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Part 1, Colonial Period

This paper makes an attempt at a selective evaluation of some aspects of the performance of the agrarian economy of Bengal, specially western Bengal as it took shape over nearly a century and to try and set this performance within the institutional framework in which it was operating. At the outset, we would like to make clear our position that it is in the domain of politics that institutional features of agrarian life in Bengal can really be placed and analysed. It is therefore, important to remember how structures of power came to be formed in the rural society of Bengal and how they dominated production and exchange relations as well as the release of productive forces throughout the late colonial period. It will also be our attempt to trace changing patterns of power structure in this region in the post-colonial period and how these in turn have shaped recent agrarian performance.

Before attempting such an analysis of the underlying determinants of cropping and output trends in Bengal agriculture, it would be necessary to have an idea of what these trends were actually like. There is a general impression that enough work has been done on agricultural trends in Bengal in the late colonial period, and any reexamination of such trends is hardly likely to be intellectually stimulating. As for the current situation, there is a lot of ongoing work by economists and government agencies into which an economic historical perspective may be difficult to fit at this juncture.

On closer examination, it can be seen that this kind of impression is not really correct. So far as the pre-Independence period is concerned, George Blyn's work (1966) on all India trends and their regional components including Greater Bengal still remains the most recognised book of reference, despite the occasional criticism. The analysis is, however, at too broad and aggregate a level to facilitate understanding of intra-regional variations and local factors that were important in a given agrarian structure, at least in the case of Bengal. Subsequent exercises at measuring agricultural performance in Bengal have been for shorter time spans like M.M. Islam (1978) and Saugata Mukherji (1971). Among other studies that were more selective regionally or cropwise were Omkar Goswami's work on the jute economy of Bengal (1991) or Manoj Kumar Sanyal's study on the rice economy of West Bengal (1990). Mukherji's 1971 study concentrated on jute and rice, and went into some detail about trends for these two crops in all the districts of Bengal, while those of Goswami (1991) or Sanyal (1990) examined the trends in those districts that were relevant for their own cases. M.M. Islam's work (1978) does not go down to the district level, but aggregates at the divisional level - a unit that was a purely administrative category without much relevance to geo-physical zones or agrarian regimes. There is indeed reason enough for taking a fresh look at area and crop trends in colonial Bengal for a closer examination of regional or temporal variations.

So far as the post-Independence period is concerned, inspite of the proliferation of literature on almost all aspects of the agrarian economy of West Bengal and Bangladesh, James Boyce's book (1987) remains the only work that has attempted to work out long term trends for the period 1949-80, both for West Bengal and Bangladesh at the district level. This book does not, however, cover the 1980s and the 1990s, and thus, according to

contemporary opinion, leaves out very significant developments that have taken place since 1979/80. A strong case can be made, therefore, to justify a study of agrarian performance in the Bengal region during the twentieth century, split conveniently in the middle by the year 1947. Such an ambitious project can, however, be a long term research project with adequate resources for the kind of task involved. In a short paper we can only hope to discuss a limited number of factors that affected, over such a long period, the agrarian organization and its functioning, primarily in West Bengal, with only some occasional reference to developments in eastern Bengal in the pre-1947 period.

It is also necessary to take stock of other works on Bengal agriculture and its functional aspects which have not attempted quantitative measurement of crop trends, most notably by Sugata Bose in 1986 and 1993. In the former book Bose had analysed the politics and economics of Bengal agriculture in the first half of the twentieth century, though not exactly in the same way as Partha Chatterjee did in his 1984 book on the land question of Bengal. In his 1993 book, Bose has sought to take a 'longe duree' kind of historical perspective about Bengal's agrarian economy through the entire colonial period from the late eighteenth century onwards, adding a few observations on post-Independence developments. This book, giving as it does a number of useful insights into the subject, takes certain factors or categories as historically given, an important one among them being the process of commercialization of agriculture in Bengal, specially from the late nineteenth century onwards.

At a more economic theoretical level, there have been attempts at building models of 'forced' commercialization of agriculture in India, using the early Bengal experience as the starting point, like Amit Bhaduri's exercises through the 1970s and the 1980s (Bhaduri, 1976, 1977, 1981). Other attempts in

analysing post-Independence developments in labour forms under changing exchange relations saw the sprouting of debates over modes of production and the stifling of capitalist development in agriculture in Bengal and other parts of the subcontinent (Utsa Patnaik, ed., 1990). Various farm management studies contributed to the understanding of emerging capital - labour relations in Bengal agriculture during the initial period of land reforms and general economic planning at the State level, in the early decades after Independence. An important feature of this discussion was about seasonal unemployment or underemployment in the agricultural production cycle in the form of a debate between Pranab Bardhan and T.N. Srinivasan on the one hand and A.K. Bagchi and Nirmal Chandra on the other in the pages of the Economic and Political Weekly between 1973 and 1976. (A.K. Bagchi, 1973, 1975, 1976; N. Chandra, 1974; P.K. Bardhan and T.N. Srinivasan, 1975).

Because commercialization of agriculture has been regarded as a crucial factor in the dynamics of colonial agriculture in Bengal, it becomes very necessary to have some idea of how this process came about and grew. Sugata Bose and some other observers are possibly quite right in emphasizing the impact of railway investments on the rise of prices (specially the price of rice in Bengal) and the emergence of jute as the principal cash crop of the region in the latter half of the nineteenth century as the main factors responsible for the exposure of peasant producers to unbridled international competition. However, the macroeconomic consequences of India being a colony within the British empire hinged on other crucial variables.

The growing interdependency of the British and Indian economies through the nineteenth century was founded firmly on the basis of inequality where India was obliged to generate

enough remittable surplus for the growing needs of the British empire. Latest research on resource transfers (both monetary and real) from India (S. Ambirajan, 1984; A.K. Banerji; 1982, 1995; A.K. Bagchi, 1989; N. Sen, 1992; S. Sen, 1992) has shown the magnitude of the financial surplus that was being remitted, the dominance of London as the international financial nerve centre shaping the pattern of imperial connections and the rate of real transfers to Britain derived from Indian export surpluses. The expansion of the export market and the consequent crop specialization failed to induce economic growth and the effect of free trade on the domestic economy did not have positive real income effects. Instead, there was a general picture of stagnation or deceleration in domestic output and a lack of consumption availabilities that could have been generated from either production expansion or more imports in return for increased exports. Forces inhibiting economic growth in colonial India were to a large extent released by the process of export expansion itself-because of the distributional implications of external trade on the domestic economy, in the shape of trade induced income transfers having a negative effect on investment potential in the agrarian economy following from the process of commercialization of agriculture. What was happening within the agrarian structure in the shape of production and exchange relations and their impact on internal surplus utilization and release of productive forces was a parallel development to the process of external transfers, although vitally conditioned by it. This is because commercialization of agriculture was tied to the necessity of an export surplus which had to be remitted to England under the terms of imperial rule. The rest of the surplus generated from the economy was distributed in a way that left very little scope for productive investment leading to growth of output in either agriculture or in the much smaller industrial

sector.

Later, during the closing stages of colonial rule, it was a class of prosperous peasantry, using its control over the interlinked land and credit markets as well as the product and credit markets who really succeeded in appropriating a large part of the surplus. This led to an intensification of the exploitation of poor peasant labour, and brought about its separation from the means of production as this class got increasingly dispossessed from land. It destroyed the viability of petty peasant production as the basic unit of Bengal agriculture (and in many other parts of India) as it ceased to compete with the production of larger farms, becoming to a large extent a source of labour supply for the latter.

Export led commercialization of agriculture (specially in important exporting areas like Bombay and Bengal) saw switching of crop production in favour of exportables and a decline in output for domestic consumption. Yield rates continued to stagnate or decline with little productive investment by landlords or traders or moneylenders in the earlier period and a land grabbing class of rich peasantry during later years. This was because the prospects of enlarging the surplus by exploiting labour (specially sharecropping cultivators in the case of Bengal) were limitless.

During the last decade of British rule there were some radical changes in the economic structure and social relationships in India as the imperial control loosened. This was also the time when the internal terms of trade turned in favour of the manufacturing and construction sector, accompanied by a credit squeeze on agriculture and a sharp polarization among the upper and lower strata of rural population (Mukherji, 1986; Sanyal, 1990). The famine of 1943 of course greatly aggravated this tendency towards polarization which continued in the two parts

of segmented Bengal well after Independence. Surveys in the 1970s and 1980s indicated that there was significant increase in intra-generational inequality and tendency towards polarization in Bangladesh (Padhi and Nair, 1993).

It is against this general background information that we may introduce our discussion on trends in area and output of rice in the colonial period and their institutional determinants. This part of the paper deals, therefore, with the general decadence in agriculture, the pattern of peasant stratification and the small and marginal producers' involvement in an exchange process that trapped them in debt cycles and loss of assets. Our long term analysis (for the period 1901-1941) will involve twelve districts of western, central and norther Bengal with some indication about trends in the eastern Bengal districts for a shorter time-span (1901-1921), the data for which was readily available to us.

A study of the nature of official crop statistics and its degree of reliability suggests that the possibility of underestimation of acreages and seasonal crop conditions cannot be ruled out. We, however, observe that the official estimates are indicative of crop trends, although they are not accurate enough to show the exact magnitude of year to year fluctuations. This observation is in agreement with the findings of P.J. Thomas and N.R.S. Sastsry (1939) and K. Mukherji (1965).

As regards the hypothesis of underestimation raised by M.M. Islam (1978), we have observed an inaccuracy in his citation of S. Subramanian's observation that he uses as his main supportive evidence. Subramanian's statement is related only to annawari estimates of yield in areas not brought under the permanent settlement. Subramanian did not raise the issue of underestimation with regard to acreage figures in the permanently settled areas.

As such, the official statistics seem to indicate agriculture trends that are fairly in agreement with the findings of R.K. Mukherjee (1938) and B. N. Ganguly (1938) providing evidence of decadence in agriculture specially for western and central Bengal during the late colonial period in terms of ecological factors. Trends in the acreage and yield of winter rice (the predominant crop in the region under discussion, at this period) and autumn rice as well as per capita rice production were either declining or stagnating in most of the districts under review (Table 1).

These findings seem to fit in with the general picture of a decline in the river system, a marked deterioration in public health and sanitation, the outbreak of epidemics leading to high mortality rates and the eastward migration that persisted till 1920. (Mukherjee, 1938; Ganguly, 1938; Bose, 1993). In the 1920s the virulence of epidemic was brought under control, mortality rates declined and the eastward migration was stalled when the absorptive capacity of agriculture in eastern Bengal reached its break-even point. But rice acreages and yields continued to decline or stagnate in these districts during the next two decades.

