

CHAPTER - IX

YIELD AND PRODUCTION OF CROPS

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Yield and production of the crops grown in an agrarian sector highlights the trend of its agricultural development. Yield per unit area clearly indicates the capacity of the land to produce crop under the influence of some suitable environmental conditions and some other socio-economic factors. Yield rate of a particular crop is the function of productive soil, favourable climatic condition, availability of irrigated water, improved seeds and fertilizer and scientific knowledge of crop production. Quantity of production of a particular crop is again the function of area covered by that crop and its yield per unit area. Greater are the area and yield of a crop, the greater is its production. That crop cultivation in the district of Hooghly has achieved considerable development can be justified by the study of trend of production and yield of the crops grown. Yield of the principal crops in the district is higher than the states average as it reveals from the following table.

Table - 1

Yield in Kg/Hectare

1979-80

Crops	West Bengal	Hooghly
Aus	844	1539
Aman	1162	1434
Boro	2680	2956
Total rice	1200	1650
Jute	1348	2027
Wheat	1518	1500
Potato	18,400	23,350

The yield rate of the principal crops in the district is also high as compared to those of the other districts (Table 36 Appendix). In 1976-77 this district occupied the highest position in terms of yield rate of total rice (1610 Kg/hectare, Aus (1564 Kg/hectare), Jute (1967 Kg/hectare). It ranked third in yield rate of Aman paddy (1272 Kg/hectare) second in Boro Paddy (3250 kg/hectare), third in potato (17359 kg/hectare) and fifth in wheat (2043 kg/hectare).

Temporal Changes in Yield and Production

Production and yield of the chief crops in the district have experienced considerable increase over time. Such positive change in yield and production of crops was achieved by

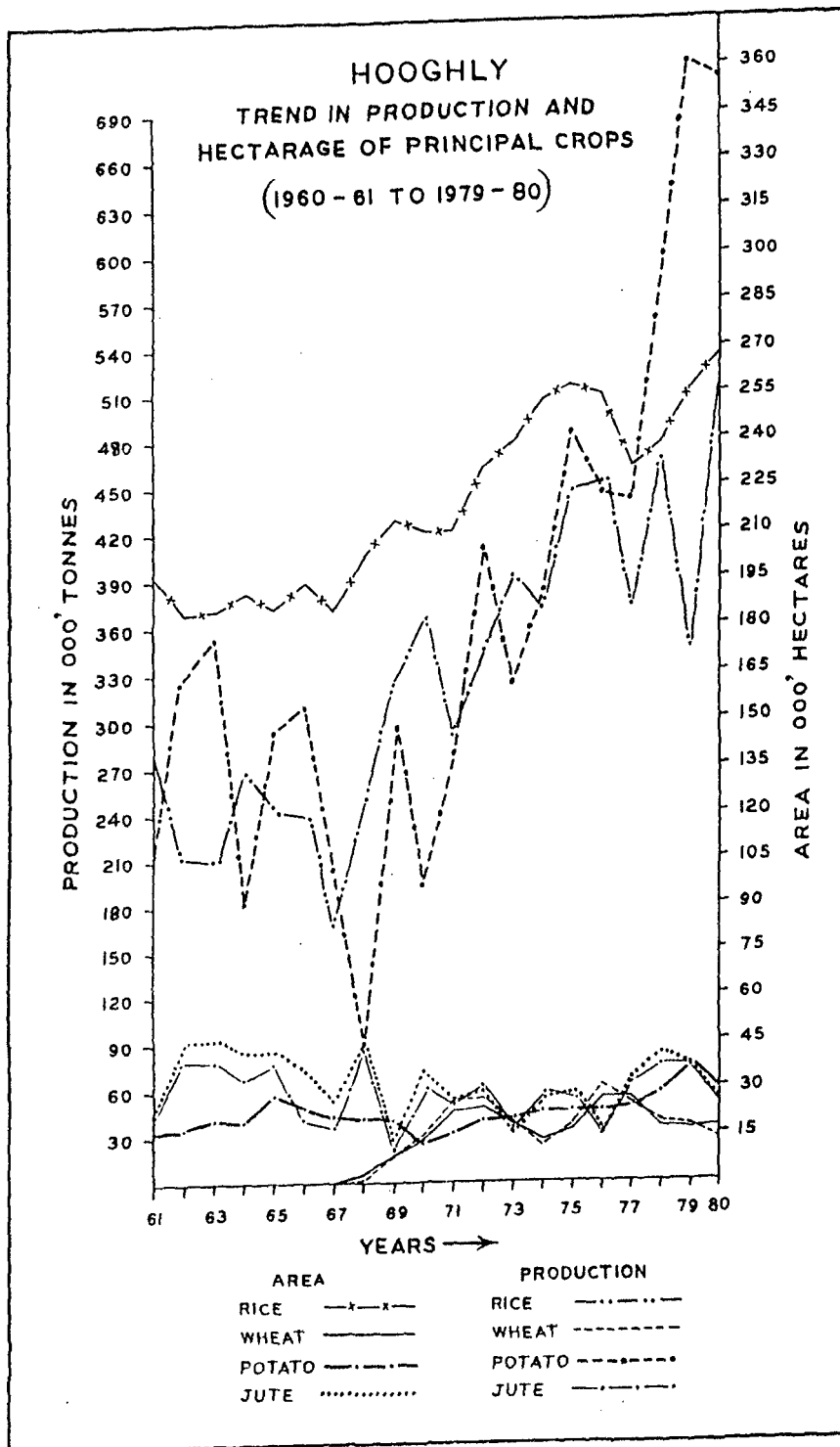


Fig. 60

means of increasing irrigation facilities to provide optimum and regular supply of water, increasing use of improved seeds and fertilizers and scientific methods of crop cultivation. In order to study the nature of yield and production of crops the yield and production figures of the respective crops have been taken into consideration for the period between 1960-61 and 1979-80. Keeping in view this objective five years moving average of yield of principal crops and trend values in respect of their production and yield have been computed. Careful analysis of all these statistical approaches has revealed the following conditions.

