUTE CULTIVATION IN NORTH BENGAL

I. Introduction

As early as 800 B.C., jute was grown as a medicinal plant and was used as a vegetable. In recent times, it is grown on the Indo-Pak Sub-continent - in West Bengal, Assam, Bihar, Orissa, Uttar Pradesh, Tripura as well as in Bangla Desh (erstwhile East Pakistan). Of 40 species of jute, only two varieties, the "White" and the "Tossa" jute, are of commercial importance. The main reasons for the cultivation of jute in these areas are favourable soil and weather conditions, availability of labour, irrigation and retting facilities, humid climate with rainfall varying between 50" and 70" between March and October with a temperature of 83° F. India and Bangla-Desh are the main producers of jute, sharing between them 73 percent of the world output. Their individual share in the world production of jute in the 1958-59 was 33 percent and 40 percent respectively.

After the partition of India, as the lion's share of the sub-continent's jute growing areas went to Pakistan, a boost in raw jute production was the most vital imperative for meeting the fibre requirements of jute mills in India. Consequently the output of the fibre did witness a sharp rise in the immediate post-partition years. As a short term measure, the Govt. of India encouraged a shift in acreage from 'aus' (autumn) paddy to jute; deciding that shortfall in respect of the availability of the former would be met by allocation of grains to the jute-growing states. Further, stress was laid on the raising of mesta. This, alongside a buoyant global demand,

led to a quick rise in area under jute - about three-fold in West Bengal and about two-fold in Bihar and Assam - over 1947 to 1956. Ever since, the Govt. has tried to expand jute acreage without reducing the area under 'aus' paddy, the ^{aim} being to encourage the culture of jute in mono-cropped land under 'aman' (winter) paddy prior to the sowing of the later. In 1984-85 production amounted to 5.97 million bales of jute and 1.37 million bales of mesta accounting for about four percent of the country's total acreage devoted to jute and paddy.

Jute production was characterised by significant year-to-year variations. For the country as a whole and over the period 1968-69 to 1984-85 (i.e. the period following the ushering in of the so-called technological revolution in Indian agriculture), the trends in jute production and acreage are not statistically significant. For West Bengal, however, there was an uptrend in production, acreage, and yield of jute. The positive growth rates in the case of West Bengal were offset by insignificant or even negative trend rates of jute production, acreage, and yield reported in the other jute-growing states of Bihar, Orissa, Assam and Uttar Pradesh. It is worth noting though, that in the jute-growing districts of Jalpaiguri,

CoochBehar, and Darjeeling in northern Bengal Jute production, acreage and yield showed no trend. In southern Bengal, only the districts of 24 Parganas, Nadia, Midnapore and Burdwan showed positive growth rates in regard to production, acreage, as well as yield of jute. Altogether, jute production, area and productivity in the country were marked by a striking sluggishness during the period under review, and with stagnant techniques and the scarcity of good land, the yield response to acreage now tends to be negative - reflecting decreasing returns - in most jute tracts of the country. In 1984 - 85 the combined output of jute and mesta at 7.34 million bales fell substantially short of the Sixth Plan target of nine million bales.

Reliable annual estimates of variety - wise and grade-wise output of jute in India are not available. The report on raw jute prepared by the Technical Committee (1981) of the Jute Manufacturers Development Council (JMDC) brought out that the average yearly output (excluding mesta) over the last five years of the decade of the 1970s was 5.5 million bales of white jute (capsularies) and tossa (olitorius) varieties, of which the former accounted roughly for 1.65 million bales and the latter for 3.85 million bales, that is in the proportion of 30 : 70. It was also shown that over the period the production of W/5 and TD/5 varieties of jute was the highest among all grades (about 36 percent of the total). The superior grades (grade 4 and above) formed about 40 percent of the total output with grades 1 and 2 accounting for only about 3 percent of the total.