A review of trends in rice output and availability in Bengal and its different regions in the early twentieth century throws up a number of interesting findings. Total or per capita availability of rice can be reconstructed only for the period 1901-1921 because we get complete data on external and internal trade flows of the different regions of Bengal that are not available from 1922. It has been shown elsewhere (Mukherji, 1976) that there was a general fall in per capita availability in Bengal as a whole and in most of its constituent regions. These figures were arrived at by dividing total availability (the retained amount of rice in a particular area after allowing for trade flows) by population. Since trade figures were not given for individual

districts, but for trade blocks that lumped together several districts of Bengal in each case, calculations had to be made accordingly. These trade blocks were Calcutta (including Howrah town), Western Bengal (Burdwan, Birbhum, Bankura, Midnapur, Hooghly, Howrah, Murshidabad and a part of Nadia), Eastern Bengal (the other part of Nadia, 24-Parganas, Jessore, Khulna, Barisal and Faridpur), the Dacca Block (Dacca, Mymensingh, Noakhali, Comilla, Chittagong and Chittagong Hill Tracts) and Northern Bengal (Rajshahi, Pabna, Bogra, Malda, Dinajpur, Rangpur, Darjeeling and Jalpaiguri). It was seen from a comparison of the averages of the indices of per capita availability for the first and last four years that there was a decline in terms of percentage, in the per capita availability of rice in Bengal as a whole and in the other regions apart from Calcutta and the Eastern Bengal block. (Mukherji, 1976, Table VI).

It was also seen there that population increase, which was only moderate through this period, could not be an important explanatory factor, whereas a fall in total production of rice was certainly a more plausible explanation. Certain aspects of market rigidities that might have also conditioned this situation were not discussed in this particular earlier work. It has sometimes been suggested that the short-fall in the production and domestic consumption of rice was to some extent due to a switch in favour of jute, the importance of which as a cash crop was growing. Looking at the overall situation in Bengal as a whole, this explanation does not seem to fit all the facts, although when we come to examine the position at different regional levels, there seems to have been some substitution of the cultivation of rice by jute for the period 1901-1921.

In the Western Bengal and Dacca blocks, for instance, it looked as if the fall in per capita availability of rice was to some

extent due to a shift from cultivation of rice to jute. In the Western Bengal block, the rice to jute ratio was substantially slashed over the period, the output of rice declining by 0.20 per cent per year and the output of jute registering an increase of as much as 2.30 per cent per year. The output of rice in the Dacca block fell by 0.80 per cent per year, while raw jute production went up by 0.94 per cent per year. The fact that unlike the Western Bengal block, the Dacca block showed an increase in population at this time leads us to assume that local consumption needs were sacrificed to an extent to bring about a substitution of rice by jute.

As regards the Eastern Bengal block, the level of per capital consumption of rice improved in this region over the period 1901-1921, despite a growth in papulation. In fact, this region presented a picture of relative prosperity, the output of rice showed an increase of 0.83 per cent per year, while the output of jute went up at a much steeper rate of 3.54 per cent per year. So, inspite of a switch in favour of jute, the levels of production and consumption of rice had not been pressed down in the Eastern Bengal block.

We get a generally bleak picture for the Northern Bengal block, characterized by a sharp fall in the per capita availability of rice accompanied by a 1.20 per cent decline in the output of rice per year. The production of raw jute also went down in this region, but the fall was less sharp at 0.78 per cent per year, thus altering the ratio in favour of jute over this period. It may be presumed that there was some scope of improving the local supply of rice by a further cut in jute cultivation. That this did not take place could possibly be attributed to some institutional rigidities which governed production decisions, particularly in norther Bengal, which operated through a virtually total control over credit and marketing channels exercised by local

moneylenders and traders, sometimes acting on behalf of large trading firms in Calcutta (Mukherji, 1971, chapter 1).

The impression of a shrinking supply of rice during this period becomes stronger when we look at the fortnightly fluctuations in the wholesale price of common rice in the market centres of Calcutta, Burdwan, Midnapur, Rangpur and Dacca at quinguennial intervals, from 1900/01 to 1920/21. These fluctuations narrowed down over the years, suggesting counter-seasonal rigidity owing to short-falls in market arrivals. The other striking feature was that in all these market centres, the increase in the price index of common rice was almost invariably over 200. For Calcutta, the increase in 1920/21 over 1900/01 at the level of minimum price was 267, the index for the maximum point rose to 219. In Burdwan, the increase in the price index at the minimum and maximum points were 241 and 240, respectively, for Midnapur 200 and 252; for Pabna 240 and 252; for Rangpur 231 and 226; and lastly for Dacca 191 and 240.

Growth of agriculture in terms of acreage and yield of rice was, therefore, stunted at a time when commercialization in the output market advanced considerably and the peasants were increasingly stratified. In this situation, the small peasant suffered most as the substantial raiyat who was often a usurer and a grain trader, made the terms of exchange for the former more unfavourable in order to keep up the level of surplus appropriation in the face of declining yield. The small peasant with his relatively weak resource base (determined by the size of his holding and command over other means of production) and inferior land rights had to concede to such terms of exchange. The laws of property and tenancy did little to protect him from rent exploitation and usury. Tenurial arrangements, as sanctioned by the relevant laws, bolstered up a handful of propertied peasants and accelerated the process of polarization in the

peasant economy.

The occupancy raiyats did no longer form a homogenous group of cultivators in terms of size of holdings and land rights. A section of raiyats came to be known as jotedars who wielded the credit machanism to bring about asset transfer in their favour. The small raiyats transferred their occupancy holdings either in part or entirely to the former group of raiyats and were resettled as sharetenants. The zamindars were, on the other hand, declining and did not provide any protection to the small raiyats. The propertied peasants with their stake in grain trade and money-lending gained primacy in the 1920s and 1930s. The professional money-lenders had contracted their sphere of operation during the period and the zamindars were incapable of meeting the small farmers' liquidity needs which increased substantially when agrarian commercialization was an accelerating process. All this hastened the process of jotedars' ascent to power in the late colonial period when agrarian relations came to be dominated by credit relations.

Commercialization of land which preceded commercialization of peasant agriculture led to the emergence of a land market. The circulation of revenue rights ultimately brought about a massive proliferation of intermediate tenure-holders and the tenancy legislations at a later period could not inhibit the growth of a multi-tier tenurial structure snapping the link between land rights and actual cultivation. The rise of the jotedar in the late colonial period was largely facilitated by the growth of a land market - a sequel to the circulation of revenue rights - and the gradual weakening of the zamindars and their subordinate tenure-holders.

The plight in which the land-owning rent receivers and the intermediaries below them found themselves in was primarily caused by a decline in rural incomes and contraction of rural

credit. The number of defaulting estates and the amount of default for the whole of Bengal (Mukherji, 1981,

Table 1) in the initial years of the depression were,

	1929	1930	1931
Number of estates	1695	1779	3694
Amount of default (Rs. 000)	391.2	826.9	1590.5

Such defaults continued late into the 1930s (Rothermund, 1983). The districts showing the highest number of defaulting estates were (Mukherji, 1981, Table 1)

	1929	1930	1931
Hooghly	196	192	148
24-Parganas	196	209	279
Nadia	145	152	302
Jessore	104	102	172
Pabna	108	123	221
Mymensingh	172	...	...
Faridpur	164	142	269
Barisal	98	114	193

Transfers of intermediate tenurial holding rights also showed an increase during the depression and immediately after (Table 2). The district wise breakdown of the sale of intermediate tenurial holdings for undivided Bengal for the period 1929/30 - 1939/40 has been shown elsewhere (Mukherji, 1986, Table 4).

The heterogeneity of occupancy raiyats as a class with the predominance of very small raiyats is indicated by the

settlement figures of distribution of raiyatee holdings by size available for the districts of Howrah, Hooghly, Murshidabad, Birbhum and Malda. The distribution of holdings in terms of percentage in each size-class of raiyatee families was bi-modal in Dinajpur. Percentages of families in the lower and upper size-classes were similar in the district. This was indicated by the district Survey and Settlement Reports (hereafter, SSR) and the Report of the Land Revenue Commission (1940) (hereafter, LRC). Data from the latter source also indicated similar bi-modal distribution in terms of areas held by families in Burdwan and Hooghly and the predominance of families with less than 2 acres of land in Bankura, Howrah, 24-Parganas and Malda.

Data for the extent of cultivation by different modes furnished by the LRC suggest the predominance of cultivation by family members of owner-cultivators in all the districts. The next dominant mode was share-cropping in Burdwan, Bankura, Hooghly, Howrah, Nadia, Murshidabad and Jalpaiguri. As it follows from the district SSR, share-cropping, known as adhiari, was also an extremely significant mode of cultivation in Dinajpur because the system was ideal for winter paddy, the predominant crop of the district. The Midnapore SSR also noted the growing significance of Bhagchas in the district.

The sets of data on the distribution of families living as bargadars and agricultural labourers presented by the LRC indicate that the aggregated proportions of families belonging to both the classes of bargadars and agricultural labourers were very high for Burdwan, Birbhum, Hooghly, Howrah, Murshidabad and Malda. The percentage of families living as agricultural labaourers was particularly high for Burdwan, Birbhum, Murshidabad and Malda.

Contemporary reports on rural impoverishment set out evidence for the predominance of consumption loans and

interlinkages between debt and dispossession. Loans were generally contracted during the pre-harvest months to meet household deficits in terms of paddy balance and repayments were made during harvests. As M.C. McAlpin (1909) observed in the context of Birbhum and Bankura, loans against mortgages of land were frequently contracted and, in the majority of cases, they led to sales of mortgaged lands. The SSRs for Birbhum, Bankura, Howrah, Dinajpur and Jalpaiguri also indicated how the peasants were trapped in debt cycles and lost their assets. The predominance of jotedar-creditors specially during the late 'twenties and 'thirties completely altered the pattern of rural dependence which came to be based on credit relations. The Dinajpur settlement authorities made a sample survey on peasant indebtedness during 1935-38 and found that almost all of the creditors were jotedars.

In 1935 the Bengal Board of Economic Enquiry (BBEE) (1935) in its Preliminary Report on Rural Indebtedness (hereafter Preliminary Report) observed that a great majority (viz., 77 per cent) were involved in debt. Its findings are particularly important for a study of the impact of the depression of the 'thirties. The survey findings of the BBEE indicated that there had been a considerable fall in the average income and expenditure of rural families and a corresponding rise in debt between 1928 and 1933 in the districts of Burdwan, Birbhum, Bankura, Midnapore, Murshidabad, Nadia and Malda for which data were given. The income-debt ratio (computed on the basis of the data furnished by the BBEE) sharply fell in 1933 from its 1928 level in 6 out of 7 districts for which data are obtained from the BBEE's survey. Malda witnessed the highest decline and Bankura the second largest. (For the situation in some eastern and north eastern districts of Bengal, see Mukherji, 1986, Table 2).