Rice : Production of rice has seen considerable increase since 1960-61 (Fig. 60). In 1960-61 production of rice amounted to 279.8 thousand tonnes, while it rose to 505.64 thousand tonnes in 1979-80. Such increase i.e. 80.7 per cent was the result of increase in area of rice from 196.9 thousand hectares to 266.4 thousand hectare. i.e. 35.2 per cent increase. Increased yield rate has also contributed to such increase in rice production. In 1979-80 the yield was 1650 kg/hectare against 1421 kg/hectare in 1960-61. Thus 16.11 per cent increase in yield was recorded. Increase in yield was achieved through the increasing use of seeds of high yielding varieties (H.Y.V.) in place of the local varieties, increase

HOOGHLY
TREND IN YIELD OF SOME CROPS
(1960-61 TO 1979-80)

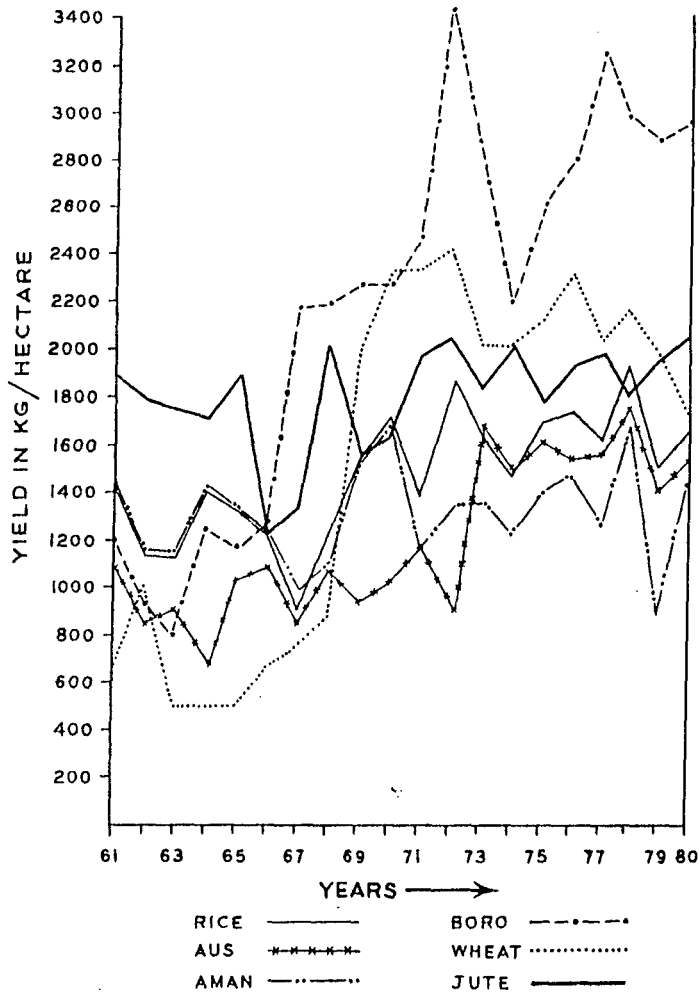


Fig. 61

in fertilizer inputs and the spread of cultivation of Boro paddy (Summer rice) utilizing irrigated water. Annual production and yield curve of rice (Figs. 60 & 61) reveals great fluctuations which seems to be closely associated with climatic hazards like drought and flood. But the curve showing the five years average of production and yield shows no such irregularities indicating that there is periodic cycle of five years in respect of production and yield of rice (Fig. 63). Trend values for production of rice ($Y_c = 188 + 13.53X$) reveals that production in 1985 is expected to be 516.25 thousand tonnes. Trend values for yield of rice ($Y_c = 1172.18 + 27.83X$) is expected to be risen to 1867.93 kg hectare. Thus trend values of both yield and production of rice show increasing trend (Figs. 64. & 65.).

Aus Paddy : Like rice as a whole aus paddy registered increasing trend in production and yield.

Unlike rice such increase in production was not the result of increase in acreage of aus but due to increase in its yield rate. Aus acreage remained almost the same during the period from 1960-61 to 1979-80, of course with much increase and decrease from time to time (Fig. 62 and Table 37 Appendix). But the production of this paddy increased from 13.3 thousand

HOOGHLY

TREND IN PRODUCTION AND HECTARAGE OF PADDY (1960-61 TO 1979-80)

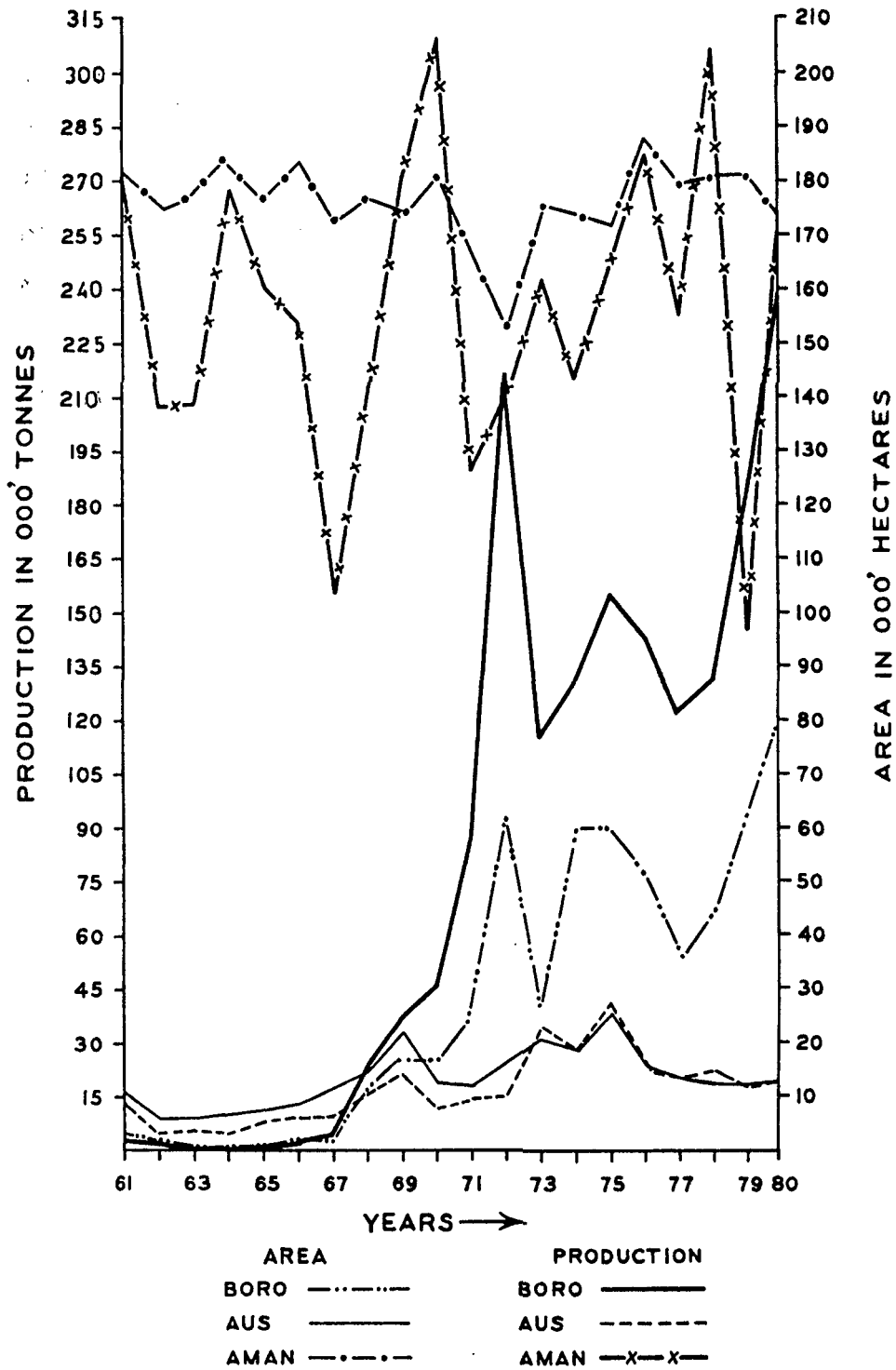


Fig. 62

thousand tonnes to 19.4 thousand tonnes i.e. 48.12 per cent. This was achieved by means of increasing preference of H.Y.V. aus type to the local one. As a result per hectare productivity of aus paddy increased from 1099 kg. to 1939 kg. i.e. 40 per cent. The trend value for production of aus ($Y_c = 5.3 + 1.1 X$) indicates that the production is expected to rise to 26.3 thousand tonnes in 1985. The increasing yield rate of aus paddy effected by increasing preference of H.Y.V. types will contribute to such increase in its production.

