IMPACT OF COVID-19 ON FARMING OPERATION IN SALEM DISTRICT

BY

GOKILA.K

(20PEC002)

A DISSERTATION SUBMITTED TO AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN

COIMBATORE - 641 043

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF

MASTER OF ARTS IN ECONOMICS

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❖ **ACKNOWLEDGEMENT**

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CHAPTER - I

INTRODUCTION

The novel Corona virus (COVID-19) pandemic has rapidly spread across the world, adversely affecting the lives and livelihoods of millions across the globe. India reported its first infection on 30 January 2020, prompting the authorities to soon initiate various measures to contain the spread of the epidemic. Given that the disease is highly contagious, the much-needed nation-wide lockdown was enforced starting 25 March 2020 in order to contain the spread of COVID-19 pandemic. During the initial few weeks, the restrictions were strict and all non-essential activities and businesses, including retail establishments, educational institutions, places of religious worship, across the country were prohibited from operating. Subsequently, these restrictions are being gradually eased in a phased manner in most parts of the country.

As the restrictions imposed due to the lockdown are being lifted, it is an opportune moment to analyse the impact of COVID-19 on different sectors of the economy. A number of reports have pointed towards the possibility of contraction of Indian GDP in 2020-21. This is a worrisome indication, since a higher GDP contributes immensely towards achieving better living standards, reduced poverty as well as improvement in other socio-economic indicators. While other sectors are reported to be under significant stress, it is important to analyse the impact on agricultural and allied sectors which provide likelihood to majority of the population in India.

Agriculture is the art and science of cultivating the soil, growing crops and raising livestock. It includes the preparation of plant and animal products for people to use and their distribution to markets. Agriculture provides most of the world's food and fabrics. Cotton, wool, and leather are all agricultural products. Agriculture also provides wood for construction and paper products. These products, as well as the agricultural methods used, may vary from one part of the world to another.

Agriculture in India is the primary source of income for about 58 % of the population. Indian agriculture commodities' contribution to the world food trade is increasing year by year. Nowadays, Indian farmers are getting all the opportunities and government schemes for

fulfilling their dreams. For that farmers get benefits and they produce advanced quality commodities and supply them in Indian markets and some commodities exported in foreign countries. Agriculture in India today is growing gradually with the advancement in technology. Mainly agriculture commodities are routine food and animals produced by the farmers on farms.

In India, various agriculture commodities are grains, dairy, livestock, and others that are consumed by users across the world. Various agricultural commodities were used for both a source of food and an industrial sector. Practically every person depends on agriculture somehow or another. We all want food for a living, and that food is called agriculture commodities, i.e., fruits, grains, vegetables, and livestock. And, agriculture commodities used to make clothes from wool and cotton. We used vehicles that had tires made from rubber.

India's rank in agriculture production 2020 is 74 out of 113 prime countries in terms of food. And, Indian grocery and food market placed 6th rank in the world. It contributes 70% of the sales. Indian farmers produce agricultural products, those products used for consumption in India and for export too. India is popularly known for its various agricultural commodities. All we know is that India is a rich agricultural country.In India consumption of rice is highest from other agriculture commodities. Rice mainly produced in India, including white rice and brown rice grown in the eastern and southern parts. India is the 2nd largest grower of rice over the world. Increasing demand in the market, rice production is in trend in India.

AGRICULTURAL AND FOOD SECTOR:

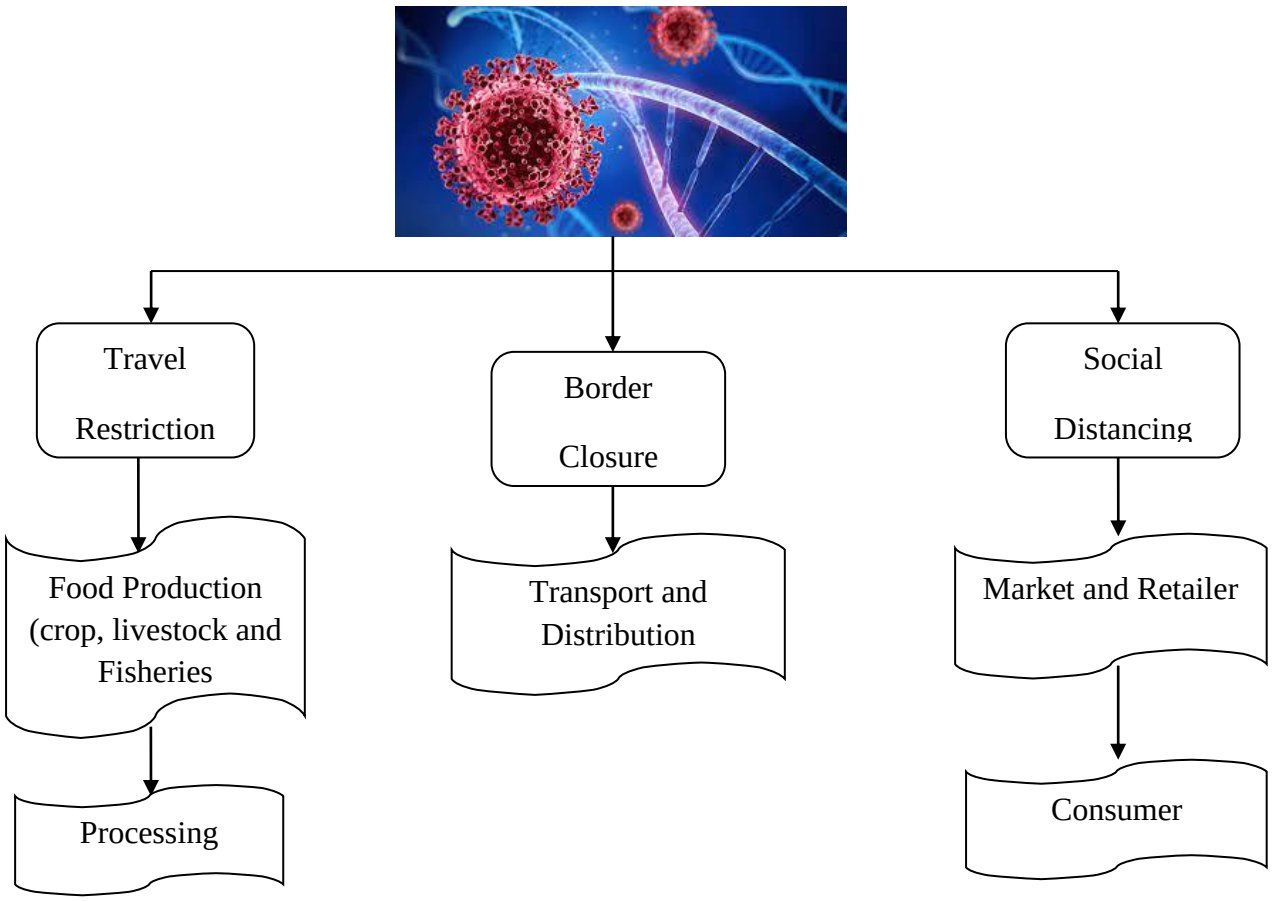
Indian economy is largely driven by the agricultural sector with around 18% of GDP and provides livelihood to 58% of the population. Already Indian farmers face several issues such as monsoon delays or failures, extreme weather conditions, price volatility, and rising debt. In addition, the COVID-19 pandemic has created new challenges that were previously not experienced by the agriculture sector. Due to the COVID-19 lockdown, most of the agricultural activities had been suspended or postponed for at least a couple of months, which has direct impacts on the water withdrawals for irrigation and crop production and allied