It is difficult to relate rural impoverishment to incidence of rent with conclusive evidence. A. Huque (1939) has found that deficit per family was large where the proportion of rent to produce was high. B.B. Chaudhuri (1977) however, shows that rent as a proportion of the value of the produce greatly diminished from about the end of the nineteenth century. This observation may hold good for raiyatee rent paid in cash. As K.M. Mukerji (1977) has pointed out, the under-raiyatee cash rent was considerably higher than the raiyatee rent. Moreover, the value of rent paid in kind went up substantially as the price of agricultural produce increased. It has also been argued that rent as a proportion to total cost of production went up during the depression of the 'thirties, but the relative importance of rent as a cost item diminished when there was a price recovery after the depression. Mukerji (1977) rightly points out that the benefit of lower raiyatee rent could not be drawn by the share-croppers paying rent in kind.

The estimated trend in the aggregate money value of registered mortgages of immovable property have been found to be strongly positive (Sanyal, 1990, Chapter 7) for all the districts ending before the onset of the depression (the terminal year of the period for most of the districts is 1928). The rest of the reference period is marked by a strong declining trend in the aggregate value of registered debt for the districts. We observe in this connection that the impact of the depression was not felt on the peasant economy of the different districts right at the same time. A slump in the land market specially in terms of sales and mortgages of lands became evident in a number of districts quite a few years before the price of rice crashed in those districts in 1931.

The annual compound rates of growth or ROGs (estimated to be positive) for the nominal value of mortgages for

period I (1903-28) are very high for Birbhum, Howrah, 24-Parganas and Jalpaiguri. (Sanyal, 1989, Table 14) We do not, however, suggest that spatial variations in the extent of rural impoverishment are always indicated by the secular movements of registered debt. ROG for Bankura for period I has been the lowest among all the reference districts. This does not, however, suggest that indebtedness was increasing at the slowest pace over the period in Bankura or that peasants in the district were least exposed to usury. The trend analysis indicates that the intercept value worked out for the district for the period (viz., 1903-28) has been fairly high and quite comparable with that of any other district. Loans were generally contracted by the peasants in the district in terms of grains even before the onset of depression in the 1930s and the peasants were exposed to this kind of usury even during the first decade of the century.

The estimated trends in the undeflated value of mortgage for period II (1929-41) overlapping the entire closing decade of the reference period have been significantly negative for all the districts. The rates of decline are particularly high for the districts of western Bengal and northern Bengal. (Sanyal, 1989, Table 14).

The estimated trend in the deflated value of mortgages (Sanyal, 1989, Table 15) for a number of districts indicates that the nominal value of mortgages did not move in sympathy with the movement of the price of rice in a number of districts. Declining trends in the deflated value have been obtained for the first two decades for Nadia and nearly for the first three decades for Burdwan and Bankura. The deflated value moved upwards in the rest of the districts during the first three decades and for a number of such districts the trend continued well beyond 1930. The 24-Parganas, for example, witnessed a rising trend in the deflated value of mortgages till 1937 defying the breakdown of

the traditional credit system in Bengal from the early 1930s.

The registered debt in terms of its deflated value declined during the `thirties (the period is not of equal length for all the districts). The decline was, however, less rapid compared to the trend in the undeflated value of mortgages. The steep fall in the price of rice which continued till 1938 withheld the deflated value of registered debt from declining as sharply as its nominal value. The upward movement in the price since 1939-40 could not neutralise the trend because of a sharper decline in the registered debt in terms of its aggregate money value. It has been noted in this connection that the deflated series are supposed to indicate fluctuations in the rice equivalent of loans against mortgages over time and they do not in any way indicate the secular movement of the incidence of indebtedness.

Trends in the number of deeds of mortgages are more or less the same as that of their aggregate money value for the periods before and after the depression. The situation was, however, different in Bankura for the period before the depression. The district witnessed negative trends during the periods from 1903 to 1914 and from 1915 to 1923. No trend is indicated if these two periods are taken together. A positive trend is, however, obtained for the quinquennium 1924-28.

The behaviour of registered sales of immovable property (number of deeds) is marked by divergence of trends between districts. The western Bengal districts (with the exception of Bankura) witnessed an upward trend during the first two decades (the trend continued up to 1927 in Hooghly) and a declining trend in the `twenties while the central and northern Bengal districts registered a rising trend till 1928. Most of the districts registered a decline in the trend for outright sales during the depression years. The length of the period in terms of the land market activities however, varied from district to district. The

effects of the depression lasted till 1937 in the land markets of Hooghly, Nadia, Murshidabad and Malda registering a declining sales trend. Signs of recovery of the sales of immovable property became evident in the rest of the districts in the early half of the `thirties. The impact of depression was not significantly felt on sales in a number of western Bengal districts, viz., Burdwan (where the period of a rising sales trend resumed from 1931), Birbhum and Midnapore (where the period began from 1932) in the `thirties.

The sales trend for the district of Bankura was somewhat different. The entire reference period has been broken into five sub-periods. The first sub-period from 1903 to 1911 is marked by a weak declining trend. The two other sub-periods, viz., 1912-21 and 1922-27, registered a rising trend. A falling trend is again observed for a very brief period, viz., 1928-32. The sales behaviour for the remaining period witnessed a rising trend in sales and was not different from that of the other districts.

The acceleration of sales and retardation of mortgages of immovable property in the `thirties had borne out the impact of a number of legislative enactments, viz., the amendments to the Bengal Tenancy Act in 1928 and 1938, the Bengal Money-lenders' Act of 1933 and the Bengal Agricultural Debtors' Act of 1935. The Preliminary Report (1935) of the BBEE observed that the professional moneylenders were winding up their business mainly because they were unable to function specially when the Bengal Money-lenders' Act of 1933 came into force. The inability of the lenders to collect any interest from the borrowers, as it was referred to in the BBEE's report, emanated from a situation created not only by legal interventions in terms of debt management but also by the depression of the `thirties. This investigation re-affirms the findings of D. Rothermund (1983) Chatterjee (1982) and Mukherji (1986) that the depression of the

`thirties led to contraction of credit and the mortgages were replaced by direct sales of land.

With the decline in the traditional credit system a large majority of cultivators of small means turned to the agriculturist creditors for grain loans. There was a fairly high non-monetized demand for paddy leading to a greater volume of exchange in kind. The Paddy and Rice Enquiry Committee (1940) or the PREC, the Bengal Provincial Banking Enquiry Committee (1930) or the BPBEC and the BBEE and district settlement authorities reported that there had been a decline in moneylending and a corresponding rise in paddy-lending with the onset of the depression and the legislative enactments imposing restrictions on cash loans granted by the mahajans. It was also indicated that the agriculturist creditors largely replaced the professional moneylenders in the Bengal districts in the late `twenties and `thirties.

The depression of the `thirties along with legal interventions in the moneylending business created conditions for the further growth of the kind of usury McAlpin referred to in the context of Bankura for an earlier period. A class of propertied peasants found it profitable to release their surplus stocks in terms of grain loans in the `thirties when the paddy market remained depressed. In case of successive loan defaults by a borrower, a mortgage was often executed, the consideration money being the cash equivalent (calculated on the basis of current market price) of the outstanding loan (the principal and the defaulted interests) in grain and a further interest charged on that at an arbitrary rate. We have cited evidence to show how the borrowers contracting grain loans succumbed to the lenders' ruse and lost their assets. (Sanyal, 1990).

The process of asset transfer was not constrained by the

falling price of land in the 'thirties as the creditor could demand more land in repayment. If the debtor was left with no land to part with he was resettled as a bargadar assuring free labour service to the landlord. This kind of debt servitude has not been found in the earlier type of credit relations between a borrower and a professional moneylender who rarely had any interest in cultivation. As we shall find later, any direct evidence of labour-tying credit for our reference period is not available, but the share-tenancy contracts, specially in case of the adhiari system in the northern Bengal districts, provided for unpaid labour service to the landlords.

Our observations in this respect do not corroborate the findings of E. Stokes (1979) indicating that debt servitude was deepest in the backward agricultural regions where the lenders appeared as alien intruders. These regions, as Stokes observes, were marginal to the market economy and were characterized by uncertain rainfall, insecure agriculture and sparse population. As we have observed, in the later phase of colonialism the creditors who dominated the rural capital market in the Bengal districts were not alien intruders. The regions that were dependably rain-fed and densely populated witnessed high incidence of agricultural indebtedness, usury and debt servitude despite the growth of a market for agricultural produce.

The output markets in our reference districts were considerably commercialized but the intertwined problems of debt and dispossession continued to afflict the peasant economy in the districts. A rise in the volume of indebtedness of a section of peasants - a concommitant of agrarian commercialization - was not an indication of its increasing investments in productive pursuits.

There is no dearth of evidence to suggest that the small peasants in the highly commercialized districts of northern and

eastern Bengal were exposed to usury in its worst form and lost their assets. This observation is equally true for a small paddy-grower in our reference regions. A high degree of involvement in the output market did not bring forth prosperity. The registration figures indicate that sales of small holdings or portions thereof dominated the total sales. It has also been argued with evidence that a very high percentage of advances against mortgages could not be repaid and the collateral was transferred to the lenders by court decree. (Sanyal, 1990, Mukherji, 1986).

The dominance of consumption in the small peasant's loan demand function is indicated by numerous pieces of evidence provided by the Registration Department, showing that the number of registrations of mortgages and sales shot up in times of food scarcity and high prices of foodgrains. The volume of registrations was, therefore, significantly affected by the operations of that section of the peasantry whose asset position was vulnerable to the fluctuations in food production and prices. In the late colonial period, declining per capita production and availability of rice must have raised the number of deficit households (and the extent of household deficit as well) accelerating mortgages and sales of immovable property.

In order to provide a further test for the hypothesis of consumption loan we have regressed mortgages (number of deeds) on per capita rice production (PCRP) and pre-harvest price of common rice of the cheapest variety (PHPR). (Table 3) A significantly inverse relationship between mortgages (number of deeds) and PCRP has been obtained for Burdwan, Birbhum, Bankura, Hooghly, Murshidabad and Malda. For the rest of our reference districts, viz., Midnapore, Howrah, 24-Parganas, Nadia, Dinajpur and Jalpaiguri, the relationship between mortgages and

PHPR is positive and significant. In all the six districts when the inverse relation between mortgages and PCRP is significant the play of PHPR as an explanatory variable is insignificant. That is to say, the two explanatory variables are uncorrelated to each other in our regression analysis. The terminal year of this investigation has been chosen to be 1929 since mortgages, as we have observed above, rapidly declined in most of the districts from the beginning of the 'thirties for legal interventions and depression. The choice of the PHPR as an unlagged explanatory variable has been prompted by the consideration that a major part of the borrowings of the deficit households were made during the lean season and the mortgages of each calendar year were, in consequence, related to the prices of the preharvest months, viz., June, July and August of the same year. Constrained by the availability of price data, the study begins from 1909 in the case of western and central Bengal districts and 1913 for the north Bengal districts.