Aman Paddy : No significant change in production and yield of aman paddy has been noticed during the said period. In 1960-61 the production of aman paddy was 262.6 thousand tonnes, whereas in 1979-80. this was 249.4 thousand tonnes. The highest production recorded so far during the period was 303.4 thousand tonnes in 1969.70 and the lowest figure was that of 146.0 in 1978-79. Another such low production (155.2 thousand tonnes) was recorded in 1966-67. These two years were the years of drought affecting to a great extent the aman paddy depended on rainfall. In the year of excessive rainfall causing flood the aman production falls considerably as it happened in 1970-71 (190.1 thousand tonnes). The trend value for aman production ($Y_c = 226.3 + 0.4X$) shows a very slower rate of increase in production. Thus the production

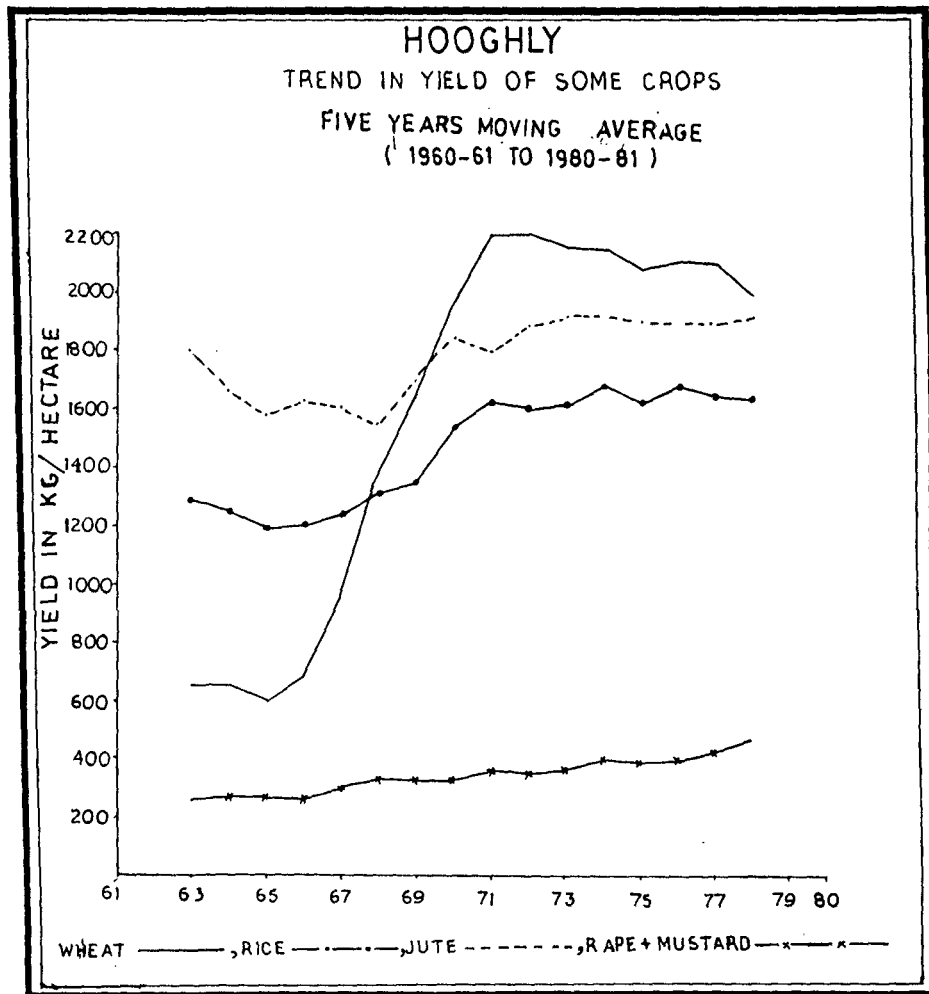


Fig. 63

of aman paddy is expected to rise to the extent of 236.3 thousand tonnes in 1985 against the trend value of 226.7 thousand tonnes in 1960-61 (Fig. 64). Such trend in aman production is due to almost static nature of aman yield per acre. In 1960-61 the yield was 1446 kg/hectare as compared to 1434 kg/hectare in 1979-80. The fluctuation in yield of aman (Table 37) is closely associated with the rainfall behaviour. Low aman yield as compared to ~~au*~~ and boro paddy is due to the fact that the stunted H.Y.V. type is not adjustable to the low lying paddy field in most of the cases. Only on some moderately high but low land the H.Y.V. type is preferred. The trend values for aman production reveals that the production of this paddy is expected to be 236.3 thousand tonnes in 1985. In spite of its low yield as compared to other varieties of paddy it leads in production among the three types of paddy. This is because it occupies the highest percentage to total cropped area.

Boro Paddy : In terms of production boro occupies the second position after aman. In 1979-80 the production of boro paddy was 236.8 thousand tonnes almost equal to that of the aman variety i.e. 249.4 thousand tonnes. It has experienced considerable increase in production during the period from 1960-61 to 1979-80. From a very insignificant

