Chapter V

INTER-TEMPORAL PROSPECT OF AREA, PRODUCTION AND YIELD OF JUTE IN COOCH BEHAR DISTRICT

5.1. Introduction

The rainfed fibre crop jute is the most dominant cash crop in the agricultural economy of Cooch Behar district. The inflow of money in the hands of the farmers mainly takes place in this district through the production and sale of this important agricultural commodity. In other words, jute production sets up the link between the non-monetised and monetised sectors of the economy of Cooch Behar district. To this effect the fluctuations of area, production and yield of jute over years assume special significance for this district. In view of this, the present chapter proposes to examine the time series of area, production and yield of jute and to identify the nature and magnitude of the variation along with finding out the probable contributory factors associated with the variation of production and area under jute.

In order to carry out this study time series data from 1970-71 to 1990-91 on area, production and yield of jute concerned with Cooch Behar district are considered. The year 1990-91 is treated as the terminal year of the period relating to the time series as data required for

the study have not been available in published form after this year. The year 1970-71 is taken as the beginning year of the period related with these time series data because of the following facts : (i) since 1970-71 there has been no gap in the time series of the magnitude of other factors relating to this study (viz., price of jute, price of aus paddy), (ii) the time series data on area, production and yield of jute before and after 1970-71 are perhaps non comparable as since the year 1971 the Government of India has started to intervene in the jute economy of India through the establishment of Jute Corporation of India. This governmental organization manages export, import and, above all, internal marketing of raw jute[1].

5.2. Nature and Magnitude of Fluctuations in Area, Production and Yield

Table 5.1 showing the magnitudes of area, production and yield of jute in Cooch Behar district for the years 1970-71 to 1990-91 is presented for a visual estimation of the nature and magnitude of fluctuations. A perusal of this table reveals no definite trend either in area, production or yield.

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1. Dewett, K.K. and Verma J.D. (1988), Refresher Course in Indian Economics, Shyamlal Charitable Trust, Ramnagar, New Delhi-55, p. 235.

The data on area, production and yield of jute show fluctuations around a more or less constant level.

In order to understand the nature of the trend in these statistics a linear equation of the form $y = a + bt$ and a non-linear equation of the form $y = ab^t$ are fitted separately for each of the three time series data. The results of these fittings are displayed in Table 5.2. It is found from this table that both types of equations show good fit with five per cent level of significance in all the cases of three types of time series data.

But the same table shows that the values of r^2 are significantly poor for all the three time series of observations for this district in the case of either types of equations. This simply implies that the fluctuations in area, production and yield of jute are more pronounced than the growth in respective magnitudes. The presence of these significant fluctuations in these time series may be manifested in a more suitable way through the graphical presentation of these time series observations. These have been done in Figures 5.1, 5.2 and 5.3. These figures very much clearly disclose the persistence of wide inter-year fluctuations in area, production and yield of jute in Cooch Behar district. Therefore, the identification of the factors responsible for the presence of these inter-year fluctuations in area, production and yield of jute is an important task in this context.