The primary reason for not obtaining any significant relation between mortgages and PHPR is that the system of exchange in kind was practised in some regions even before the onset of the depression of the 'thirties. We have already mentioned the case of Bankura where money as a medium of exchange was almost unknown to an ordinary cultivator. Variations in the degree of monetization of the rice market provide a plausible explanation for district to district variations in the response of mortgages to PHPR. As we have already observed, transactions in paddy largely replaced cash exchange for rice in the local market during the 'thirties. The insignificant role of PHPR as an explanatory variable in some districts may also be explained in terms of the limitations of the choice of a homogeneous period of preharvest months (for which the price data have been used) since the period may not exactly correspond

to the preharvest season for all the districts. Spatial and temporal variations in the harvest season (and for that matter the preharvest period) caused by fluctuations in monsoon cannot be ruled out.

Further investigation has been made to bring out the pattern of choice between two forms of asset transfer, viz., mortgages and sales of immovable property. To secure loans against mortgages of asset, instead of their outright sale, should obviously be the first choice of a deficit household. Since loans were contracted for meeting immediate consumption needs, the household in question would have to resort to sale of assets in case of a substantial decline in the rice value of mortgage loans. We have, therefore, tried to correlate annual fluctuations in the number of deeds of sale of immovable property to the annual fluctuations in the aggregate value of mortgages deflated by the annual average of the retail price of common (average) rice. (Table 4) Results obtained from the correlation analysis indicate that fluctuations in the number of sale deeds were inversely related to the fluctuations in the deflated value of mortgages. The correlation analysis has been made for the period 1901-41 (I) and two sub-periods viz., (II) 1901-29 and (III) 1930-41 in the case of western and central Bengal districts and (I) 1913-41 and (II) 1913-20 and (III) 1930-41 for the northern Bengal districts. Results obtained therefrom indicate a significantly positive association between the sales and deflated value of mortgages for a majority of the districts for period I and for all the districts for period II. A positive and significant association has been obtained for all the periods for Burdwan, Bankura and Nadia. Sale of assets was, therefore, perpetuated by a decline in the rice value of mortgage loans. The sale variable is unlagged.

The deficit in terms of paddy balance and the charges for servicing past debts could not always be met by contracting fresh

loans and postponing sales of assets indefinitely by a borrowing household. Transfer of encumbered assets were, as we have observed above, often unavoidable and it constituted a very high proportion of total sales. The deficit households also sold off their unencumbered assets in times of successive bad harvests to service their past debts or to meet their subsistence needs. But the percentage of sales of non-collateral (immovable) assets cannot be known from the available aggregative data on the sales of immovable property. Moreover, a portion of sales of unencumbered assets was made freely and it should be viewed as an outcome of the normal market activities. Figures for each of these categories of sales are not available and it is difficult to estimate the proportion of sales induced by past debts in terms of mortgage loans.

We, however, attempt to correlate the time series of the number of sale deeds with a lag to the time series of the number of deeds of mortgages for the period 1903-29 for the western and central Bengal districts sand 1912-29 for the northern Bengal districts. (Table 5) The maximum lag length has been assumed to be six years on the basis of the Bengal Provincial Banking Enquiry Committee's (BPBEC) findings. For all the reference districts of western and central Bengal a five-year lag has been fitted whereas the lag length spans six years for the north Bengal districts of Dinajpur and Malda and four years for Jalpaiguri. The correlation co-efficients are significantly positive for all the districts. These findings lead to the conclusion that land transfers, mortgages and indebtedness were all positively related to one another and these relations are marked by some distressing regularities.

We have already observed that the transfer of encumbered assets along with distress sales of non-collateral assets constituted a significant portion of total sales of

immovable property. Credit was the principal mechanism through which the transfer was brought about. A deficit household had to contract loans at terms that spelled unequal exchange in the product market. Its `perverse' price response, i.e., buying dear and selling cheap illustrates the cultivator's involuntary involvement in such an exchange process. The household deficit multiplied with a rise in the ratio between preharvest and harvest prices of paddy (or the buying and selling prices of paddy of an individual cultivator).

It may be argued that in the colonial agriculture of Bengal the scope of manipulating the price was somewhat limited as the price system in Bengal became increasingly meshed in the world market fluctuations (Bose : 1986). It was, however, easier on the lender's part to raise interest rates rather than to manipulate prices. The data on the rates of interest furnished by the BPBEC indicate that the credit market in the Bengal districts was characterized by high and heterogeneous rates of interest. The non-monetary rates of interest (in case of grain loans) were also extremely high. Since the deficit household's loan demand was interest-inelastic, a high rate of interest could be charged for maximizing interest-earnings. It has, however, been argued with evidence that high interest rates were often charged to induce loan defaults and bring about asset transfer in the lender's favour. Maximization of interest-earnings was not always aimed at. Our empirical findings seem to support A. Bhaduri's (1977) default hypothesis. High interest rates and the underpricing of collateral which constitute the lending strategy in Bhaduri's model seems to have characterized the lending operations of the usurers in our reference regions specially during the late 1920s and 1930s.

From the late 1920s onwards the usurers in the Bengal districts have been found to be using accumulated debt as a means of securing land from the indebted peasant. The

hypothecation of land was often made a necessary condition for borrowing. Evidence of land and produce linked credit has been drawn from the reports of the settlement authorities, BPBEC, Royal Commission on Agriculture and Registrar of the Cooperative Societies to show that the agriculturist-creditor conjointly exploited the debtor-cultivator in two or more markets by interlinking market deals. Most of the evidence indicates that loan defaults were induced through high interest rates. All kinds of produce-linked credit were extremely usurious and often brought about land transfer in the lender's favour, although land was not pledged. Even in case of grain loans, credit transaction was not always an end in itself. The lender who was often a cultivator and a trader extended his domain of control beyond the credit market, and the borrowers' freedom of operations in the land, labour and produce markets was severely curtailed. This observation holds good for land-linked as well as produce-linked credit.

The system of dadan or making advances for cultivation by the money-lending trader was also usurious. Available evidence indicates that the implicit rate of interest on such advances was very high and the borrower contracting dadan invariably lost his freedom of operations in the produce market. However, dadan in terms of cash was prevalent mostly in the jute belt (Mukherji: 1971) whereas in the predominantly paddy-growing districts the system of making advances in the terms of seeds, instead of cash, was a common practice during the sowing season. The latter type of credit system transaction was quite different from grain loans contracted by the deficit households in the preharvest season for consumption. Terms and conditions of seed loans were extremely usurious and debtor-cultivators, in case of loan defaults, have been reported to be 'completely ruined' (GOB : 1928).

It has been observed further that even in the regions where dadan was not a dominant form of credit transaction the petty producers' operations in the produce market were restricted by the itinerant middlemen, specially the beparis. (Mukherji, 1971, Chap.1).

We do not, however, find evidence of labour-tying credit for our reference districts. It may be plausibly explained in terms of the fact that in view of the scarcity of land and abundance of labour the debtor-cultivator was induced to pledge land instead of labour. The adhiari system of cultivation in the north Bengal districts of Dinajpur and Jalpaiguri, in particular, and other forms of share-cropping system in the rest of our reference regions might have reduced the necessity of instituting separate contracts of labour-tying credit. We, however, observe on the basis of available evidence that credit was the basic instrument through which interlinked market deals were instituted and the transfer of peasants' assets was brought about.

Part 2. The post-colonial developments in West Bengal

The long-standing stagnation in agriculture in West Bengal during the post-colonial period has not received adequate critical analysis from economists. Boyce's (1987) comprehensive study on agricultural growth in West Bengal and Bangladesh for the period 1949-80, however, sets the ground for raising the hypothesis of the `agrarian impasse'. His estimates (with no `outlier' dummies) set out 1.74 per cent annual growth in agricultural output which trailed far behind the rate of population increase during his reference period. The sluggish growth of aman yields (0.80%), as he observes, accounts for the failure of output growth `to match or surpass' the rise in population. He, therefore, finds strong grounds for advancing an argument of

stagnation or 'impasse' in West Bengal agriculture for his entire reference period.

Our estimates of area, production and productivity of all rice crops, specially aman, for the period 1947-76 corroborate Boyce's hypothesis. According to our estimates, production of all-rice crops annually expanded at a rate of 2.12 percent where as the estimated rate of growth of productivity stands at 0.94 percent. The area of all rice crops increased at the rate of 1.17 per annum. The rate of expansion of aman area (0.76 percent) was lower than the growth rate for all rice crops. The output growth of aman registered a rise of 1.42 percent while output per hectare increased at 0.66 percent rate (Table 6).

Structural constraints to agricultural growth have their origin in the colonial conditions of Bengal agriculture. An inability to remove these constraints was the main reason for the protracted stagnation in agricultural output during the first three decades of the post-colonial period. The breakdown of the irrigation structure based on river systems of the region and the ecological damage done by the expansion of railways had hastened the process of deceleration in agricultural output growth in the late colonial period. There was practically no sign of retrieval of canal irrigation even after independence. A slow pace of growth of the DV,BI and other canal irrigation projects and a very limited diffusion of water supply through canal irrigation during the 1950s and 1960s adversely affected cultivation in a wide region of western Bengal.

A picture of severe decline in agriculture emerges from the district-wise decomposition of the output growth of all-rice crops and aman (Table 7). Burdwan and Midnapore, the two largest paddy-growing districts, registered a decline in total rice area as well as the aman area during the fifties. In many other districts there had been a decline in area, production and

productivity. We obtain positive figures of output growth for all-West Bengal simply because the northern Bengal districts registered very high growth rates for area, production and productivity. The situation vis-a-vis output growth improved noticeably in the late sixties.

A skewed distribution of landholdings favouring the upper strata of the agrarian society stifled private initiatives by the small operators forming the largest group of investors in land. The output growth from the late 'sixties would have been much higher if their access to new technology could be raised by the right type of state intervention. Legal intervention for securing egalitarian land distribution completely failed to attain the declared objectives. The Land Ceiling Act of 1955 which imposed a ceiling of 25 acres on individual holdings was evaded by big landowners through large scale diffusion of ownership among family members. Restrictive measures for land distribution were however, adopted in 1971 by imposing a ceiling of 17.5 acres on the family holding instead of the individual holding. The state authorities, however, failed to act against the big landowners who evaded the new Ceiling Act once again. Contrary to popular expectations, inequality among landowning households increased sharply (K. Dutta, 1977).

Public investments in terms of key inputs like irrigation and fertilizer did not increase in a manner that could encourage private investments (Data furnished in Table 8 are indicative of a poor state of irrigation by Government Canals even during 1977-88). This apart, property rights were not well defined and a vast mass of cultivators suffered from tenurial insecurity inhibiting growth in private investments to a large extent.

The low level of private investments in agriculture is also reflected in the use of chemical fertilizers by the cultivators.

Fertilizer intensity (nutrient-kg per hectare) was extremely low prior to the 1970s. In 1965 only 8.3 kg. of nutrient per hectare of GCA was used. The corresponding figure stood at around 13 kg. during the early 'seventies (Boyce, 1987). Consumption of chemical fertilizer (CF) started rising from the late 'seventies. (Districtwise rates of growth of CF are shown in Table 9. Table 10(a) and 10(b) set out the results of regression of output/productivity on CF).