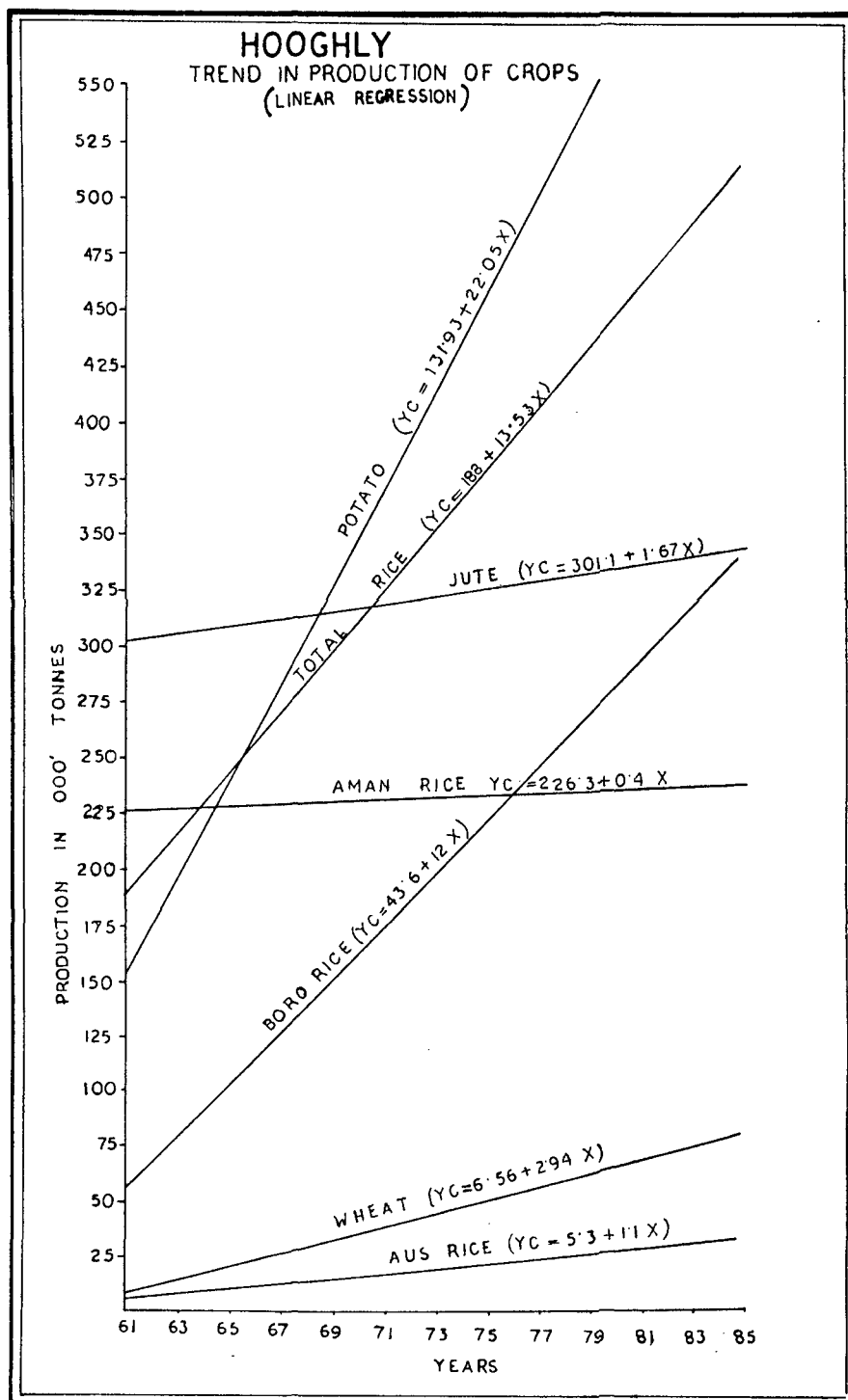


Fig. 64

production of this paddy (3.9 thousand tonnes) in 1960-61 it has risen to 236.8 thousand tonnes i.e. an increase of 5971 per cent. Up to the middle part of sixties the boro production was quite insignificant (ranging from 0.4 to 3.9 thousand tonnes) as compared to aman and even to aus paddy. But since 1967 there has been a spectacular rise in boro production. Such remarkable progress was achieved through extension of its acreage and the utilization of H.Y.V. type. During the period from 1960-61 to 1966-67 the area occupied by boro ranged from 0.5 to 3.2 thousand hectares. In 1967-68 boro acreage was increased to 11.8 thousand hectare and in 1979-80 it amounted 79.9 thousand hectare i.e. an increase of 579.96 per cent. Trend equation for production of boro paddy ($Y_c = 43.6 + 12 x$) indicates that its production is expected to rise to 346 thousand tonnes i.e. it will surely surpass the production of aman paddy and lead in the production of paddy.

Per hectare yield of boro paddy has also increased significantly. Before 1966-67 yield was remarkably low ranging from 800 kg to 1278 kg/hectare. Afterwards the yield has risen from 1278 kg in 1965-66 to 2956 kg/hectare in 1979-80. Even in some years it rose to more than 3200 kg/hectare. From the trend equation for boro yield ($Y_c = 477.3 + 153.4 x$) it appears

TREND IN YIELD OF SOME CROPS (1961 1984)

