CHAPTER - VII

A COMPARISON BETWEEN THE TWO SELECTED DISTRICTS ON DEGREE OF MECHANIZATION, USE OF DIFFERENT FARM INPUT AND CROPPING PATTERN

I. INTRODUCTION

Agriculture is the main occupation of Bardhaman and Dakshin Dinajpur districts of West Bengal. Although industrial sector is quite sound in Bardhaman where 42 per cent people depend on this sector, agriculture is providing 58 per cent occupation for rural people. Cultivation in the district has improved since 1953 with the implementation of the irrigation projects undertaken by the Damodar Valley Corporation. On the other hand, Dakshin Dinajpur is predominantly agricultural district. More than 80 per cent people of this district depend on the farm sector for their livelihood. It is a non- industrial district in West Bengal. Only there are some rice mills in some places of this district. It is noticeable that Bardhaman district is far better than Dakshin Dinajpur district in respect of agriculture. Total 9.06 per cent net sown area exists in Bardhaman whereas the percentage of net sown in Dakshin Dinajpur is only 3.67 per cent. Farmers of Bardhaman district are more educated and they are aware about present situation of agriculture. They are using different facilities such as subsidized fertilizers, machineries, pesticides, irrigation etc. provided by government. But farmers of Dakshin Dinajpur are not much educated and they are cultivating land with mostly old farming techniques. Scope of use of high yielding seeds, required fertilizers, improved machineries, better technique of irrigation is limited in this district.Farmers who are comparatively rich in this district are using different improved machineries, fertilizer, and other modern practices. In this chapter we shall discuss about differences of agricultural performance and agricultural operation between two selected districts of West Bengal.

II. USE OF DIFFERENT MACHINERIES OVER THE TIME PERIODS

It is worth noting that traditional agriculture was driven by the old wooden made machineries in India. After introducing Green Revolution in 1962 new modern farm machineries has been introduced in farm sector. Among different improved machineries tractor occupies a big position in farm sector. At the beginning of Green Revolution these tractors were imported from England in a large extent. Tractors are not only used for tilling purpose but also are used in different field of farm sector like for transfer of input and output from one place to another, for harrowing, threshing etc. efficiently. Similarly, other machineries like thresher, combine harvester, digger, power tiller, duster, sprayer, pump set, dryer, cleaner, seeder, weeder, etc. are used in the farm sector to get higher productivity and timely operation. Although all these machineries are used in farm sector but found only some of these machineries use in our field survey conducted in two districts of West Bengal say, Bardhaman and Dakshin Dinajpur. The reasons behind limited use of farm machineries are (a) small land holding, (b) lack of credit, (c) lack of education, (d) absence of proper information regarding benefits of machineries, (e) adverse impact of monsoon etc. In the present chapter we shall make a comparison of used farm machineries between two districts. We found some common machinery like tractor, rotavator, power tiller, thresher, harvester, sprayer, pump set, in use in two districts of West Bengal. Now we shall discuss on the intensity of use of the above machineries in the two districts one by one.

II.1. Machineries Used in Ploughing

Farmers are using bullock plough, tractor, power tiller and rotavator for tilling their lands. The farmers who use more mechanical power in farming are using tractor, rotavator and power tiller. Their argument to use of such machineries is that by the use of these machineries they can save time and money. Not only that according to them these machineries plough their lands very well and it results in higher productivity. On the other hand, use of rotavator is doing dual job viz. tilling and harrowing. But poor farmers having marginal and small land holding they argue in favour of the use of bullocks. According to them bullocks are useful in small plot of land where use of tractor and rotavator is impossible. Although there is scope of use of power tiller, the cost of use of such machinery is very high to them. They also said that bullocks can also be used for different

purpose like tilling, harrowing, transplanting, thresheing etc. The most crucial benefit of bullock use is that farmers get organic manure and also get fuel from the dung of bullocks. In the following table we have furnished figures regarding use of bullock, tractor, power tiller and rotavator in the two districts.

Table 7.1: Use of Plough in Different Time Periods

Machineries	Use of Plough							
	In the Current year		5 years ago		10 years ago		15 years ago	
	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Animal drawn plough	25(**20.83**)	64(53.33)	23(19.16)	74(61.66)	34(28.33)	86(71.66)	56(46.66)	110(91.66)
Power tiller	53(**44.16**)	58(48.33)	32(26.66)	41(34.16)	21(17.50)	15(12.50)	13(10.83)	5(4.16)
Tractor	40(33.33)	79(65.83)	56(46.66)	52(43.33)	65(54.16)	33(27.50)	80(66.66)	16(13.33)
Rotavator	105(87.5)	39(32.5)	56(46.66)	23(19.16)	25(20.83)	4(3.33)	0(0.00)	0(0.00)

Source: Field Survey

The above table indicates that farmers of two districts in West Bengal mainly depend on four modes of ploughing their land viz. animal drawn plough, power tiller, tractor and rotavator. It is revealed that 15 years ago farmers were using animal drawn plough to a large extent compared to other ploughing modes. It is also noticeable that dependency on animal drawn plough was very large in Dakshin Dinajpur compared to Bardhaman district. We can see that 91.66 per cent were depended on this ploughing system whereas this percentage was 46.66 in Bardhaman district. But if we look at the current rate of plough use we find that only 13.33 per cent farmers are dependent on animal plough in Bardhaman and 55.00 farmers are dependent on same machineries in Dakshin Dinajpur. So it is clear that use of animal plough has been decreasing but farmers of Dakshin Dinajpur still depend on this farming system to a large extent. Use of machineries for ploughing has been increasing gradually but in recent times rotavator is playing an important role in ploughing. Although cost of tilling by rotavator is quite high but farmers are using this machinery extensively.