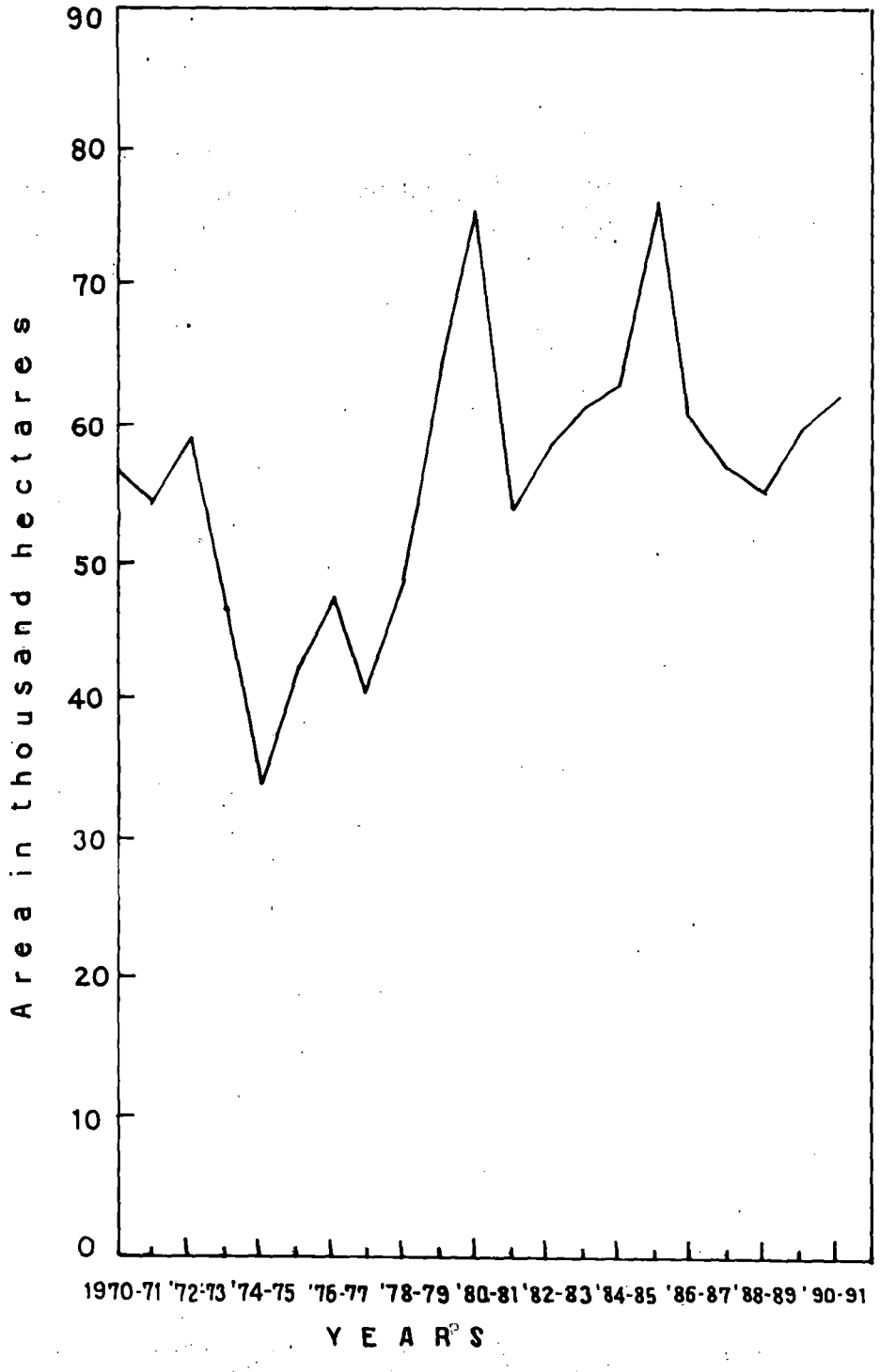

Figure-5.1. Area of Jute in Cooch Behar district during 1970-71 to 1990-91.

