

**ANALYSIS OF THE EFFECT OF COVID-19 PANDEMIC ON  
FARMERS BEHAVIOUR IN RELATION WITH THEIR  
MANAGEMENT DECISIONS**

**A Thesis Submitted to the Uttar Banga Krishi Vishwavidyalaya  
in partial Fulfilment of the requirements for the Degree of  
Master of Science (Agriculture)**

**in**

**Agricultural Economics**

**By**

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**DEPARTMENT OF AGRICULTURAL ECONOMICS  
UTTAR BANGA KRISHI VISWAVIDYALAYA  
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2022**



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### CERTIFICATE – I

This to certify that the thesis entitled “*An analysis of impact of Covid-19 pandemic on farmers’ behaviours in relation with their management decision*” submitted by Rahul Ashad (Reg. No. A-2020-003-M) for award of degree to M.Sc.(Ag.) in Agricultural Economics of Uttar Banga Krishi Viswavidyalaya has been checked against plagiarism through **Urkund Software** on 12<sup>th</sup> Sept., 2022 and that the Similarity Index has been achieved at **0% (zero percent)** which is below the maximum tolerable range as per the stipulation of this Viswavidyalaya. The thesis of Rahul Ashad may be accepted for the award of the Master Degree in Agricultural Economics i.e. M.Sc.(Ag.) in Agricultural Economics.

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Date : 12<sup>th</sup> Sept., 2022.

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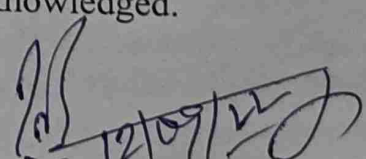
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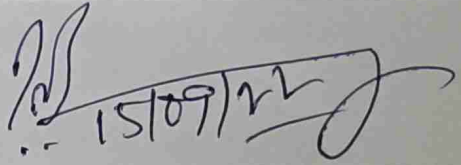

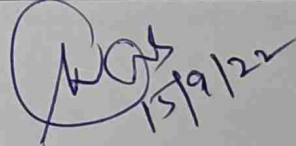
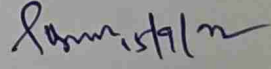
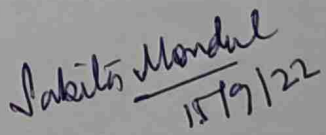
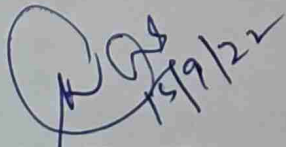
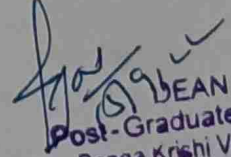
This is to certify that the Master's thesis entitled "*An analysis of impact of Covid-19 pandemic on farmers' behaviours in relation with their management decision*" submitted by Rahul Ashad (Reg. No. A-2020-003-M) for award of degree to M.Sc.(Ag.) in Agricultural Economics is an outcome of a bonafide and original work. The study has been undertaken according to some specific and feasible objective during the period of Covid-19 pandemic (new normal). The thesis is purely based on the primary data collected personally by him from the selected location of West Bengal. He has also consulted some secondary data for convenience of the study. It is, further, to confirm that the whole part or any part of the thesis (chapters or findings) has not been published or sent elsewhere for publication before submission. Cooperation and assistances received from different persons or organizations to complete the study and submission of the thesis are hereby duly acknowledged.

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## APPROVAL OF EXAMINERS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS

We, the undersigned, having been satisfied with the performance of **Mr. Rahul Ashad (Reg.No. A-2020-003-M)**, in the Viva-Voce examination on final evaluation of thesis, conducted today, the 15<sup>th</sup> September 2022, recommended that the thesis be accepted for the award of the master degree in Agricultural Economics.

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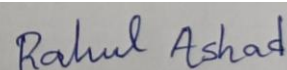
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## ABBREVIATION

GDP	Gross Domestic Product
ILO	International Labour Organization
ADB	Asian Development Bank
INR	Indian Rupee
NGO	Non-Governmental Organisation
PPC	Plant-protection Cost
DBT	Direct Benefit Transfer
GST	Goods and Service Tax
SP	Semi Pucca
P	Pucca
K	Kuccha
Q	Quintal
Ha	Hectare
MD	Man-days
t	Ton
Rs	Rupees
Kg	kilogram
%	Per Cent
ε	Error term
R <sup>2</sup>	Regression Coefficient
\$	Dollar

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# **ANALYSIS OF THE EFFECT OF COVID-19 PANDEMIC ON FARMERS BEHAVIOUR IN RELATION WITH THEIR MANAGEMENT DECISIONS**

## **ABSTRACT**

In the event of worldwide economic recession in all the sectors including agriculture due to appearance of Covid-19 pandemic, the thesis entitled “*An analysis of impact of covid-19 pandemic on farmers’ behaviour in relation with their management decision*” to M.Sc.(Ag.) in Agricultural Economics was crafted to pursue with a primary data set in a district of West Bengal keeping main thrusts on to examine the impact of pandemic on farmers’ farm operations and the practices (strategies) adopted by them to tackle the anticipated adverse impact during that period. CACP cost concepts, multiple regression analysis, constraints analysis (Garrett ranking), etc. were applied in the study. Performances of three crops (paddy, wheat and jute) were studied to examine the variation of costs and farm efficiency during “before”, “during” and “after” pandemic. Cost of cultivation (Cost  $A_1$  and Cost  $C_3$ ) of all three crops (paddy, wheat and jute) were higher (18 to 57%) during pandemic. Higher cost of cultivation might be attributed to *inter alia* higher cost of inputs and hired labour. Productivity (yield) of all crops showed a declining level during pandemic. Return-cost ratios for all crops were around 1.80 (based on Cost  $A_1$ ) and 1.07 (based on Cost  $C_3$ ) which were lower than other two periods. Similar pattern of costs and returns were found for wheat and jute crops too. Costs incurred for inputs and hired labour were higher, family labour engagement had increased and price of the produce was reduced during pandemic. Estimates of MRA (multiple regression analysis) showed that area (before), area & MSP (during) and area & use of fertilizer were found to significantly (5% level of significance) influence the level of yield

wheat, paddy and jute crops respectively. Farmers perceived that supply of necessary goods, direct benefit transfer, holding of liquid money, seeking of alternative jobs, short duration high yielding seed, free ration, agricultural credit, etc. had remained in the priority list in the event of pandemic. Among different countries who had adopted various policies, India had taken exhaustive initiative in almost all sectors of the economy (social and economic) with more emphasis on farm and related problems. Govt. of Bangladesh and Canada had mainly concentrated on monetary and fiscal policies. China had also adopted lot of useful steps to retain its position in world economy. However, some of the impacts of initiatives of Govt. of India had been evident in the area of GDP, agricultural production, export, inflation, etc.

# CHAPTER- I

## INTRODUCTION

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The Covid-19 pandemic COVID-19 has caused an unanticipated downturn of economics all over the world leading to a wide scale economic recession during 2020 and onwards. The ground level resultants of this event have been viewed in terms of low per capital income, shrinkage and sometimes disappearance of employment opportunities in informal sectors, in particular, health sector and human lives, general well-being, etc. Thus, the world has witnessed an unprecedented and significant social and economic misery as a result of the ongoing pandemic.

India is not an exception to the deep economic damage caused by Covid-19 pandemic. On March 24, 2020, the Indian government declared a State of lockdown throughout the country which lead to stagnant of economy to a large extent. The lockdown's economic impacts are anticipated to not only dwarf the pandemic's direct effects (Ray & Subramanian, 2020), but several industries were found to be affected badly. While the pandemic resulted in the loss of employment for more than four millions Indians under the age of 30s (ILO & ADB, 2020), the migrants and casual daily workers have experienced severe economic hardship as a result of declining employment opportunities, rising consumption costs, and worries about food insecurity (ILO 2020). All these collectively have increased the level of poverty. The country witnessed a single largest drop of its GDP (24% approx.).

The impacts of Covid-19 are being discussed everywhere. Though the economy was showing down trend, but occurrence of the event has aggravated the situation in all sectors of economy firstly like unemployment, low earnings, rural hardship, starvation, and pervasive inequality. Second, the sizable informal sector in India is particularly exposed (Jakhotia, 2021). These agricultural, migratory, and other informal labourers would be hardest-hit during the lockdown because they lack regular salaries or revenues. According to the International Labour Organization, there will be 195 million fewer full-time employment globally in the second quarter of 2020, or 6.7% less hours worked overall. In comparison to the Great Recession, which saw a loss of 25 million jobs, they estimated that 30 million jobs were destroyed in just the first quarter (ILO, 2000). A survey conducted by World Bank that the GDP growth rate in pandemic year 2019 is approximately 3.74% in India. However, the GDP growth rate in 2020

is the lowest and most negative among the previous ten years, at around -6.60% (World bank, 2022)

India is an agrarian economy and agriculture is the main stay of the economy. It has brought hardship to the farmers' income and lives. Poverty, hunger, debts and farm bankruptcy remain common phenomenon in agrarian India. India has 100 to 150 million farmers and employs nearly 263 million workers of which 45% are cultivator and 55% are engaged as agricultural labourers (Menon & Vogt, 2022). Sudden lockdown has disrupted the normal agricultural operations due to shortage of labour, input, time management for specified cropping system. Besides, important services like transportation, cold storage, marketing, credit, etc. have been severely affected. Farmers have to sell their produce at lower prices particularly fruits and vegetable crops. Export has been drastically reduced during the period due to international travel and transportation ban. There were worries that the pandemic would make farmers less able to afford inputs for the forthcoming crop season as they struggled to get fair prices for their rabi crop harvests. This would create a difficult-to-break vicious cycle that would require major public help (BBC, 2020). Farmers who were about to harvest their winter crop faced labour shortages as the large migrant workforce on which they depend had departed for their native villages and towns. Many farmers had limited access to harvesters and shops that serviced equipment and machinery. Most faced serious difficulties in getting their produce to markets, both on account of transport restrictions and intermittent closure of regulated markets or mandis (Rawal and Kumar, 2020).

Following the initial phase of lockdown, on April 14, 2020, the government loosened the limitations placed on the agriculture sector as a result of the pandemic outbreak. Despite the fact that farming activities had resumed in all the States, farmers were still hesitant to make investment decisions because of a lack of inputs, price fluctuations in agricultural commodities, and a lack of money. The Indian Council of Agriculture Research (ICAR) has published rules for farming activities that included physical separation requirements and hygienic requirements. The government implemented a number of resolute efforts to combat the present pandemic. Families below the poverty threshold received free food grain as part of the public distribution programme. The plan was successfully implemented among the States and showed how the government responded forcefully to the situation. To protect against the deadly virus, the Indian government have taken necessary and strict measures, including establishing health check posts between the national borders to test whether people entering the country have the virus (Kumar *et al.*, 2020).

Reports showed that, in spite of negative growth rate, agriculture has remained the only sector to yield positive growth rate during the period. Although, the rate was little bit lower than previous year. This can be attributed to good monsoon and traditional farming operations. However, scarcity of necessary resources compels the farmers to take up appropriate strategies in view of coping up the adverse situation. Many studies have been undertaken by different researchers at different places in this respect. It is anticipated that farmers' attitudes, behaviours, strategies, innovativeness are likely to change with the changed scenario in respect of inputs, services, credit, marketing, etc. and that would be in compatible with a focus of obtaining minimum return from their agricultural business.