II. The Production System of Jute : Features and Forces :

Jute is a commercial crop and about 95 percent of its output may be regarded as marketable surplus, the balance being retained as seed and for village - level consumption. Jute is also predominantly a crop of small farmers and tenant cultivators. Data regarding the size - distribution of jute holdings are scanty, but it is generally estimated that about three-fourths of the area under the crop is covered by holdings below two hectares. A study conducted by the Department of Economics of Calcutta University covering a sample of 891 jute growers in West Bengal brought out that in 1975-76 about 80 percent of jute farmers raised the crop on land extending from less than a biga (0.133 hectare) to 5.99 bighas (0.801 hectare). The corresponding figure for the previous year was 72 percent. The average size of jute holding in 1975-76 and 1974-75 was respectively 4.2 bighas (0.562 hectare) and 5 bighas (0.669 hectare). The agricultural Census (1976-77) data on West Bengal also brought out the unimodal structure of jute (and mesta) ~~mainadaixaxstaxaxaxaf~~ farming in the state, revealing that in that year 58.5 percent of the jute acreage was accounted for by farms upto two hectares in size, and 78.8 percent of the acreage by farms upto three hectares. Irrigated jute area formed only about 10 percent of the total area under jute.

Accordingly, the production of jute is crippled by the typical hazards and constraints of small - scale farming in a quasi-feudal rural economy that thwart growth. Some instability

is doubtless the result of the stochastic element of weather variations - a very large proportion of the jute tract in the country being rain-fed, remains vulnerable to uncertain weather conditions.

III. Constraints of the Production system

The factors that prevented jute growers from exploiting the yield potential of their farms and of the improved jute varieties may be categorised along conventional lines into two groups : (i) technological, (ii) structural or institutional (socio - economic), and as is well known, these are not mutually exclusive, there are organic interactions between them.

The technological factors relate to (a) genetic potential and characteristics on one hand and (b) cultural practices on the other. As regards the former, the availability of improved or hybrid seed is stated to be an important limiting factor in increasing yields of jute. Whereas the availability of certified seeds of recommended improved varieties of jute is generally inadequate, that of capsularies is particularly meagre - only about five percent of the total requirement. This is because capsularies are shy-yielders, with high unit costs of production, and the seed producing agencies are reluctant to take up their production. Secondly, genetic improvements in regard to jute have not yet resulted in varieties which may cause jute to displace significantly other crops on rainfed or

irrigated land. That is to say, the potential of genetic improvements and superior cultural practices are less fully exploited for jute than for the basic foodgrains - wheat and rice, and some major progress is yet to be achieved. Moreover, several genetic advances secured or foreshadowed in the laboratories have not yet been transmitted to the jute growers. Yield gap analyses reveal that multiples of existing representative yields are realisable, though to a lesser extent than when comparing high-yielding varieties with the traditional ones in the case of foodgrains. Tests under controlled conditions have shown that yields could be raised to even 35 quintals per hectare, whereas under actual field conditions the normal yields are considerably less. Also, the range of variation in yield is pronounced under varying agro-climatic environment. Existing improved and hybrid varieties of jute tend to have much higher production costs, but higher net returns as well. The greater production costs of the select varieties however make them suitable for farmers who are financially capable of assuming greater risks, or for intensive cultivation on smaller plots.

As regards cultural practices, a chief difficulty concerns retting which exerts a potent influence on quality. The potential of communal retting facilities, and of mechanical and microbiological retting techniques is almost totally unrealised. Jute areas having line sowing are also very limited, and there is scarcely any use of seed drills of even the hand-pushed, single-

row types. Jute and mesta growers still sow by adopting the age-old broadcasting method, despite the acknowledged gains from line sowing. The recommended doses of fertilisers are not applied in most areas, including the IJDP areas, except in some of the alluvial tracts of southern Bengal. And some jute farmers are not inclined to use fertilisers in low-lying tracts owing to the risk of inundation. There is evidence that jute growers have in many areas transferred their subsidised fertiliser supplies to paddy or other crops. Plant protection against pests and weeds is also unsatisfactory.

Institutional impediments : Credit - Although the importance of credit has been somewhat overrated by many (such as the RBI's 1981 Working Group on Institutional Credit for Jute growers), given the facts that credit requirements for jute by virtue of the high costs of jute growing are relatively high per hectare and the most common immediate source of it is indigenous, there does arise a dearth of resources which harasses the small jute growers exactly when they need them. The major jute - growing states are in the eastern region where the scale of institutional finance in the agricultural sector is well below the average for the country. And the 'dadan' (tied advances) system, deeply entrenched in undeveloped semi-feudal agriculture, has subjugated a vast section of impoverished jute growers as well. Jute being a commercial crop, growers (including share -

croppers) can command some credit in the informal market comprising landlords/traders/money lenders against the security of their crop. The low (and even Zero) rate of interest often charged by the lenders conceal to a considerable extent charges in the form of low prices for produce forcibly sold in repayment - indeed a striking feature of the 'dadan' system is that it is garbed in a form that avoids the emergence of any interest - and much of the prices received by the jute growers, therefore represent a high, implicit rate of interest. An integration of production, credit and marketing has been conspicuously lacking in the case of jute because of a languishing co-operative movement, while JCI's involvement in production has until very recently been minimal.