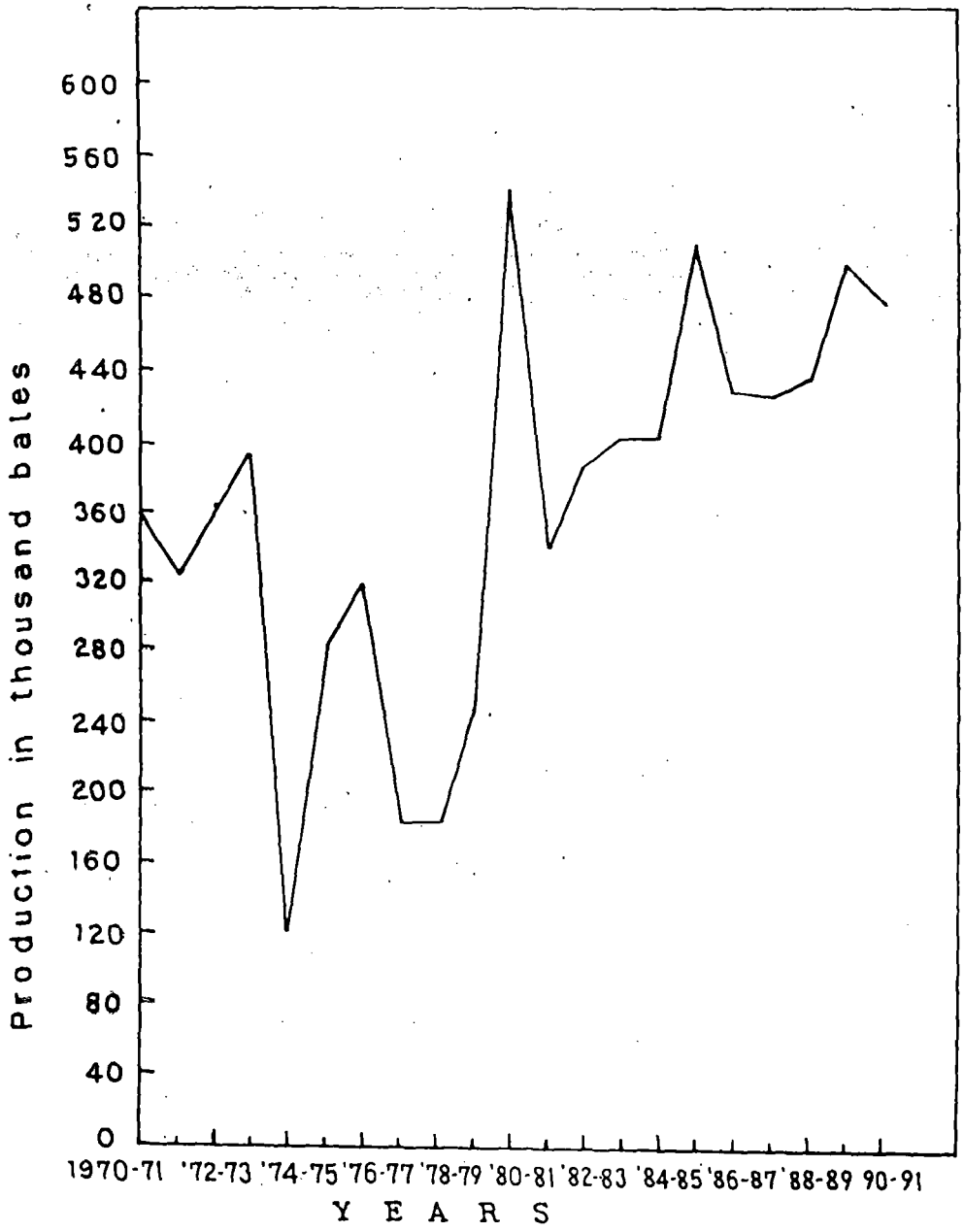

Figure-5.2. Production of Jute in Cooch Behar district during 1970-71 to 1990-91.