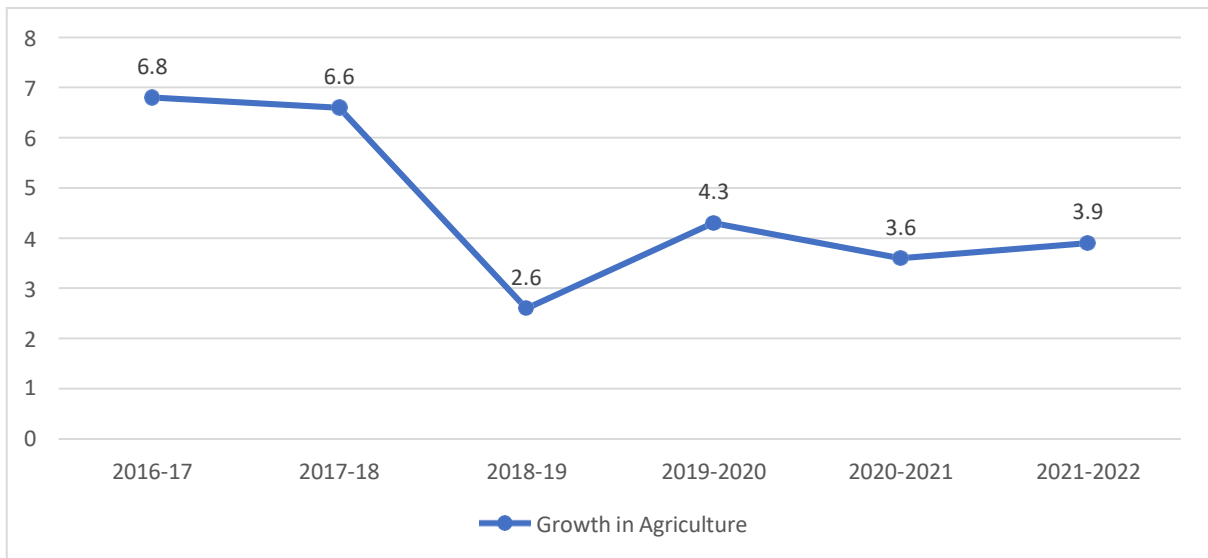
Table 1 focuses on growth rate of GDP and its year-wise change of growth for last ten years including the period of pandemic 2012-13 to 2021-22. All the years had sustainable positive growth rate except the period of pandemic where GDP has witnessed a negative growth rate (-6.60%). However, GDP has been recovered in the very next year (8.95%).

**Table-1: GDP growth in India for last Ten year (2012-13 to 2020-21)**

Year	GDP growth	Annual change (%)
2012-13	5.46	0.22%
2013-14	6.39	0.93%
2014-15	7.41	1.02%
2015-16	8.00	0.59%
2016-17	8.26	0.26%
2017-18	6.80	-1.46%
2018-19	6.45	-0.34%
2019-20	3.74	-2.72%
2020-21	-6.60	-10.33%

\*Source: World bank, 2022

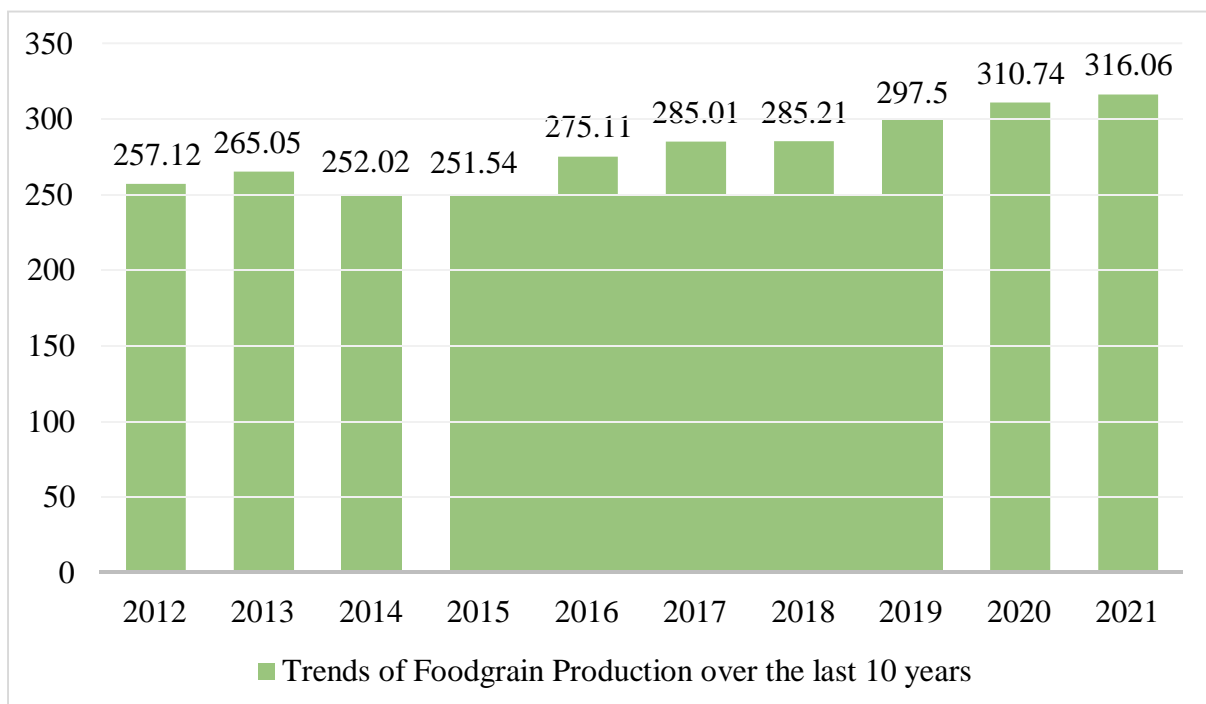
Fig. 1 shows agricultural GDP for last five years (2016-17 to 2021-22). In spite of variation, agricultural GDP remains positive throughout the period. However, during pandemic level of growth rate was found to remain at lower side (3.9%) compared to other years.



**Fig-1: Growth in Agriculture**

**Source:** First Advance Estimate of National Income 2021-22

Fig. 2 demonstrates the volume of food grains production for last one decade i.e. 2012-13 to 2021-22 which confirms that food grains production had an increasing trend for the period. During the period of pandemic, food grain production was still higher (316.06 million ton) compared to previous year (310.76 million ton) though rate of growth was little bit low.



**Fig-2: Trends of Food grain Production over the last 10 years.**

**Source:** Ministry of finance, Govt. of India, 2022

Table 2 displays the overall export-import scenario of India for last ten years (2011-12 to 2020-21) including agricultural export and import. Both export and import had shown a negative growth before and during pandemic. After 2020, values of export and import have incremental growth rate.

**Table 2.** Export and Import scenario of India (2012-13 to 2021-22)

Year	Export Value (Billions of US)	% Of Growth in export	Import Value (Billions of US)	% Of Growth in import
2012	448.40	-5.03	571.31	0.81
2013	472.18	5.3	527.57	-7.6
2014	468.35	-0.8	529.24	0.37
2015	416.79	-10	465.10	-12.11
2016	439.64	5.4	480.17	3.24
2017	498.26	13.3	582.02	21.21
2018	538.64	8.1	640.30	10.01
2019	529.24	-1.74	602.31	-5.93
2020	499.10	-5.6	509.43	-15.42
2021	660.50	32.33	725.55	42.42

\*Source: World Bank, 2022

Table 3 indicates the export-import scenario of agricultural commodities (2012-13 to 2021-22). Growth of export of agricultural commodities is found to maintain a stable scenario throughout the period except 2021-22. This can be attributed *inter alia* to the impact of Covid-19 pandemic. But values import show an increasing trend. However, value in 2020-21 was little bit higher compared to the previous year (2019-20) and following year (2021-22). Thus, import was less effected when compared with export scenario for last ten years in India.

**Table 3.** India's Export and Import value of Agricultural Commodities.

Year	Export Value (Rs. lakh cr.)	Share of export to the total National export (%)	Import Value (Rs. lakh cr.)	Share of Import to the total National Import (%)
2012-13	2.27	13.90	0.96	3.59
2013-12	2.62	13.79	0.85	3.16
2014-15	2.39	12.64	1.22	4.43
2015-16	2.15	12.55	1.40	5.63
2016-17	2.27	12.26	1.65	6.39
2017-18	2.52	12.86	1.52	5.07
2018-19	2.75	11.90	1.37	3.81
2019-20	2.52	11.40	1.47	4.39
2020-21	3.05	14.20	1.58	5.42
2021-22	2.65	9.35	1.37	4.35

\*Source: Ministry of Commerce, industry and CMIE, Govt. of India, 2022.

Against these backdrops, the present study has been conceived in an agriculture-based area of Northern district of West Bengal with primary data during 2021-22 to examine the effect of Covid-19 pandemic on farmers' strategic behaviour in relation to different aspects of farm management decisions to keep their farm business sustainable at their best. Different aspects farming which will be taken care of include prevailing farming operations, functions and services. Besides, the study will attempt to note the variations of results of farming operations for the information of three phases viz. before, during and after the event Covid-19 pandemic. The exercise will also show the different emergent schemes/programmes/policies adopted by India and some other countries for benefits of the farmers and agriculture as a whole.

However, the specific objectives and focus of the study are as follows:

- 1. To explore the existing socio-economic status of the farmers.**
- 2. To analyse and compare the variations in farm operations and economics for the three stages viz. before, during and after Covid-19 pandemic.**
- 3. To examine the farm management and other practices adopted by the farmers during pandemic to reduce risk.**
- 4. To highlight different emergent schemes or policies adopted by the Govt. for safety of farmers and agriculture in general.**

## **CHAPTER – II**

### **REVIEW OF LITERATURE**

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An essential step in gaining insight for conceptual clarity, methodological improvement, and the theoretical framework for the research work to be done is to conduct a thorough and methodical review of the prior relevant literature on the topic of investigation. The review of the literature serves as a foundation for formulating and deciding on the objectives, creating a suitable questionnaire, constructing the methodology to analyse the data, interpreting, and presenting the results in a scientific manner, as well as for comparison and suggestion making as needed. Therefore, an effort has been made to present reviews of the literature related to the impacts of Covid-19 on farmers behaviour in this chapter. A few studies that are relevant to the issue have been reviewed. The available research work has been divided into three categories according to the objectives of the study and is presented under the following headings:

#### **2.1 To explore the existing socio-economic status of the farmers**

According to **Aromolaran and Muyanga (2020)**, the pandemic had a detrimental impact on farming households through reduced labour availability, increased farm labour costs, and decreased sales of agricultural products.

The study on the assessment of socioeconomic impact of Covid-19 pandemic in India by **Ranjan and Vaishali in the year of 2020** reported that more than 122 million individuals in India lost their employment in April 2020, the majority of them were small traders and wage employees and also over 80% of urban workers

lost their employment, with a dramatic fall in the wages of farmers and self-employed people in industries other than agriculture.

The economic effects of the COVID-19 pandemic on dairy farmers were studied by **Bhandari & Ravishankar and Chandel *et al.* in 2020**. They concluded that the vulnerability of the industry was increased by the inability to immediately adjust production in response to demand, the high perishability of milk, the larger (60%) share of the unorganized sector, the low level of processing, the high-income elasticity of milk and milk products, and the high proportion of farmers with small marketable surplus.

Rural women, who are important players in food production and trade in developing nations, are subjected to greater inequality, which disrupts their participation in the agri-food value chains during pandemics, according to research by **Bellizzi *et al.*, 2020; Gulati and Kelly 2020**. Their study also mentioned about the likelihood of an increase in gender-based violence during the COVID-19 pandemic.

**Coopel *et. al.*, (2008)** while working with secondary sources of information on economic development of India opined that instead of managing the broad measures to reduce the rural poverty, understanding the current mitigation mechanisms to overcome the vulnerability of poor rural household to economic shocks should be made.

According to **Puskur *et al.*, 2020**, mobility restrictions related to the 2020 pandemic are exacerbated by pre-existing social norms and increased caregiving obligations, which restrict women's access to information outside of their immediate social networks.

**Rasul, 2020; Hossain *et al.*, 2020** noted that the region's large population, high rates of poverty, poor socio-economic conditions, insufficient social protection systems, limited access to water and sanitation facilities, and inadequate living conditions have all contributed to COVID-19's unique challenges for the Indian economies.

**Deshpande *et al.*, 2020** came to the conclusion that the decline in employment is found to be discriminatory and not gender-neutral in India, which has one of the most uneven gender divisions of domestic labour internationally, during their study on the social implications of COVID-19 on Indian farmers. Due to the already significant gender difference in employment, men are experiencing a greater absolute decrease than women. In most states, a drop in the gender disparity in the number of hours spent on household tasks on average during the first month of lockdown is discovered by comparing the hours spent on domestic chores before and after the lockdown. Men's share of household chores has increased from 0.5 to 4 hours since the lockdown.

**Furceri *et al.*, 2020** found out the disproportionate burden of the crisis on low skilled workers, poor people, and other vulnerable sections. Their study showed that COVID-19 is most likely expected to increase inequality within and among countries, and the study's findings support the idea that those with basic education (low skilled) are affected more than those with higher and advanced degrees in terms of income loss, confirming an increase in income.

**Hossain *et al.*, 2020** noted that marginalized individuals, such as farmers, who already bear psychological loads as a result of ongoing issues in the agricultural sector, may face serious psychological difficulties. Due to their difficult socioeconomic circumstances, approximately 16,500 occurrences of farmer suicide are reported each year. Due to COVID-19, these cases may become more severe.