IV. Nature of Production of Jute

production of jute is characterised by extreme instability in production. The picture is no different in North Bengal. This will be revealed from the following tables :

Table - 4.1

District-wise area of cultivation of Jute

(In thousand hectares)

	<u>1950-51</u>	<u>60-61</u>	<u>65-66</u>	<u>70-71</u>	<u>75-76</u>	<u>89-90</u>
Jalpaiguri	13.9	35.5	45.4	42.1	29.2	35.7
Darjeeling	1.2	2.4	4.3	3.3	2.0	5.0
Malda	20.8	20.6	18.1	23.4	18.0	18.1
W.Dinajpur	18.2	44.8	61.0	61.4	49.7	33.9
CoochBihar	23.7	40.6	54.7	56.5	42.3	59.6

Table - 4.2

Districtwise Production of Jute

(In thousand bales of 180 Kgs each)

	<u>1950-51</u>	<u>60-61</u>	<u>65-66</u>	<u>70-71</u>	<u>75-76</u>	<u>89-90</u>
Jalpaiguri	90.1	263.1	289.4	270.7	218.0	318.4
Darjeeling	9.1	19.5	36.9	18.3	12.4	42.4
Malda	103.8	119.2	51.9	120.0	107.7	163.6
W.Dinajpur	90.7	254.0	306.8	310.7	286.8	276.5
CoochBihar	176.9	253.0	299.8	358.8	281.9	498.2

The fluctuations in production is partly explained by fluctuations in price, which is reflected in the following table, i.e. Table 4.3. The reasons behind fluctuations in price of raw jute are analysed in Chapter - 5.

Table - 4.3

Districtwise harvest price of Jute

(Rs. per maund for 1955-56 & Rs. per quintal for other years)

	<u>1955-56</u>	<u>60-61</u>	<u>65-66</u>	<u>75-76</u>	<u>88-89</u>
Jalpaiguri	21.50	91.79	105.00	130.50	386.56
Darjeeling	-	-	113.00	-	NT
Malda	-	-	104.00	146.30	370.15
W.Dinajpur	24.00	99.16	109.00	135.92	373.15
CoochBehar	22.00	94.47	100.00	135.34	361.24

NT - No transaction.

(Source, Table - 4.1, 4.2, 4.3 : (i) statistical Abstract, West Bengal, 1962, 1976-77, and 1978 to 1989 (combined), Published by Bureau of Applied Economics & Statistics, Govt. of West Bengal)
(ii) Annual Summary of Jute & Gunny Statistics, 1992-93, ICMA)

Data in respect of area, production and prices for the entire period is shown in Appendix A. The production of raw jute is closely correlated with the price of raw jute. The year in which the price of fibre rises high, more jute is sown during the following year. The year in which the price falls to low levels, the jute sowing area of the following year shows a marked reduction. If, however, the price line is held at a reasonable level to cover the cost of cultivation plus some margin, the fluctuation in production can be adequately controlled. However, the jute farmers have reconciled themselves to the seasonal, annual and regional fluctuation in raw jute prices in view of the failure of all attempts to stabilize area and production and to regulate the raw jute market. Other contributing factors to this failure are a defective marketing system, transport difficulty and speculative activities, the last of which is responsible for coercive slumps in price. In some years a sharp fall in area of ~~of~~ cultivation or production of jute is observed. A possible explanation of this phenomena is flood situationⁱⁿ North Bengal.

The constraint on jute prices deriving from the ~~max~~ viability of the jute industry calls for an improvement in the yield and quality of the fibre so that cultivation of jute be remunerative to the farmers. If the unit yield of jute is low, it is difficult for the growers to make reasonable profit by producing the fibres and supplying the industry at prices which would enable it to compete in world markets.

(110)

Both in the Research stations and in the growers fields it has been abundantly proved that the present low yield rate can be improved by input application. Inability of the growers to invest in inputs, as well as non-availability of the inputs in time and at convenient points has adversely affected the output. If credit facility is made available and the supply line of inputs is improved, the yield rate is bound to improve.