Agrarian Reforms and Output Growth

The Estate Acquisition Act of 1953 with no provision for land ceiling, and the land Reforms Act of 1955 and its subsequent amendments aimed at abolition of intermediaries and an equitable distribution of ownership through ceiling on landholdings. The reasons why these objectives remained unfulfilled have been generally ascribed to a lack of `political will' on the part of the state. They, however, form a part of a much more complex process, in which the `passive revolution of capital' consciously `sought to incorporate within its framework.... entire structures of pre-capitalist community taken in their existent forms.' (Partha Chatterjee, 1994). It took a major shake up in the form of widespread and violent uprising in rural areas of West Bengal to change the scenario to a considerable extent. Signs of disintegration of the power relations structure favouring landlord-jotedars were apparent when the Naxalbari movement gathered momentum in the early 'seventies. The mahajans were busy in winding up usury and the jotedars (who were often involved in grain trade and usury) were prodded into a situation in which they could no longer resist the pressure from tenant-cultivators, sharecroppers and landless labourers. The state's agriculture was surely poised for a change, but the situation

during the 'seventies was not quite congenial for the growth of private investments. Risk and uncertainty emanating from the political climate constrained the growth of investments by the propertied peasants. The left front government, since 1977, however, found a favourable situation to pursue its land reform programmes within the given legal framework as there was very little resistance from the landlord class which had lost much of its clout in the wake of the Naxalbari movement. Moreover, elected self-governing institutions like Panchayat Samities at the block level frustrated the landlords' efforts to organize resistance to the adoption of various land reform measures for the benefit of the small landowners and landless cultivators. By the end of 1980 the area of agricultural land vested in West Bengal stood at 11.77 million acres while little over 40 lakh acres of land were declared surplus throughout the country (Statistical Cell, BR GOWB 1980) Distribution of surplus land has raised the number of operational holdings.

Data from Input Survey (1980-81) and Agricultural Census (1985-86) made by the Board of Revenue and the Directorate of Agriculture of the state government suggest that irrigation and fertilizer intensities for the cultivated area under marginal and small holdings are fairly high. Recent evidence of input use by the different size classes of holdings give an indication that the rise in the number of marginal and small holdings is not likely to affect production and productivity.

The end of the `agrarian impasse' actually began from the closing years of Boyce's period (1949-80). The end is reflected in the gradual removal of structural constraints rather than in the level of output growth. Boyce's emphasis on low aman yields as an evidence of stagnation in agricultural output growth loses much of its importance with the growing share of boro production in the total rice output. John Harris (1992) observes

that `a quite dramatic spurt in agricultural production' resulting mainly from the growth of boro production marks the end of `the impasse' of Boyce's title. The reason he has assigned to the remarkable output growth is the development of private shallow tubewell irrigation. In his opinion, all this has taken place `in the absence of any reform of the agrarian structure'. The task, as Harris believes, was accomplished by some growth in `suitable technology' and by reversing the previous kind of `extremely unfavourable fertilizer/paddy price ratio'.

It is difficult to agree with John Harris' attempt to play down the role of land reform measures in accelerating agricultural production in West bengal in recent times. The measures intensified state intervention in defining property rights in a more meaningful manner narrowing the gap between ownership and operation and widening the access of the small cultivators to technology and other inputs. Since the small and marginal cultivators claim the largest share of the total landholdings, the latter development is extremely significant from the point of view of growth in production and productivity in recent times.

Output growth : 1977-88

The estimated rates of growth of the different crop area, production and productivity for the period 1977-88 indicate a welcome change in the agricultural performance of West Bengal (Table 11). High growth rates of production for a number of crops were achieved by bringing about improvements in productivity. This is particularly true for foodgrains excluding boro crop in case of which area expansion has been mainly responsible for about 10 per cent rise in production. Among the non-foodgrain crops there has been a remarkable rise in the

production of oilseeds. The rise in both area and productivity has brought about 17.51 percent annual rise in the state's production of oilseeds. The dominance of foodgrains, specially of rice crops in the GCA can be traced up to the late `eighties and a rise in the production of food crops accounts for a sudden spurt in agricultural production in recent times. The share of foodgrains in the GCA has been about 83 per cent in 1986-87. (GOWB BAES Statistical Abstract 1977-88) The corresponding figure for the rice crops stands at 71.24 per cent. Obviously, the contribution of foodgrains to output growth accounts for the recent spurt in agricultural production.

A district-wise decomposition of output growth indicates some notable changes. The traditionally backward districts of Bankura and Purulia have registered much higher growth rates in all-crop production (4.71 percent and 4.95 percent respectively) compared to the corresponding figures for all-West Bengal. The production performance of Midnapore, Howrah, Hooghly and Nadia have also exceeded the all-West Bengal mark in terms of growth rates. Bankura (21.32 percent), West Dinajpur (23.27 percent) and Cooch Behar (25 percent) have registered more than 20 per cent annual growth in boro production.

Growth rates for oilseeds production have been exceptionally high in comparison with the all-West Bengal situation in the districts of Birbhum (29.56 percent), Midnapore (18.03 percent), 24-Parganas (20.95 percent) and Purulia (19.83 percent).

Burdwan, the most advanced district in terms of potato production, is no longer in a position to maintain the lead. The rate of growth of potato production of the district seems to be much lower (5.76 percent) than the all-West Bengal growth rate. Growth rates of potato production for Bankura (10.45 percent), Midnapore (13.15 percent) and Birbhum (9.57 percent) have

exceeded the corresponding rate for all-West Bengal.

Agrarian reforms and the development of an institutionalical from of panchayat rai have surely played a vital role in overcoming stagnation in West Bengal agriculture. The reforms along with a change in the credit-relations structure have bolstered up the position of marginal and small peasants in terms of their access to technological inputs of production. The significant rise in cropping and irrigation intensities for marginal and small sizes of holdings during the 'eighties (GOWB, BR & DA : Agricultural Census, 1985-86, Table 6.3) shows that agricultural growth in the state has not been unfavourably affected by the agrarian reforms that are often held responsible for the contraction in the size of holding and a rise in the number of marginal and small operators. The average size of operational holdings had declined from 0.95 ha in 1981-82 to 0.92 ha in 1985-86 while the marginal size-class (< 1 ha) has gained substantially in the size of holdings. Table 7 shows that the proportion of wholly irrigated holding area to total area for the marginal size-class is considerably higher than the corresponding proportion for all size classes. Furthermore, operational holding of the marginal size-class account for 64.9 percent of holdings receiving irrigation and 74.6 percent of wholly irrigated holdings. 25.5 percent of the marginal holdings were irrigated by tubewells. The corresponding figure for 1985-86 stands at 50.4 percent. Figures presented in Tables 12 through 15 indicate that the marginal and small operators have gained substantially in terms of fertilizer consumption, irrigation and HYV cultivation.

Issues relating to fragmentation of land-holdings should be raised in an attempt to identify structural constraints on agricultural output growth. Holding fragmentation would raise supervision time as well as the cost for a farm even when complete labour homogeneity exists. Frisvol's (1994) study on

supervision based on Indian farm level data, however, rejects the hypothesis of complete labour homogeneity with no supervision effects. We observe that heterogeneity of labour (in terms of family labour and hired labour), in particular, would raise supervision costs of a family farm with fragmented holdings. Further on, distance between parcels as well as the location of parcels with respect to irrigation structure matter much in terms of supervision costs.

Agrarian reform measures adopted by the state authorities have no provision for restructuring the operational holdings with several parcels. The magnitude of the problem can be guessed from the data furnished by Input Survey (1981-82). Even for the holdings belonging to the marginal and small categories of operators, the average number of parcels are 2.91 and 5.44, respectively. The average areas for these categories of operational holdings are 0.14 ha and 0.28 ha, respectively. Operators, either small or big, have to face problems of supervision even when they are owners. The survey findings also bring out that the parcels are located in a number of widely apart mouzas.

Supervision of fragmented holdings for a share tenancy farm (either partly leased-in or wholly leased-in) poses a serious problem for any empirical study. Our investigations, however, remain incomplete even for drawing any tentative conclusions in this respect. Barga operation has added a new dimension to the problem since the sharecroppers with recorded rights of cultivation are more or less free to take major decisions as regards investments in labour and material inputs.

Concluding observations

Ill-defined property rights, differential access of the farming households to inputs and resources, the failure of the state authorities to revive canal irrigation and promote private investments in land and technological inputs had in different way contributed to stagnation in agriculture which lasted till the end of the 'seventies. These constraints on growth are found to have their origin in the colonial conditions of Bengal agriculture.

Attempts have, however, been made in recent times to remove these constraints subject to certain limitations. Any rearrangement of property relationships in a given constitutional frame through legal means is by no means an easy task. Moreover, the resource-base of West Bengal agriculture is traditionally weak and, contrary to Bergmann's (1984) expectations, the 'political will' (of a leftist state goverment) for agrarian reforms often flounders when the task has to be performed in a given situation of scarce resources in terms of land and other inputs.

It can be also seen that there is enough evidence to suggest that state intervention has played a crucial role in strengthening the resource base of the marginal and small operators and this surely finds expression in the recent recovery of agriculture in West bengal from stagnation in the post-colonial period.

Our empirical findings do not corroborate Byres' (1981) view that the new technology would hasten the process of differentiation and consolidate the rich peasantry as a powerful class. What might be true for the heart-belt of the green revolution has little relevance for recent agrarian developments in West Bengal with a long tradition of peasant movement influencing the nature of state intervention which seems to have

widened the access of the small peasants to scale-neutral technology. We, however, agree with the view that new technology is not resource-neutral, and the impact of institutional reforms will cease to be favourable for output growth if the resource position of the marginal and small operators declines.

It is here that we have to draw lessons from other institutional factors influencing the nature of labour inputs which have survived from colonial times. It is necessary to go deeper into the nature of labour involvement in small scale production to find out whether or not subordinate social groups in West Bengal's rural society are likely to be denied real benefits from the recent spurt of growth in agricultural production. Issues relating to labour utilization in traditional agriculture and the impact of institutional changes on forms of labour utilization constitute a large area of independent enquiry which cannot obviously be gone into just now, in course of the present discussion. But it is important to remember that during the colonial period, capital could concentrate its control over the product and credit markets without incurring costs in the labour market by intensifying labour within family units engaged in small scale agricultural production. It was also precisely in some pockets of agricultural growth in West Bengal in the 1950s that the process of intensification of such labour reached a new high. It is only in recent years that there has been an attempt to look into the implications of inequality along gender and generation lines (Amrita Basu, 1993, cited in Sugata Bose, 1995) and regional differences in generational inequalities in India and Bangladesh (Padhi and Nair, 1993), and how such intensive and largely unremunerated family labour has historically favoured the capitalist advantage of squeezing larger amounts of surplus from small scale agricultural production. It has also been recently argued that while a number of rural labouring population has

gained from increased employment and higher wages, relative poverty had increased in West Bengal in the 1980s owing to an erosion of access over common property resources like grazing rights, and freely available items of fuel and food (Beck, 1995) and that the quality of life of the poorest may have suffered owing to the failure on the part of the state to ensure individual rights to a minimum level of education and health care as opposed to its narrow concern over establishing and redistributing private property in land (Sengupta and Gazdar, 1997).