Because rotavator harrows land itself and prepare lands for sowing. That is why percentage of use of this machine in Bardhaman is 86.66 and in Dakshin Dinajpur it is 28.33. Farmers of Dakshin Dinajpur still depend on tractor having 65.00 percentages use mainly due to lack of credit and lack of awareness. Overall, we can see that farmers more or less moves to use of improved farming machineries compared to old machineries.

II.2. Machineries Used for Harrowing Over the Periods

Before introduction of tractors, power tillers and rotavators farmers were using animal drawn harrow for leveling their lands. These animal drawn harrows were different in nature in many regions of the country. In some region farmers were using animal drawn blade harrow and in some other regions farmers were using discharrow. These harrows were driven by bullocks and horses. All these techniques were indigenous in nature. But after introducing different machineries farmers are not dependent on the animal drawn harrows. But still in some agricultural zone of our country where land holding is very small farmers are dependent on such old system of harrowing. In the following table we have shown about the use of different types harrows used in the two districts.

Table 7.2: Use of Harrows in Different Time Periods

Different types of machineries	Use of Harrows							
	In the current year		5 years ago		10 years ago		15 years ago	
	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Animal drawn harrow	16(13.33)	66(55.00)	23(19.16)	74(61.66)	34(28.33)	86(71.66)	56(46.66)	110(91.66)
Power tiller	14(11.66)	5(4.16)	7(5.83)	4(3.33)	7(5.83)	0(0.00)	10(8.33)	0(0.00)
Tractor	20(16.66)	12(10.00)	1512.50)	10(8.33)	13(10.83)	5(4.16)	10(8.33)	2(1.66)
Rotavator	104(86.66)	34(28.33)	92(76.66)	23(19.16)	25(20.83)	4(3.33)	0(0.00)	0(0.00)

Source: Field Survey

From the above table we can see that 13.33 per cent animal drawn harrows are used in Bardhaman whereas 55 per cent such harrows are used in Dianajpur in current year. If we see the figures of 15 years back we can see that 91.66 per cent farmers were dependent on animal drawn harrows and 46.66 per cent were used in Bardhaman district out of 120 farmers of each district. So over the period farmers are moving away to the use of mechanical harrows. On the other hand, opposite picture is visible if we look at the use of machine driven harrows over the periods. Use of power tiller, tractor and rotavator for harrowing purpose is increasing gradually over the periods. It is worth mentioning that in recent times rotavators are used to a large extent for harrowing purpose in both the districts. We can see that 86.66 per cent farmers in Bardhaman and 28.33 per cent farmers in Dinajpur are dependent on rotavator.

II.3. Threshers Used in two Districts

Farmers are using different types of machineries to threshing their produced crops mainly paddy, wheat, mustered, pulses etc. For paddy especially for Boro variety power thresher is being used extensively in Bardhaman district. But in Dakshin Dinajpur district we found manual thresher driven by manpower are used. Moreover, in some areas of Dakshin Dinajpur we found traditional threshing habit i.e. farmers are using wooden made blade for threshing their paddy especially for Amon variety. But in Bardhaman district we did not get such system of threshing. Although farmers had been threshing their crops by traditional process 15 years ago, but in recent times no one is using this process in Bardhaman. We can say that threshing system has been completely mechanized in Bardhaman district. But traditional system of threshing exists in some areas of Dakshin Dinajpur district till date. Huge change in threshing process has emerged in both the district in the case of wheat. Combine harvester has brought revolution in wheat cultivation in Dakshin Dinajpur district. Farmers of this district have chosen wheat cultivation as alternative to Boro cultivation. According to surveyed farmers of Dakshin Dinajpur district Boro cultivation is much costlier compared to wheat cultivation. In the following Table we have provided data on the use of thresher for paddy cultivation of both the district.

Table 7.3: Use of Threshers in Different Time Periods

	Use of Thresher (in the case of Boro Paddy)							
	In the current year		5 years ago		10 years ago		15 years ago	
Machineries	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Bullock Thresher	0(0.00)	27(22.50)	0(0.00)	40(33.33)	11(9.16)	42(35.00)	29(24.16)	62(51.66)
Power Thresher	120(100.00)	93(77.50)	120(100.00)	80(66.66)	109(90.83)	78(65.00)	91(75.83)	58(48.33)

Source: Field Survey

The above table shows the figures related to use of thresher in the case of paddy crops of both the districts. We can see that farmers are using mechanized technique in threshing gradually. We have taken data of threshing up to 15 years back. Farmers are using mainly two types of threshing techniques namely, bullock operated and power thresher. It is revealed that ago 15 years 51.66 per cent farmers out of 120 sample of Dakshin Dinajpur district were using bullock thresher where this percentage is only 24.16 in Bardhaman. But only 22.50 per cent farmers of Dakshin Dinaupur district are using bullock driven thresher where this percentage is zero in Bardhaman district. 100 per cent power thresher is being used in Bardhaman and 77.50 per cent in Dakshin Dinajpur in current years. But this rate was 75.83 per cent in Bardhaman and 48.33 in Dinajpur.