Fertilisers and improved seed are the most important inputs which need to be provided to increase the yield rate.

Improvement of retting facilities and training in proper retting procedures are the most important aspects for improving the quality of fibre. Some attempts have been made to train the cultivators but as the retting facility has not been improved the attempts have been more or less futile. Besides good retting facility, for better quality of fibre little more care and attention of the farmer is necessary. The additional expenditure for the same is however negligible except on concrete slabs or bamboo poles to weigh down the charge for steeping which, in most cases is now done by chunks of mud which makes the fibre dirty in colour.

Some of the disadvantages faced by the growers in respect of marketing are -

1. Arbitrary deductions and allowances.

2. Monopsonistic buyer - ultimately the jute mills, for almost all jute.
3. Lack of transport, storage and grading facilities.
4. Indebtedness.
5. Imperfect knowledge of market conditions.
6. Tie up between traders and jute mills.

It appears that a large number of arbitrary deductions and allowances both in cash and kind exist in the jute trade and are borne by the sellers. Their incidence is passed on to the cultivators.

While there are large number of growers (none of whom can individually influence price), there is finally one group, representing practically all ultimate buyers - the IJMA - which wields a considerable influence on the jute market.

It is generally recognised that the farmers' share in the ultimate consumer price tends to increase if the produce is sold after grading at the farm level. The Indian Standards Institution, with the help of the Directorate of Jute Development, industry, trade and growers as well as research institutions has evolved an eight grade system. This will have little impact unless the growers are themselves trained in the grading of their fibre. The Directorate of Jute Development is at present arranging training in jute grading.

The weak financial position of the growers is sometimes exploited by the 'beparis' and 'farias' who advance them loans under the 'dadan' system making it often obligatory for them to dispose of the bulk of the fibre to the creditor - dealers locally, at a price which may well be below the market rate.

While it is difficult to substantiate by statistical evidence, the existence of a tie - up between jute trading interests and jute goods manufacturers, it is understood that a number of influential mill owners also have a big share in the raw jute trade. At one end of the chain, the growers are deprived of a remunerative price, at the other end ultimate end users may have to pay a high price. Problems of marketing, however, are discussed separately in Chapter 5.

The aforesaid imperfections have to be taken care of. But above all, the fate of the cultivators are linked with the jute industry. Indian jute industry has ceased to be an export - oriented industry. Exports of jute goods have been declining rather sharply since mid-seventies, from 5.83 lakh tonnes in 1974 - 75 to 3.17 lakh tonnes in 1978 - 79. While foreign demand for Indian jute goods has declined, The domestic demand has continued to be brisk. The internal consumption of jute goods went up from 5.4 lakh tonnes in 1974 - 75 to 9.9 lakh tonnes in 1982-83, mainly as a result of increased demand from agricultural sectors, and sugar, cement and fertiliser industries. (Report of the Agricultural prices

commission for the season 1984-85). The nature of the crisis in jute industry and reasons behind it have been discussed in detail in chapter 3.

It is likely that in the coming years the demand for raw jute will increase at a faster rate than in the past. It is mainly because earlier the increase in domestic consumption jute goods was being counter balanced by decline in exports. In future it is possible that exports will stabilise at the existing level and domestic requirements of raw jute will increase. As a result demand for raw jute, is surely to go up.

(V). Survey on Jute cultivation ;

I have undertaken a survey on jute cultivation in two villages of CoochBehar district. The questionnaire of the survey is shown in Appendix 'B'. The name of the Villages are Kawardera and Bara Kaimari, both in the Mathabhanga Sub-division. The survey was undertaken in the jute year 1990-1991 (July to June). In choosing respondents random sampling method was adopted. A number of 50 jute growers were selected in each of the two Villages.

Kawardera is a Village having population of 3,500. Main occupation of the villagers are cultivation, business and service. The distance of the nearest town Mathabhanga from this village is 5 kms and that of the nearest

market centre Golakganj is 1 Km. There is a branch of Bank of Baroda in the village. Bus communication with nearest town Mathabhanga has improved. But electrification has not extended to entire village.

Jute cultivation in this village is characterised by small scale farming. Area under jute cultivation of a particular cultivator varies from 1 bigha to 8 bighas. There are two varieties of jute, viz, white and tossa. Normally area under tossa variety is higher than that of white jute. Only in a few cases white jute is cultivated in a greater proportion as it requires comparatively less water.