These are some of the factors that have given rise to a few apprehensions in some quarters that inequalities in relations of production and in structures of exchange and distribution may ultimately lead to a decline in the resource position of not only the poorest strata of rural people, but also of the marginal and small cultivators who have so far provided the impetus for growth. Effective public intervention at the local level could be one of the surest ways to ensure greater social justice for the weaker sections in rural society. That however, depends on strategies evolved through ongoing struggles of the mass of the labouring population for greater political empowerment of such segments of people - a task that does not look too easy in the given environment of idealization of the market and the release of new forces fovouring greater accumulation by the self-enriching rural magnates and their more powerful and influential counterparts in the non-agrarian sectors of the economy.

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Table 1 : Annual Compound Growth Rate (percent) of Winter Rice, Autum Rice & Per Capita Rice Production : 1901-41*

District	Winter Rice			Autum Rice			Per Capit Rice Productio
	Area	Yield per acre	Output	Area	Yield per acre	Output	
Brdwan	-1.145	-	-1.599	-3.839	1.624	-3.839	-2.725
Birbhum	-0.459	-	-0.917	-3.395	-	-3.172	-1.372
Bankura	-	-	-	9.901	0.925	10.917	-
Midnapore	-	-	-	3.514	0.693	3.992	-
Hoogly	-0.917	-0.459	-1.372	-1.145	-	-0.917	-2.051
Howrah	-	-	-	-3.395	0.693	-2.725	-1.825
24-Parganas	-0.230	-0.688	-1.145	0.688	-	0.688	-2.051
Nadia	1.859	-	1.391	0.925	-	1.391	0.925
Murshidabad	0.462	-	-	0.462	-	-	-
Dinajpur	-0.917	-	-	-	1.158	1.158	-
Jalpaiguri	-0.917	0.462	-	-	0.462	-	-
Malda	-2.949	-	-3.395	-1.372	-1.599	-2.949	-3.617

* Source : Sanyal, 1990, Chapter 2.

Table 2 : Transfer of intermediary tenures and index number 1929/30 - 1939/40*

Years	No. of transfers	Index
1929/30	106810	100.00
1930/31	128150	119.98
1931/32	125728	117.71
1932/33	122693	114.87
1933/34	125613	117.60
1934/35	143939	134.76
1935/36	149482	139.95
1936/37	138524	129.60
1937/38	138881	130.03
1938/39	136306	127.61
1939/40	123304	115.44

* Source: Report on Land Rev. Admin. of the Presidency of Beng., 1929/30 - 1940/41.

Table 3 : Linear Regression Analysis of Determinants of Mortgage (1909-29)*. Dependent Variable - Mortgate (No. of deeds) of Immovable Property (Y_i)
Explanatory Variables - Pre-harvest Price of Price (X_1)
Per Capita Rice Production (X_2)
(Explanatory Variables)

District	Intercept	X_1	X_2	R^2	D.W. Sta
Burdwan	22874.068	493.235	-17.433		
		(1.063)	(-3.639)*	0.588	1.806
Birbhum	12886.134	779.915	-8.402		
		(1.568)***	(-2.258)**	0.543	1.332
Bankura	13797.310	3.480	-6.420		
		(0.078)	(-2.457)**	0.279	1.363
Midnapore	10790.225	233.612	4.056		
		(1.871)**	(0.569)	0.178	1.041
Hooghly	8774.658	280.196	-11.241		
		(1.096)	(-1.774)**	0.323	0.854
Howrah	43373.869	5234.215	-48.755		
		(5.212)*	(-1.218)	0.606	1.458
24-Parganas	18376.642	2576.603	-14.870		
		(2.425)**	(-0.903)	0.515	1.967
Nadia	50428.951	3351.951	-19.061		
		(2.974)*	(-1.395)	0.341	1.086
Murshidabad	14946.527	530.608	-26.575		
		(1.238)	(-3.211)*	0.574	0.900
Dinajpur	9714.260	1858.123	-1.443		
		(3.417)*	(-1.060)	0.569	0.483
Jalpaiguri	-2404.428	5196.753	14.482		
		(3.411)*	(1.429)	0.461	0.700
Malda	80997.954	1736.176	-29.323		
		(1.176)	(-3.209)*	0.588	1.301

Source: Manoj Sanyal (1990, Table 6.2).

Notes : Figures in brackets indicate T values
* Significant at < 1 percent level
** Significant of <5 percent level
*** Significant at < 10 percent level.

Table 4 : Correlation Analysis, Sale (No. of Deeds) and Mortgage (value deflated by the Retail Price of Rice) of Immovable Property

District	Periods	r	T
Burdwan	I (1901-41)	-0.545	-4.055*
	II (1901-29)	-0.462	-2.708*
	III (1930-41)	-0.794	-4.135*
Birbhum	I (1901-41)	-0.349	-2.299***
	II (1901-29)	-0.200	-1.041
	III (1930-41)	-0.852	-5.138*
Bankura	I (1901-41)	-0.624	-4.299*
	II (1901-29)	-0.491	-2.872*
	III (1930-41)	-0.959	-10.655*
Midnapore	I (1901-41)	-0.426	-2.902*
	II (1901-29)	-0.165	-0.855
	III (1930-41)	-0.919	-7.000*
Hooghly	I (1901-41)	-0.271	-1.735***
	II (1901-29)	-0.302	-1.616
	III (1930-41)	-0.833	-4.754*
Howrah	I (1901-41)	-0.116	-0.709
	II (1901-29)	-0.633	-4.088*
	III (1930-41)	-0.930	-7.972*
24-Parganas	I (1901-41)	-0.157	-0.982
	II (1901-29)	-0.274	-1.454
	III (1930-41)	-0.806	-4.308*
Nadia	I (1901-41)	-0.175	-3.286*
	II (1901-29)	-0.338	-1.793***
	III (1930-41)	-0.746	-3.544*
Murshidabad	I (1901-41)	-0.356	-2.351**
	II (1901-29)	-0.030	-0.152
	III (1930-41)	-0.817	-4.483*
Dinajpur	I (1901-41)	-0.162	-0.868
	II (1901-29)	-0.093	-0.373
	III (1930-41)	-0.640	-2.631**
Jalpaiguri	I (1901-41)	-0.334	-1.844***
	II (1901-29)	-0.030	-0.117
	III (1930-41)	-0.720	-3.281*
Malda	I (1901-41)	-0.073	-0.380
	II (1901-29)	-0.431	-1.850***
	III (1930-41)	-0.780	-3.947*

Source: Manoj Sanyal (1990, Table 6.3).

Notes : * Significant at < 1 percent level
* Significant at <5 percent level
*** Significant at < 10 percent level.

Table 5 : Correlation Analysis, No. of Deeds of Sales (lagged) and Mortgages of Immovable Property*

Districts	Periods	r	T
Burdwan	(1903-29)	0.657	3.890*
Birbhum	(1903-29)	0.674	4.078*
Bankura	(1903-29)	0.439	2.185**
Midnapore	(1903-29)	0.553	2.970*
Hooghly	(1903-29)	0.569	3.098*
Howrah	(1903-29)	0.362	1.825*
24-Parganas	(1903-29)	0.762	5.268*
Nadia	(1903-29)	0.733	4.826*
Murshidabad	(1903-29)	0.653	3.856*
Dinajpur	(1912-29)	0.505	1.853**
Jalpaiguri	(1912-29)	0.537	2.204**
Malda	(1912-29)	0.707	3.160*

Source: Manoj Sanyal (1990, Table 6.4).

Notes : * Significant at < 1 percent level
* Significant at <5 percent level

Table 6 : Annual Growth in Area, Production and Productivity of Total and Aman Rice (per cent) in West Bengal (1947-76)

(per cent)

	Area	Production	Productivity
Total Rice	1.173	2.120	0.936
Aman Rice	0.760	1.423	0.660

Source : GOWB : Socio-economic Evaluation Branch.

Table 7 : Compound Growth in Area, Production and Productivity of Total Rice and Aman Rice per cent (1952-53 - 1961-62)

	TOTAL RICE			AMAN RICE		
	Area	Production	Productivity	Area	Production	Producti
All Bengal	1.131	1.373	0.346	1.220	1.555	0.331
Burdwan	-0.034	0.879	1.619	-0.759	1.006	0.556
Birbhum	-0.538	-0.041	-0.525	-0.820	-1.116	1.509
Bankura	-0.882	0.108	0.999	-0.665	0.405	1.077
Midnapore	-0.020	0.592	0.613	-0.261	0.493	0.756
Howrah	-1.905	-2.533	-0.640	-1.975	-2.581	2.276
Hooghly	-0.050	-0.890	-0.640	-0.100	-0.732	-0.633
24-Parganas	-0.347	-0.099	0.249	-0.137	0.114	-0.567
Nadia	1.015	-0.071	-0.075	0.600	-1.688	-2.273
Murshidabad	-0.710	-0.334	0.167	-0.189	-0.200	1.058
West Dinajpur	6.674	7.081	0.295	6.166	6.948	0.738
Jalpaiguri	0.725	2.456	1.719	0.723	2.583	1.847
Malda	-0.302	-0.793	-0.712	0.678	0.100	-0.574
Cooch Behar	0.535	1.560	1.020	0.723	2.183	1.022

Source : GOWB : State Statistical Bureau.

Table 8 : Growth of Irrigation by Government Calals (Area in hectare) in percent per annum (1977-78 -- 1985-86)

All West Bengal	0.606
Burwan	0.635
Birbhum	0.872
Bankura	0.590
Midnapore	2.321
Howrah	5.026
Hooghly	1.422
Murshidabad	1.627
Jalpaiguri	4.205
Purulia	5.158

Source : GOWB, BAES : Statistical Abstract (1977-88).

Table 9 : Growth (per cent) of Fertilizer (N, P & K) Consumption in the districts (1977-78 - 1987-88)

West Bengal	11.276
Burwan	8.697
Birbhum	7.664
Bankura	7.324
Midnapore	11.008
Howrah	13.413
Hooghly	11.435
24-Parganas	12.325
Nadia	6.904
Murshidabad	10.665
West Dinajpur	12.481
Jalpaiguri	21.135
Malda	15.329
Darjeeling	18.685
Cooch Behar	21.640
Purulia	17.255

Source : GOWB, BAES : Statistical Abstract (1977-88).