During his research on rural household pattern **Dr. B. Rajeshwari (2020)** found out that during the period of covid-19, rural household need to change their food consumption pattern and also village panchayets had to prepare capacities to understand the quarantine and other pandemic related measures.

An estimation made by the **Indian Agricultural Research Institute (2020)** based on telephone interviews with 100 farmers in West Bengal, 91 percent of them had trouble purchasing inputs (seeds, fertilizer, and pesticides) for the upcoming Kharif season (82 percent).

## **2.2 To analyse and compare the variations in farm operations and economics for the three stages viz. before, during and after Covid-19 pandemic**

**Dev & Sengupta** in the Pre-COVID era **in the year of 2020** reported that India was experiencing significant macroeconomic issues such as nearly recession with the sluggish GDP growth rate of 4.7 percent in 2019 which is lowest since 2013 (as indicated by the official statistics), high unemployment rate, decline in industrial output of core sectors—the worst in 14 years, stagnancy in private sector investment, decline in consumption expenditure.

Gross Domestic Product (GDP) estimates were released by **the national statistical office for the first quarter (April–June 2020)**, and they indicated a negative economic growth of 23%. Comparatively, the service sector has experienced negative growth of 47%, while the manufacturing sector has experienced negative growth of 50%. On the other hand, Agriculture and related industries have seen a positive growth of 3%.

**Harris et al., 2020** who studied on agricultural production, livelihood, and food security in India during this pandemic situation in the year of 2020, suggested that during the period of lockdown, labor shortages (about 32%) and the high cost of labor (accounted for 53%) were the important contributors to yield loss and increasing harvest cost.

According to the **Mrutyunjay (2019)**, before the spread of covid-19, the Indian economy was already going down due to some reasons such as demonetization, abrupt implementation of GST and global slowdown.

**Ceballos et al., (2020)** observed that sowing time, inputs use and harvesting time of wheat crop were unaffected during lockdown period to check Covid-19 and no adverse effect on yield (normal yield= 3.38 metric ton (MT)/hectare and yield during pandemic= 3.36 metric ton (MT)/hectare) of the crop was recorded. Thus, the study suggested minimal variation in yield of the crop during pandemic compared to normal time. This field experiment at farmers' level was conducted in the state of Haryana during the year of 2020.

In view of keeping isolation distance to check infection of Covid-19, **Berber et al., (2020)** suggested that harvesting time of wheat crop could be rescheduled so that all farmers would not harvest at the same time

According to the economists **Manish et al., (2020)**, due to improper planning and mis-management of central government, there was a massive downfall in the Indian economy that hit hard to the working people through crisis of their necessary food items.

**Chetty *et al.*, (2020)** showed a great concern that the impacts of covid-19 in India were likely to be magnified due to more dependency on cash transaction and cash-flow constraints.

Farmers feared to engage the family labor in the field operations during this pandemic situation and had trouble deciding suitable crops, varieties, cropping system and farming operations etc. during that condition. This integrating qualitative research was made by **Lin, Meuwissen *et al.*, in the year 2020.**

From the study on the impacts of covid-19 on smallholder agricultural system, **Boughton *et al.*, (2020)** concluded that although smallholder system in agriculture is critical to preserving food and nutritional security, the consequences of a covid-19 lockout would be a humper to the smallholder system throughout the country.

With the study on sectoral effect of Covid-19 in **the year of 2020, Devinder *et al.***, emphasized that while the other sectors in the economy was facing shutdown, agriculture sector was the only sector that would continue and his study concluded that the agriculture sector is the only sustainable part of India's economy.

**Cortignani *et al.*, (2020)** while working on farmers' losses in this pandemic situation concluded that covid-19 created an impact on losses of farmers' goods, especially fresh vegetables, fruit, and milk products which were associated with restrictions imposed by countries for movement and interactions, labour losses as well as demand reduction due to closure of restaurants, hotels etc.

**Mukhra *et al.*, (2020)** were found to show a greater view on reverse migration during Covid-19 period and recommended that there was a mass reverse migration due to limited employment opportunities, fear of more destruction due to the uncertainty of future and financial crisis, health crisis, and so forth. The extent of

this reverse migration was such that the efforts of government through policies could not match this crisis.

**Dr. Sudarshan Dutta (2021)**, who studied on labour migration during covid-19 period reported that a significant shift in labour dynamics who used to work in states like Delhi, Punjab, and Haryana, returning to their homes, has been occurred with over 50 million migrants.

According to **Mukhopadhyay, 2020**, India's rural economy was seeing a fall in revenues for primarily temporary workers before this epidemic, as well as a decline in rural wages (real). When food prices began to rise in January 2020, there were a few glimmers of optimism, but with the onset of this new crisis, all dreams were dashed.

**FAO,2020** concluded that the absence of local or migrant labour due to illness or travel restrictions enforced by lockdown has a substantial impact on the supply chain. In circumstances where the illness directly affects their health or mobility, it also reduces the capacity to produce due to their own food safety measures.

In a recent poll by **Espitia et al., 2020 and FAO, 2020**, typically, export restrictions have some negative outcomes. First, export limitations lower domestic pricing, which hurts farmers financially and lowers crop production while also reducing industry incentives. Second, by losing their position in global marketplaces, nations will lose their advantage over rivals. Third, export limitations damage exporters' reputations and encourage importers to have less faith in the global market, which undermines international trade and eliminates possibilities for exporters to grow their businesses in the future.

According to **The Economic Times (2020)**, the sizeable informal sector has hit hard by covid in India. 90% of India's workforce is still employed in the informal sector, which includes a sizable number of rickshaw drivers, migrant workers, landless agricultural laborers, etc. Working in the unorganized sector has its share of challenges. The employee is placed in very poor circumstances because there is no work stability, no paid time off for illness, and no paid vacation.

### **2.3 To examine the farm management and other practices adopted by the farmers during pandemic to reduce risk:**

**Dagar *et al.*, (2020)** concluded that during Covid-19, farmers increased their technical efficiency by making the best use of family labour. If small farmers' cultivation methods are technically more effective, they can cut the amount of input needed to produce the same amount of crop by 41%.

**Boss *et al.*, (2020)** while working on controlled measures that were taken by the government during covid-19 period opiated that by strengthening FPCs and FPOs, the small and marginal farmer would be extremely beneficial in reaping the benefits of economies of scale.

By more explicitly evaluation on food security, **Totapally *et al.*, (2020)** reported that about 84% of majority of people reduced the number of meals consumed in daily need basis and thus, received food rations through public distribution system.

**Tetteh Anang *et al.*, 2015** suggested that improved and modern storage facilities can also be used to reduce food loss all along the food value chain. Modernized equipment or better technologies, however, result in greater production costs because they call for more capital investment. As a result, small and medium-

sized agricultural businesses can continue operating with the help of government or donor funding.

**Workie et al., (2020)** suggested on pandemic coping techniques, such as establishing a set amount of donation limit that must be given to the lower income class, migrants, workers, and pregnant women in these unsure times. Such tactics will govern the country's economy while also enhancing the quality of life for its citizens.

According to **Principato et al. (2020)**, optimal food management strategies at the household level include creating an ideal purchase list and appropriate meal plans during the period of pandemic.

As per **Bansal et al., (2020)** analysis on the effects of social media on the prices of agricultural products and the purchasing patterns of consumers in the market during the pandemic period, technological advancement has made people's lives easier and has been channelled through various social media.

**Borah and Sharma (2021)** postulated that women farmers should be equally involved with male farmers in agricultural activities because women labourers have been documented participating in all on-farm and off-farm activities both technically and economically and have thereby significantly contributed to household income for surviving in this pandemic situation.

**Workie et al., (2020)** proposed that the fundamental strategy should be educating the public to avoid panic buying and hoarding goods in favour of maintaining market staff hygiene, sanitising market yards, and social distancing that could lead to the market's efficient operation in the face of this pandemic crisis.

**Heck et al., 2020** suggested that farmers need to rely on reliable access to seeds and other production inputs to secure the food security of their families during

the pandemic condition. They also suggested that producers need to get short-term help in a way that maintains maximum productivity.

Family farmers should be more actively involved in the agricultural sector, according to **FAO and IFAD (2019)**, which might help not only with increasing productivity but also with preserving biodiversity and creating new technologies to address economic and social concerns. This will also assist the family members gain more experience, and the younger family members may develop fresh, innovative ideas for farming that could be more useful.

#### **2.4 To highlight different emergent schemes or policies adopted by the Govt. for safety of farmers and agriculture in general:**

According to **Varshney et al. (2020)**, when making investment decisions for the agriculture sector, it is important to consider when PM-KISAN benefits are transferred to farmers during the period of Covid-19.

According to the survey conducted by **UN Women in 2017** beneficiaries of the ATMA scheme will receive 30% of the total budget allotted for all ongoing schemes and programmes.

**Sulaiman and Reddy** in the year of **2014** concluded that analyses of key government and non-governmental organisation (NGO) projects demonstrate that dividing women into homogeneous groups has facilitated the effective implementation of policies for agricultural development and the empowerment of women farmers.

Another effective tactic studied by **Warrier et al.,2020** for enhancing women farmers' access to reliable extension training and deploying community frontline employees. Both nations have had great success with this strategy in the areas of

fundamental maternal and child health and feeding practises by using ICDS and Anganwadi workers in India and Female Community Health Volunteers in Nepal. These frontline workers have also directed post-COVID assistance efforts in rural areas.

To address the issue of unemployment in the urban informal sector, **Rangarajan and Dev (2020)** proposed (a) increasing the number of days under MGNREGA from 100 to 150 days and (b) introducing an employment guarantee scheme with 150 days in urban regions.

After the lockdown, an orderly repatriation of the migrant workers to their various workplaces must be planned, according to **Kapur and Subramanian's 2020** suggestion. They must be able to use the advantages of social safety nets like PDS, Ujjwala scheme, etc. even in urban and semi-urban regions.

**The Press Information Bureau, 2020** stated that the "Atmanirbhar Bharat" (Self-reliant or Self-sufficient India) movement, with an economic package of 20 lakh crore (INR) being allocated to it, is a tremendous initiative by the Central Government to recognise local initiatives and boost self-reliance across sectors in order to mitigate the challenges affecting economic resurgence in the wake of the pandemic.

## CHAPTER- III

### RESEARCH METHODOLOGY

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Research methodology deals with the techniques or the specific procedure which helps to identify, choose, process, and analyze information about a subject. It helps the readers to evaluate the validity and reliability of the study in the research paper. The details of the components of research methodology of the study problem have been discussed as follows.

#### **3.1 Location of the study:**

In anticipation of the homogeneous (common) impact of Covid-19 pandemic on agriculture, income, livelihood, behaviour and other socio-economic issues of the residents (farmers) of the villages all over the country, the farmers of a single village has been selected for the study. The name of the village is Khairbari which belongs to Jalpaiguri district of West Bengal. The study was conducted during the year 2021-22.

#### **3.1.1 Profile of the Village (Khairbari):**

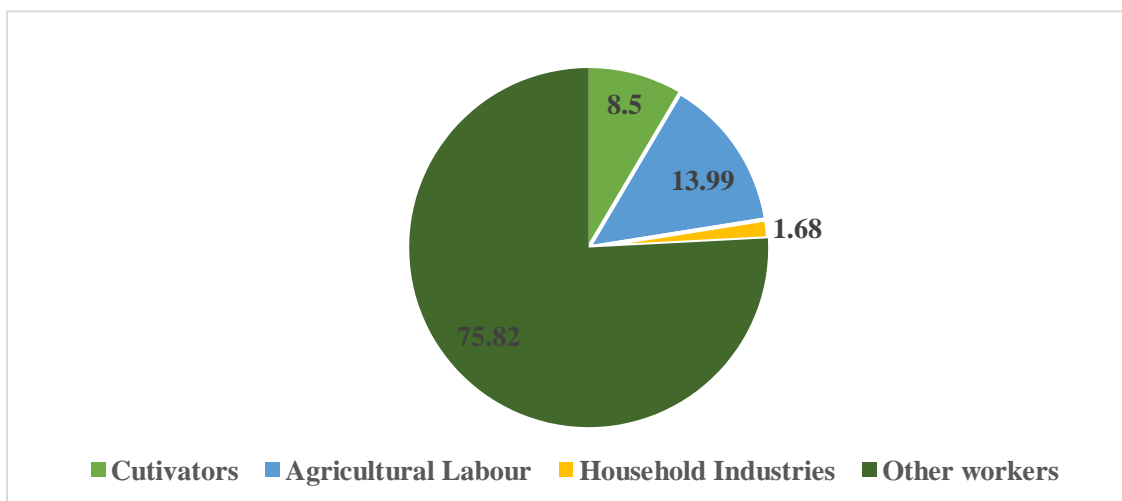
The village Khairbari is located at 26°52'52''N 88°54'18''E in Jalpaiguri district of West Bengal State. The village is located in the north-central region of the district. Rivers Murti, Gatia and Jaldhaka are flowing through the district. The Khairbari village is surrounded by Bhutan in the north, Dhupguri in the east, Maynaguri block south, and Matiali CD block in the west.