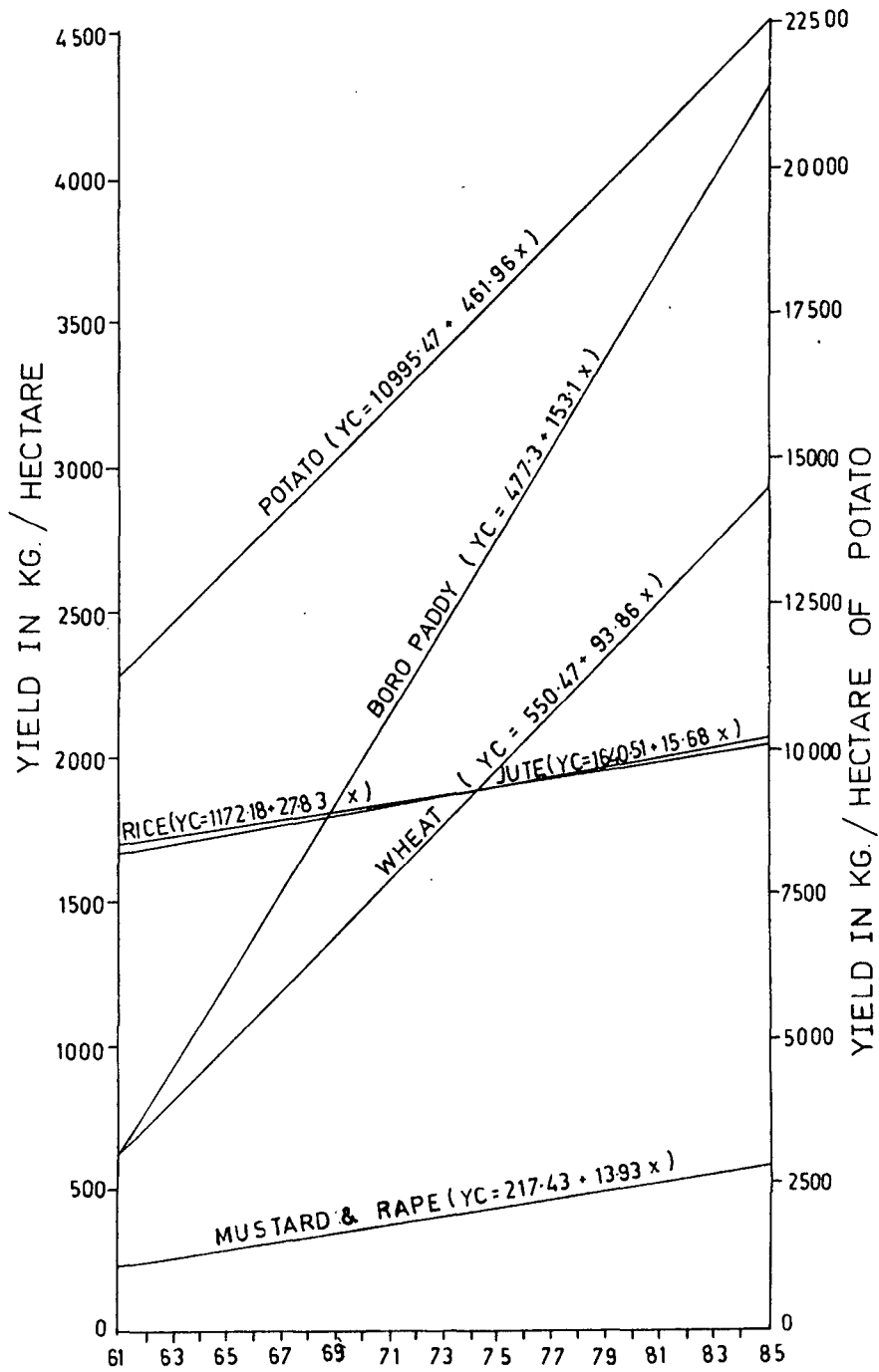


Fig. 65

that the yield is expected to rise to 4204.8 kg/hectare. The fluctuation in yield and production of this paddy is due to monsoon hazards in rainfall and some other atmospheric phenomena like Norwester and hail storm. In the year of drought because of fall in ground water level and reduction in volume of water in the canals, rivers and ponds etc. regular irrigation to such paddy is hampered considerably and as a result yield and production falls considerably. But in the year of normal rainfall and the non-occurrence of hail storm the yield and production of boro paddy rises considerably.

Wheat : Among the food grains wheat ranks second after rice in terms of production. Among the individual food grain crops its position was third after aman and boro paddy. Like rice it has also recorded an increasing trend in production and yield. In 1979-80 the production figure was 27.3 thousand tonnes against 0.2 thousand tonnes in 1960-61. Like boro paddy the production of wheat has increased considerably since 1967-68. Before that year the production was quite insignificant ranging from 0.2 to 0.6 thousand tonnes. Such spectacular achievement in wheat production was due to increase in wheat cropped area and its yield per hectare. Before 1967-68 wheat cropped area ranged from 0.2 to 0.8 thousand hectare. Since 1967-68 there has been steady rise in area occupied by

wheat rising to 18.2 thousand hectare from 0.8 thousand hectare in 1966-67. With the advent of Green Revolution the farmers took great interest in wheat cultivation during rabi season as with the application of improved wheat seed like Kalyan Sona, and Sonalika per acre wheat production increased considerably. Increasing trend of wheat production is also visible from trend equation ($Y_c = 6.56 + 2.94 X$). Fluctuation in wheat production is due to the variation in wheat cropped area which is closely associated with the availability of irrigated water. Yield of wheat has also increased considerably. Yield rose from 882 kg/hectare in 1967-68 to 1500 kg/hectare. In some years during that period the yield increased to 2403 kg/hectare (1971-72).

Jute : Jute production in the district varies considerably.

This fluctuation is closely associated with the nature of premonsoon rainfall which greatly influences the sowing of jute. Jute cultivation is curtailed very much in those years in which there is much delay to April rain. Great damages is also caused to the young jute plant in those years in which there is longer period without rain after the sowing of jute utilizing too early April rainfall. In some years young jute plants are submerged beneath the stagnant water caused by unusual rainfall. During the period of observation jute production ranged between 19.3 thousand and 93.9 thousand tonnes. During

During the period from 1960-61 to 1967-68 there was increasing trend in production of jute but since 1967-68 there has been a decreasing trend of it. This decrease may be attributed to reduction in area of jute as jute price has not risen adequately to cope with the increased cost of production. As a result jute cultivation is now being less profitable than the cultivation of other crops grown during the time of its cultivation. Trend equation for jute production ($Y_c = 301.10 + 1.67 X$) reveals that jute production in 1985 is expected to be 61.70 thousand tonnes which is less than the actual production of 72.5 thousand tonnes in 1978-79. Yield of jute during the said period did not show considerable increase or decrease. The highest yield to the tune of 2028 kg/hectares was recorded in 1979-80 against the lowest of 1221 kg/hectare in 1964-65. Yield rate is expected to rise to 2093 kg/hectare ($Y_c = 1172.18 + 27.83 X$) in 1985. This increase may be attributed to the increasing use of fertilizers and improved methods of cultivation.

Potato : Hooghly district is the leading producer of potato in West Bengal. Among the crops boro paddy comes close to potato in respect of increasing trend in production. The production has increased from 217.8 thousand tonnes in 1960-61 to 726.7 thousand tonnes in 1979-80, i.e. an increase of 233.33 per cent. Such spectacular achievement in the production of potato is attributed to the extension of