Table 10(a) : Regression of Agricultural output on Fertilizer Consumption (1977-78 - 1988-89)

	Cons-tant	Std. of Err. of Y Est.	R^2	X Co-efficient	Std. Err. of Coeff.
West Bengal	81.514	12.022	0.685	0.222	0.050
Burwan	88.470	15.118	0.643	0.270	0.067
Birbhum	56.627	18.641	0.409	0.365	0.146
Bankura	41.419	17.335	0.665	0.528	0.125
Midnapore	60.370	13.193	0.744	0.252	0.049
Howrah	58.151	18.858	0.684	0.249	0.056
Hooghly	92.993	10.854	0.839	0.271	0.039
24-Parganas	96.232	19.959	0.393	0.177	0.073
Nadia	47.721	21.378	0.637	0.698	0.176
Murshidabad	99.623	15.575	0.261	0.130	0.072
West Dinajpur	91.710	11.524	0.299	0.093	0.047
Jalpaiguri	111.269	7.058	0.469	0.027	0.010
Malda	104.069	12.653	0.601	0.133	0.036
Darjeeling	108.179	8.810	0.820	0.093	0.015
Cooch Behar	94.257	6.924	0.585	0.032	0.009
Purulia	71.055	29.036	0.395	0.156	0.065

Y - Output Index
X - Fertilizer Index

Table 10(b) : Regression of output per hectare on Fertilizer Consumption (1977-78 - 1988-89)

	Cons-tant	Std. of Err. of Y Est.	R^2	X Co-efficient	Std. Err. of Coeff.
West Bengal	84.692	9.178	0.707	0.179	0.038
Burwan	101.710	12.416	0.453	0.150	0.055
Birbhum	67.714	12.387	0.548	0.321	0.097
Bankura	47.217	12.964	0.728	0.459	0.093
Midnapore	58.151	18.859	0.684	0.249	0.058
Howrah	62.787	14.037	0.639	0.168	0.042
Hooghly	91.526	11.270	0.734	0.204	0.041
24-Parganas	97.776	17.611	0.321	0.134	0.065
Nadia	72.637	19.813	0.508	0.496	0.163
Murshidabad	100.054	13.389	0.275	0.115	0.062
West Dinajpur	84.819	9.858	0.397	0.099	0.041
Jalpaiguri	99.594	4.825	0.500	0.020	0.007
Malda	114.085	13.807	0.599	0.144	0.039
Darjeeling	109.046	7.258	0.667	0.051	0.012
Cooch Behar	84.117	5.999	0.476	0.022	0.007
Purulia	85.458	26.925 0	.316	0.122	0.060

Y - Productivity Index
X - Fertilizer Index

Table 11 : Annual Growth (per cent) of Acreage, Production and Productivity in West Bengal By Districts (1977-78 - 1988-89)

(Per cent)

		West Bengal	Burdwan	Birbhum	Bankura	Midna
	Area	0.50	1.14	-0.27	0.14	0.50
All crops	Production	3.87	3.94	2.89	4.71	5.80
	Productivity	3.36	2.76	2.98	4.57	5.28
	Area	0.07	0.57	-1.29	-0.10	0.13
Food grains	Production	3.42	3.23	1.69	4.04	4.81
	Productivity	3.33	2.65	3.10	4.15	4.68
	Area	0.81	1.24	-0.19	0.31	0.62
Rice	Production	3.93	3.55	2.41	4.35	5.07
	Productivity	3.10	2.28	2.61	3.95	4.43
	Area	-1.25	0.94	3.93	-0.09	-0.82
	Production	2.50	4.77	7.20	5.58	4.22
Aus	Productivity	3.80	5.46	3.14	5.69	5.14
	Area.	0.20	0.15	-0.72	-0.16	-0.38
Aman	Production	2.76	2.28	1.95	3.42	3.83
	Productivity	2.55	2.11	2.71	3.58	4.23
	Area	9.36	7.73	5.21	17.18	10.57
Boro	Production	9.88	8.31	5.65	21.32	10.65
	Productivity	0.47	0.53	0.40	3.54	0.07
	Area	-2.75	-11.24	-8.49	-7.73	-9.39
Wheat	Production	-1.84	-10.34	-7.17	-4.59	-9.25
	Productivity	0.95	1.01	1.08	3.45	0.16
	Area	-11.42				
Barley	Production	-9.89				
	Productivity	0.99				
	Area	-5.19	-11.25	-8.23	-6.00	-7.67
Pulses	Production	-2.98	-9.02	-5.63	-5.28	-3.63
	Productivity	2.33	2.68	2.83	0.74	4.39
	Area	-6.79	-15.26	-4.95	-10.56	
Gram	Production	-6.01	-16.36	-4.73	-9.93	
	Productivity	0.84	-1.30	0.23	0.71	
	Area	-4.74	-10.55	-9.84	-6.26	-8.09
Other Pulses	Production	-1.64	-7.19	-6.69	-4.86	-4.12
	Productivity	3.26	3.76	3.50	1.49	4.32

Table 11 contd..

		Howrah	Hooghly	24-Parganas	Nadida	Murshi-dabad
All crops	Area	1.12	0.47	0.46	1.13	0.38
	Production	6.39	4.65	2.91	5.62	2.09
	Productivity	5.19	1.63	2.43	4.44	1.71
Food grains	Area	1.15	-0.25	0.22	0.72	-0.30
	Production	7.02	2.66	2.68	5.90	2.36
	Productivity	5.81	2.91	2.45	5.16	2.66
Rice	Area	2.11	0.44	0.67	1.64	1.89
	Production	7.81	3.10	2.84	6.49	3.55
	Productivity	7.49	2.64	2.11	4.77	1.63
Aus	Area	15.39	3.26	1.08	-1.79	0.59
	Production	26.41	7.09	6.53	-1.09	0.68
	Productivity	9.55	3.62	5.23	2.35	0.39
Aman	Area	-0.59	-0.19	-0.40	-1.01	1.17
	Production	7.18	4.15	0.67	2.47	1.52
	Productivity	7.81	4.39	1.06	3.52	0.24
Boro	Area	13.65	1.99	10.33	13.94	11.91
	Production	14.06	0.80	10.94	14.58	12.82
	Productivity	0.50	-1.16	0.55	0.56	0.81
Wheat	Area	-19.42	-13.46	-2.30	2.92	-0.52
	Production	-19.89	-12.45	-4.29	5.97	0.78
	Productivity	-0.55	1.19	1.32	2.43	1.35
Barley	Area				-22.46	-7.67
	Production				-24.12	-8.85
	Productivity				-2.15	-1.29
Pulses	Area	-6.11	-13.18	-7.03	-2.54	-6.47
	Production	-5.19	-10.89	-6.24	-0.35	5.53
	Productivity	1.32	2.64	0.84	0.24	1.97
Gram	Area			-15.11	-4.25	-9.81
	Production			-12.83	-3.44	-9.12
	Productivity			2.69	0.85	0.76
Other Pulses	Area	-6.11	-13.55	-6.45	-1.06	-5.09
	Production	-5.19	2.72	-4.24	-2.45	-3.11
	Productivity	1.32	2.78	1.17'	4.47	5.87

Table 11 contd..

		West Dinajpur	Malda	Jalpai-guri	Darjee-ling	Cooch-Behar	Purulia
	Area	-0.26	0.17	0.24	1.06	0.64	1.11
All crops	Production	2.34	3.41	1.46	2.82	2.65	4.95
	Productivity	2.61	3.23	1.22	1.78	1.99	3.79
	Area	-0.11	0.16	-0.10	0.79	0.55	1.05
Food grains	Production	2.85	3.77	0.69	3.24	2.75	4.96
	Productivity	2.96	3.61	0.98	2.44	2.19	3.87
	Area	0.74	-6.15	-1.05	1.85	1.29	0.69
Rice	Production	3.65	4.41	1.28	1.93	4.36	-19.10
	Productivity	2.89	3.48	1.11	0.08	3.20	4.37
	Area	-6.06	-2.42	-2.98	2.77	-1.09	-4.66
Aus	Production	-2.91	-1.03	-0.43	5.93	3.02	0.57
	Productivity	3.35	1.42	2.61	3.04	4.17	5.78
	Area	1.62	0.85	1.27	1.63	2.03	0.73
Aman	Production	3.05	1.49	1.61	1.31	4.40	5.11
	Productivity	1.40	0.65	0.33	-0.22	2.29	4.65
	Area	17.40	7.68			20.89	
Boro	Production	23.27	12.27			24.99	
	Productivity	1.98	4.27			3.39	
	Area	-1.87	2.13	-2.86	-11.79	-3.71	-5.04
Wheat	Production	-1.83	2.66	-5.39	-13.82	-6.32	-6.58
	Productivity	-0.54	0.52	-2.61	-2.49	-2.71	-1.62
	Area	-25.54	-8.33				
Barley	Production	-19.32	-6.43				
	Productivity	8.24	0.10				
	Area	-7.42	-1.98	-8.49	-3.64	-1.81	0.71
Pulses	Production	-7.73	0.27	-7.86	-5.49	-0.32	3.59
	Productivity	-0.58	2.30	1.72	-1.92	1.57	1.73
	Area	-7.36	-4.27				-3.46
Gram	Production	-8.25	-5.46				-0.32
	Productivity	-0.96	-1.25				3.25
	Area	-7.68	-1.82	-9.73	-3.64	-1.41	2.32
Other Pulses	Production	-8.05	1.97	-8.14	-5.49	0.09	5.15
	Productivity	-0.42	3.86	1.78	-1.92	1.52	2.77

Table 11 : Annual Growth (per cent) of Acreage, Production and Productivity in West Bengal By Districts (1977-78 - 1988-89)

(Per cent)

		West Bengal	Burdwan	Birbhum	Bankura	Midnapur
	Area	2.66	5.17	10.99	2.53	6.10
Non-Food	Production	5.10	4.94	10.50	8.88	10.89
Grain	Productivity	2.37	0.91	-0.44	6.82	4.52
	Area	9.28	12.06	16.99	3.43	10.89
Oil Seeds	Production	17.51	17.20	29.56	4.59	18.03
	Productivity	7.53	5.00	10.74	6.98	6.50
	Area	13.77	19.54	30.30	15.71	19.13
Rape &	Production	20.74	27.23	33.13	21.06	21.48
Mustard	Productivity	6.14	6.43	2.17	4.67	11.42
	Area	-10.32				
Linseed	Production	-10.06				
	Productivity	1.21				
	Area	9.37	0.13	0.91	-1.42	6.23
Sesamum	Production	10.90	-3.75	-2.02	12.76	7.06
	Productivity	1.39	-3.87	-2.91	4.69	1.01
	Area	-1.41	-3.49	0.46	-7.60	-1.97
Fibres	Production	1.72	0.27	0.94	-5.93	0.80
	Productivity	3.18	3.90	0.48	1.29	2.82
	Area	-0.84	-3.44	-4.40	-10,60	-2.47
Jute	Production	2,20	0.56	2.54	-6.11	-0.35
	Productivity	2,95	4.14	7.26	5.02	2.03
	Area	8.31		-0.06		7.39
Spices	Production	6.48		9.16		3.65
	Productivity	-1.68		9.22		-3.49
	Area	2.07	9.03	0.77	3.94	6.48
Vegetables &	Production	6.54	5.66	7.12	9.58	12.01
Miscellaneious	Productivity	4.37	2.48	6.30	5.42	5.18
	Area	3.77	3.63	3.88	6.01	7.05
Potato	Production	7.36	5.76	9.57	10.45	13.15
	Productivity	3.48	2.06	5.48	4.19	4.36
	Area	-8.47	-7.58	-9.06	-16.37	-4.71
Sugar Cane	Production	-7.26	-5.45	-11.06	-18.25	-1.27
	Productivity	1.33	2.30	-2.20	-0.32	3.35
	Area	0.80				-0.00
Tobacco	Production	2.44				
	Productivity	1.63				

Table 11 contd..