The size of the area is about 8.75 square kilometer. Village has a population of 3534 (Census, 2011). Number of male populations is 1872 (52.97%) and female population is 1662 (47.02 %). Male-female ratio stands at 1000:888. Total geographical area of the village is 691.21 ha. Population density is 5 persons per ha. There are nearly 761 number of households. Literacy percentage of the study area is moderate (62.41%) in which male are more literate (67.85%) compared to female (56.43%). According to survey in 2011, the village Khairbari consisted of agricultural labourers made up of 13.99%; home industry workers 1.68%; and other workers 75.82% respectively. **Fig.3** shows the map of the village.



**Fig.3: Map of the village**

In the study area, the bulk of the population is engaged in agriculture for their livelihood, which is the main driver of economy. Paddy, jute, maize, mustard seeds, wheat, etc. are significant field crops. The district has a rich emporium of plantation crops too. Besides, tea and wood are well-known commercial products of Jalpaiguri. Average annual rainfall is 3,440mm. However, excessive rainfall sometimes has caused flood also which may badly affect the agricultural production. Following Fig.2 depicts the status of livelihood opportunities of the area under study.



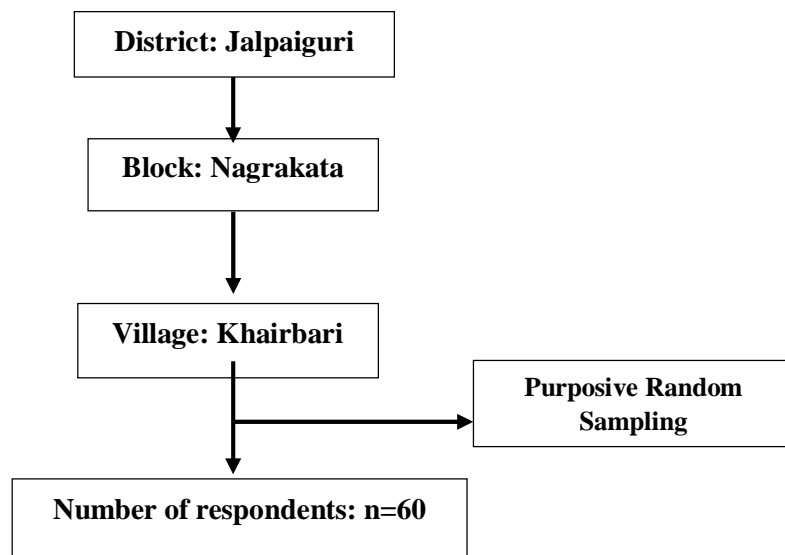
**Fig-4: Livelihood in Khairbari village**

### 3.2 Sample Size

A total of 60 (sixty) farmers were selected for the study. The study area is totally agricultural-based and population are quite homogenous in many aspects. This is also presumed that Covid-19 has common impact on all categories of farmers. So, it is expected that this sample size will be representative to fulfill the objective of the study.

### 3.3 Sampling frame

Sampling frame or design for the study has been shown in the following sketch.



### 3.4 Collection of data:

#### 3.4.1 Collection of primary data:

A personal approach was made by the each of head of the family in the chosen sample area in order to individually interview them and collect pertinent information. Data for the agriculture year 2021-22 were gathered for the current study. The main information was gathered about the socioeconomic traits of farm families, the way they used their inputs, the costs they incurred, at the farm level for different phases of Covid-19. Two categories of farmers were made for convenience of study on the basis of variations in respect of operational land holding and other economic parameters which is as follows:

**Table 4: Distribution of sample farmers into various farm size group according to the size of holdings:**

Category of farmer	Operational Holding Size (ha)	Number of farmer(n)
Small	1 - 2	n= 40
Medium	More than 2	n= 20

### 3.4.2 Collection of secondary data:

Secondary sources of data (information) to complement the primary data have been collected from Agriculture Department and Horticulture Department, Govt. of West Bengal. Besides, published works, articles, thesis and various websites have also been consulted for the study.

### 3.5 Method of collection of data

#### 3.5.1 Development of schedule

A pre-survey was conducted in the study area to gather information on socioeconomic status as well as different aspects of Covid-19 before the final commencement of data collection through schedule/questionnaire. In order to establish the final schedule with some addition, omission, and modification, a small number of interviews were done with a few respondents in the given study area. Final data were collected through the technique to personal interview method.

### 3.6 Analytical procedure and concepts used:

After thoroughly checking the adequacy and accuracy, the data were categorized and tallied with the objectives of the study. The socioeconomic situation of farmers, their income and saving trends, crop production, pricing spreads, production and marketing issues, investment analysis, different aspects of pandemic etc. were all examined by using simple tabular analysis. To evaluate and appropriately understand the results, basic knowledge of farm management like cost of production and profitability measures were followed. Besides, statistical methods like averages and percentages of the data were employed. In addition, to examine the extent of influence of independent variables on dependent variables, multiple regression analysis had been exercised. To ascertain the respondents' views about constraints and future strategy, Garrett's Ranking technique was applied. Details of all the methods are explained below:

### 3.6.1 Cost Concepts

To measure the efficiency of farm business, farm management cost concepts of CACP (Commission for agricultural costs and prices) were applied (Dhondyal, 2008). There are eight concepts of costs. However, for convenience of the study, only Cost A<sub>1</sub> and Cost C<sub>3</sub> had been followed as first one represents the operational (paid out) cost and other is total cost (operational + fixed). Farmers are more concerned about the Cost A<sub>1</sub> and Cost C<sub>3</sub> is utilized for policy making (price) purpose like MSP (minimum support price).

A. **Cost A<sub>1</sub>**: Actual paid out costs for owner cultivator i.e. only the operational costs involved during the cultivation of crops. This includes mainly input costs and hired labourers.

B. **Cost C<sub>3</sub>** = Cost C<sub>2</sub> + 10 percent of cost C<sub>2</sub> to account for managerial input of the farmer.

However, since the small and marginal farmers perform the roles of owner, funding, management, etc. simultaneously at a time, share of management cost to total cost (Cost C<sub>3</sub>) was ignored.

### 3.6.2 Multiple Linear Regression Analysis

The technique of Multiple Linear Regression Analysis is applied for tracing the variable responsible for production or yield of crop. Thus, the results of the analysis will show the extent of influence of each input (variable) on the level of product of the crop. This analysis was carried out by using the following equation-

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9$$

Where,

**Y** = Yield (Production)

**a** = Constant

**b<sub>i</sub>** = Regression coefficients

**X<sub>1</sub>** = Area

**X<sub>2</sub>** = Fertilizer application

**X<sub>3</sub>** = Price of crops

**X<sub>5</sub>** = Total householding

**b** = MSP (Minimum Support Price)

**X<sub>7</sub>** = Application of manure

**X<sub>8</sub>** = Savings

**X<sub>9</sub>** = Investment in Agriculture

Besides, to find out the different values, estimation and variations between sample data, the basic statistical concept had been carried out like mean (or average), range, standard deviation, frequency distribution, etc.

### **3.6.3 Garrett Ranking**

It helps to study the preference, change of orders of constraints and advantages into numerical scores. The prime advantage of this technique over simple frequency distribution is that the constraints are arranged based on their severity from the point of view of respondents. For scoring purpose, Likert scale was used. A Likert scale is a rating scale that quantitatively assesses opinions, attitudes, or behaviors. It is made up of 4 or more questions that measure a single attitude or trait when response scores are combined. In this study, score 1 (one) to 4 (four) were assigned for different perceptions level of the respondents on a particular issue related farm practice.

### **3.7 Limitation of the Study**

Due to constraints in time, fund and pandemic (new normal) situation, the study was restricted in a particular location with limited number of sample farmers.

## CHAPTER- IV

### RESULTS AND DISCUSSIONS

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This chapter deals with results and discussion on the primary data. The main (raw) data were organized and entered the work sheet. Necessary compilation, processing and calculations have been done in accordance with the objectives, hypothesis, and methodology of the study.

#### 4.1 Socio-Economic status of the farmers:

##### 4.1.1 Age-wise distribution of Farmers:

On the basis of the primary information, the study area was dominated by small (less than 2.0 ha of operational holding) and medium (2 to 4 ha) farmers. A total of 60 farmers were selected out of which 40 belong to small and other were medium. Age-wise distribution of farmers was categorized into three parts on the basis of the farming experience. In the age between 45 to 55, there were 9 small famers and 23 medium farmers, and in the age between 56-65, there were 11 small farmer and 15 medium farmers. Lastly, in the age between 66-75, only 2 medium farmers entered in this age category (**Table 5**).

**Table:5 Distribution of farmers according to age (n=60)**

Age of the Head	Small Farmers (No.)	Medium Farmers (No.)
45-55	23	9
56-65	15	11
66-75	2	0
<b>Total Farmers (60)</b>	40 (66.66%)	20 (33.33%)

##### 4.1.2 Type of Resident and Household Size of head of the family

In case of small farmer, 50% farmers lived in semi pucca houses, 20% farmers lived in pucca houses and 30% of farmers lived in kuccha houses. Similarly, in case of medium farmer, 22.5% farmers lived in semi pucca houses, 60% farmers lived in pucca houses and 17.5% farmers lived in kuccha houses. The estimated male-female ratio (small-1.08, medium-1.27) show that the number of male members was more compared to the female members in both small and medium categories of farmers. The migration percentage in small and medium farmers were 45% and 57.5% respectively (**Table 6**).

**Table:6. Family size, type of houses and male-female ratio**

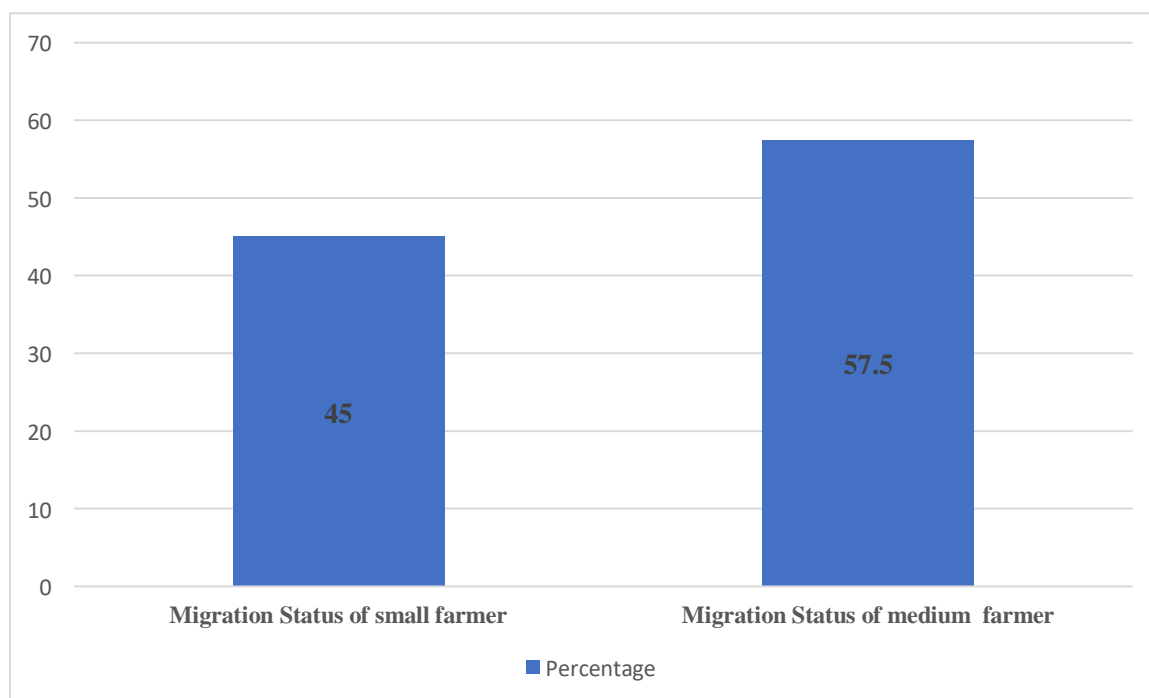
Village	Category	Type of House	Household Size	Male: Female	Migration Percentage
Khairbari	Small (n=40)	SP = 50%	Male = 49	1.08	45%
		P = 20%			
		K =30%	Female = 45		
	Medium (n=20)	SP =22.5%	Male = 102	1.27	57.5%
		P = 60%			
K =17.5%		Female = 80			

\*SP=Semi pucca, P=Pucca, K=Kancha

#### 4.1.3 Migration status of the head of the family:

Due to sudden imposition of lockdown for pandemic, there are certain number of migrated people came to their home.