II.4. Machineries Used in Bund Making Purpose

Some farm activities are done completely by manual way till now. The current process of these works is same as before 20 years back in West Bengal. Among these works bund making is done in traditional way. Although some states like Punjab, Haryana, Uttar Pradesh, Rajasthan etc. are using machineries to do this job, West Bengal still depends on manual system. Farmers of West Bengal are using spade to make bund to divide the ownership of land. The reason behind this work is fragmented land holding. Machineries

related to bund making are not appropriate for fragmented land. That is way farmers of West Bengal completely depends on manual system of band making. In the following table we have given some information regarding use of bund maker used in two districts of West Bengal.

Table 7.4: Use of Bund Maker Machine if Different Time Periods

	Use of Bund maker							
	In the current year		5 years ago		10 years ago		15 years ago	
	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Manual spade	120(100.00)	120(100.00)	120(100.00)	120(100.00)	120(100.00)	120(100.00)	120(100.00)	120(100.00)
Mechanical	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)

Source: Field Survey

We have surveyed 120 households from each district in West Bengal to find out the use of bund maker machineries. We took information of current farming system and also have taken information of farming status of 15 years back. But we found farming system in respect of bund making is same over the mentioned period. Farmers of both the districts are using manual spade to make bunds on their arable land.

II.5. Harvester Used in two Selected Districts

Harvesters are used in many field of farm operation in India. This machinery is extensively used in paddy harvesting, wheat harvesting, potato harvesting, pulses harvesting and in garm harvesting in different states of India. We have already discussed that a sea change has taken place in of wheat crop in West Bengal. After surveying 120 households from each district we found that wheat crop is grown only in Dakshin Dinajpur. According to farmers surveyed in both the districts wheat cultivation and Boro cultivation is done simultaneously. Since farmers of Bardhaman prefer to cultivate paddy because of favorable atmosphere of cultivation they are not interested in wheat cultivation. Now we are discussing about the harvesting system in case of paddy cultivation in both the districts. We found that combine

Table 7.5: Use of Harvester in Different Periods

	Use of Harvester							
	In the current year		5 years ago		10 years ago		15 years ago	
	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Manual cutting by sickle	114(95.00)	111(92.50)	120(100.00)	120(100.00)	120(100.00)	120(100.00)	120(100.00)	120(100.00)
Tractor drawn reaper harvester	15(12.50)	9(7.50)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
Both	6(5.00)	9(7.50)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)

Source: Field Survey

harvester has been introduced very recently in both the districts. But farmers are not interested to use this machine to harvest their paddy. We found only 12.50 per cent farmers of Bardhaman and 7.50 per cent farmers of Dakshin Dinajpur out of 120 surveyed samples are using harvester for harvesting paddy. According to the farmers surveyed in both the districtsuse of combine harvester is not much suitable. The reasons behind that are:

a) Land fragmentation

b) Wet land of some areas is not appropriate to use this machinery.

c) Combine harvester damage the straw of paddy whose market value is high.

d) This machine is not available in all locations of farming etc.

We can see that use of this machine is used in Bardhaman district by only 12.50 per cent farmers whereas in Dakshin Dinajpur it is only 7.50 per cent in current year. So farmers are dependent on manual labour to harvest their paddy. Surveyed farmers told that in the peak season of harvesting group of migrated labourer come from different places and they take their payment in kind.

II.6. Availability of Sprayers in Both the Districts

It is worth mentioning that full mechanization has taken place in the case of spraying. All categories of farmers in both the districts use sprayer to spray pesticide as required. It was a time when farmers used broom to spray pesticide on their crop. But now a days different types of improved sprayer has been innovated to spray medicine and pesticide to protect crops from the attacked of insect. It has been found that farmers who are not able to purchase a sprayer they use the sprayer provide by the fertilizer and pesticide shop. It is one strategy of fertilizer shop keepers by which they can sell out their fertilizer. We also found that in some areas small farmers collectively brought a sprayer and use it as required.

Table 7.6: Use of Sprayer in Different Time Periods

	Use of Sprayer							
	In the current year		5 years ago		10 years ago		15 years ago	
	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Manual knapsack machine	98(81.66)	115(95.83)	109(90.83)	120(100.00)	120(100.00)	120(100.00)	120(100.00)	120(100.00)
Sprayer and duster	22(18.22)	5(4.16)	11(9.16)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)

Source: Field Survey

In our field survey we have found that farmers are using two types of sprayers namely, manual knapsack machine and Sprayer cum duster. Sprayer cum duster has been newly introduced in West Bengal. If we see the record of our field survey we can see this sprayer is only used in Bardhaman and not a single farmer of Dakshin Dinajpur has used this machine to spray. But in current year we found that 18.22 per cent farmer of Bardhaman and 4.16 per cent farmers of Dinajpur are using this sprayer cum duster machine.