		Howrah	Hooghly	24-Parganas	Nadia	Murshidabad
	Area	0.90	2.58	2.13	1.84	2.80
Non-Food	Production	4.91	6.64	4.00	5.02	5.14
Grain	Productivity	3.42	3.98	1.84	1.36	2.25
	Area	4.41	9.65	13.81	5.91	6.86
Oil Seeds	Production	-5.97	16.48	20.95	17.93	13.33
	Productivity	-10.00	6.25	6.22	10.97	6.06
	Area	31.70	19.48	16.26	15.07	15.21
Rape &	Production	27.63	27.35	22.35	24.74	17.95
Mustard	Productivity	-1.42	6.59	5.27	8.40	1.75
	Area				-9.71	-21.32
Linseed	Production				-9.66	-21.25
	Productivity				0.16	0.09
	Area	3.12	3.73	12.28	17.91	3.18
Sesamum	Production	-0.61	7.49	17.32	39.16	4.58
	Productivity	-3.62	3.64	8.05	19.02	1.36
	Area	-6.95	-4.10	-4.45	0.81	1.45
Fibres	Production	-5.01	-0.79	-1.62	4.88	5.23
	Productivity	2.08	3.45	2.96	-3.77	-0.36
	Area	-6.93	4.17	-3.99	1.15	1.40
Jute	Production	-5.01	-0.80	-1.26	5.80	4.41
	Productivity	1.86	3.52	2.85	3.94	3.80
	Area			9.60	8.13	7.57
Spices	Production			11.65	7.14	4.23
	Productivity	5.02		1.81	-8.88	-3.11
	Area	7.36	4.43	-1.86	-8.59	-3.70
Vegetables &	Production	2.21	5.11	4.25	-4.76	-0.31
Miscellaneious	Productivity	3.88	2.89	6.23	4.19	3.41
	Area	7.43	4.29	-1.00	-1.80	-1.30
Potato	Production	3.43	7.43	4.80	-1.28	1.57
	Productivity		3.03	5.85	0.52	2.90
	Area			-8.58	-17.74	-7.06
Sugar Cane	Production			-6.13	-16.36	-6.67
	Productivity			2.68	1.67	0.40
	Area					
Tobacco	Production					
	Productivity					

Table 11 contd..

		West Dinajpur	Malda	Jalpai-guri	Darjee-ling	Cooch-Behar	Purulia
	Area	-0.97	0.19	1.55	1.42	0.96	3.43
Non-Food	Production	0.48	1.21	1.83	2.56	2.67	4.79
Grain	Productivity	1.46	1.03	0.27	0.97	1.49	1.32
	Area	4.17	5.35	4.68	-1.11	2.43	9.12
Oil Seeds	Production	14.85	12.37	7.62	13.54	4.27	19.83
	Productivity	10,26	6.66	1.73	14.81	1.76	9.81
	Area	8.95	8.84	3.21	-1.11	-1.47	-0.24
Rape &	Production	18.40	15.18	7.62	13.54	0.87	1.82
Mustard	Productivity	8.67	5.82	4.27	14.81	2.37	2.06
	Area	-12.36	-6.24				
Linseed	Production	-13.61	-6.20				
	Productivity	- 1.43	0.03				
	Area	13.15	1.61	11.44		11.56	3.60
Sesamum	Production	7.64	0.73	11.71		7.63	8.10
	Productivity	-5.63	-0.86	-6.76		-3.52	4.35
	Area	-4.68	-4.76	1.02	-6.54	0.84	-14.70
Fibres	Production	-4.02	-3.72	3.22	5.48	3.38	-9.55
	Productivity	0.70	1.11	2.21	6.69	2.53	5.78
	Area	-3.50	-4.34	1.62	-5.98	1.72	
Jute	Production	-2.87	-3.46	3.85	6.08	4.12	
	Productivity	0.66	0.92	2.19	6.71	2.36	
	Area	3.47		16.20	4.42	1.88	
Spices	Production	-2.09		14.83	8.90	-7.04	
	Productivity	-5.43		-1.18	4.29	-8.76	
	Area	-4.41	-4.40	1.96	2.94	2.27	6.10
Vegetables &	Production	-1.83	-3.76	5.47	5.74	3.02	1.91
Miscellancious	Productivity	1.98	0.79	3.44	2.72	0.72	8.53
	Area	-2.33	-1.70	0.61	2.94	4.79	
Potato	Production	-0.83	0.92	3.41	5.50	7.42	
	Productivity	1.54	2.67	2.79	2.49	2.51	
	Area	-18.49	-7.27				-16.25
Sugar Cane	Production	-18.51	-9.11				-11.96
	Productivity	-0.03	-1.98				5.13
	Area	-14.18	-2.43	2.77		1.33	
Tobacco	Production	-12.48	-1.86	8.58		2.13	
	Productivity	1.98	0.62	3.71		0.79	

Source : Statistical Abstract, various issues.

Table 12 : Proportion of Irrigated Area to Holding Area in West bengal (1981-82)

SI.No.	Size classes (ha)	Proportion of Net Irrigated Area to Holding Area	Proportion of Gross Irrigated Area to Holding Area
1.	Below 1.00	21.28	28.47
2.	1.00 - 2.00	25.86	34.61
3.	2.00 - 4.00	24.54	31.61
4.	4.00 - 10.00	25.92	35.46
5.	10.00 & above	24.94	39.94
6.	All size	24.14	32.08

Source : Input Survey 1981-82 (GOWB : Board of Revenue and Directorate of Agriculture).

Table 13 : Proportion of Irrigated Holdings to Total Holdings in West Bengal (1985-86)

Sl. No.	Size Class (ha)	% of wholly Irrigated Holding Area to Total Area	% of Partly Irrigated Holding Area to Total Area	% of Net Irrigated Holding Area to Total Area
1.	Below 0.5	24.34	8.35	32.68
2.	0.5 - 1.0	20.42	12.44	32.86
	MARGINAL	22.06	10.72	32.78
3.	1.0 - 2.0	20.26	14.88	35.14
	SMALL	20.26	14.88	35.14
4.	2.0 - 3.0	20.45	14.96	35.40
5.	3.0 - 4.0	21.01	14.81	35.81
	SEMI-MEDIUM	20.60	14.92	35.51
6.	4.0 - 5.0	23.68	14.58	38.26
7.	5.0 - 7.5	18.64	17.22	35.86
8.	7.5 - 10	35.19	9.90	45.09
	MEDIUM	22.50	15.28	37.79
9.	10.0 - 20.0	44.93	10.82	55.75
10.	20.0 - 30.0	80.82	-	80.82
11.	30.0 - 40.0	76.67	-	76.67
12.	40.0 - 50.0	83.53	-	83.53
13.	50.0 & Above	1.34	-	1.34
	LARGE	4.06	0.65	4.71
14.	ALL SIZES	20.54	13.08	33.62

Source : Agricultural Census, 1985-86 (GOWB, BR & DA).

Table 14 : Distribution of Irrigated Areas and Fertilizer Consumption according to size-class (1981-82)

Sl. No.	Size Class (ha)	Irrigated area under all crops per holding	Irrigated area under Hyv per holding	% of Irrigated area under Hyv to total irrigated area
1.	Below 1.00	0.38	0.18	46.49
2.	1.00 - 2.00	1.20	0.55	45.74
3.	2.00 - 4.00	1.87	0.73	38.82
4.	4.00 - 10.00	3.90	1.67	42.90
5.	10.00 & Above	9.19	5.32	57.93
6.	All Size	0.86	0.38	43.85

Table 14 co

Sl. No.	Size Class (ha)	% of holdings (No.) treated with Super Phosphate to total holding	% of total area treated with Super Phosphate to total irrigated area	% of area under Hyv treated with Super Phosphate to total irrigated area
1.	Below 1.00	3.61	1.44	1.28
2.	1.00 - 2.00	5.50	1.53	2.31
3.	2.00 - 4.00	5.59	1.11	1.49
4.	4.00 - 10.00	6.94	2.46	4.98
5.	10.00 & Above	1.55	1.06	-
6.	All Sizes	4.41	1.51	2.14

Table 14 con

Sl. No.	Size Class (ha)	% of Phosphate (MT) applied to the total irrigated area	% of Phosphate applied to the total holdings	% of area under Hyv treated with Super Phosphate to total irrigated area
1.	Below 1.00	0.60	2.29	52.74
2.	1.00 - 2.00	0.75	0.89	58.28
3.	2.00 - 4.00	0.45	0.84	58.61
4.	4.00 - 10.00	0.76	2.97	60.52
5.	10.00 & Above	0.38	3.53	57.06
6.	All Sizes	0.63	0.54	55.04

Table 14 contd..

Sl. No.	Size Class (ha)	% of Phosphate (MT) applied to the total irrigated area	% of Phosphate applied to the total holdings	% of area under Hyv treated with Super Phosphate to total irrigated area
1.	Below 1.00	43.90	21.80	5.90
2.	1.00 - 2.00	43.96	19.70	6.01
3.	2.00 - 4.00	41.89	18.52	5.98
4.	4.00 - 10.00	41.74	17.71	5.95
5.	10.00 & Above	57.96	44.15	6.98
6.	All Sizes	43.19	19.80	5.97

Table 14 contd..

Sl. No.	Size Class (ha)	% of Phosphate (MT) applied to the total irrigated area	% of Phosphate applied to the total holdings	% of area under Hyv treated with Super Phosphate to total irrigated area
1.	Below 1.00	2.25	29.73	33.15
2.	1.00 - 2.00	7.19	30.78	38.78
3.	2.00 - 4.00	11.21	29.05	39.19
4.	4.00 - 10.00	23.18	31.66	41.61
5.	10.00 & Above	64.12	12.51	25.42
6.	All Sizes	5.13	30.09	35.50

Sl. No.	Size Class (ha)	% of Phosphate (MT) applied to the total irrigated area	% of Phosphate applied to the total holdings	% of area under Hyv treated with Super Phosphate to total irrigated area
1.	Below 1.00	20.62	13.39	5.10
2.	1.00 - 2.00	22.55	12.61	15.08
3.	2.00 - 4.00	18.12	12.37	23.19
4.	4.00 - 10.00	20.85	13.10	51.06
5.	10.00 & Above	9.19	7.30	67.09
6.	All Sizes	20.63	12.80	11.01

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