From the study area, there were out of 45% and 57.5% farmers under the category of small and medium farmer came to their home and spend. (fig.5).



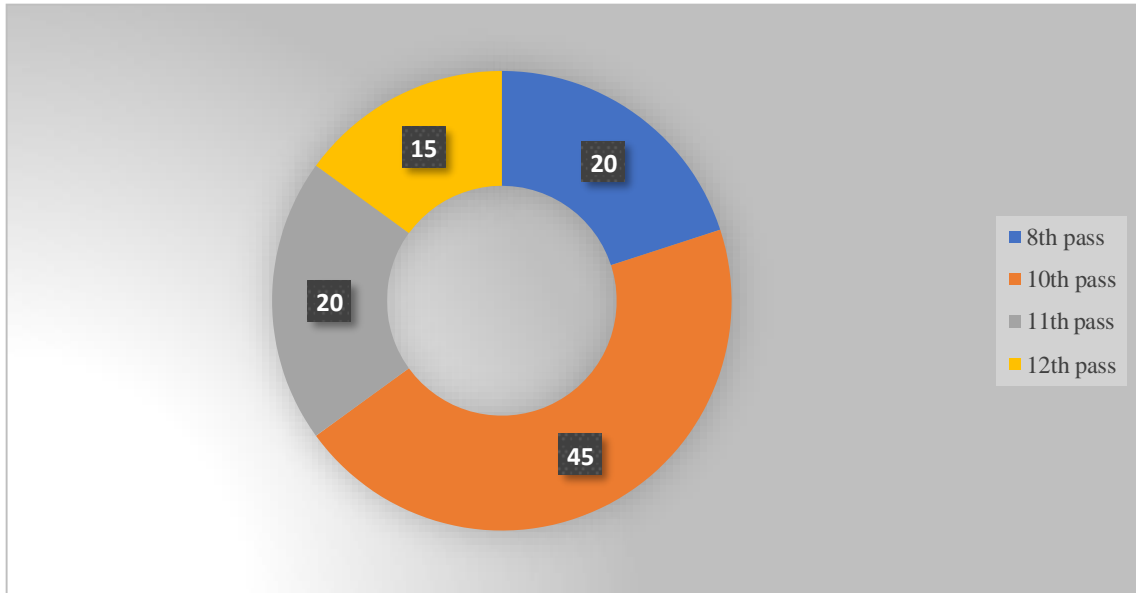
**Fig. 5.** Percentage distribution of Migration of the head of the family

#### 4.1.4. Educational Status of the Head of the family:

Th study the educational status, the head of the sample farmers were classified into four categories according to the education level like 8th, 10th, 11th, and 12th standard.

From the Fig. 6, about 45% (highest) farmers came under the category of 10<sup>th</sup> pass which was followed by 20% with categories of both 8<sup>th</sup> pass and 11<sup>th</sup> pass. The lowest percentage of about 15% had fallen under the category of 12<sup>th</sup> standard (**Fig. 6**).

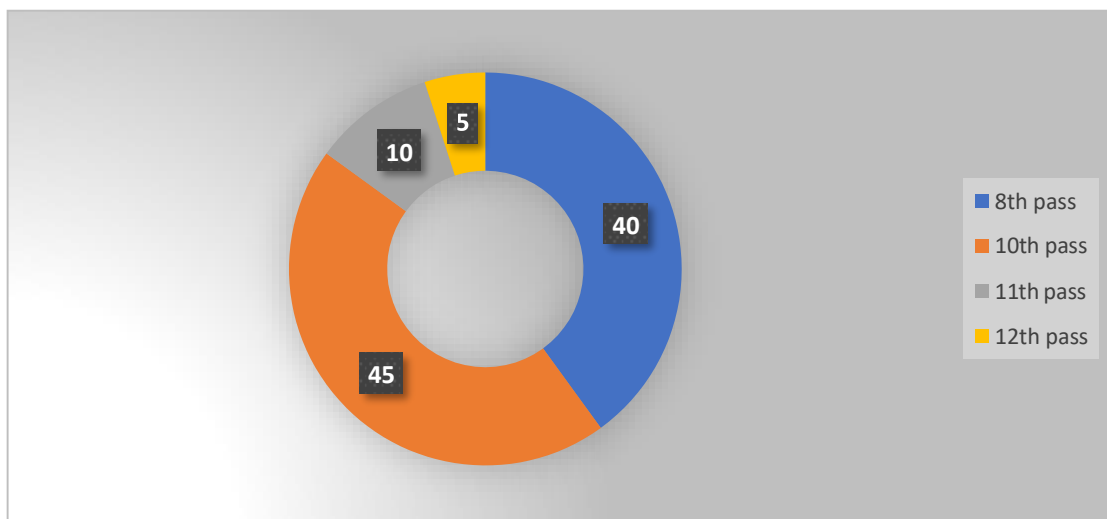
**A. Small Farmer:**



**Fig. 6: Educational Status of the Head of the family**

From the figure 7. About 45% (highest) farmers came under the category of 10<sup>th</sup> pass which was followed by 40% and 10% with categories of 8<sup>th</sup> pass and 11<sup>th</sup> pass. The lowest percentage of about 5% had fallen under the category of 12<sup>th</sup> standard (**Fig. 7**).

**A. Medium Farmer:**



**Fig. 7: Educational Status of the Head of the family**

#### 4.1.5. Participations ratio in farming and yield of Paddy crops in the three different period of pandemic

In Covid-19 pandemic condition, the farmers cultivated paddy crop in pre-kharif season. An effort has been made in this exercise to compare the yield of principal crops for three periods, namely, before, during and after Covid-19 pandemic. The small and medium farmers obtained a yield of paddy for 35.55Q and 40.5Q per ha in the period of before pandemic. However, during pandemic, the estimated yield of paddy had come down to 30.65Q/ha and 40.65Q/ha respectively. In after pandemic when new normal situation was experienced, the yield of paddy showed an increasing trend at 38.5Q/ha and 42.5Q/ha. Thus, results reveals that the yield of paddy in the period of after pandemic had recorded the highest among previous two periods of pandemic. **Table 7** demonstrates all the information. The study also identified that engagement of family members of small category of farmers was low (33.3%) compared to medium farmers (66.6%)

**Table 7. Distribution of farmers and yield of paddy crop in three different period of pandemic:**

Category	Participation (%)	Yield of Paddy(Q/ha)		
		Before Pandemic	During Pandemic	After Pandemic
Small	33.3	35.55	30.65	38.5
Medium	66.6	40.5	40.65	42.5

#### 4.1.6. Participations of farmers and yield of wheat crops in the three different period of pandemic:

Farmers of the study area cultivated wheat crop in rabi season. The respective yields obtained by small and medium farmers before pandemic

situation stood at 38Q/ha and 38.5Q/ha. However, during pandemic, the yields were found to reduce at 36Q/ha and 38Q/ha respectively for them. In after pandemic, the yield of wheat was recorded at 40.5Q/ha and 40,5Q/ha respectively. It is, thus, observed that the yield of wheat in the period of after pandemic is highest among previous two period of pandemic (**Table 8**).

**Table 8. Distribution of farmers and yield of wheat crop in three different period of pandemic:**

Category	Participation (%)	Yield of Wheat(Q/ha)		
		Before Pandemic	During Pandemic	After Pandemic
<b>Small</b>	33.3	38	36	40.5
<b>Medium</b>	66.6	38.5	38	40.5

#### **4.2. Cost of cultivation and farm business analysis of different crops**

It was presumed that impacts of Covid-19 pandemic could be reflected in farmers' behaviour while applying the level of inputs in the field for cultivation of the crop. Covid-19 pandemic was a stress situation for the farmers and it is one of the main objectives of the study to know their operational strategies in farming. According, this part of the study, would examine the level of input uses and, consequently, their influences on production, productivity and return both for small and medium categories of farmers. Following Table 9 will show the relevant information and analysis as stated above.

#### **4.2.1 Cost of cultivation of paddy according to farm size and three stages of pandemic (Unit: Rs/ha)**

##### **A. Small Farmers:**

Table 9 reveals that cost of cultivation (both Cost  $A_1$  and Cost  $C_3$ ) was higher during pandemic. In case of total cost (Cost  $C_3$ ), the value stood at Rs. 68351.52/ha which was 13% and 6% more than before and after pandemic situation. If Cost  $A_1$  was considered, Cost of cultivation of paddy (Rs.37437.75/ha) during pandemic remained 12% and 5.57% higher when compared with before and after pandemic. This difference of cost of cultivation was attributed to mainly higher cost of inputs during pandemic. Besides, family labour engagement was also more due to reverse migration.

**Table 9. Cost of cultivation of paddy according to farm size and three stages of pandemic (Unit: Rs/ha)**

**A. Small Farmers:**

Sl. no	Particular	Units	Before Pandemic			During Pandemic			After Pandemic		
			Amount	Rate	Total	Amount	Rate	Total	Amount	Rate	Total
1	Hired labour	MD	60	250	15000	58.5	200	11700	60.2	250	15050
2	Seed	Rs/Kg	56.8	70	3976	55.5	120.5	6687.75	58.2	75	4365
3	Manure	Rs/t	1.42	1680	2385.6	1.05	2200	2310	1.75	1750	3062.5
4	Urea	Rs/Kg	155	5.63	872.65	160	9.5	1520	165	6.05	998.25
5	SSP	Rs/Kg	210	7.5	1575	200	14	2800	215	8	1720
6	MOP	Rs/Kg	82.5	13	1072.5	80	24	1920	85	13	1105
7	Plant Protection	Lumpsum			3500			4500			4000
8	Machinery charge	Lumpsum			4800			6000			5500
<b>9</b>	<b>Cost A<sub>1</sub></b>				33181.75			37437.75			35800.75
<b>10</b>	<b>Cost C<sub>3</sub></b>				60466,175			68351.525			64570.825

## **B. Medium Farmers:**

Table 10 reveals that cost of cultivation (both Cost A<sub>1</sub> and Cost C<sub>3</sub>) was higher during pandemic. In case of total cost (Cost C<sub>3</sub>), the value stood at Rs. 72991.325/ha which was 14% and 7% more than before and after pandemic situation. If Cost A<sub>1</sub> was considered, Cost of cultivation of paddy (Rs. 40855.75 /ha) during pandemic remained 12.4% and 4.82% higher when compared with before and after pandemic. This difference of cost of cultivation was attributed to mainly higher cost of inputs during pandemic. Besides, family labour engagement was also more due to reverse migration.

**Table 10. Cost of cultivation of Paddy of khairbari village in the three stages of pandemic (per ha):**

**B. Medium Farmers:**

Sl. No	Particular	Units	Before Pandemic			During Pandemic			After Pandemic		
			Amount	Rate	Total	Amount	Rate	Total	Amount	Rate	Total
1	Hired labour	MD	62	250	15500	60.5	200	12100	62.5	250	15625
2	Seed	Rs/Kg	64.5	70	4515	58.5	120.5	7049.25	65	75	4875
3	Manure	Rs/t	2.5	1680	4200	2	2200	4400	2.75	1750	4812.5
4	Urea	Rs/Kg	175.85	5.63	990.0355	175	9.5	1662.5	180	6.05	1089
5	SSP	Rs/Kg	220.5	7.5	1653.75	220	14	3080	230	8	1840
6	MOP	Rs/Kg	90.75	13	1179.75	86	24	2064	95	13	1235
7	Plant Protection	Lumpsum			3500			4500			4000
8	Machinery charge	Lumpsum			4800			6000			5500
9	Cost A <sub>1</sub>				36338.53			40855.75			38976.5
10	Cost C <sub>3</sub>				63787.383			72991.325			68091.65

## 4.2.2 Profitability analysis of paddy crop in the three stages of pandemic

### A. Small Farmer:

Profitability analysis shows (**Table 11**) that estimated values of farm business income (Rs. 37292.25/ha) and net farm income (Rs.6378.47) during pandemic were low compared to before and after pandemic situations. Farmers received Rs. 8301/ha (18.2%) and Rs.14557/ha (28%) less compared to before and after pandemic respectively when considered Cost A<sub>1</sub>. In case of Cost C<sub>3</sub>, decline of incomes recorded at Rs.11930/ha (65%) and Rs. 16700/ha (72.36%) respectively for before and after pandemic. Results of return-cost ratios were more than one in all the cases implying that paddy cultivation was still profitable when estimated on the basis of both operational and total cost of cultivation. Thus, the extent of loss for paddy cultivation was found more in case of total cost of cultivation. In general, farmers income was found to reduce during the situation of pandemic.