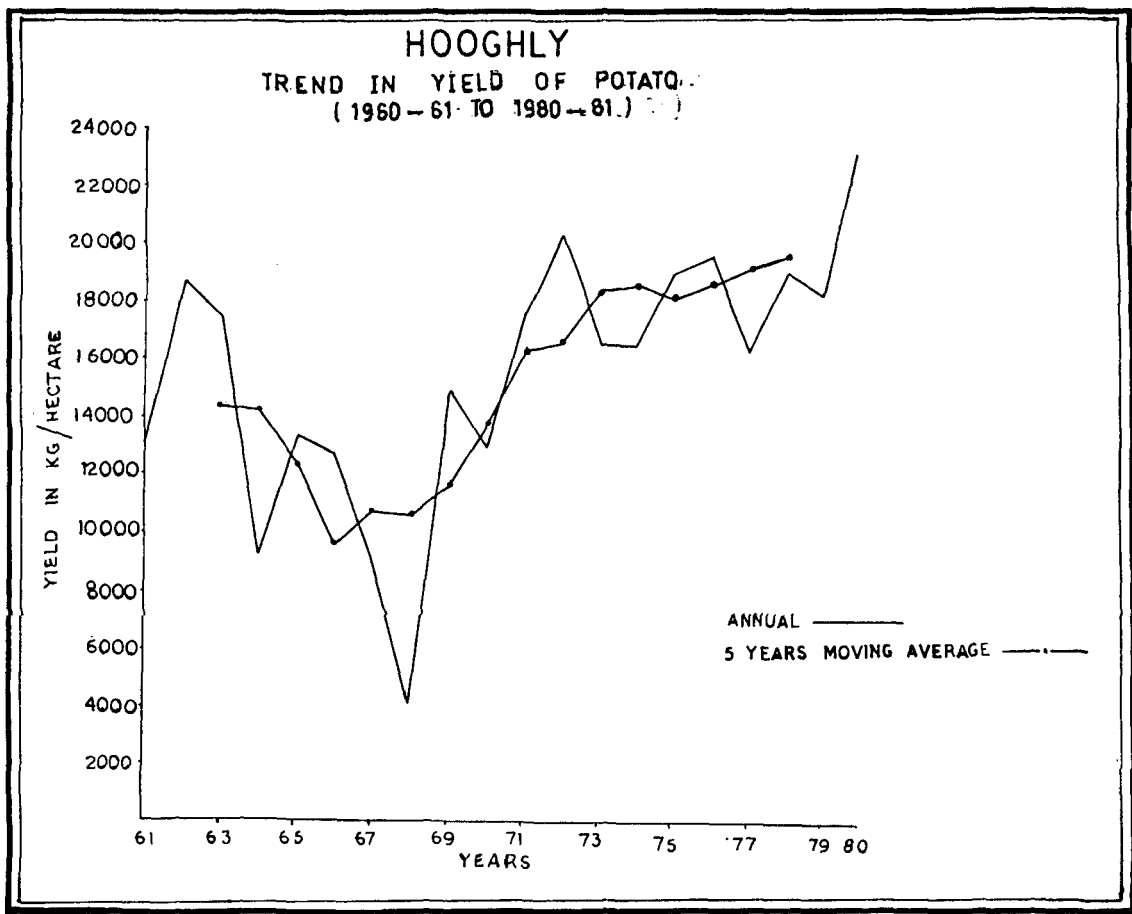
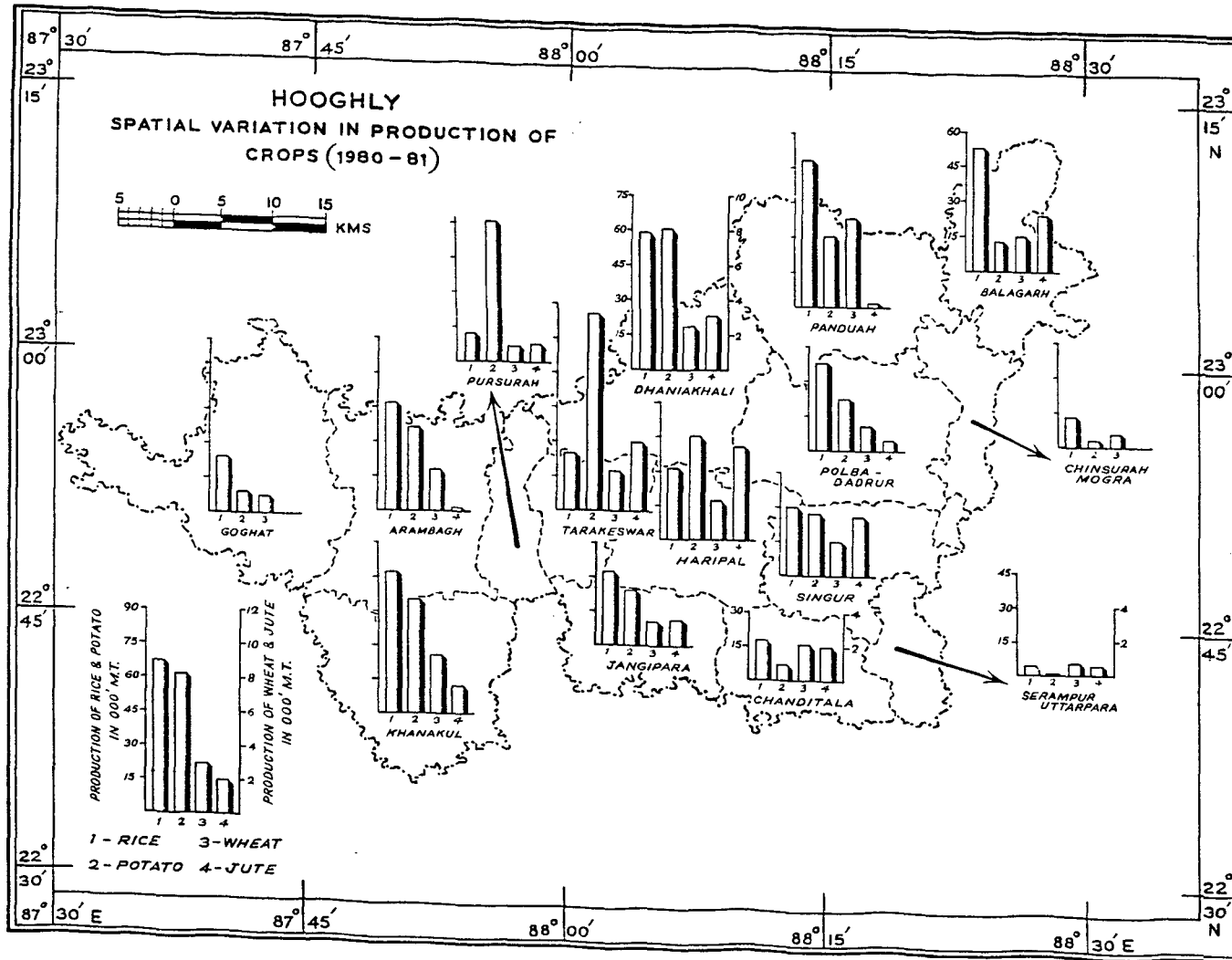


Fig. 66

area under the crop on the one hand and steady increase in yield/ hectare on the other (Fig. 66). The highest production (732.6 thousand tonnes) was recorded in 1978-79 and the highest yield (23350 kg/hectare) in 1979-80. Increase in yield of potato per hectare is attributed to the use of high yielding variety of potato seed which has enormously high productive capacity as compared to the old variety. Trend equation for yield of potato ($Y_c = 1095.47 + 461.96 X$) reveals that yield is expected to be 22544.45 kg/hectare in 1985. Fluctuation in yield of potato is associated with the climatic hazards like abnormal increase in winter temp. cloudy weather for days together and rainfall caused by western disturbances during its growing season. Some of fatal diseases of potato very easily attack potato during such adverse climatic conditions. Late winter rainfall also causes much damage to standing potato crop particularly at the harvesting time.

Spatial Variation in Yield and Production :

The district does not only exhibit temporal variation in yield and production but also variation in spatial aspect (Figs. 67 & 68). Since production and yield of crop is the function of so many physico-socio-economic factors the spatial variation in production and yield is quite consonance with the spatial variation of those factors.



Total Rice : In the production of rice Panduah leads among the blocks (Table 38 Appendix). In 1980-81 it contributed 63.78 thousand M.T. The next important blocks are Dhaniakhali (59.306 thousand M.T.) and Khanakul (62.658 M.T.). In Balagarh and Arambagh the production amounted to 52.79 and 46.942 thousand M.T. respectively. In urbanised blocks like Chinsurah-Mogra and Serampore-Uttarpara production was considerably low (12.471 and 4.766 thousand M.T. respectively). In the rest of the blocks excepting Purusrah production varied from 17.975 to 37.83 thousand M.T. Such variation in production is due to Variation in area occupied by rice and the yield per hectare. In terms of area Goghat block ranked first in 1980-81 but it contributed only 24.578 thousand M.T. to the total rice production of the district in that year. It is because that highly productive boro paddy occupied a very insignificant portion (0.627 thousand hectare) of total cropped area. But in Khanakul out of total rice cropped area of 18.767 thousand hectares boro paddy occupied 10.512 thousand hectares. In other leading blocks in rice production boro paddy occupied considerable portion of total rice cropped area; Balagarh (3.464 thousand hectares), Panduah (3.237 thousand hectares), Arambagh (3.541 thousand hectares). In Dhaniakhali greater production of rice is contributed by aman paddy covering 18.2111 thousand hectares

and aus paddy covering 1.254 thousand hectare. Yield of rice varied considerably ranging from 1102 kg/hectare to 3685 kg/hectare. Highest yield was recorded in Singur and the lowest in Goghat. Yield was above 3000 kg/hectare in Panduah (3031), Chinsurah-Mogra (3052), Tarakeswar (3047), Balagarh (3663) and Khanakul (3338). In the rest of the blocks the yield ranged from 1931 to 2981 kg/hectare.