sectors. It is estimated that the reduction in food grains production in India during the lockdown can be as high as 23% even after providing relaxation to agricultural activities. Reduced agricultural activities and supply chain has declined the vegetables, fruits, and oil supply by 10% in India but, with minimal impacts on prices.

IMPACT OF COVID-19 ON AGRICULTURAL INPUTS:

The farmer is harvesting his crop with seasonal planning. Similarly, it is necessary to provide the necessary seeds, fertilizers, medicines. Fertilizers and seeds are essential for the farmer. The average farmer buys fertilizers and seeds for the kharif season from April to June. Also, farmers use a lot of chemical or organic fertilizers to get better yields. The corona and lockdown caused a severe shortage of fertilizers and seeds. This is because the lockdown completely disrupted the supply chain of seeds, fertilizers, and agricultural inputs. The lockdown, which was carried out to stop the corona epidemic, had suspended the packaging of the produced seeds. Also, the supply of chemical fertilizers, medicines, and packaging work was stopped. In the coming kharif season, farmers had to face various difficulties in getting seeds. Also, the lockdown had made it difficult to find seeds. He had to go to the taluka place to get it, but it was impossible as it was closed everywhere. However, to get it by some trick, he got the seeds by paying two to three times more than the fixed price.

AGRICULTURE: FOOD CRISIS CONTEXT



In food crisis countries, up to 80 percent of the population relies on agriculture for their livelihoods. Therefore, any further disruptions to food production and related value chains, for example in the form of reduced availability of critical inputs or restricted access to lands or markets, could be catastrophic for vulnerable populations.

The agriculture sector plays an important role in influencing migratory patterns. Transhumant pastoral populations are likely to be hard hit by any border closures, as they rely on seasonal movements of livestock for their food and income. The disruption of traditional and western patterns and the creation of new ones may lead to tensions and even violent conflicts between resident and pastoralist communities, resulting in local displacement and increased levels of poverty and food insecurity.

According to FAO, it is crucial to maintain and support the continuous functioning of local food markets, value chains and agri-food systems in food crisis contexts, including through on-going and scaled up support to food processing, transport, marketing, and so forth; strengthening of local producers' groups to maintain negotiation power and access to markets; and advocating for trade corridors to remain open as much as possible during COVID-19 related movement restrictions.

INDIA'S POSITION IN WORLD AGRICULTURE

As regards, India's position in world's agriculture is concerned; it is the largest producer of pulses, okra, mango, banana and lemon and the second largest producer of wheat, rice groundnut, potato, tomato, onion, cabbage, cauliflower, brinjal etc. India produces more than one fifth of global production of paddy and pulses. Similarly, it contributes to more than twenty per cent of global production of many of the horticulture crops such as okra, cauliflower, brinjal, banana, mango and papaya. However, the area of concern is the low level of productivity of major field and horticulture crops in the country.

Table – 1.1

INDIA'S POSITION IN WORLD AGRICULTURE

Item	India (Million Tonnes)	World (Million Tonnes)	India		Next to
			% Share	Rank	
I. Crop Production					
A. Total Cereals	294	2849	10.3	Third	China, USA
Wheat	93.5	749.5	12.5	Second	China
Rice (paddy)	159	741	21.4	Second	China
Total pulses	17.6	82	21.5	First	
B. Oilseeds					
Groundnut (in shell)	7	44	15.6	Second	China
Rapeseed	6.8	69	10	Third	Canada, China
II. Fruits & Vegetables					
Vegetables & Melons	120	1075	11.2	Second	China
Okra	5.5	9	62.0	First	China
Potatoes	44	377	11.6	Second	China
Tomato	18.4	177	10.4	Second	China
Onion (dry)	19.4	93.2	21	Second	China
Cabbage & other Brassicas	9	71.2	12.3	Second	China
Cauliflower & Broccoli	8.2	25.2	32.5	Second	China
Brinjal	12.6	51.3	24.5	Second	China
Fruits excluding Melons	91	866	10.5	Second	China
Banana	29.1	113.2	25.7	First	
Mango and Guava	18.8	46.5	40.4	First	
Lemon & Lime	3	17.3	17.2	First	
Papaya	5.6	12.6	44.4	First	

Source: NABARD, 2020

GLOBAL VS NATIONAL YIELD OF MAJOR CROPS

Although, India is one of the largest producers of some of the agriculture and horticulture products, yet the national yield of major crops (except ground nut) is less than the global average yield production. Further, the national yield of such crops is far less than the highest yield achieved in other parts of the world. The COVID 19 pandemic has adversely impacted the globally agriculture sector and Indian agriculture sector is no exception.