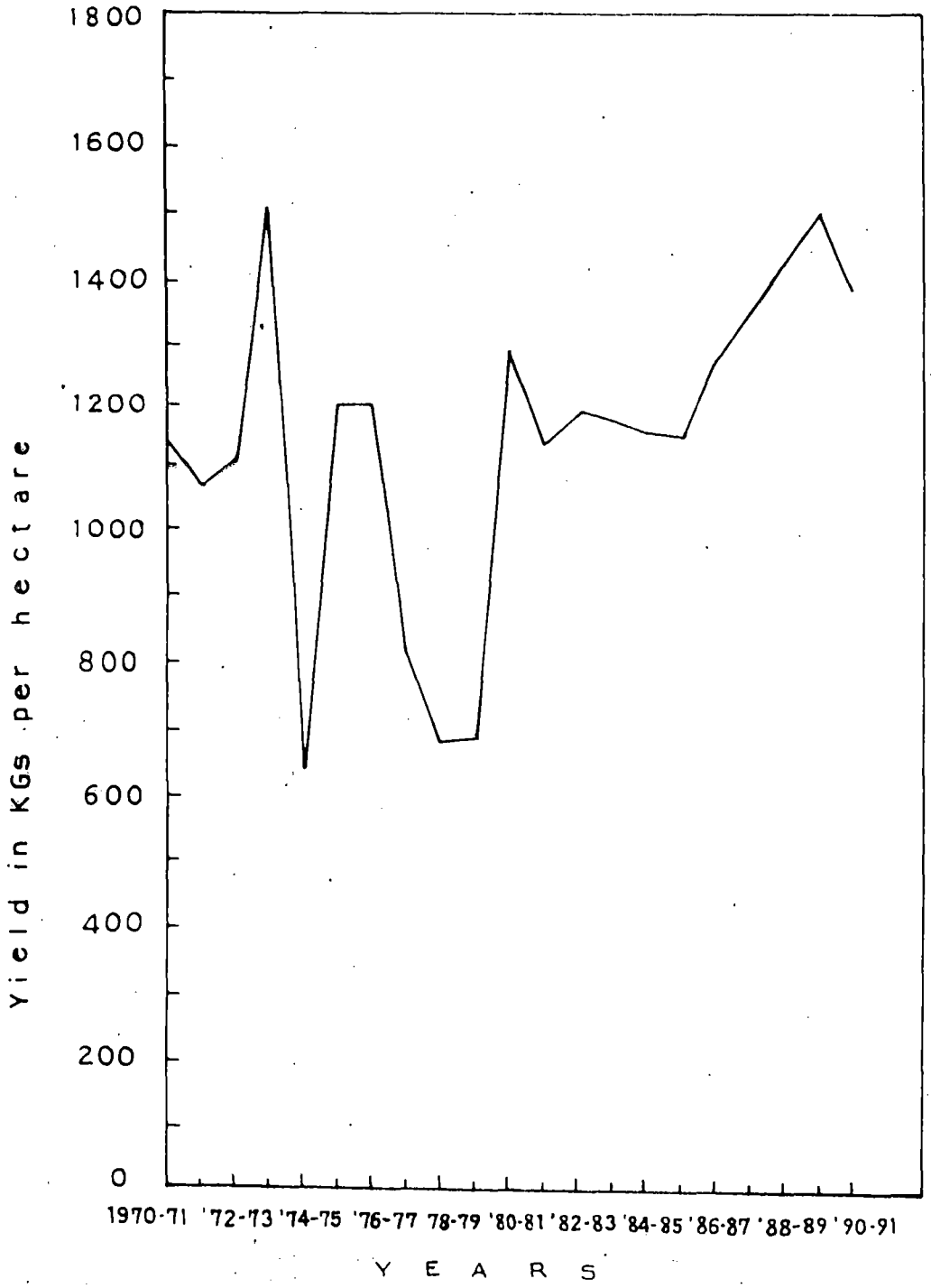

Figure-5.3. Yield of Jute per hectare in Cooch Behar district during 1970-71 to 1990-91.

5.3. Explanatory Factors behind Fluctuations

At the outset, it will not be irrelevant to state that production of jute and any other agricultural commodity depends primarily upon area under cultivation and yield. Therefore, the inter-year fluctuation in the production of jute in Cooch Behar district as evident previously may be expected to be explained significantly by the inter-year fluctuations of area and yield of jute in this district. The magnitudes, 0.79 and 0.84 of the correlation coefficients (significant at one per cent level) between jute production - jute area and jute production-yield rate justify the stated probe. The inter-year fluctuations in the yield rate of jute may be on the one hand associated with non-economic factors viz., climatic condition and on the other with some economic factors, namely, use of fertilizers, manures, irrigation, clean water facilities and so on. But the time series data on these economic factors are not available. For this, it has not become possible in the periphery of the study to search out the economic factors contributing to inter-year fluctuations in the production of jute through their impacts on the yield rate.

However, the most important factor which is expected to affect the growers' decision regarding area to be allocated

under a particular crop is its actual price[2]. Therefore it may not be an exaggeration to state that the area as well as production of jute basically depends upon the actual price of jute. So it is necessary to examine the time series data on prices of jute. These data on prices are shown in Table 5.3 and through graphical method in Figure 5.4. These presentations of the time series data on prices of jute in Cooch Behar district demonstrates more or less a rising trend in prices.

To have a support for correctness about the preceding statement, i.e., about the rising trend in prices linear and non linear regression equations of the former types are fitted to the time series prices of jute in Cooch Behar district. Results of these fittings are presented in Table 5.4. The table shows that both the linear and non-linear forms of equation do possess good fit and the coefficients of regression are highly significant at one per cent level for this district in both the cases of equations. These, specially, with the noticeable better fit of exponential type of equation imply that fluctuations in price over years

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2. Banerjee, B.N. and Islam, M.M. (1989) "Analysis of Trends in Area, Yield and Price of Jute in Bangladesh", Economic Affairs, Calcutta, Vol. 34, No. 3, p. 178.