Aus : In 1980-81 Goghat was the leading producer of aus (3.989 thousand M.T.). Balagarh, Dhaniakhali and Pursurah ranked, second (3.382 thousand (M.T.)), third (2.886 thousand M.T.) and fourth (2.398 thousand M.T.) respectively. Panduah occupied the fifth position (1.656 thousand M.T.). The ranking in production of aus was consonance with the aus cropped area viz. Goghat (1.636 thousand hectares), Balagarh (1.252 thousand hectares), Dhaniakhali (1.252 thousand hectares) and Pursurah (0.839 thousand hectares). Regarding yield of aus Hari-pal ranked first 3018 kg/hectare and Pursurah second 2858 kg/hectare). Next important block was Khanakul 2739 kg/hectare). In the rest of the blocks excepting Balagarh the yield ranged from 1460 kg/hectare to 2438 kg/hectare. Fertility variation of soil seems to be the cause of such spatial variation.

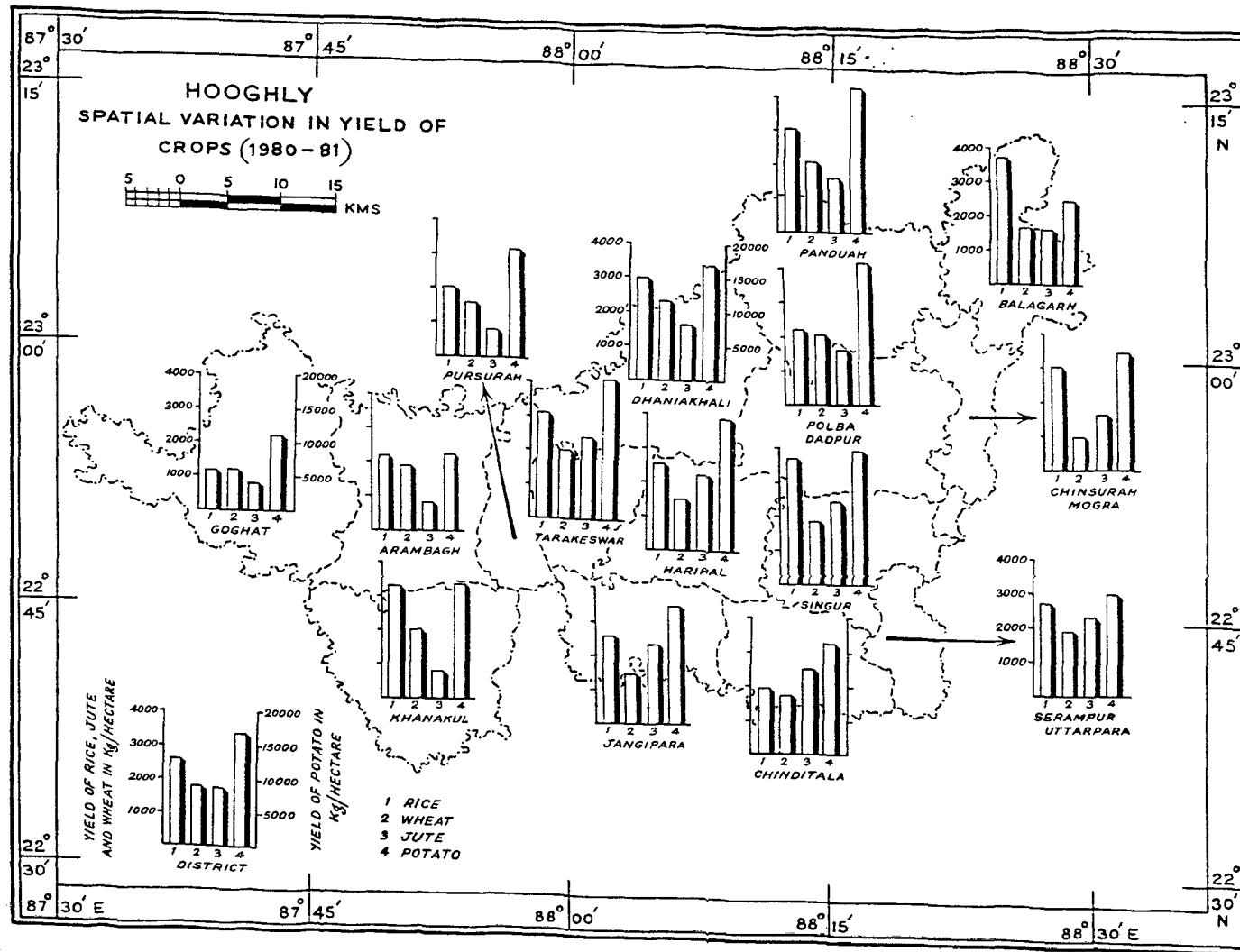


Fig. 68

Aman (Winter rice) : Dhaniakhali ranked first among the blocks in production of Aman paddy (55.425 thousand M.T.). Panduah is the second ranking block (51.166 thousand M.T.). In the rest of the blocks aman production ranged from 4.593 thousand M.T. to 32.138 thousand M.T. Variation in aman production seems to be the function of aman cropped area and yield per hectare. In terms of aman cropped area Goghat was the leading (20.032 thousand hectares) but its yield was the lowest i.e. 930 kg/hectare. The highest yield (3598 kg/hectare) was recorded in Singur. The yield is also higher (above 3000 kg/hectare) in Balagarh, Panduah, Dhania-khali and Tarakeswar. High fertility status of the soil contributes much to such higher fertility. Moderately high land suitable for H.Y.V. type is also responsible to some extent for such high yield. Yield is comparatively low in all those blocks namely, Polba-Dadpur, Chanditala, Pursurah, Arambagh Khanakul etc. where H.Y.V. type occupies insignificant area compared to local variety. Frequency of flood in the blocks like Pursurah, Arambagh and Khanakul is also responsible for such low yield.