TABLE – 1.2

GLOBAL VS NATIONAL YIELD OF MAJOR CROPS

Item	World(kg/ha)	India(kg/ha)	Next to
Paddy	4602	3848	China (6917), Brazil (6210)
Wheat	3531	3219	Germany (7644), France (6757)
Maize	5755	3115	USA (11084), Argentina(7576)
Pulses	1009	664	Russia (2008), Canada (1964)
Sugarcane	70891	69735	Guatemala(121012), USA (82412)
Groundnut	1686	1732	USA (4566), China(3709)
Tobacco	1843	1711	Pakistan (2368)

Source: NABARD, 2020

Agriculture plays a significant role in the Indian economy and provides employment and livelihood to a large section of the Indian population. Generally, Agriculture has been facing numerous problems related to inputs, infrastructure, production, finance, marketing and others. Since 2019, (COVID – 19) pandemic situation the Indian farmers face a variety of multiple stresses while practicing agricultural operations, these stresses had been further compounded by two times lockdown led by Corona virus. In this study an attempt was made to assess the effect of COVID-19 pandemic on agricultural operations with the following objectives.

OBJECTIVES:

- To study about the socio economic status of the respondents
- To assess the impact of COVID-19 on farming operations among the selected farmer's in the study area

CHAPTER - II

REVIEW OF LITERATURE

The review of literature relating to the "Impact of COVID – 19 on Agriculture" is discussed under the following headings:

I. Studies on impact of COVID – 19 on human and their livelihood.
II. Studies on problems and difficulties for agriculture products during the pandemic.
III. Studies on impact of COVID – 19 on global food system.
IV. Other related studies

I. STUDIES ON IMPACT OF COVID-19 ON HUMAN AND THEIR LIVELIHOOD:

Poulami Ray et al., (2020) conducted a study on the spread of COVID-19 across the world and nationwide lockdown as a restrictive measure has affected the livelihood of billions of people in the world. Agriculture is one of the sectors which are vulnerable to this disturbance caused due to pandemic. The Food and Agriculture Organization (FAO) has anticipated upcoming challenges in terms of food insecurity and malnutrition in the world. The article discussed problems to agriculture like Labor availability, market and farm prices, supply chain disruption, and occupation cuts. The discussion reveals that there is a need to check farm price volatility, encouragement of public-private partnerships, and target specific strategies by premier institutions like ICAR to secure our future needs.

Poudel et al., (2020) attempted to study about the disease outbreak and global pandemics have been the greatest threat for the sustainability of human existence. Mankind has witnessed many pandemics over the course of human history that killed millions of people and ravaged the global economy and politics. In the current context, the world is facing yet another pandemic as Corona virus disease of 2019 (COVID- 19). Realizing the gravity of situation, every country has undertaken special steps to fight against the pandemic mostly with non-pharmaceutical measures involving social distancing and self-isolation. In addition, restriction in travel and trade are done in majority of countries to limit the spread of the virus. All these combat against the pandemic

has vastly affected the major economic sectors such as Agriculture. Agriculture serves as the most important economic sector endorsing food security and human development. The review intends to go through every possible impact of global pandemic COVID -19 on Foods and Agriculture across the globe. It is important to assess the effect of COVID-19 pandemic on Agricultural sector and Food as it primarily involves the sustainability of human life and secondarily involves the economy. The pandemic protocols and provisions interferes the supply chain of the market with impaired production and distribution accompanied with lack of labor and supply of inputs. This vastly affects the livestock, poultry, fishery as well as dairy production. The planting of spring crops like maize, sunflower, spring wheat, barley, canola and open field vegetable can't be operated amidst pandemic. Thus, the pandemic has seeded a serious impact on the food security due to distortion of the supply chain which is needed to be addressed quickly by the government.

Muhammad et al., (2021) the impact of COVID-19 on agriculture is complex and varied among different sectors of agriculture. The containment measures made farmers face a shortage of agricultural inputs such as seeds, fertilizers, agro-chemicals. The harvesting and marketing of crops have been affected due to the unavailability of labor. The livestock and fisheries industries were also affected by the pandemic due to limited access to labor, animal feeds, vaccines, and drugs. The marketing of dairy products and other perishable commodities got affected due to the closure of processing industries. The containment measures have led to an increase in the consumer's price of agricultural commodities. The study concluded that the containment measures have affected all aspects of agriculture and is causing serious food security concern.

Yuvaraj (2020) analysed the on-going health crisis around COVID19 has affected all walks of life. Protecting lives of people suffering from the disease as well as frontline health responders have been the priority of nations. Governments have swung into actions since the Corona virus attack created an unprecedented situation. India declared a three-week nation-wide lockdown till mid-April in the initial phase, which was subsequently extended for achieving satisfactory containment of the virus spread.