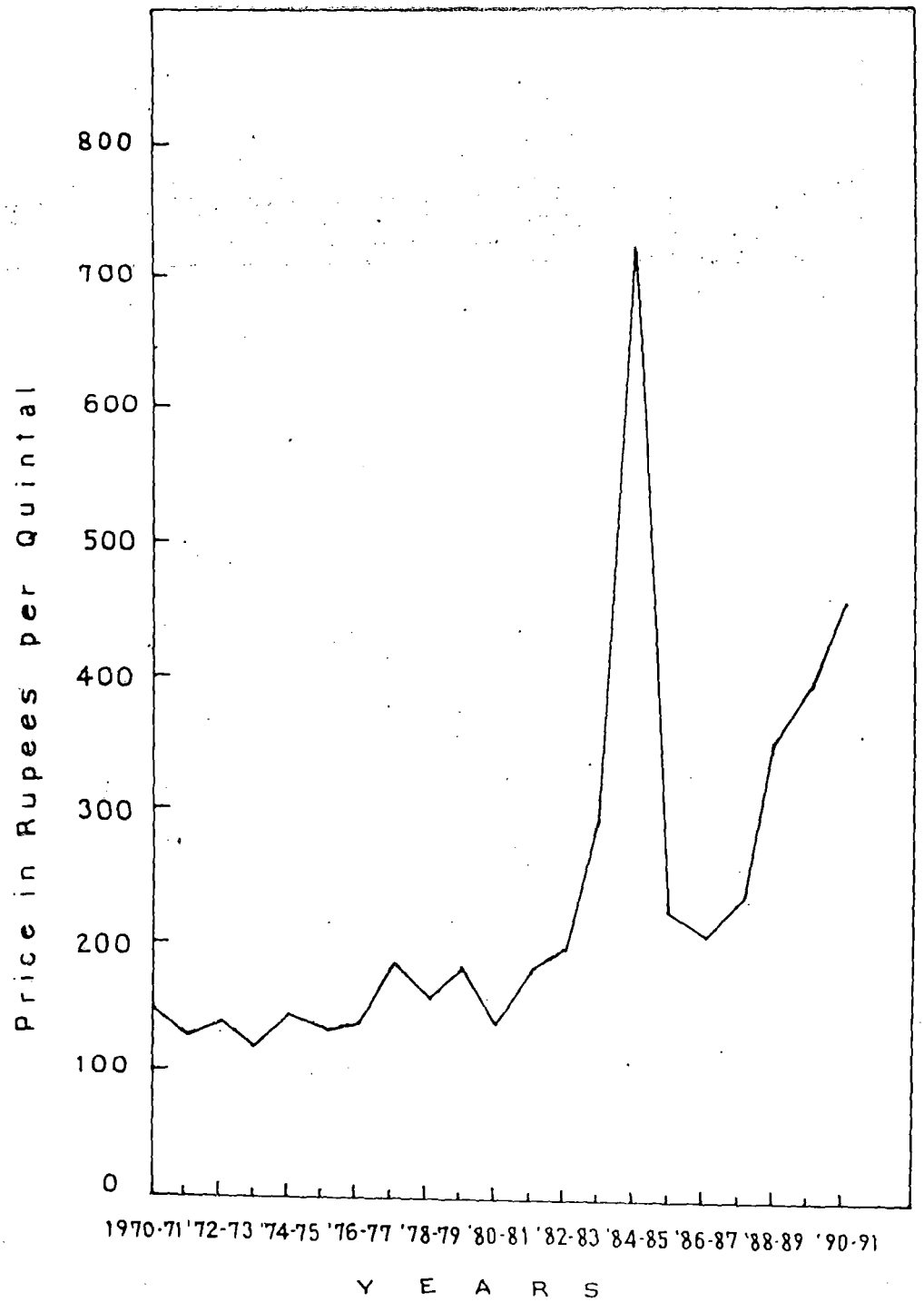

Figure - 5·4. Price of Jute in Cooch Behar district during 1970-71 to 1990-91.

is not significant[3]. Therefore, the actual/present prices of jute fail to explain either the acreage or production of jute in this district. The same may further be confirmed with the highly low and insignificant magnitude of correlation coefficient between jute area and jute present price or actual price evinced from Table 5.5.

It is believed that instead of the price of the same year, previous year's price affects the decision of the growers regarding acreage allocation and thereby production[4]. In this study such belief has been confirmed. Table 5.5. shows that the correlation coefficient between jute area and one-year lagged price of jute is of the order of 0.59, significant at one per cent level. The same further exhibits that the correlation coefficient between production and one-year lagged price is of the order of 0.56 and also significant at one per cent level. All these establish directly that in Cooch Behar district inter-year fluctuations of time series data of area and production of jute are amply explained by the lagged price of jute. Apart from lagged price of jute there are some other important factors affecting area under jute and thereby production. These factors are (i) jute area

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3. Ibid., p. 178.