Cultivators face some problems in undertaking jute cultivation. Natural calamities affect cultivation. North Bengal is a flood-prone area. In years of excess rain, weeding becomes difficult as water remains stored in the farms. In years of scarce rain, farmers face problem regarding retting. This is so as retting tanks become dry. They have to carry jute plants to distant places where deep tanks have some water. Lack of finance makes it difficult collection of materials for cultivation such as fertiliser.

Jute cultivation is not much remunerative as margin of revenue over cost of cultivation is insignificant. It is insignificant in consideration of length of the season of crop and area of jute cultivation. On an average this margin was Rs. 350.00 per bigha. Cultivators carry on jute cultivation whether the prices are remunerative or not due to inertia, lag and absence of any other alternative. We rarely find a causal relationship between costs of production and prices. This lack of correspondence between agricultural prices and costs has

been particularly conspicuous in countries like India as well as in the region of North Bengal where, for majority of farmers, agriculture has been more a tradition and mode of living rather than an economic pursuit.

It is also pertinent to note that some jute growers prefer to raise the crop out of tradition rather than fully switching to paddy in response to relative changes in prices or profitability. This is done as well for immunity against floods that are common to several jute-growing tracts. If only aus paddy is cultivated, it is liable to be severely damaged by floods which do not affect the jute crop as much, insofar as the latter generally is quite tall by the time floods occur in such regions. Moreover, in poor soil areas the growing of jute may increase soil fertility which also spurs its culture in preference to pure aus - aman combination. These considerations lie behind the continued cultivation of some jute, particularly by risk - averse growers, even in the wake of low prices of the commodity.

Most of the growers of the village do not take any loan for jute cultivation. The reason is uncertainty in production due to natural calamities and fluctuations in monsoon. In some cases farmers are influenced by previous year's jute price in determining acreage of jute cultivation. Acreage increases if previous year's price is high and it declines if previous year's price is low. But generally jute is cultivated on traditional basis. Climate and finance are other determining

factors. In the absence of timely rain acreage declines. In years of financial hardship acreage declines.

Women members of the family take part in cultivation. They undertake weeding, separating the fibre and drying. In some cases, women do not take part in any stage of cultivation.

Local jute market is dominated by private merchants as role of JCI is insignificant. So price falls after harvesting and price is not much remunerative. Farmers prefer to sell to merchants as JCI do not come to market in proper time. Moreover JCI do not make payment readily in cash, whereas growers are in need of ready money to meet their daily expenses.

The residents of the village are mainly divided into two ethnic groups - one is 'rajbansi' who are original inhabitant of the village. The other group is non-raj-bansi who have migrated from Bangladesh before or immediately after independence. Most of the growers being small farmers, they are compelled to undertake distressed sale a small part of their production.

The name of the other village surveyed is Bara Kaimari. It is a village having population of 2,500. Main occupation of the villagers are cultivation and business. The distance of the village from the nearest town Mathabhanga is 10 Kms and that from the nearest market is 1 Km. There is a branch of the Central Bank of India in this village. It may be mentioned that Central Bank of India is the lead bank of this region. Bus communication with

nearest town Mathabhanga has improved. But electrification has not extended to entire village.

The nature of production system and the problems faced by the jute growers of this village are almost similar to that of the village mentioned earlier. Jute is cultivated traditionally. Previous year's price affect acreage of jute cultivation marginally. In this connection mention may be made of a study by Kanailal Basak and Kamal Kr Dutta regarding some factors influencing jute acreage. The subject of Indian Farmers' responsiveness to economic opportunities has gained importance in the literature during the past few decades. The existing studies (Dharam Narain, N C A E R, Rabbani and Ahmed) indicate the economic rationality of farmers in general. In particular, they suggest that farmers make appropriate adjustments in acreages under crops in response to changes in prices. The ~~speed~~^{broad} conclusion to emerge from those studies on jute growers is that they vary their area under jute when jute-paddy (aus) price ratio changes, though the elasticities of response, both short run and long run are not large. But the study of Kanailal Basak and Kamal Kr. Dutta holds an altogether different view contrary to the traditional belief of responsiveness of the farmers to changes in prices. An attempt is made by them to find out the determinants of jute cultivation in different parts of West Bengal.

The study reveals that the jute growers are not responsive to changes in relative jute prices, i.e. changes in

jute prices relative to paddy (aus) prices do not appear to have had any significant impact on the grower's decision to grow jute. This may partly reflect the importance of non-price elements which give rise to forms of tied agreements arising out of systems of financial advance.