Arumugam et al., (2020) analyzed the progressing wellbeing emergency around COVID-19 has influenced varying society. Protecting the life of individuals experiencing the infection just as

bleeding-edge welfare responders has been the need of countries. Governments have swung into activities since the Corona virus assault made an extraordinary circumstance. Rules gave by the Ministry of Home Affairs, Government of India on 15 April 2020 after the expansion of lockdown till 10 May 2020, excluded agribusiness, agriculture, creature farming, poultry, and fishery, and partnered exercises from lockdown limitations; workers can go to work, markets are to open, acquirement is to occur and Agri-input shops and agro-handling focuses are to work. MNREGS work will likewise initiate. Powerful spread of the rules and usage on the ground will be urgent, as ranchers gather the rabbi yield and start arrangements for the Kharif season. Going ahead, one can predict numerous difficulties as ranchers and homestead workers set out to modify their lives and jobs. This has led to a fall in the world economy especially in developing countries like India. India with its suitable control has however tried its best to combat this crisis with a country wide lockdown to prevent the health implications. But agriculture being the backbone of the country and the GDP has been impacted in a negative way with enormous disruption in the provide series and cropping decisions for imminent agricultural seasons. All these have a negative implication on the farming group of people that is and will be undergoing serious inimical and mind losses.

Rushikesh Khandagale et al., (2020) attempted to study about the outbreak of major dangerous corona virus there is a question of existence of human life is creating now. Later it renamed as SARS-CoV- 2 by the International Committee on Taxonomy of Viruses (ICTV). Due to SARS-CoV-2 the chain of human life is on the way disposing. Due to arrival of Corona virus in all over world its great impact on all of the sectors. Agriculture is the most important sector of Indian economy. India is an agriculture based country, where more than 50% population is depending on agriculture. The commitment of agribusiness in the national income in India is all the more subsequently; it is said that the agriculture in India is the backbone for Indian economy. Due to arrival of Corona virus in all over world its great impact on all of the sectors. The agricultural response & its role is now becoming very important scenario. Due to corona virus battle the contribution of Agriculture in Indian economy is going of descending order. In the Lockdown period, there were many challenges were created against the agricultural community. It deeply affected on Indian economical system also.

Siche and Raul (2020) described the different pandemics that humanity has experienced, such as the Spanish Flu, Asian Flu, Hong Kong Flu, HIV/AIDS, SARS, Ebola, and Swine Flu, have had a great impact on the economy, the environment and any human activity, such as livestock, agriculture, tourism, transport, education, health, fishing, mining, industry, commerce, etc. Currently, humanity is facing another pandemic, the infection of the new corona virus (2019-nCoV) that generates the disease known as COVID-19. The objective of the study was to analyse and discuss the effects in agriculture of events related to the disease of COVID-19. For this analysis, data from the Food Agriculture Organization (FAO), the World Health Organization (WHO) and scientific and technical documents have been used. The study conclude that evidence to affirm that the pandemic caused by the COVID-19 disease has an important effect on agriculture and the food supply chain, mainly affecting food demand and consequently food security, with a great impact on the most vulnerable population.

Khan et al., (2020) described the global epidemics and illness outbreaks are the huge threats to human prosperity and sustainability. In mankind history, humans have faced many epidemics that have caused millions of deaths and destroyed the global economy, politics, etc. Under the existing era, the globe is facing another pandemic, namely the Corona virus Disease-2019 (COVID-19). Aware of the gravity and severity of the prevailing situation, each country has taken special steps to combat this dinger epidemic, mainly through no pharmaceutical trails including self-isolation and social distance. Moreover, most countries restrict travel and trade to limit the spread of the corona virus. By adopting these measures, still the epidemic has greatly pretentious key economic sectors, for instance agriculture, the most significant economic sector that supports human development and food security. The study aims to explore possible drastic impacts of worldwide pandemic (COVID-19) on food and agriculture sector. It is very significant to assess the impact of COVID-19 epidemic on the food, agriculture, and economy, because it mainly concerns the sustainability of human existence and the economy. The guidelines and regulations to curb pandemic interfered with the markets supply chain, resulting halt production, distribution, and lack of labor and inputs. This has greatly affected dairy production, poultry, livestock and fisheries. During the pandemic, it was not possible to plant spring crops, such as, open field of vegetables, wheat, maize, barley, sunflower, and canola.

Therefore, due to the supply chain, the pandemic has serious impacts on food, agriculture, and economy, which the governments need to quickly resolve this issue.

Bhat et al., (2020) assessed the impact of COVID-19 lockdown on Food, Agriculture and Fisheries. The researchers suggested that policy makers, health providers and religious scholars should provide mental support as is needed at this time to the vulnerable group in J&K as COVID-19 is not going away any time soon. To cope with COVID-19 threat and lockdown stress, we should follow WHO guidelines as well as health ministry. We should keep ourselves busy in physical activities, religious activities and social work to avoid COVID-19 stress.

Nkamleu and Guy Blaise (2020) described the world is facing unprecedented challenges from COVID-19, which is disrupting lives and livelihoods. The pandemic could profoundly affect the African continent and wipe out hard-won development gains, as sub-Saharan Africa heads into its first recession in 25 years. Beyond the multispectral impact of the corona virus in Africa, its effects on the agriculture and food system is of particular interest, as food security could be the most affected area and, at the same time, agriculture could be the sector that could help African economies recover quicker from the impact of COVID19. This paper supports the view that COVID-19 offers an opportunity to revive interest in the agricultural sector. The COVID-19 pandemic has placed immense pressures on African countries to raise additional resources, and consequently Africa's growing public debt is again coming back to the centre stage of the global debate. The conversation on African debt sustainability has begun to dominate the scene and will flood the debate in the near term. While the observed, growing calls for debt relief for African countries are legitimate, we support in this paper that one should not divert attention from the long-term solutions needed to strengthen Africa's resilience. These long-term solutions lie where they always have: in agriculture. With COVID-19, shipping agricultural inputs and food products from other continents to Africa has become disrupted and is accelerating the trend towards shortening supply chains. This will leave a potential market for inputs and food produced on the continent. COVID-19, together with the launching of the African Continental Free Trade Area, has aligned the stars in favor of a decisive transformation of the agriculture sector on the continent. Agriculturalists and development experts need to be aware of their responsibility at this time, as they need to advocate for the topic of agricultural development to return to the centre and the heart of the agenda of discussions on how to respond to the consequences of

Covid-19 in Africa. In this sense, and unexpectedly, COVID-19 is an opportunity for the agricultural sector.