4. Ibid., p. 178.

to one-year lagged yield of jute (ii) jute area to aus paddy area (iii) jute area to jute-aus paddy area ratio (iv) jute area to jute-aus price ratio (v) jute area to jute-aus one-year lagged price ratio[5].

In order to have an idea about the efficiency of these factors to explain the inter-year fluctuations of jute area and production in this district correlation coefficients between jute area and each of these factors have been calculated and also presented in Table 5.5. From this table it is noticed that correlation coefficient between jute area and jute-aus paddy area ratio on the one hand and jute area and jute-aus one-year lagged price ratio on the other are significant at one per cent level. Therefore, it may not be an over-expectation to claim from this result that jute-aus paddy area ratio and jute-aus one year lagged price ratio have also a strong bearing upon the inter-year fluctuations in the time series of jute area and production besides one-year lagged jute price in Cooch Behar district. Again, a comparison among the magnitudes of the correlation coefficients of (i) jute area and one-year lagged price of jute (ii) jute area and jute-aus paddy area ratio (iii) jute area and jute-aus one-year lagged price ratio exhibits that the magnitude of correlation coefficient between jute area

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5. Ibid., p. 179

and jute-aus paddy area ratio is the highest followed by the magnitudes of jute area and jute-aus one-year lagged price ratio as well as jute area and one-year lagged price of jute. Thus it is revealed that relative area of jute that is, jute-aus paddy area ratio is the most dominant factor explaining the inter year fluctuations in the time series of area vis-a-vis production of jute in Cooch Behar district.

5.4. Findings

The work done so far broadly manifests that there remains significant inter-year fluctuations of area, production and yield of jute in Cooch Behar district. The inter-year fluctuation of production is amply explained by the inter-year fluctuations in yield rate and area. The factors, namely, (i) jute area and one-year lagged price of jute, (ii) jute area and jute-aus paddy area ratio and (iii) jute area and jute-aus one-year lagged price ratio collectively explained the inter-year fluctuations in the area as well as production of jute. The most dominant factor explaining the inter-year fluctuation of the area of jute and its production is the jute-aus paddy area ratio.

Table 5.1 Area, Production and Yield of Jute in Cooch Behar District during 1970-71 to 1990-91

Year	Area ('000 ha)	Production ('000 bales of 180 kgs each)	Yield (Kgs/ha)
1970-71	56.5	358.8	1143
1971-72	54.5	323.2	1067
1972-73	58.7	362.5	1111
1973-74	47.3	395.2	1504
1974-75	33.7	120.9	646
1975-76	42.3	281.9	1201
1976-77	47.4	317.2	1204
1977-78	40.6	184.8	819
1978-79	48.7	185.7	686
1979-80	64.3	248.8	697
1980-81	75.4	541.8	1293
1981-82	54.0	337.8	1134
1982-83	58.5	388.0	1194
1983-84	61.4	403.9	1184
1984-85	62.9	404.5	1158
1985-86	76.1	510.6	1152
1986-87	60.4	428.2	1276
1987-88	56.8	427.2	1355
1988-89	55.2	437.4	1426
1989-90	59.6	498.2	1505
1990-91	61.8	478.7	1394

Compiled from the sources:

i) Statistical Abstract of West Bengal, 1976 and 1977 (Combined), Bureau of Applied Economics and Statistics, New Series Nos. 2 and 3, Govt. of West Bengal.

ii) District Statistical Handbook, Cooch Behar, Bureau of Applied Economics and Statistics, Govt. of West Bengal.

iii) Economic Review, different years, Govt. of West Bengal.

Table 5.2 Trend Equations (Linear and Non-linear Types) of Area, Production and Yield of Jute in Cooch Behar District during 1970-71 to 1990-91

Types of equation	Variables	Observed form of equation	S.E. of b	Observed 't' value	r^2 value
Linear (Y=a+bt)	Area	$47.43+0.78t^{*}$	0.34	2.31	0.22
	Production	$248.09+10.50t^{*}$	3.36	3.12	0.34
	Yield	$952.41+17.96t^{*}$	8.34	2.15	0.20
Non-linear($Y=ab^t$)	Area	$46.71(1.02)^{t}$ *	0.43	2.36	0.23
	Production	$241.71(1.03)^{t}$ *	0.39	2.66	0.27
	Yield	$932.67(1.02)^{t}$*	0.52	1.98	0.17

Note : * Significant at 5 per cent level of significance.