**Table 11. Profitability analysis of paddy crop in the three stages of pandemic:**

**A. Small Farmer:**

Sl. no	Particular	Units	Before Pandemic			During Pandemic			After Pandemic		
			Amount	Rate	Total	Amount	Rate	Total	Amount	Rate	Total
1	Main Product	Rs/q	35.55	1800	63990	30.65	1950	59767.5	38.5	1850	71225
	By Product	Rs/kahan	17.5	850	14875	15.75	950	14962.5	18.25	900	16425
	Gross Income				78775			74730			87650
2	Cost A <sub>1</sub>				33181.75			37437.75			35800.75
3	Cost C <sub>3</sub> (Total Cost)				60466.175			68351.525			64570.825
4	Farm Business income (Gross income – Cost A <sub>1</sub> )				45593.25 (R:C= 2.37)			37292.25 (R:C= 1.99)			51849.25 (R:C=2.45)
5	Net Farm Income (Gross income – Cost C <sub>3</sub> )				18308.825 (R:C=1.30)			6378.475 (R:C=1.09)			23079.175 (R:C=1.3)

## **B. Medium Farmers:**

Profitability analysis shows (**Table 12**) that estimated values of farm business income (Rs. 38432.5/ha) and net farm income (Rs 6296.925.) during pandemic were low compared to before and after pandemic situations. Farmers received Rs. 15128.9/ha (28.2%) and Rs.21016/ha (35%) less compared to before and after pandemic respectively when considered Cost A<sub>1</sub>. In case of Cost C<sub>3</sub>, decline of incomes recorded at Rs.19815.692/ha (75%) and Rs. 24034.425/ha (79.2%) respectively for before and after pandemic. Results of return-cost ratios were more than one in all the cases implying that paddy cultivation was still profitable when estimated on the basis of both operational and total cost of cultivation. Thus, the extent of loss for paddy cultivation was found more in case of total cost of cultivation. In general, farmers income was found to reduce during the situation of pandemic.

**Table 12. Profitability analysis of paddy crop in the three stages of pandemic:**

**B. Medium Farmers:**

Sl. no	Particular	Units	Before Pandemic			During Pandemic			After Pandemic		
			Amount	Rate	Total	Amount	Rate	Total	Amount	Rate	Total
1	Main Product	Rs/q	40.5	1800	72900	40.65	1950	79267.5	42.5	1850	78625
	By Product	Rs/kahan	20	850	17000	20.75	950	19712.5	22	900	19800
	Gross Income				89900			79288.25			98425
2	Cost A <sub>1</sub>				36338.53			40855.75			38976.5
3	Cost C <sub>3</sub> (Total Cost)				63787.383			72991.325			68091.65
4	Farm Business income (Gross income – Cost A <sub>1</sub> )				53561.47 (R:C= 2.47)			38432.5 (R:C= 1.94)			59448.5 (R:C= 2.52)
5	Net Farm Income (Gross income – Cost C <sub>3</sub> )				26112.617 (R:C=1.40)			6296.925 (R:C=1.08)			30333.35 (R:C= 1.44)

### **4.2.3 Cost of cultivation of Wheat of khairbari village in the three stages of pandemic (per ha):**

#### **A. Small Farmers:**

Table 13 reveals that cost of cultivation (both Cost  $A_1$  and Cost  $C_3$ ) was higher during pandemic. In case of total cost (Cost  $C_3$ ), the value stood at Rs.76362/ha which was 12.6% and 5.8% more than before and after pandemic situation. If Cost  $A_1$  was considered, Cost of cultivation of paddy (Rs. 44520/ha) during pandemic remained 13% and 4.8% higher when compared with before and after pandemic. This difference of cost of cultivation was attributed to mainly higher cost of inputs during pandemic. Besides, family labour engagement was also more due to reverse migration.

**Table 13. Cost of cultivation of Wheat of Khairbari village in the three stages of pandemic (per ha):**

**A. Small Farmers:**

Sl. No	Particular	Units	Before Pandemic			During Pandemic			After Pandemic		
			Amount	Rate	Total	Amount	Rate	Total	Amount	Rate	Total
1	Hired labour	MD	58.8	250	14700	55.65	200	11130	60	250	15000
2	Seed	Rs/Kg	62	100	6200	60.5	150	9075	62.4	110	6864
3	Manure	Rs/t	2.6	1680	4368	2.5	2200	5500	2.65	1750	4637.5
4	Urea	Rs/Kg	175	5.63	985.25	170	9.5	1615	180	6.05	1089
5	SSP	Rs/Kg	225	7.5	1687.5	220	14	3080	240	8	1920
6	MOP	Rs/Kg	190	13	2470	180	24	4320	200	13	2600
7	Plant Protection	Lumpsum			3300			4000			3500
8	Machinery charge	Lumpsum			5000			5800			5200
9	Cost A <sub>1</sub>				38710.75			44520			42381.5
10	Cost C <sub>3</sub>				66671.825			76362			71919.65

## **B. Medium Farmers:**

Table 14 reveals that cost of cultivation (both Cost A<sub>1</sub> and Cost C<sub>3</sub>) was higher during pandemic. In case of total cost (Cost C<sub>3</sub>), the value stood at Rs. 79915 /ha which was 11.4% and 7.1% more than before and after pandemic situation. If Cost A<sub>1</sub> was considered, Cost of cultivation of paddy (Rs. 47350/ha) during pandemic remained 12.4% and 8.07% higher when compared with before and after pandemic. This difference of cost of cultivation was attributed to mainly higher cost of inputs during pandemic. Besides, family labour engagement was also more due to reverse migration.

**Table 14. Cost of cultivation of Wheat of khairbari village in the three stages of pandemic (per ha):**

**B. Medium Farmers:**

Sl. No	Particular	Units	Before Pandemic			During Pandemic			After Pandemic		
			Amount	Rate	Total	Amount	Rate	Total	Amount	Rate	Total
1	Hired labour	MD	60	250	15000	58.6	200	11720	62.5	250	15625
2	Seed	Rs/Kg	72.5	100	7250	65	150	9750	70	110	7700
3	Manure	Rs/t	3	1680	5040	2.75	2200	6050	3	1750	5250
4	Urea	Rs/Kg	185	5.63	1041.55	180	9.5	1710	190	6.05	1149.5
5	SSP	Rs/Kg	250	7.5	1875	240	14	3360	250	8	2000
6	MOP	Rs/Kg	195	13	2535	190	24	4560	200	13	2600
7	Plant Protection	Lumpsum			3500			4200			3800
8	Machinery charge	Lumpsum			5200			6000			5400
9	Cost A <sub>1</sub>				41441.55			47350			43524.5
10	Cost C <sub>3</sub>				70775.1			79915			74166.95

#### **4.2.4 Profitability of Wheat crop of khairbari village in the three stages of pandemic:**

##### **A. Small Farmers:**

Profitability analysis shows (**Table 15**) that estimated values of farm business income (Rs. 35380/ha) and net farm income (Rs 3538/ha.) during pandemic were low compared to before and after pandemic situations. Farmers received Rs. 1730/ha (4.6%) and Rs.3838.5/ha (9.7%) less compared to before and after pandemic respectively when considered Cost A<sub>1</sub>. In case of Cost C<sub>3</sub>, decline of incomes recorded at Rs.5610.175/ha (61.3%) and Rs. 6142.35/ha (63.4%) respectively for before and after pandemic. Results of return-cost ratios were more than one in all the cases implying that paddy cultivation was still profitable when estimated on the basis of both operational and total cost of cultivation. Thus, the extent of loss for wheat cultivation was found more in case of total cost of cultivation. In general, farmers' income was found to reduce during the situation of pandemic.

**Table 15. Profitability of Wheat crop of khairbari village in the three stages of pandemic:**

**A. Small Farmers:**

Sl. no	Particular	Units	Before Pandemic			During Pandemic			After Pandemic		
			Amount	Rate	Total	Amount	Rate	Total	Amount	Rate	Total
1	Main Product	Rs/q	38	1980	75240	36	2200	79200	40.5	2000	81000
	By Product	Rs/trolley			580			700			600
	Gross Income				75820			79900			81600
2	Cost A <sub>1</sub>				38710.75			44520			42381.5
3	Cost C <sub>3</sub> (Total Cost)				66671.825			76362			71919.65
4	Farm Business income (Gross income – Cost A <sub>1</sub> )				37110 (R:C=1.95)			35380 (R:C=1.79)			39218.5 (R:C=1.9)
5	Net Farm Income (Gross income – Cost C <sub>3</sub> )				9148.175 (R:C=1.13)			3538 (R:C=1.04)			9680.35 (R:C=1.14)

## **B. Medium Farmers:**

Profitability analysis shows (**Table 16**) that estimated values of farm business income (Rs.36950/ha) and net farm income (Rs 4385/ha.) during pandemic were low compared to before and after pandemic situations. Farmers received Rs. 1581/ha (4.47%) and Rs.1125.5/ha (3%) less compared to before and after pandemic respectively when considered Cost A<sub>1</sub>. In case of Cost C<sub>3</sub>, decline of incomes recorded at Rs.1652.9 /ha (27.3%) and Rs. 3048.05/ha (41%) respectively for before and after pandemic. Results of return-cost ratios were more than one in all the cases implying that paddy cultivation was still profitable when estimated on the basis of both operational and total cost of cultivation. Thus, the extent of loss for wheat cultivation was found more in case of total cost of cultivation. In general, farmers income was found to reduce during the situation of pandemic.

**Table 16. Profitability of Wheat crop of khairbari village in the three stages of pandemic:**

**B. Medium Farmers:**

Sl. no	Particular	Units	Before Pandemic			During Pandemic			After Pandemic		
			Amount	Rate	Total	Amount	Rate	Total	Amount	Rate	Total
1	Main Product	Rs/q	38.5	1980	76230	38	2200	75240	40.5	2000	81000
	By Product	Rs/trolley			580			700			600
	Gross Income				76810			84300			81600
2	Cost A <sub>1</sub>				41441.55			47350			43524.5
3	Cost C <sub>3</sub> (Total Cost)				70775.1			79915			74166.95
4	Farm Business income (Gross income – Cost A <sub>1</sub> )				35368.45 (R:C=2.33)			36950 (R:C=1.78)			38075.5 (R:C=1.87)
5	Net Farm Income (Gross income – Cost C <sub>3</sub> )				6037.9 (R:C=1.08)			4385 (R:C=1.05)			7433.05 (R:C=1.08)

### 4.3 Variation in farm efficiency according to farm size and three stages of pandemic:

An effort had been made in this exercise to examine the variations level of input application, yield and profit according to farm size and three stages of pandemic. The important factors considered were hired laborer cost, family labour, inputs, machineries, etc.

**Table 17. Variations level of input application, yield and profit according to farm size and three stages of pandemic:**

Category of farmers	Particular	Units	Extent of Variation (increase or decrease)		
			Before Pandemic	During Pandemic	After Pandemic
Small Farmer	Hired labour cost	Rs	+	-	+
	Participation of family labour	MD	-	+	-
	Input costs (seed, PPC, fertilizer, manure, machinery)	Rs	-	+	-
	Yield	Q/ha	+	-	+
	Price of produce	Rs/Q	+	-	+
	Gross Income	Rs	+	-	+
	Net Income	Rs	+	-	+
Medium Farmer	Hired labour cost	Rs	+	-	+
	Participation of family labour	MD	-	+	-
	Input costs (seed, PPC, fertilizer, manure, machinery)	Rs	-	+	-
	Yield	Q/ha	+	-	+
	Price of produce	Rs/Q	+	-	+
	Gross Income	Rs	+	-	+
	Net Income	Rs	+	-	+

\*Note : “+” sign = increase and “-” sign = decrease

Accordingly, **Table 17** demonstrated that cost of hired labour and other inputs were increased during pandemic. Inputs were not adequately available as per the demand and consequently, price was increased. Due to reverse migration and low level of employment opportunity, attachment of family labour was found to rise. Farmers could not always get fair prices for their produce due to lack of access to contact with consumers, transportation, and market. As a result, net income, though remained positive, was drastically reduced during the period of pandemic. Thus, during pandemic, employment, and income of the respondent sample farmers in the area under study had been found to decline.