Kesarm et al., (2021) analysed the findings from a large-scale survey of around 5000 respondents across 12 states of India to study the impact of COVID-19 pandemic containment measures (lockdown) on employment, livelihoods, food security and access to relief measures. The study found that massive increase in unemployment, an equally dramatic fall in earnings among informal workers, large increases in food insecurity, depletion of savings and patchy coverage of relief measures. Two-thirds of our respondents lost work. The few informal workers who were still employed during the lockdown experienced more than a fifty percent drop in their earnings. Even among regular wage workers, half received either no salary or reduced salary during the lockdown. Almost eighty percent of surveyed households experienced a reduction in their food intake and a similar percentage of urban households did not have enough money to pay next month's rent. We also use a set of logistic regressions to identify how employment loss and food intake varies with individual and household level characteristics and also the study found that migrants and urban Muslims are significantly worse off with respect to employment and food security. Among employment categories, self-employed workers were more food secure. The Public Distribution System (PDS) system was seen to have the widest reach among social security measures. However, even under PDS, 16 percent of vulnerable urban households did not have access to government rations. Further, half of the respondents reported not receiving any cash transfers (state or central).The study concluded that much more is needed in the way of direct fiscal support that has been announced thus far by state and central governments in India.

II. STUDIES ON PROBLEMS AND DIFFICULTIES FOR AGRICULTURE PRODUCTS DURING THE PANDEMIC:

Adeethcariappa et al., (2021) conducted a study on “impact of COVID-19 on agriculture in India”. COVID-19 pandemic has disrupted the Indian agricultural system extensively. Nevertheless, the recent quarterly GDP estimates post-COVID scenario showcase robustness and resilience in Indian agriculture, the only sector to register a positive growth of 3.4% during the financial year (FY here after) 2020–21 (Quarter 1: April 2020 to June 2020). At the same time, the immediate past quarter growth was estimated at 5.9% witnessing a decline by 2.5% point.

The study aimed to synthesize the early evidence of the COVID-19 impact on the Indian agricultural system viz., production, marketing and consumption followed by a set of potential strategies to recover and prosper post-pandemic. The findings of the study indicate that the pandemic has affected production and marketing through labor and logistical constraints, while the negative income shock restricted access to markets and increased prices of food commodities affecting the consumption pattern. The pandemic wreaked a substantial physical, social, economic and emotional havoc on all the stakeholders of Indian agricultural system. Seizing the crisis as an opportunity, the state announced a raft of measures and long-pending reforms.

Bhoye et al., (2021) studied the end of 2019 COVID-19(corona virus) is spread in all over the world. COVID-19 originates from Wuhan, China. After the spreading in all over world the situation is very critical of all sectors. In the march 2020 India had become a hotspot for the Corona virus. The government urgently reacted to the outbreak and imposed lockdown in India. Due to lockdown all markets are closed, all transport is closed, because the completely lockdown the supply chain of foods, seeds, fertilizers, and agricultural inputs was completely disrupted. In those days it was very difficult for farmers to get labor to work in the fields. Because the COVID-19 epidemic had led to border demarcations across the country, it was difficult to make labor available for work. Rumors also influenced hatcheries. An extremely large part of the population totally depends on the agriculture sector and thus the effect of the pandemic on the agriculture system, is crucial to understand.

Singh et al., (2020) attempted to study about the impact of COVID-19 on Indian agriculture the study observed that in livestock sector, surplus production of milk and marketing, feed and concentrate availability were major affected areas along with government initiative for marketing with curfew passes considered as major factors. The effect of COVID-19 on food and horticulture/floriculture sector was affected severely. The harvesting of major food crops was completed but in some part it was affected the farmers due to non-availability of laborers. Major fruit crops harvesting and marketing was affected. Agricultural laborers were affected mostly due to shut down of different activities. Through various government schemes laborers were supported financially and logistically with supply of food products. Social media have emerged as essential tools to disseminate the information through various social media and digital platforms.

Devika et al., (2020) assessed agriculture is unavoidable even under pressure of pandemic. In agriculture, calendar of operations cannot be postponed for much time even under difficult situations. Delay of agricultural operations may leave a lasting impact and county's food security may get disturbed. Lock down due to COVID-19 has created considerable dispute for agriculture sector, because of massive lockdown for more than 2 months. Unavailability of labors led to delay/ slowdown of agricultural operations. This article has shown the impacts and challenges before agriculture in the wake of global COVID19 pandemic.

Deepak Varshney et al., (2020) assessed the impact of the spread of COVID-19 and the lockdown on wholesale prices and quantities traded in agricultural markets. The authors compared whether these impacts differ across non-perishable (wheat) and perishable commodities (tomato and onion), and the extent to which any adverse impacts are mitigated by the adoption of a greater number of agricultural market reform measures. The study used a granular data set comprising daily observations for 3 months from nearly 1000 markets across five states and use a double- and triple- difference estimation strategy. The results of the study differ by type of commodity and period of analysis. While all prices spiked initially in April, they recovered relatively quickly, underscoring the importance of time duration for analysis. Wheat prices were anchored in large part by the minimum support price, while tomato prices were lower in some months. Supply constraints began easing in May with greater market arrivals perhaps reflecting distress sales. Market reform measures did help in insulating farmers from lower prices, but these effects are salient for the perishable goods, and not so much for wheat where the government remained the dominant market player. Taken together, these results point to considerable resilience in agricultural markets in dealing with the COVID-19 shock, buffered by adequate policy support.