Allocation of area under a crop having competing crops is expected to be influenced by changes in relative prices, because these crops can be sown directly on the same land and thus could compete for area. But Basak and Dutta find a weak and insignificant correlation between the percentage change in relative jute prices and the percentage change in the proportion of land devoted to jute cultivation for each district. So the importance of non-price elements.

This leads them to have a fresh look on the nature of transactions in the informal credit market with particular focus on the terms and contracts of different transactions and the sources of credit. There are three types of loan transactions prevailing in the districts of West Bengal -

- (a) Loans given and recouped in money terms
- (b) Loans given in money and recouped in crop
- (c) Loans given in kind (inputs) and recouped in crop.

Differences in the sources of credit to the jute growers have given birth to differences in financial and marketing arrangements in the southern and northern parts of

West Bengal. This gets reflected in forward financing by the jute traders in South Bengal, while it is absent in North Bengal. Sale of jute, however, involves traders, though they are not interested in financing in North Bengal. Because of the relative absence of irrigation facilities in North Bengal in particular and other infrastructural facilities associated with production, there exists a mono-cropped situation. Farmers practice traditional cultivation and depend mostly on their "owned" inputs, not purchasing from the market. This means that they require less finance. On the other hand, this results in low productivity. Hence the lower volume of transaction discourages the traders to finance the growers.

The farmers are insensitive to price stimuli. Basak and Dutta concludes that this does not necessarily mean that the farmers are not responsive to economic incentives and opportunities. It is the financial - cum - marketing system that prevented the primary producers from benefiting from price fluctuations. This is so because the jute merchants and the village mahajans controlled the sources of credit. These producers, as they were indebted to traders and mahajans had little effective control over the decision making process in agricultural production.

The conclusions of Basak and Datta, however, do not have full support in the findings of my survey. Most of the farmers do not take any loan for jute cultivation and use their "owned" inputs. But it is not true that they can not determine the acreage of jute independently.

Apart from mentioning the problems of jute cultivation in particular, the jute growers of the villages also expressed their sentiment against the salaried people of towns from the point of difference of financial status. So, unless economic backwardness of the cultivators is taken care of on an emergency basis, social tension is surely to aggarvate in near future.

VI. A Short - Run Supply Response Model of Jute

We can frame a short-run supply response model of jute based on data of production of raw jute, area of cultivation of raw jute, harvest price of jute and cost of cultivation of jute. Data of production and area of cultivation have been collected from Annual Summary of Jute and gunny statistics, 1992-93 published by IJMA which have been verified from the data published in statistical Abstract, West Bengal, 1978 to 1979 (Combined), published by Bureau of Applied Economics and statistics, Govt. of West Bengal. Data of harvest prices have been collected from statistical Abstract, West Bengal. Data on cost of cultivation have been collected from different issues of "Study on Farm Management and Cost of Production of Crops in West Bengal" published by Directorate of Agriculture, Govt. of West Bengal.

In the standard supply response models desired output is related to some index of expected profitability - usually the unit price - average cost ratio.

$$Y = \text{Yield rate} = \frac{\text{Production}}{\text{Area}}$$

$$\text{Desired yield } Y_t^* = a_0 + a_1 \left(\frac{P}{C}\right)_{t-1}^e \dots (1)$$

$$a_0 > 0, a_1 > 0$$

P = Price, C = Cost

$\left(\frac{P}{C}\right)_{t-1}^e$: expected profitability in t computed on the basis of information available in (t - 1).

Expectations are formed according to Narlovian "Adaptive Expectations" (revision of expectations is proportional to error).

$$\left(\frac{P}{C}\right)_{t-1}^e = \left(\frac{P}{C}\right)_{t-2}^e + \beta \left[\left(\frac{P}{C}\right)_{t-1} - \left(\frac{P}{C}\right)_{t-2}^e \right]$$

$$0 \leq \beta \leq 1$$

$\left(\frac{P}{C}\right)$: Actual profitability

$\left(\frac{P}{C}\right)_{t-1}^e$ Can be written as

$$\pi_{t-1}^e = \beta \pi_{t-1} + \beta(1-\beta) \pi_{t-2} + \beta(1-\beta)^2 \pi_{t-3} + \dots (2)$$

$$\left[\pi = \frac{P}{C} \right]$$

The desired yield rate Y_t^* is related to actual/observed rate through the mechanism of "Partial Adjustment".