II.7. Machineries Used in Irrigation

Irrigation is one of the most important inputs of farming. Although a large part of Indian farming is dependent on monsoon to irrigate the land, artificial irrigation is necessary to get higher productivity. Modern agriculture where farmers are using high yielding seeds, pesticides, fertilizers to get higher productivity also require timely irrigation. Ancient system of farming was characterized by the use of different manual processes of irrigation. At that time farmers were using bucket made by tin to irrigate their land. Also they were using other traditional irrigation system. Cannel irrigation was a useful system of irrigation at that time. But in recent era different irrigation processes are used of which few are provided by government. Government subsidizes irrigation system because government considers that without proper irrigation productivity would not be high. In our field survey we have found that farmers are using different type of equipments to irrigate their crops. Among all these system Shallow -Tube well, Tank irrigation, River Link Irrigation, Government provided Deep-Tube Well irrigation and small pump set irrigation are very important. It is worth mentioning that now a day, not a single farmer is using traditional farming process. If farmers want to irrigate a small piece of land where they cultivate vegetables, they use small pump set. Sometimes farmers are using this small equipment on custom hiring basis. So we can say that irrigation system has been completely mechanized. In the following table we have categoried irrigation system into two parts- one is manual or traditional irrigation and another one is mechanized irrigation. All irrigation made by machinery has been included in mechanized irrigation category.

Table 7.7: Use of Different Machineries for Irrigation in Different Periods

	Use of Irrigation							
	In the current year		5 years ago		10 years ago		15 years ago	
	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Manual	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	13(10.83)	0(0.00)	30(25.00)
IC engine driven pump	120(100.00)	120(100.00)	120(100.00)	120(100.00)	120(100.00)	10789.16)	120(100.00)	90(75.00)

Source: Field Survey

According to collected data it is clear that recently irrigation system has been completely mechanized. If we look at the data of 15 years back we can see that 25 per cent farmers of Dinajpur district had been using traditional irrigation process whereas 100 per cent mechanized irrigation were practiced found in Bardhaman in same period. Before 10 years ago 10.80 per cent farmers were using traditional irrigation system and not such irrigation process were prevalent in Bardhaman. But from 5 years back to till date all irrigation processes in both the districts have been completely mechanized. So it clear that complete mechanized irrigation has been introduced very recently in Dinajpur district.

III. FARM MECHANIZATION AND EMPLOYMENT

There is a big controversy regarding of farm mechanization and employment. One group of economist opines that farm mechanization reduces the opportunity of farm employment. On the other hand,other group of economists say that farm mechanization enlarges the opportunity of employment. Babu conducted a study in 1971 in West Godavari district of Andhra Pradesh and reported that "tractor use induced changes in cropping pattern which promoted the demand for human labour" (Babu, 1971). Uses of modern efficient machineries generate chance of multi cropping and timeliness of operation in farm sector. So the requirement of labour increases to do more work. Another study was conducted by IEG, Delhi and reported that "the technological displacement of labour associated with tractor use was compensated by the employment of labour owing to increased yield as a result of tractor use among farms characterized by partial tractorization. The net employment effect of tractor use turned out to be positive when its complementarity with other techniques was taken into account" (IEG,1975). Demand for labour requirement has been classified by the implementation of farm machineries. Some machineries required efficient and trained labourer to carry on the farm work successfully. Balishter, Gupta and Singh (1991) and reported that "with mechanization, the demand for hired labour increased while participation of family labour in crop production declined. Thus, mechanization reduced the use of family labour while it increased the use of hired labour". But the overall problem of recent agriculture in India is farm labour shortage. The question of impact of mechanization on labour employment in agriculture is meaningless where labour shortage exists. Now a day, we can see involvement of women farm labourer has been increasing due to lack of men labourer. Male labourers are going to do non-farm jobs in nearby town or neighboring states.

The shortage of labour is generated due to wage differential between farm and non-farm jobs. In our study we have found some common reasons of labour shortage. These are:

- Wage differentiation across the available work. Poor people prefer to work non-farm jobs where they are getting higher wage compared to farm work.
- Daily wage labourer thinks that non-farm jobs are more prestigious than farm job.

- They also realized that in farm work they have to do different types of works in a day like ploughing, digging, weeding, sowing, etc. whereas in non-farm jobs they have to do only doing single work like only construction, shop helper etc.
- In farm job uncertainty is present which is one of the most important reasons of not preferring farm jobs by labourer.
- Daily workers think that in non-farm jobs working per day hour is fixed say , 8 hour whereas in farm sector sometimes they have to do more than 8 hours work.
- Another important reason of labour shortage is huge migration of young people outside the state.