Daglis et al., (2020) assessed the COVID-19 pandemic on the overall economy, impacting many fields, including the agricultural sector. In this paper, the author two important commodities of the agricultural sector, namely oats and wheat, during the COVID-19 spread and the lockdown measures. Using relevant time series specifications, the study established a hypothesis regarding the effect of the COVID-19 pandemic on these two commodities. The findings of the study revealed that the commodities were affected by the COVID-19 spread and moreover, the Covid-19 confirmed cases provide useful information for the prediction and forecasting of these values.

The study stated that the findings are robust, since the out-of-sample forecasting accuracy of the alternative model employed, that explicitly incorporates the pandemic induced by the COVID-19 disease, is superior to the baseline model.

Pavan Kumar et al., (2021) analyzed, the various consequences of the COVID-19 lockdown for farming systems in India, including the economy, taking into account the associated emergency responses of state and national governments. Combining quantitative and qualitative sources of information with a focus on the Indian state of Uttar Pradesh, including expert elicitation and a survey of farmers, the paper identified and analyzed the different factors that contributed to the severe disruption of farming systems and the agricultural sector as a whole following the lockdown. Among other issues, the study found that the lack of migrant labor in some regions and a surplus of workers in others greatly affected the April harvest, leading to a decline in agricultural wages in some communities and an increase in others, as well as to critical losses of produce. Moreover, the partial closure of rural markets and procurement options, combined with the insufficient supply of products, led to shortages of food supplies and dramatically increased prices, which particularly affected urban dwellers and the poor.

Maheshwari and Kanika (2020) conducted a study on the agricultural value chain in India has been adversely suffering from the Covid-19 crisis and therefore the resultant lockdown. Agriculture remains a central pillar of the Indian economy. The sector serves the food consumption needs of the entire country, while also placing among the highest exporters of agricultural produce within the world. The sector has been facing its share of challenges in recent years, but few are as severe because the domestic and international travel restrictions during Covid-19.

Paul Mansingh et al., (2020) studied the COVID-19 pandemic severely influenced all the areas including agriculture. The effect of COVID-19 on agriculture varies from country to country among farmers. In India, small and marginal farmers are worst affected by the first lockdown. As the COVID-19 pandemic is a recent phenomenon, there is a dearth of studies in determining its impacts on farming and the related sectors. Hence, the relevant and recent literature was reviewed and the possible impact felt in farm production, food demand, and the price is organized thematically and the impact pathways are identified. The impact pathway clearly

describes the impact on agriculture. Several lessons were learned namely the importance of social programs, institutional credit, input delivery, e-commerce, and storage structures. Many innovative models were also developed and implemented by farmers, Self-Help Groups, Farmer Producer Organizations, and private enterprises in supply chain management. The Government of India has announced relief packages like free ration and cash transfers for the poor and loan moratorium for farmers. To transform the crisis as an opportunity, the government proposed many reforms in the Essential Commodities Act, the Agricultural Products Market Committee Act, and the Contract Farming Act.

Shirpiand Thirumoorthi (2020) in their research study on the COVID-19 disaster and lockdown imposed by the government, farmers find difficult to harvest, transport and sell them at competitive prices. Farmers cultivating perishable agricultural products (Tomato, Brinjal, Ladies Finger, Bitter Gourd, Leafy vegetables and Flowers) face lots of difficulties and problems in Salem district due to the curfew conditions. These products are cultivated around 10,000 Hectares and 1, 30,000 metric tons are produced. Farmers face problems in operational, logistics and marketing problems due to COVID-19 conditions. Measures have been suggested to reinstate the cultivation activities of farmers in Salem district.

Khan et al., (2020) in their research study addressed the impact of lockdown on wheat harvesting season in Pakistan and food prices post-COVID-19 outbreak and agriculture supply chain management of vegetables, fruits and pulses. The study observed that as reported cases increasing in agricultural bread baskets of Pakistan (Punjab and Sindh) in which approximately 70% of harvest of wheat depends on traditional farm laborers, who came from low-income and remote zones before the harvesting period. But this time due to prolonged and partial lock down in all remote and industrial zones of country they could not make it the right profit of the year. The Government announced finical support packages and partially lifted the ban on movement of carriage and equipment for harvesting, but the announcement packages shown to be not as much of useful because most of our machinery needs maintenances and repairing every year around the harvest season and the workshops continued in state of shutdown. It is imperative to keep an eye on the food situation in the country in the middle of this pandemic because keeping supply chains functioning well is crucial to food security. It should be noted that 2 to 3 million deaths in the Bengal famine of 1943 were due to food supply disruptions - not a lack of food availability.

There have been information's of certain anxiety and panic purchasing and interruptions in logistics. It is recommended that to safeguard food security and to reduce the impact of the lockdown, we need to review food policy and analyze how market forces will respond to the imbalanced supply and demand, storage facilities and capacity, price control of products.

Kalogiannidis et al., (2020) in their research study on the global pandemic negatively impacted various sectors of the economy. The responsive measures of government to combat global pandemic resulted in various travel restrictions and temporary lockdown of markets. The travel restricts created disturbances in supply chain due to which there are unnecessary wastages of supplies and increasing stocks at warehouses. Several business sectors faced huge losses and closed down their organizations. The agriculture sector faced limited restrictions due to the approval of government for agriculture sector as essential and exemption from any travel movement. There are huge cereal stocks and production stocks but we can say that COVID impacts are limited on agriculture sector as compared other sectors of the economy. There are various challenges and opportunities for agriculture sector which will be discussed in detail in this essay.