Table 5.3 Time Series Data on the Price of Jute in Cooch Behar District during 1970-71 to 1990-91

Year	Price (Rs./Q)
1970-71	148.16
1971-72	126.37
1972-73	140.24
1973-74	121.77
1974-75	144.59
1975-76	135.34
1976-77	140.19
1977-78	183.75
1978-79	160.00
1979-80	181.01
1980-81	140.15
1981-82	179.72
1982-83	196.87
1983-84	293.05
1984-85	723.98
1985-86	227.12
1986-87	209.18
1987-88	235.27
1988-89	352.50
1989-90	393.83
1990-91	457.75

Compiled from the sources:

i) Socio-Economic and Evaluation Branch (Official Record), Directorate of Agriculture, Govt. of West Bengal.

ii) Office of the Superintendent of Agricultural Marketing (Official Record), Cooch Behar, Govt. of West Bengal.

Table 5.4 Trend Equations (Linear and Non-linear Types) of Price of Jute in Cooch Behar District during 1970-71 to 1990-91.

Types of equation	Observed form of equation	S.E. of b	Observed 't' value	r^2 value
Linear ($Y = a+bt$)	67.50+15.04t *	4.14	3.63	0.41
Non-linear ($Y = ab^t$)	105.19 $(1.06)^t$ *	0.19	5.57	0.62

* Significant at 1 per cent level of significance

Table 5.5 Magnitudes of Correlation Coefficients between Jute Area and other Related Variables along with Production and One-Year Lagged Price of Jute in Cooch Behar District during 1970-71 to 1990-91.

Variables	r value	't' value
Jute area and present price of jute	0.31	1.49
Jute area and one-year lagged price of jute	0.59*	3.94
Jute production and one-year lagged price of jute	0.56*	3.53
Jute area and one-year lagged yield of jute	-0.18	-0.80
Jute area and aus paddy area	-0.49	-2.84
Jute area and jute-aus paddy area ratio	0.93*	28.15
Jute area and jute-aus price ratio	0.35	1.72
Jute area and jute-aus one-year lagged price ratio	0.61*	4.19

Note : * Significant at 1 per cent level of significance.

Table 5.6 Area, Production, Yield and Price of Aus Paddy in Cooch Behar District during 1970-71 to 1990-91

Year	Area ('000 ha)	Production ('000 tonnes)	Yield (Kgs/ha)	Price (Rs./Q)
1970-71	89.3	79.4	889	135.80
1971-72	88.5	74.3	840	145.00
1972-73	81.9	64.2	784	147.20
1973-74	89.1	50.4	566	265.56
1974-75	107.4	64.2	598	232.35
1975-76	116.1	73.2	630	204.29
1976-77	111.7	71.6	641	189.09
1977-78	100.2	65.6	655	202.50
1978-79	82.8	82.0	990	180.00
1979-80	106.7	56.9	533	189.01
1980-81	86.9	69.2	796	226.86
1981-82	100.7	62.2	618	238.62
1982-83	97.1	63.7	656	272.21
1983-84	90.7	72.0	794	341.41
1984-85	96.5	71.0	735	328.18
1985-86	83.4	61.2	733	178.33
1986-87	97.1	64.8	668	226.67
1987-88	77.1	61.4	790	209.37
1988-89	100.0	96.1	961	240.12
1989-90	88.3	86.9	984	265.83
1990-91	89.1	105.4	1183	290.83

Sources: Compiled from

i) Statistical Abstract of West Bengal 1976 and 1977 (Combined) Bureau of Applied Economics and Statistics, New Series Nos. 2 and 3, Govt. of West Bengal.

ii) District Statistical Handbook, Cooch Behar, Bureau of Applied Economics and Statistics, Govt. of West Bengal.

iii) Economic Review, different years, Govt. of West Bengal.

iv) Socio-Economic and Evaluation Branch (Official Record), Directorate of Agriculture, Govt. of West Bengal.

v) Office of the Superintendent of Agricultural Marketing (Official Record), Cooch Behar, Govt. of West Bengal.