#### 4.4. Determination of inputs responsible for yield with multiple regression analysis:

Yield prediction has been done by using multiple regression analysis and different independent variable collected during the survey for small and medium farmer in the three stages, viz. before, during and after pandemic condition.

The **Table 18** describes different regression coefficient along with their p-Value for small farmer. So, the result suggested that the variable area is significance at 100% level of significance for determination of yield. The  $R^2$  and adjusted  $R^2$  of the model (formula  $y = b_1x_1 + b_2x_2 + \epsilon$ ) are 0.858 and 0.851.

**Table 18. Results of estimates determinants of yield of wheat crop in the period of “Before pandemic”:**

In case of Small Farmer:

Sl. No	Variables (Small Farmers)	Units	Coefficient	p-Value
1	Area	Ha	2.109	0.001*
2	Savings	Rs	-0.002	0.94
3	$R^2$		0.858	
4	Adjusted $R^2$		0.851	

**\*5% Significance Level**

The **Table 19** describes different regression coefficient along with their p-Value for medium farmer. So, the result suggested that the variable area is significance at 100% level of significance for determination of yield. The  $R^2$  and adjusted  $R^2$  of the model (formula  $y = bx + \epsilon$ ) are 0.859 and 0.855.

**Table 19. Results of estimates determinants of yield of wheat crop in the period of “Before pandemic”:**

In case of Medium Farmer:

Sl. No	Variables	Units	Coefficient	p-Value
1	Area	Ha	2.06	<2e-16***
2	R <sup>2</sup>		0.859	
3	Adjusted R <sup>2</sup>		0.855	

**\*\*\*1% Significance Level**

The **Table 20** describes different regression coefficient along with their p-Value for small farmer. So, the result suggested that the variable area and minimum support price are significance at 5% level of significance for determination of yield. The R<sup>2</sup> and adjusted R<sup>2</sup> of the model (**formula  $y = b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+ \epsilon$** ) are 0.771 and 0.689.

**Table 20. Results of estimates determinants of yield of paddy crop in the period of “during pandemic”:**

In case of Small Farmer:

Sl. No	Variables	Units	Coefficient	p-value
1	Intercept		6.695	0.026
2	Area	Ha	0.911	0.043*
3	Fertilizer	Kg/ha	-0.126	0.407
4	Price of Crops	Rs	0.088	0.530
5	MSP	Rs	0.580	0.030*
6	Manure	Kg/ha	-0.361	0.408
7	R <sup>2</sup>		0.771	
8	Adjusted R <sup>2</sup>		0.689	

**\*5% Significance Level**

The **Table 21** describes different regression coefficient along with their p-Value for medium farmer. So, the result suggested that the variable minimum support price and manure are significance at 5% and 10% level of significance for determination of yield. The  $R^2$  and adjusted  $R^2$  of the model (formula  $y = b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + \epsilon$ ) are 0.623 and 0.568.

**Table 21. Results of estimates determinants of yield of paddy crop in the period of “during pandemic”:**

In case of Medium Farmer:

Sl. No	Variables (Medium Farmers)	Units	Coefficient	p-Value
1	Intercept		6.182	0.06
2	Area	Ha	0.158	0.563
3	Fertilizer	Kg/ha	0.151	0.298
4	Price of Crops	Rs	0.044	0.747
5	MSP	Rs	0.310	0.034*
6	Manure	Kg/ha	0.443	0.08**
7	$R^2$		0.623	
8	Adjusted $R^2$		0.568	

**\*5% Significance Level, \*\*10% Significance Level**

The **Table 22** describes different regression coefficient along with their p-Value for small farmer. So, the result suggested that area significance at 100% level of significance for determination of yield. The  $R^2$  and adjusted  $R^2$  of the model (formula  $y = b_1x_1 + \epsilon$ ) are 0.708 and 0.693.

**Table 22. Results of estimates determinants of yield of jute crop in the period of “After pandemic”:**

In case of Small Farmer:

Sl. No	Variables	Units	Coefficient	p-Value
1	Area	Ha	2.24	<1.74e-06***
2	$R^2$		0.708	
3	Adjusted $R^2$		0.693	

**\*\*\*1% Significance Level**

The **Table 23** describes different regression coefficient along with their p-Value for medium farmer. So, the result suggested that area and fertilizer are significance at 5% level of significance for determination of yield. The  $R^2$  and adjusted  $R^2$  of the model (**formula  $y = b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+ \epsilon$** ) are 0.710 and 0.667.

**Table 23. Results of estimates determinants of yield of jute crop in the period of “After pandemic”:**

In case of Medium Farmer:

Sl. No	Variables (Medium Farmers)	Units	Coefficient	p-Value
1	Intercept		0.480	0.918
2	Area	Ha	0.501	0.000*
3	Fertilizer	Kg/ha	0.458	0.000*
4	MSP	Rs	-0.673	0.505
5	Savings	Rs	-0.234	0.816
6	Investment in Agri.	Rs	0.052	0.582
7	$R^2$		0.710	
8	Adjusted $R^2$		0.667	

**\*5% Significance Level**

#### 4.5 Constraints analysis based on farmers perception

Farmers' perceptions were studied to ascertain their views and feeling about different constraints during Covid-19 pandemic which may stand in the way of business performance of farming for social and economic well beings. Garrett technique was followed in this exercise. Only ten important constraints were considered as per farmers' perception which is presented in **Table 24**.

**Table 24. Score and position of different constraints for of small farmers on yield performance**

Sl. No.	Constraints	Score	Rank
1	Liquid money	85.6	5
2	More DBT scheme	86	4
3	<b>Govt. arrangement in emergency</b>	<b>86.6</b>	<b>2</b>
4	<b>Supply of Necessary goods</b>	<b>89</b>	<b>1</b>
5	More Credit	85.35	8
6	Free inputs and ration supply	84.2	10
7	Alternative job	85.4	7
8	Physician near home	85.5	6
9	High interest for saving	85.2	9
10	<b>Promotion of FPO or SHG</b>	<b>86</b>	<b>3</b>

It is evident from the study that supply of necessary goods occupies the first position according to farmers' perceptions. It was followed by Govt. initiatives during emergency period (pandemic) and promotion of FPO and SHGs. Besides, they perceived that direct benefit transfer, free supply of agricultural inputs and ration and more credit would help them during the period of pandemic.

The same exercise was pursued for medium group of farmers. They assigned maximum weightage on free supply of agricultural inputs and ration (PDS). Besides, possession of liquid money, delivery of more farm credit, alternative jobs, road repair for marketing, etc. had much role for social and economic benefits of the medium farmers during the period of study. All the information has been shown in **Table 25**.

**Table 25. Score and position of different constraints for of medium farmers on yield performance**

<b>Sl. No.</b>	<b>Constraints</b>	<b>Score</b>	<b>Rank</b>
1	<b>Liquid money</b>	<b>89</b>	<b>2</b>
2	More DBT scheme	86.2	5
3	<b>More Credit</b>	<b>86.7</b>	<b>3</b>
4	<b>Free input supply</b>	<b>89.2</b>	<b>1</b>
5	Alternative job	86.6	4
6	Physician near home	85.8	7
7	New technology of farm	83	10
8	High interest for saving	89	8
9	Promotion of FPO or SHG	85.8	6
10	Road repair	84.2	9

#### 4.6 To examine the farm management and other practices adopted by the farmers during pandemic to reduce risk

**Table 26. Strategies and practices adopted by small farmers**

Sl. No.	Strategies	Number of farmers followed	Percentage
1.	Seeking alternative Job	13	65
2.	New scope of job	7	35
3.	High yield short duration crop	7	35
4.	<b>Involvement of Family labour</b>	<b>14</b>	<b>70</b>
5.	Crop production management	10	50
6.	Borrowed fund	8	40
7.	Holding liquid money	9	45
8.	Insurance	11	55
9.	Savings	8	40
10.	Marketing of produce through	11(Direct sale) + 9(Middleman)	55+45
11.	Use of online media	6	30

Covid-19 pandemic brought lot of stresses among the farming. Since the farmers had very few alternative jobs, they had to stick to on farm operation for their livelihoods. But the changing scenario during pandemic made them to adopt some specific strategies to tackle the situation. In view of this, an effort was made in this exercise to access to different farm and family-oriented practices as followed by them (**Table 26**). More family labour engagement, seeking alternative jobs, short duration high yielding varieties, holding more liquid money, marketing through individual or by middlemen, etc. are some of primary aspects which were by small farmers. However, due non-availability of employment opportunity, they were compelled to engage them in farming.

**Table 27. Strategies and practices adopted by medium farmers**

	Strategies	Number of farmers followed	Percentage
1.	Seeking alternative Job	28	70
2.	New scope of job	22	55
3.	High yield short duration crop	33	82.5
4.	<b>Involvement of Family labour</b>	<b>36</b>	<b>90</b>
5.	Crop production management	31	77.5
6.	Borrowed fund	21	52.5
7.	Holding liquid money	24	60
8.	Insurance	26	65
9.	Savings	30	75
10.	Marketing of produce through	27(Direct sale) + 13(Middleman)	67.5 + 32.5
11.	Use of online media	14	35

**Table 27** shows same trend with regards to adoption of strategic farm practices by the medium farmers. In addition, crop production management, insurance and borrowed fund, etc. were also given much importance. Thus, small and medium farmers had followed same attitudes to maintain their farms and families for their social and economic sustainability during the period.

#### **4.7. Different management policies and programme taken by government of different countries for helping the farmers during pandemic:**

The COVID-19 pandemic's long-term effects on household wellbeing will depend on how households handle the income shocks it causes. Poorer households may reduce consumption, especially of necessities like food and healthcare, and sell off productive assets in order to deal with income shocks because they have less money, savings, or access to insurance, credit, and social safety. management mechanisms like these can assist families in addressing their immediate needs, but they can have long-term impacts on the welfare of the family and place families in poverty traps with low equilibrium that are difficult to escape. Thus, the government of different countries have taken some necessary and emergent actions and develop some policies or programme to help the farmer to meet their basic needs. Accordingly, some of the such initiatives have been presented below for the countries like India, Bangladesh, Canada and Canada.

##### **4.7.1 Strategies that are taken by different countries:**

<b>INDIA</b>	<ul style="list-style-type: none"> <li>• One of the key pillars of support in helping rural households in times of distress has been the government's flagship employment programme, MNREGA. The lockdown put the program's effectiveness and scope to the test as it tried to meet the extra (overdue) demand of people looking for job and a paycheck. Only 39% of the respondents who attempted to obtain MNREGA employment in August 2020 reported doing so. In June 2020, this forecast was higher, at 55%.</li> </ul>
	<ul style="list-style-type: none"> <li>• In comparison to MNREGA, both recipient coverage and the amount of relief delivered by PDS are high. Nearly 88–90% of respondents who qualified for free rations</li> </ul>

	<p>stated that they received free rice, wheat, or pulses from PDS shops between June 2020 and August 2020. It's interesting to note that PDS seems to satisfy 76% of family cereal needs.</p>
<ul style="list-style-type: none"> <li>• During the lockdown, cash and bank transfers were crucial in supporting rural households. In June 2020, about 51% of all households claimed to have received money in cash or a direct transfer to a bank account from the government.</li> </ul>	<ul style="list-style-type: none"> <li>• There is evidence that welfare and transfer programmes perform better when there are strong connections between households and government organisations. Given their reach and penetration among households, Self-Help Groups (SHGs) can, in this sense, play a catalytic role in facilitating government transfers to beneficiaries.</li> </ul>
<ul style="list-style-type: none"> <li>• The government should enhance the allotments for direct transfers to farmers through PM Kisan from Rs 6,000 to at least Rs 10,000 per farming family for this year, and include everyone who is actively participating in farming regardless of where (s)he owns a certain piece of land or not (2020-21). This will provide the majority of farming households with immediate assistance in somewhat recouping their losses from March and April as well as some protection from the deflationary effect that the protracted lockout had on agricultural prices.</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluations of significant government and non-governmental organisation (NGO) projects show that grouping women into homogeneous units has aided in the</li> </ul>