Saha et al., (2020) conducted a study on the lockdown to curb the spread of COVID-19 has severely hampered India's agricultural sector, starving it of buyers and migrant laborers as the restrictions halt people's movements. Agriculture sector currently contributes to 16-17% of the GDP. India hosts nearly one fourth of the world's farmers and possess 48% of world's arable land. The country has made significant advances in many off-farm sectors such as service sector, industrial production etc. but agriculture continues to be the lifeline of the nation, especially for the 64% Indians living in rural areas. Non-availability of migrant laborers is interrupting some harvesting activities but the Government and ICAR is monitoring in its best possible way to boost the farmer's income as well as to ensure the food security of the nation.

Gray and Richard (2020) assessed how COVID-19 related disruptions in transportation services, as well as new demands for transportation services, could impact Canadian agricultural supply chains. The analysis revealed that agricultural access to bulk ocean freight, rail movement, and trucking has generally improved in the pandemic, bolstered by the reduced demand for these transportation services by other sectors of the economy. The intermodal

containerized movement of grains and food products has seen some disruption from the lack of empty containers in North America. The widespread consumer adoption of physical distancing measures has vastly increased the demand for retail food pickup and delivery services to the point where these services are being rationed by long wait times. From a policy perspective, there is an apparent need for (a) continued supply chain monitoring and industry engagement, (b) the proactive development of strategies to deal with absenteeism and other potential threats to the supply chain, and (c) an assessment of the economic and health merits of providing additional public resources to provide greater access to grocery pickup and delivery services.

Loske and Dominic (2020) assessed the governmental restrictions aspiring to slow down the spread of epidemic and pandemic outbreaks lead to impairments for economic operations, which impact transportation networks comprising the maritime, rail, air, and trucking industries. Witnessing a substantial increase in the number of infections in Germany, the authorities have imposed drastic restrictions on everyday life. Resulting panic buying and increasing home consumption had versatile impacts on transport volume and freight capacity dynamics in German food retail logistics. Due to the lack of prior research on the effects of COVID-19 on transport volume in retail logistics, as well as resulting implications, this article aspires to shed light on the phenomenon of changing volume and capacity dynamics in road haulage. After analyzing the transport volume of n = 15,715 routes in the timeframe of 23.03.2020 to 30.04.2020, a transport volume growth rate expressing the difference of real and expected transport volume was calculated. This ratio was then examined concerning the number of COVID-19 infections per day. The results of this study prove that the increasing freight volume for dry products in retail logistics does not depend on the duration of the COVID-19 epidemic but on the strength quantified through the total number of new infections per day. This causes a conflict of interest between transportation companies and food retail logistics for non-cooled transport capacity. The contributions of this paper are highly relevant to assess the impact of a possibly occurring second COVID-19 virus infection wave.

Elleby et al., **(**2020) analysed the impacts on global agricultural markets of the demand shock caused by the COVID-19 pandemic and the first wave of lockdown measures imposed by the governments in the first semester of 2020 to contain it. The results revealed that the sharp decline in economic growth causes a decrease in international meat prices by 7–18% in 2020 and dairy

products by 4–7% compared to a business as usual situation. Following the slowdown of the economy, bio-fuel prices fall strongly in 2020, followed by their main feedstock's, maize and oilseeds. Although the income losses and local supply chain disruptions associated with the pandemic undoubtedly has led to an increase in food insecurity in many developing countries, global food consumption is largely unaffected due to the inelastic demand of most agricultural commodities and the short duration of the shock. From an environmental viewpoint, the COVID-19 impacts point to a modest reduction of direct greenhouse gases from agriculture of about 1% or 50 million tons of carbon dioxide equivalents in 2020 and 2021.

Sunil et al., (2020) examined the on-going corona virus pandemic is a most challenging issue of world at present time. The study stated that COVID-19 has severe impacts on agriculture, but due to the rapid mortality rate, it has shadowed the agricultural issues. But this ignorance of agricultural sector may create a dangerous crisis of food security in India if the appropriate measures are not taken. Due to prolonged lockdown, as announced by government, several restrictions are imposed on transportation sector. It is also ordered to population that not to move outside of their houses. These restrictions have created closure of various agricultural markets that hampered the agricultural supply chain. Main problem created due to this COVID-19 issue is the migration of agricultural labors. As a result of this labor scarcity, various agricultural operations like harvesting become difficult to be handled. It has also become difficult for farmers to get quality seeds and proper machinery for their agricultural operations. Government should plan appropriate strategies to tackle these agricultural problems. There is need of introduction of self-operated machinery so that hindrance in agricultural operations as caused by labour scarcity can be effectively tackled off. ICT is also a good option during this pandemic. Subsidies must be provided to the manufacturers of such machineries so that these machineries can be available to farmers at affordable prices. Farm population must be protected from corona virus by rapid testing and practicing social distancing. There should be involvement of farming community including agricultural workers in the government assistance package.

III. STUDIES ON IMPACT OF COVID-19 ON GLOBAL FOOD SYSTEM:

Maan et al., (2021) studied the challenges imposed by the pandemic to the agricultural supply chain in the context of the Indian subcontinent and also the study analyzed the variations in the arrivals and costs of the products. The study described the conventional flow of perishable food supply chain products from farmers to end customers. Thereafter, the most widely used product (Tomato) has been chosen and its availability across the Indian regions has been identified. Consequently, we also identified the zones (Red, green, and orange) under which these regions are mapped. Later, with several analyses, the effect of zones and its impact on product arrival and its cost is discussed in detail. Finally, several research directions and the challenges to overcome by the agricultural supply chain have discussed.