Boro (Summer Rice) : Khanakul ranked first in boro production (50.245 thousand M.T.). Balagarh, Arambagh occupied second and third position respectively

accounting to 17.27 thousand M.T. and 15.465 thousand M.T. respectively. Next important block is Pandua contributing to 10.96 thousand M.T. In the remaining blocks the production varied from 0.171 thousand M.T. to 6.762 thousand M.T. In terms of boro cropped area Khanakul ranked first (10.512 thousand hectares). Next important blocks are Balagarh (3.646 thousand hectares), Arambagh (3.541 thousand hectares and Panduah (3.237 thousand hectares). Among these four blocks the first two shared their ranks respectively regarding yield per hectare viz. Khanakul (4779 kg/hectare) Balagarh (4736 kg/hectare). Singur and Chinsurah-Mogra ranked third (4686 kg/hectare) and fourth (4510 kg/hectare) respectively. In the remaining blocks excepting Serampore-Uttarpara the yield was above 3000 kg/hectare but below 4000 kg/hectare. The spatial variation in area and production seems to be closely associated with the availability of adequate irrigation facilities and the yield with the fertility status of soil.

Wheat : In production of wheat Panduah ranked first (5.91 thousand M.T.) and Khanakul second (4.445 thousand M.T.). These two blocks ranked first and second respectively regarding area under wheat. Production was minimum in Serampore-Uttarpara (0.7111 thousand M.T.). In other blocks the production ranged from 0.808 thousand M.T. to 1.566 thousand M.T.

Yield was highest in Dhaniakhali (2327 kg/hectare). Polba-Dadpur ranked second in respect of yield (2059 kg/hectare). The third and fourth ranking block were Panduah (2048 kg/hectare) and Tarakeswar (2035 kg/hectare) respectively. In the remaining blocks the yield ranged from 1138 kg/hectare to 1947 kg/hectare. Variation in yield may be due to variation in soil texture to some extent. As loamy soil is highly suitable for wheat cultivation the blocks having loamy texture are characterised by higher yield. Dhaniakhali having the sandy loam soil leads in yield per hectare (2327 kg/hectare). Fertility status of the soil is also to some extent responsible for such spatial variation in yield. The blocks having higher productivity of soil (Proportionate score value vide table 15B Appendix) possesses higher yield of wheat (Table 38 viz. Panduah, Polba-Dadpur, Dhaniakhali, Tarakeswar, Singur, Arambagh and Khanakul (Yield averaging from 1877 kg/hectare to 2327 kg/hectare and score values above 80).

Potato : Among the blocks Tarakeswar ranks first in production of potato contributing 85 thousand tonnes i.e. 18 per cent of total production (471.744 thousand tonnes). Next important blocks are Dhaniakhali (61.2 thousand tonnes), Pursurah (60.75 thousand tonnes), Khanakul (51 thousand tonnes), Haripal (45.03 thousand tonnes) and Arambagh (36.55 thousand

thousand tonnes). All these blocks also shared greater proportion of total potato cropped area. Tarakeswar being the leading producer also occupied the highest proportion of potato cropped area (3.642 thousand hectares). Dhaniakhali occupying the second position in potato production covered 3.642 thousand hectares of total potato cropped area in the district.

Regarding yield Panduah ranked first (21257 kg/hectare). The lowest yield (11,123 kg/hectare) was observed in Goghat.

The yield varied from above 15,000 kg/hectare to below 21,000 in those blocks which are the important producer of potato.

Variation in yield and production of potato seems to be greatly associated with the productivity of soil and its texture.

As varieties of loamy soil (viz. Sandy loam, Clay loam, Silt loam and silty clay loam) is very suitable for potato cultivation both production and yield are considerably higher in all those blocks having such soil texture compared to those having other soil textures.

Jute : Haripal was the leading producer of jute accounting to 5.5 thousand tonnes. This block also ranked first in respect of jute cropped area (2.493 thousand hectares). Next ranking blocks in respect of production were Tarakeswar (4 thousand tonnes), Singur (3.5 thousand tonnes), Balagarh (3.289

3.289 thousand tonnes) and Dhaniakhali (3.11 thousand tonnes). It is significant to note that production and area of jute are high in all those blocks which are also the leading in terms of production and area of potato. This is because jute and potato is found to be the most important crop association. Soil textures which are suitable for potato are also conducive for jute cultivation. Besides this potato is entirely a rabi crop and jute a Kharif crop. Therefore, there is no chance of clash between sowing of one and harvesting of the other. Yield per hectare was also quite variable ranging from 790 kg/ hectare to 2411 kg/hectare. Highest yield was recorded in Chanditala (2509 kg/hectare). Yield was also fairly high in Tarakeswar, Haripal, Jangipara, Serampore-Uttarpara. Yield and production of jute are also significant in all those blocks which are also noted for production of winter vegetables. Suna land) in all these urban fringed blocks is highly suitable for jute cultivation.

Remarks : Analysis of yield and production of the chief crops grown in the district reveals that agricultural situation has achieved a spectacular development. Yield and production of those crops excepting aman paddy have experienced considerable increase. The increasing trend is expected to continue in future keeping in conformity with the increasing use of organic and

inorganic fertilizers improved seeds, adoption of scientific methods of cultivation, and the extension of irrigation facilities.

Though the average yield of the chief crops is fairly high compared to that of India as a whole and West Bengal excepting wheat (Table 1) it is low compared to other countries of the world (Table 2).

Table 2. Yield of some crops in selected countries of the world.
in Kg/hectare

Crop	Countries
Wheat ..	India, 1937; Argentina, 1603; Canada, 1802; France, 3,888; Italy, 2714; Romania, 1857; Egypt, 2504; U.K. 4382; U.S.A. 2,060.
Rice ..	India, 1082; Bangladesh 1825; Burma 1827; China, 3235; Indonesia 2686; Japan, 6185; Pakistan 2271; Egypt, 5326; U.S.A. 5105 and U.S.S.R. 4000

Source : F.A.O. Production Year Book 1979.

Though average yield of rice in this district is considerably low as compared to other rice growing countries particularly China, Indonesia, Japan, Egypt, U.S.A. and U.S.S.R. the yield is somewhat higher than the average yield in some of

the blocks. The highest yield of rice (3686 kg/hectare) was recorded in Singur in 1980-81. But this figure is also low compared to that of Japan (6185 kg), Egypt (5326 kg). Yield per hectare of boro paddy is more encouraging in the district. The highest yield of boro paddy recorded in Khanakul block was 4779 kg.

Wheat yield is also somewhat higher in some of the blocks in the district. The highest yield of wheat was 2327 kg/hectare in Dhaniakhali in 1980-81. But this figure is considerably low compared to that of France, Italy and U.K.

In the light of the comparison of yield of rice and wheat between the district and other countries of the world it is apparent that yield may be increased further if efforts are directed to provide the farmers with improved seeds and fertilizers, irrigation facilities and other infrastructural facilities. In this respect the discovery of more high yielding variety of paddy adopted to the prevailing environmental condition is imperative. The high yielding variety of aman paddy capable to adjust with the rising water level has not yet been invented. To augment the production of rice in this district and in others of West Bengal such type of aman paddy is greatly needed.

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