We know that complete mechanization of agriculture has not occurred in West Bengal. Few farming work like irrigation, tilling, threshing etc. has been modernized in this state. All these works are performed by the male farmers. So it is clear that mechanization has replaced the work of male workers. As we know male workers are migrating from the farm sector to non-farm sector mechanization has covered the lack of this labour supply. But the farm activities which are labour intensive like sowing, harvesting, weeding etc. are extensively done by the female farm labourers. Now a days farming heavily depends on female laboueres due to shortage of male farmers. Females of poor families in rural areas are going to work in farm sector. In the peak season of sowing and harvesting they make a group and take contract for farm works. Since male labour shortages are present in farm sector there in no longer any wage differential between male and female labourer. We can see the wage differential across the region according to availability of labourer. So in our study we have found wage differential across the blocks in both the districts but not across the genders

Table 7.8: Wage Differential between Current and Previous Periods in Bardhaman (wage rate per day in rupees)

Bardhaman /blocks	Current Year				Previous Year			
	Male		Female		Male		Female	
	peak season	lean season	peak season	lean season	peak season	lean season	peak season	lean season
Memari II	Rs.180	Rs.130	Rs.180	Rs.130	Rs.160	Rs.130	Rs.160	Rs.130
Katwa-II	Rs.160	Rs.130	Rs.160	Rs.130	Rs.150	Rs.130	Rs.150	Rs.130
Aushgram II	Rs.150	Rs.130	Rs.150	Rs.130	Rs.150	Rs.130	Rs.150	Rs.130

Source: Field Survey

We can see that labour wage vary in peak season and in lean season of sowing and harvesting. According to the statement of surveyed farmers farm wage has been increasing rapidly. We have collected wage rate of current year and previous year and have seen wage differentiation. The collected data shows that wage of current year and previous year in Memari II block of Bardhaman is Rs.180 and Rs. 160. In Katwa II the wage rate Rs.160 in current year and Rs.150 in previous year. Similarly wage rate of current year in Aushgram II block is Rs. 150 and in previous year Rs. 150.

Table 7.9: Wage Differential between Current and Previous Periods in Dakshin Dinajpur (wage rate per day in rupees)

Dakshin Dinajpur/blocks	Curernt Year				Previous Year			
	Male		Female		Male		Female	
	peak season	lean season	peak season	lean season	peak season	lean season	peak season	lean season
Balurghat	Rs.160	Rs.110	Rs.150	Rs.110	Rs.150	Rs.100	Rs.140	Rs.100
Banshihari	Rs.140	Rs.100	Rs.140	Rs.100	Rs.130	Rs.100	Rs.130	Rs.100
Kushmandi	Rs.150	Rs.100	Rs.150	Rs.100	Rs.140	Rs.100	Rs.140	Rs.100

Source: Field Survey

The collected data of Dakshin Dinajpur district shows that male wage of peak season in current year in Balurghat block is Rs.160 and female wage is Rs.150. But in lean season male and female wage is same having Rs.110. But in previous year male and female wage rate of peak season is Rs.150 and Rs. 140. But for lean season is wage rate of male and female is same which is Rs. 100. But wage differential between male and female did not arise in other two blocks. We have found that wage rate of peak season of current year in Banshihari blocks is rs.140 and for lean season it is Rs.100. But in previous year the wage rate of male and female labourer for peak season is Rs.130 for lean season it is Rs. 100. In Kushmandi we have found that wage of male and female labourer of current year for peak season is Rs.150 where the wage rate of lean season is Rs. 100. Similarly the wage rate of previous year in peak season for male and female labourer is Rs.140 and for lean season the wage rate is Rs.100. So it has found that across the gender wage rate is more or less same in both the district but wage rate is much different in peak season from lean season for both male and female.

IV. USE OF FARM INPUTS AND PRODUCTIVITY

Agricultural productivity in terms of food grains yield depends on the investment in farm sector. The poor resource base farming system of West Bengal is suffering from higher productivity since they are not able to invest more in farm sector. Farmers are not able to use sufficient fertilizer as they required. Most of the farmers are doing cultivation by using traditional wooden made equipments till date. Irrigation structure is very poor due to lack of agricultural credit. Overall productivity of some crops has shown in the following table.