$$Y_t - Y_{t-1} = \alpha (Y_t^* - Y_{t-1}) \dots (3)$$

$$0 < \alpha \leq 1$$

α : Co-efficient of adjustment

For statistical exercise we write

$$Y_t^* = a_0 + a_1 \pi_{t-1}^e + U_t$$

U_t : error term

and simplify (2) by ignoring the higher order terms

$\pi_{t-3}, \pi_{t-4}, \dots$ since β is a fraction these terms have progressively decreasing weights in π_{t-1}^e . So, $\pi_{t-1}^e = \beta \bar{\pi}_{t-1} + \beta(1-\beta) \pi_{t-2}$

Substituting in (3) and rearranging

$$Y_t = a_0 \alpha + a_1 \alpha \beta \bar{\pi}_{t-1} + a_1 \alpha \beta (1-\beta) \pi_{t-2} + (1-\alpha) Y_{t-1} + \alpha U_t \dots (J)$$

This equation (J) is the reduced form expression for our simplified yield-response model for jute. We note that from the estimates of the parameters of (J), the estimates for the original structural form parameters a_0, a_1, α, β can be recovered, so that there is no identification Problem.

We can also write the equation (J) as follows for convenience of calculation of the parameters :

$$Y_t = A + B \bar{\pi}_{t-1} + C \pi_{t-2} + D Y_{t-1} + E_t$$

As a representative case, the supply response model is formed for Jalpiguri district alone.

we know, $Y = \text{yield} = \frac{\text{Production}}{\text{Area}}$

and $\pi = \frac{\text{Price}}{\text{Cost}}$

The model is framed by taking the data for the period from 1980-81 to 1989-90. The data is represented below :-

Year	Production (in '000bales)	Area ('000hec)	Price (Rs/Qt)	Cost (Rs/Qt)	Yield	Price/Cost
1980-81	388	56	167	46	6.93	3.63
1981-82	315	44	172	39	7.16	4.41
1982-83	327	44	207	52	7.43	3.98
1983-84	301	43	298	65	7.00	4.58
1984-85	293	47	752	86	6.23	8.74
1985-86	507	70	185	65	7.24	2.85
1986-87	311	50	205	53	6.22	3.87
1987-88	357	44	276	60	8.11	4.60
1988-89	395	45	387	85	8.78	4.55
1989-90	318	36	302	106	8.83	2.85

DATA FOR REGRESSION

Year	Yt	(p/c)t-1	(p/c)t-2	Yt-1
1982-83	7.43	4.41	3.63	7.16
1983-84	7.00	3.98	4.41	7.43
1984-85	6.23	4.58	3.98	7.00
1985-86	7.24	8.74	4.58	6.23
1986-87	6.22	2.85	8.74	7.24
1987-88	8.11	3.87	2.85	6.22
1988-89	8.78	4.60	3.87	8.11
1989-90	8.83	4.55	4.60	8.78

Solving the regression equation by ordinary least squares method, we get

$$Y_t = 3.32 + .087 \pi_{t-1} - .309 \pi_{t-2} + .712 Y_{t-1} + .886$$

where $R^2 = 0.572$

It may be mentioned, one limitation of the model is that time span of time series data is small. Although data for area, production and prices are available for greater number of years, unfortunately Directorate of Agriculture, Govt. of West Bengal could not supply data of cost of cultivation for more than 10 years. This is because they can supply only published data as per government specification.

REFERENCES :

1. Marketing of Jute in West Bengal, A. Sengupta in Arthaniti (1975 and 1976).
2. Some factors influencing Jute Acreage in West Bengal : Role of Jute Prices and the Credit Market, Kanailal Basak and Kamal Kr. Datta in Indian Journal of Agricultural Economics, October - December'1984.
3. Statistical Abstract, West Bengal, 1962, 1976-77 and 1978 to 1989 (combined), published by Bureau of Applied Economics and statistics, Govt of West Bengal.

- 4) Jute in India, Goutam K. Sarkar (1989),
Oxford University Press, Calcutta

- 5) Report of Agricultural Prices Commission
on Price Policy for Jute for the season
1984-85.

- 6) The Dynamics of Supply : Estimation of
Farmers' Response to Price, Nerlove (1958),
The Johns Hopkins Press, Baltimore.