	<p>efficient implementation of measures for agriculture development and the empowerment of women farmers (Sulaiman and Reddy, 2014). Examples of such government-led initiatives include the Society for the Elimination of Rural Poverty initiative in Andhra Pradesh, the Kudumbashree model applied in Kerala, the Aajeevika programme and Mahila Kisan Sashaktikaran Pariyojana under the National Rural Livelihood Mission. The formation of SHGs by PRADAN and a number of projects by SEWA in Gujarat are important NGOs' contributions to the empowerment and economic independence of women producer groups, notably during the epidemic.</p>
	<ul style="list-style-type: none"> <li>• Training and deploying community frontline staff are another promising strategy for improving women farmers' access to trustworthy extension. By utilizing ICDS and Anganwadi workers in India and Female Community Health Volunteers in Nepal, both countries have achieved notable success with this model in the areas of fundamental maternal and child health and feeding practices. Additionally, these frontline personnel have led post-COVID relief efforts in rural areas (Warrier, 2020).</li> </ul>
<b>Bangladesh</b>	<ul style="list-style-type: none"> <li>• The government of Bangladesh has announced two additional stimulus packages: Tk. 12 billion for the expansion of the old age and widow allowance programme and Tk. 15 billion for the microcredit and marginal people's lifestyle development programme.</li> </ul>

	<ul style="list-style-type: none"> <li>• Banks' daily (from 5 to 3.5 percent) and biweekly (from 2 to 2 percent) cash reserve ratios (CRR) were both decreased (from 5.5 to 4 percent).</li> </ul>
	<ul style="list-style-type: none"> <li>• Bangladesh Bank enables foreign owned/controlled businesses operating in Bangladesh to access short-term working capital loans from their parent companies/shareholders abroad to meet actual needs for paying wages and salaries. This includes providing foreign currency to Bangladeshi nationals facing difficulties returning home due to travel disruptions.</li> </ul>
<b>Canada</b>	<ul style="list-style-type: none"> <li>• The Bank of Canada included an increase in the existing GST tax credits as well as \$290 billion (13.2 percent of GDP) in direct aid to consumers and businesses, including wage subsidies, payments to employees without sick leave and access to employment insurance, and child care benefits.</li> </ul>
	<ul style="list-style-type: none"> <li>• The federal government will provide assistance to Farm Credit Canada, increasing its ability to lend growers, agribusinesses, and food processors an additional \$5.2 billion.</li> </ul>
<b>China</b>	<ul style="list-style-type: none"> <li>• China government took some important steps include: (i) enhanced public investment; (ii) faster unemployment insurance payments; (iii) extension of benefits to migratory employees; (iv) tax relief; and (v) waiver of social security contributions.</li> </ul>

It is, thus, evident that India had taken exhaustive initiative in almost all sectors of the economy. However, more emphasis was given to farm and related

problems. Govt. of Bangladesh and Canada had mainly concentrated on monetary and fiscal policies. On the other hand, Covid-19 was first appeared in China, but it had also adopted lot of useful steps to retain its position in world economy. Evidences showed that they were quite successful as they became the world top exporter surpassing USA during the period of pandemic.

#### **4.7.2. Impact of initiatives of Govt. of India**

i) GDP growth rate came to positive growth in 2021 (8.95%) after a negative growth rate of -6.60% in 2020.

ii) Area, production and productivity of principal crops for both seasons (Rabi and Kharif) had no adverse effect. Instead, they showed a little increasing trend. Indian economy is agriculture based. Thus, agriculture had saved Indian economy during pandemic.

iii) Export volume had shown a recovery during 2021.

iv) Inflation had come to 5.13% (2021) from 6.62% (2020)

## CHAPTER – V

### SUMMARY AND CONCLUSION

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The topic for dissertation to M.Sc.(Ag.) “*An analysis of impact of covid-19 pandemic on farmers’ behaviour in relation with their management decision*” was conceived in connection with an event of Covid-19 pandemic. The worldwide spread of this pandemic has caused an unanticipated economic downfall in a large scale and becomes the main influencer of economic recession. The impacts have been observed in case of various aspects of economic, social and environmental issues. Agriculture was also not exceptional. Since India is an agrarian economy, lot of studies have been undertaken to assess the empirical phenomenon occurred due to this pandemic. In view of this, this study was conducted in a district (Jalpaiguri) of West Bengal with sample farmers (60 no.) during 2021-22. The main thrusts of the study were to examine the impact of pandemic on farmers’ farm operations and the practices (strategies) adopted by them to tackle the anticipated adverse impact during that period.

Techniques like CACP cost concepts for estimation of cost of cultivation of principal crops, multiple regression analysis, constraints analysis (Garrett ranking), etc. were applied in the study.

The study found that majority of the farmers were either small and marginal with low level of educational qualification (8<sup>th</sup> standard). Main occupation was farming. They usually raised all major crops like paddy, potato, wheat, jute, etc. To ascertain the variation or impact of farming efficiency during pandemic, three stages of analysis with three crops (paddy, wheat and jute) in respect of small and marginal farmers were done viz. before, during and after the pandemic. The CACP concepts for estimation of cost of cultivation were followed.

Farm efficiency measures revealed that cost of cultivation (Cost A<sub>1</sub> and Cost C<sub>3</sub>) of all three crops (paddy, wheat and jute) were higher (18 to 57%) during pandemic when compared with before and after pandemic. However, this variation was little bit small for wheat crop. This higher cost of cultivation might be attributed to *inter alia* higher cost of inputs and hired labour. Although farmers had of view that they would apply minimum level of inputs. Productivity (yield) of all crops showed a declining level during pandemic except wheat crops whose yield was little bit at par with existing level of productivity (20 to 30 q/ha). Return-cost ratios for all crops in respect of both small and marginal farmers were around 1.80 (based on Cost A<sub>1</sub>) and 1.07 (based on Cost C<sub>3</sub>) for paddy crop during pandemic. These values stood at lower side when compared with before and after pandemic. Similar pattern of costs and returns were found for wheat and jute crops too. Return in absolute term was seen higher for wheat crop. It was also seen that costs incurred for inputs and hired labour were higher, family labour engagement had increased and price of the produce was reduced during pandemic. Thus, returns from cultivation of all three crops were positive during pandemic though it was reduced compared to the returns of the same crops during 'after' and "before" pandemic.

To predict the factors (inputs) influencing the level of production (yield) for both small and medium farmers at all three stages, multiple regression analysis was done. The estimates showed that area under cultivation was found to significantly (5% level of significance) influence the level of yield wheat crops before pandemic for both small and medium farmers. In case of paddy crop, area and MSP could be predicted to affect the yield for small and medium farmers during pandemic. After pandemic, while using jute crop, it was estimated that area and use of fertilizer had much influence (5% level of significance) to predict the level of yield after pandemic. R<sup>2</sup> and adjusted R<sup>2</sup> values were also found to be more than 0.855.

Farmers' perceptions were studied to ascertain their views and feeling about different constraints during Covid-19 pandemic which may stand in the way of

business performance of farming for social and economic well beings. Garrett technique was followed in this exercise. For both types of farmers (small and medium), free supply of necessary goods, direct benefit transfer, holding of liquid money, seeking of alternative jobs, short duration high yielding seed, free ration, agricultural credit, Govt. initiatives, promotion of FPOs and SHGs, etc. had remained in the priority list as perceived by the farmers to face the event of pandemic.

The governments of different countries have taken some necessary and emergent actions and develop some policies or programme to help the farmer to meet their basic needs during pandemic. Accordingly, some of the such initiatives have been presented below for the countries like India, Bangladesh, Canada and Canada. India had taken exhaustive initiative in almost all sectors of the economy (social and economic). However, more emphasis was given to farm and related problems. Govt. of Bangladesh and Canada had mainly concentrated on monetary and fiscal policies. On the other hand, Covid-19 was first appeared in China, but it had also adopted lot of useful steps to retain its position in world economy. Evidences showed that they were quite successful as they became the world top exporter surpassing USA during the period of pandemic. However, some of the impacts of initiatives of Govt. of India had been realized in the following few cases which are as follows :

i) GDP growth rate came to positive growth in 2021 (8.95%) after a negative growth rate of -6.60% in 2020.

ii) Area, production and productivity of principal crops for both seasons (Rabi and Kharif) had no adverse effect. Instead, they showed a little increasing trend. Indian economy is agriculture based. Thus, agriculture had saved Indian economy during pandemic.

iii) Export volume had shown a recovery during 2021.

iv) Inflation had come to 5.13% (2021) from 6.62% (2020)

# CHARTER-VI

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PANDEMIC ON FARMERS BEHAVIOUR IN  
RELATION WITH THEIR MANAGEMENT  
DECISIONS

## Schedule

1. Name of the farmer(head)-
2. Address-
3. Household details-

Short name	Age(yrs )	Gender (M/F)	Education	Relation with head	Occupation (F/B/S/W/O)	Farming (F/S/P/N)	Migration (S/A/P)

**Occupation:** F-Farming, B-Business, S-Service, W-Wage Earning, O-Others

**Farming Participation:** F-Fully, S-Seasonally, P-Partially, N-Non participation

**Migration Status:** S-Seasonally, A-Annually, P-Permanently

4. **Type of residence :** Kuchha/ Semi Pucca/ Pucca;
5. **Land details:** leased or leased out
6. **Crop Production**

Particular	Before Pandemic	During Pandemic	After Pandemic
Area under cultivation of major crops	Season / Crop / Area	Season / Crop / Area	Season / Crop / Area
Variety (Seed)	Certfied/own/others	Certfied/own/others	Certfied/own/others
Ploughing	Mech/Human/Bullock	Mech/Human/Bullock	Mech/Human/Bullock
Inputs application	Fertilizer : Bio-ferti. : Manure/FYM : Irrigation : Insecticide : Others :	Fertilizer : Bio-ferti. : Manure/FYM : Irrigation : Insecticide : Others :	Fertilizer : Bio-ferti. : Manure/FYM : Irrigation : Insecticide : Others :
Availability of labour	Adequate/Shortage	Adequate/Shortage	Adequate/Shortage
Labour (MD)	HL ..... FL .....	HL ..... FL .....	HL..... FL .....
Labour cost (Rs/MD)			
Implements possession			
Yield of crops			
Marketable surplus			
Marketed surplus			
Price of crops			
Access to MSP			
System of market			
Any new marketing strategy			
Wastage of			

produce, if any			

### 7. Impact on other aspects

Particulars	Before Pandemic	During Pandemic	After Pandemic
Continuity of study			
Cost of Education (decrease/increase)			
Cost of Health (decrease/increase)			
Cost of living (decrease/increase)			
Cost of food (decrease/increase)			
Availability of job (decrease/increase)			
Migration (decrease/increase)			
Social contact (decrease/increase)			
Communication (decrease/increase)			
Entertainment (decrease/increase)			
Credit (decrease/increase)			
Saving (decrease/increase)			
Liquid money (decrease/increase)			
Livestock (decrease/increase)			
Investment in agril. (decrease/increase)			
Unemployment (decrease/increase)			

Note : Give quantitative values where ever is applicable.

### 8. Strategy adopted

Particulars	During Pandemic
Prioritising of strategy	
Seeking alternative job	
New scope of job	
Change of farming system or cropping pattern	

Change of time of sowing	
High yielding short duration crop	
Crop production management	(Implement/technology/input/labour)
Borrowed fund	(Purpose/source/amount/interest/repayment)
Holding liquid money	
Insurance (life/crop)	
Regular contact with	(Education/health/farming/market/job)
Effort for benefit of govt. scheme	
Engagement of excess manpower	
Marketing of produce	
Food habit	
Education	
Use of online media	
Online market	

**9. Farmers' perception (score 1 to 4)**

Constraints	Low (1)	Moderate (2)	High (3)	Very high (4)
Liquid money				
More DBT scheme				
Opening of educational instt.				
Govt. arrangement necessary goods				
Govt arrangement for selling of produce				
More credit				
Free Input supply				
Alternative job				
Physician near home				
Free ration				
Awareness during pandemic				
New technology for farm				
High interest for saving				
Promotion of FPO or SHG				
Laziness for seeking job				
Worst affected •Agriculture				

<ul style="list-style-type: none"><li>•Education</li><li>•Wage earner</li><li>•Health</li><li>•Peace</li></ul>				
Increased dependency <ul style="list-style-type: none"><li>•Luck</li><li>•God/Allah</li><li>•Astrologer</li><li>•Govt.</li><li>•Local leader</li><li>•Relatives</li><li>•saving</li><li>•Efficiency</li></ul>				

**Certificate of Originality**

To  
The Chairman, Advisory Committee  
Department of Agricultural Economics  
Faculty of Agriculture  
Uttar Banga Krishi Viswavidyalaya

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- iv. Name of the Department : Department of Agricultural Economics
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