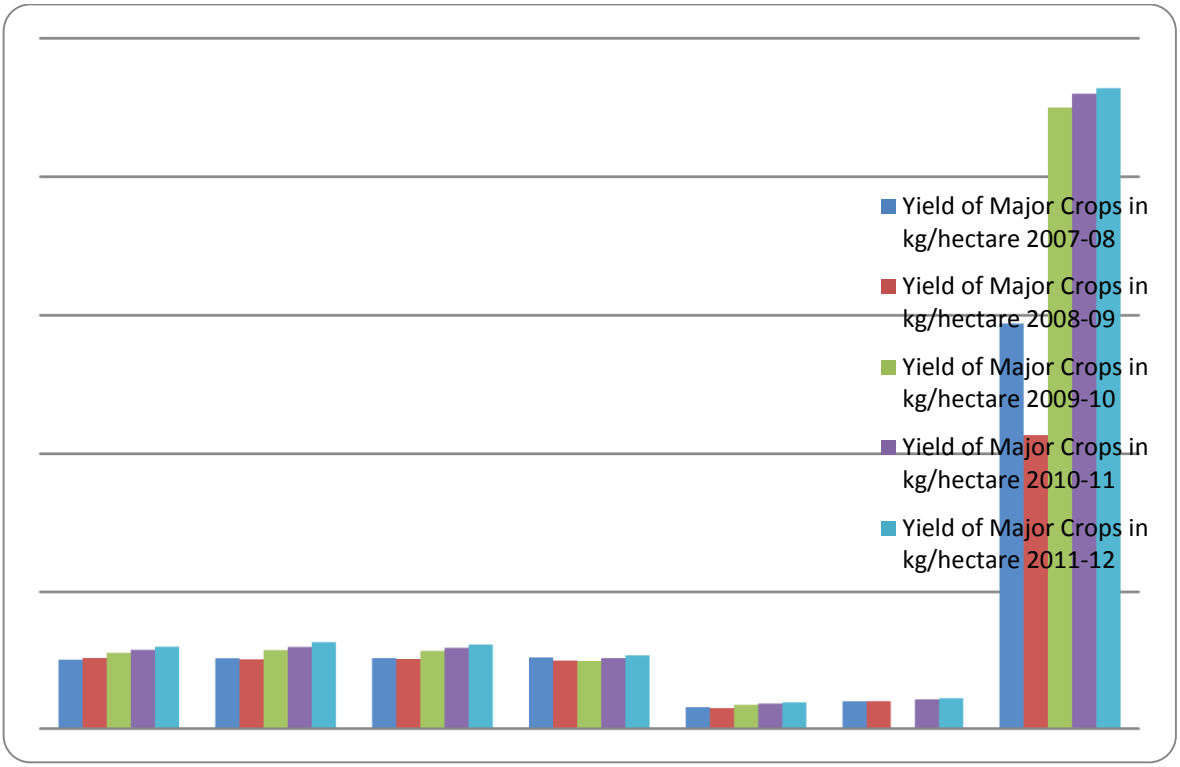
Table 7.10: Yield of Major Crops in kg/hectare in Different Time Periods

Crops	Yield of Major Crops in kg/hectare				
	2007-08	2008-09	2009-10	2010-11	2011-12
Food grain	2521	2581	2770	2881	2996
Rice	2573	2533	2872	2986	3160
Cereals	2578	2545	2843	2957	3075
Wheat	2602	2490	2476	2575	2678
Pulses	786	750	872	915	961
Oilseed	998	1005	1028	1069	1112
Potato	14704	10677	22500	23000	23200

Source: Dept. of Agriculture, Govt. of West Bengal, 2011-2012

In the above table we have shown the productivity of some crops produced in West Bengal. We have collected data of the period from 2007 to 2012 and observed that more or less productivity of all crops has increased. The main crops produced in West Bengal are rice, wheat, jute, pulses, cereals, oilseed, potato etc. Productivity of any crop depends on proper supply of important ingredients like fertilizer, pesticide, high yielding seeds, proper irrigation etc. The trend of productivity of different crops produced in West Bengal has also been shown in the following diagram.

Figure: 7.1Yield of Major Crops in kg/hectare in Different Time Periods



IV.1. Types of Fertilizer Used

Modern agriculture needs the application of different type of fertilizers, pesticides and high-yielding seed varieties. It is well known that in some states like Punjab, Haryana, Uttar Pradesh etc. productivity of lands is decreasing due to excess use of such farm ingredients. We know that all factors have maximum productivity and if we use excess of any of such factors is used productivity will decrease which is known as diminishing marginal return of factors. So the farmers who are able to use excess of factors the productivity of these farmers will diminish which have happened in the above mentioned states. So there is no scope to unlimited increase in agricultural productivity. But all farmers of West Bengal are not so rich to use all needed improved farm ingredients as required. So in West Bengal there is much scope to increase the level of agricultural production. It is worth mentioning that farmers of this state not only unable to provide required level of farm inputs but also they

are using organic fertilizer and home stored seeds for cultivation. So the probability of getting higher productivity to the farmers of this state.

Table 7.11: Types of Fertilizer used by Farmers in the two District of West Bengal

	Types of fertilizer used by Farmers in the two district							
	Only Chemical		Only Organic		Both		Total	
Crops/used fertiliser	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Amon	99(82.50)	56(46.66)	0(0.00)	0(0.00)	21(17.50)	64(53.33)	120	120
Boro	88(83.01)	21(48.83)	0(0.00)	0(0.00)	18(16.98)	22(51.16)	106	43
Potato	61(72.61)	23(47.91)	0(0.00)	0(0.00)	23(27.38)	25(52.08)	84	48
Jute	0(0.00)	25(44.64)	0(0.00)	0(0.00)	0(0.00)	31(55.35)	0	56
Wheat	3(100.00)	17(56.66)	0(0.00)	0(0.00)	0(0.00)	13(43.33)	3	30
Mustard	37(86.04)	13(56.52)	0(0.00)	0(0.00)	6(13.95)	10(43.47)	43	23
Chilly	5(100.00)	3(11.53)	0(0.00)	0(0.00)	0(0.00)	23(88.46)	5	26

Source: Field Survey

In the above Table we have shown use of fertilizers on some crops produced in two selected districts in West Bengal. The crops which are produced in both the districts are Amon, Boro, Potato, Jute, Wheat, Mustered, Chilly etc. We have classified use of fertilizers into three categories as use only chemical, use only organic and use of both fertilizers. It has found that all farmers of our sample are cultivating Amon and it has observed that 82.50 per cent farmers are using only chemical fertilizer and only 17.50 farmers are dependent on both fertilizers in Bardhaman district. But the picture of fertilizer use is quite different in Dakshin Dinajpur district. Here 46.66 per cent farmers are dependent on only chemical fertilizer and 53.33 per cent farmers still dependent on both fertilizers. As far as Boro cultivation is concern 83.01 per cent use only chemical fertilizer and 16.98 per cent are using both fertilizers in Bardhaman district. In Dakshin Dinajpur district we found that only 43 households out of 120 are cultivating Boro among which 48.83 per cent farmers are

using only chemical fertilizer and 51.16 farmers are using both fertilizers. Similarly use of only chemical fertilizer to cultivate Potato in both the district is 72.68 per cent and 47.91 per cent out of 84 and 48 farmers. But 27.38 per cent and 52.08 per cent farmers are using both the fertilizers on Potato cultivation. In our field investigation we did not find a single household is cultivating Jute in Bardhaman district whereas total 56 farmers are cultivating Jute in Dinajpur out of 120 household. Among 56 Jute cultivators in Dinajpur 44.64 farmers are using only chemical fertilizer and 55.35 per cent farmers are using both the fertilizers. In wheat cultivation farmers of Bardhaman using only chemical fertilizers where in Dinajpur 56.66 per cent farmers are using only chemical fertilizer and 43.13 per cent farmers are using both fertilizers out of total 30 household found in Wheat cultivation. For mustered cultivation 86.04 per cent farmers using chemical and 13.95 per cent farmersuse both fertilizersout of total 43 farmers in Bardhaman. But in Dinajpur district user of only chemical fertilizer is 56.52 per cent and both fertilizres user is 43.47 per cent out of 23 farmers of Mustard cultivation. In Chilly cultivation 100 per cent chemical fertilizer user has found in Bardhaman out of total 5 farmers but in Dakshin Dinajpur district total Chilly cultivators is 26 out of which 11.53 per cent farmers are using only chemical fertilizer and 88.46 per cent farmers are using both chemical and organic fertilizer. So we found that not a single farmer is using only organic fertilizers.

IV.2. Types of Seed Used

Farmers are using two types of seed for their cultivation. One type of seed is available in cooperative societies which are preserved scientifically and another type of seed is stored domestically. In recent time high yielding seeds are available in agricultural cooperative societies where farmers purchase required seeds at reasonable price. Farmers are also getting other necessary farm inputs in such place. So farmers are agreeing to use improved seed by which they can get maximum productivity on their small plot of arable land. But seeds of all types of crops are not available in agricultural cooperative societies and due to that they uses own produced crops as seed. In the following table we give some statistics of using seeds for cultivation of two selected districts.

Table 7.12: Types of Seed Used by Farmers in the two Selected District of West Bengal

Crops/used seed	Types of Seed used by Farmers in the two District							
	Local		High Yielding		Both		Total	
	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur	Bardhaman	Dakshin Dinajpur
Amon	10(8.33)	67(55.83)	99(82.50)	21(17.5)	11(9.16)	32(26.66)	120	120
Boro	0(0.00)	0(0.00)	112(100.00)	44(100.00)	0(0.00)	0(0.00)	112	44
Potato	0(0.00)	0(0.00)	85(100.00)	40(100.00)	0(0.00)	0(0.00)	85	40
Jute	0(0.00)	0(0.00)	0(0.00)	56(100.00)	0(0.00)	0(0.00)	0	56
Wheat	0(0.00)	10(31.25)	0(0.00)	16(50.00)	0(0.00)	6(18.75)	0	32
Mustard	6(11.53)	7(25.00)	39(75.00)	17(60.71)	7(13.46)	4(14.28)	52	28
Chilly	0(0.00)	24(85.71)	5(100.00)	4(14.28)	0(0.00)	0(0.00)	5	28

Source: Field Survey

In the above Table we have shown the utilization of seeds in agriculture. We have surveyed 120 households from each district and total 240 households in two districts. We have seen that farmers are using two types of seed viz. local seed and high yielding seed to cultivate some common crops like Amon Paddy, Boro Paddy, Potato, Jute, Wheat, and Mustard, Chilly etc. Farmers also growing different vegetables like Cabbage, Cauliflower, Brinjal, and ladyfinger etc. for which they are using only high yielding seeds. Similarly for some

crops like Ginger, Onion, Garlic, and Arum for which they use local seeds completely. That is why we did not consider the use of seed for such crops in the above Table.

We have seen that all farmers in the two districts are cultivating Amon Paddy because the cost of cultivation is less compared to Boro rice. We have classified the use of seeds into three categories as use only local seed use only high yielding seed and use of both seed in cultivation. Our collected data show that 8.33 per cent farmers in Bardhaman and 55.83 per cent farmers in Dinajpur use local seed to cultivate Amon Paddy. We have also seen 82.50 per cent farmers in Bardhaman and 17.5 per cent in Dinajpur use only high yielding seed. Percentages of farmers who are using both seeds to cultivate Amon Paddy in two districts are 9.16 per cent in Bardhaman and 26.66 in Dinajpur. On the other hand, Boro Paddy cultivation required adequate irrigation and huge chemical fertilizer along with other necessary farm inputs which is more expensive to small farmers. Although the productivity of this Paddy is far better than Amon Paddy lack of adequate irrigation reduce the extension of cultivation of this Paddy. It is better to say cultivation of this Paddy completely depends on modern farming. We have found that total 112 farmers are cultivating this Paddy in Bardhaman and 44 farmers in Dinajpur and also found that 100 per cent farmers are using high yielding seed to cultivate this Paddy.

All farmers want to get higher productivity and for which they are using high yielding seeds. If we look at the cultivation of Potato in two districts we find that all farmers are using high yielding seeds which they are purchasing from local market and also from cooperative societies. The collected data show that total 85 farmers out of 120 surveyed households in Bardhaman district are growing Potato and we found that all farmers are using high yielding seed. In Dakshin Dinajpur we have seen that total 40 farmers out of 120 farmers are growing Potato and the percentage of high yielding seeds is 100. The above table shows that not a single farmer is growing Jute and Wheat in Bardhaman district. Total 52 farmers are growing Jute in Dakshin Dinajpur among whom all farmers are using high yielding seeds to grow Jute. But in case of wheat total cultivator is 32 of which 31.25 per cent farmers are using local seed, 50.00 per cent farmers are using only high yielding seed and 18.75 per cent farmers are using both types of seed out of total 120 households. In our filed investigation we have found that total 52 farmers in Bardhahman and 32 farmers in Dinajpur are growing Mustered. The percentage of local seed user of this crop is 11.53 in

Bardhaman and 25.00 in Dinajpur. Similarly, the percentage of only high yielding seed user in Bardhaman is 75.00 and in Dinajpur it is 60.71. We also found that total 13.46 per cent farmers are growing Mustard by using both types seeds and total 14.28 per cent farmers are using both types of seeds. If we look at the cultivation of Chilly we see that 81.75 per cent farmers are using only local seeds and 14.28 per cent high yielding seed in Dinajpur out of total 28 Chilly cultivators. But in Bardhaman we found only 5 farmers who are cultivating Chilly and all farmers are using high yielding seed.

V. SUMMARY

In this section of our study we found that Bardhaman district is far better in agriculture compared to Dakshin Dinajpur district. Size of landholding is quite big on an average in Bardhaman and farming technique is modern. This district also is industrially sound and nearly 40 per cent people depend on this sector. As a result population pressure is not much in farm sector. On the other hand, more than 80 per cent people living in Dakshin Dinajpur district is dependent on farm sector. There is a huge difference in farming technique in the two districts. Farmers of Bardhaman district are cultivating by using modern technique whereas farmers of Dakshin Dinajpur are cultivating by both modern and traditional technique. Our primary data show that presently 20 per cent farmers of Bardhaman district are using animal drawn plough whereas in Dakshin Dinajpur more than 50 per cent farmers are using animal drawn plough. We have surveyed 120 households from each district. Use of rotavator in Bardhaman is quite high compared to Dinajpur district. In case of harrowing, farmers of Bardhaman are using rotavator, tractor and power tiller whereas in Dakshin Dinajpur the owners of bullock are using bullock operated harrow. Recently farmers of Bardhaman are using thresher for threshing paddy but the 75 per cent farmers of Dakshin Dinajpur are using wooden made blade as thresher till today. Although combine harvester has been introduced but farmers of both the districts do not much prefer to use this machine. Only 12 per cent in Bardhaman and 7 per cent in Dakshin Dinajpur district are using this machine. However others machineries have been introduced in farm sector such as Bund Maker, Drayer, Weeding machine etc. but farmers of both the districts are doing these jobs manually. Also in some farm works like spraying and irrigation more than 90 per cent farmers are using machineries.

It is worth to mention that farm mechanization displace agricultural labourer. This displacement question is valid where labour availability exists. But in recent days labour crisis is a big problem of farm sector. As a result current farming system is going on by coping up with labour shortage strategy. On the other hand, machineries alone can do massive work. So use of machine in farm sector solves the problem of labour shortage and brings profit to farmers. Another result we have found in this section is related to use of seed for farming. Farmers of Dakshin Dinajpur are using house stored corns as seed and also are using organic fertilizer on some crops. On the other hand, only 8 to11 per cent farmers of Badhaman are using house stored seeds and more or less 15 to 17 per cent farmers are using organic fertilizer. It would be found that farm mechanization has developed over the years. We found that in 10-15 years back agriculture was not much mechanized and farmers of West Bengal were not much habituated in using high yielding seeds and chemical fertilizer on their land.