Gurbuz et al., (2021) aimed to uncover how the public perceived the impact of Covid-19 on the agriculture and food sector. The study used online survey and the data from 428 participants were analysed using the SPSS (v.23) program. The study reviewed that the third of respondents (30.8%) believed the outbreak would last between six months to one year, during which time food shortages will occur (32.5%). While 27.4% of the respondents reported that they stockpiled food, 44.8% reported that if the outbreak continued, they would stock up on food. Participants were concerned that if planting cannot be done, food shortages will occur (74.6%), basic foodstuffs cannot be produced (67.8%), food imports (69.4%) and exports (74.6%) will be adversely affected by the outbreak. The research found that if farming disturbed, food prices would increase (82.3%) and the government should include agriculture-supporting measures (85%) in its economic measures.

Biazoti et al., (2021) in their research the COVID-19 pandemic stated that farmers worldwide were greatly affected by disruptions in the food chain. In 2020, São Paulo city experienced most of the effects of the pandemic in Brazil, with 15,587 deaths through December 2020. Here, we describe the impacts of COVID-19 on urban agriculture (UA) in São Paulo from April to August 2020. We analyzed two governmental surveys of 2100 farmers from São Paulo state and 148 from São Paulo city and two qualitative surveys of volunteers from ten community gardens and seven urban farmers. The data showed that 50% of the farmers were impacted by the pandemic with drops in sales, especially those that depended on intermediaries. Some farmers in the city

adapted to novel sales channels, but 22% claimed that obtaining inputs became difficult. No municipal support was provided to UA in São Paulo, and pre-existing issues were exacerbated. Work on community gardens decreased, but no garden permanently closed. Post COVID-19, UA will have the challenge of maintaining local food chains established during the pandemic. Due to the increase in the price of inputs and the lack of technical assistance, governmental efforts should be implemented to support UA.

Jamber et al., (2020) summarized the early evidence by screening global newspaper articles and sites written on the topic until 10 April 2020. The most read English-based newspaper articles were downloaded and accessed together with a Google search on specific keywords in order to have a complete picture of the topic. Results suggest that agriculture-related pandemic effects can be grouped into supply, demand, labor, food security, food safety, trade and other effects. It is also evident that the first impacts are not one-sided: what helped some hurt others.

Lin et al., (2020) investigated the impact of COVID-19 on agricultural export companies in China using a unique firm-level survey data. The study found that although on average agricultural businesses experienced declines in the exports, exports of some agricultural products especially grain and oil held strong and even increased, implying the essential demand for staple food during the pandemic. Not surprisingly, exports of medicinal herb also increased significantly during the pandemic. However, exports of goods such as edible fungus and horticultural products sharply decreased. Our results also showed that in general, impact of COVID-19 on smaller firms was more severe than that on larger firms. The results of this study can provide useful guidance and implications for agricultural businesses and policy makers on their COVID-19 mitigation efforts to navigate this global pandemic

Hari et al., (2020) describes Agriculture is a critical sector of Indian economy as a significant percentage of the population are dependent on this sector. Further, it is keys to the state of rural demand as well. Before Covid-19 period, agricultural GDP experienced an average growth rate of 3.2% per year in the period 2014-15 to 2019-20. However, with the advent of Covid-19, agricultural sector is witnessing disruptions in various agricultural activities. As per the Food and Agriculture Organization (FAO), restrictions of movement and labor scarcity may impede farming and food processing. Further, shortages of fertilizers, veterinary medicines and other

inputs also affect agricultural production. Demand for fresh produce, poultry and fisheries products have also diminished because of closure restaurants and transport bottlenecks. The paper proposes to study four specific components of the agriculture sector in India. First, the supply chain logistics of the sector are critically looked at, followed by an assessment of the impact of Covid-19 on the milk and poultry sector. The food security of the nation, which is heavily dependent on the fortunes of the agriculture sector, is looked at in the next section, which is followed by a discussion on the recent agricultural reforms introduced by the national government. Finally, a set of policy recommendations are proposed.

Mouloudj et al., (2020) analysed the impact of COVID-19 on food security. The study stated that the scale of the analysis was of an international level, with special focus on countries suffering from food insecurity such as Algeria. Toward this end, data provided by the Food Agriculture Organization (FAO), and the World Health Organization (WHO) have been analysed, as well as studies conducted and published on the subject. The findings indicate that Covid-19 has had a huge impact on perishable food and caused remarkable food shortages in poor countries, conflict zones and war-affected regions. Additionally, Covid-19 threatened food security even in some developed, whereas developing countries are the most affected due to their high dependency in securing their food supplies. Finally, based on the findings, we have suggested some recommendations that would help boosting sustainable food security.

Timilsina et al., (2020) highlighted the connection of global pandemic with agricultural and food systems. The study used secondary data through online portals, daily national newspapers, and published scientific article. The results of the study shows that from pandemic to lockdown, locust to heavy rainfall, unsold crops to rotten crops, financial crisis to acute hunger, has brought agricultural activities to standstill, where people value only those who can produce food for them. It is high time for action and priority must be given to the farmers who are putting their hard work to thrive the whole world as that of police and health workers. The government needs to take vigorous steps to facilitate farmers using automated machinery facilities like autonomous tractors, seeding robots, robotic harvesters, drones and ICTs, toll-free numbers; enhancing quality seeds, fertilizers and direct financial funding on vulnerable farmers to build agricultural sector resilience to the pandemic.

Maiti et al., (2021) analysed the second most populous country in the world, India, is under huge pressure. Since the corona pandemic left deep wounds around the world, India is awaited for the depth of the socio-economic effects that the pandemic could soon cause. Besides India's current history, the abrupt end of economic growth will lead to improved food security and a reduction in farmers' well-being worldwide. Covid-19 has brought a threat to the agriculture sector. It's the right time to find out necessary mitigating measures during the post-COVID crisis period to ensure a stable food system in this country, as well as the forms in which government intervention has affected the crisis of 140 million farmhouses throughout the region. Early action has also been taken to limit the dissemination of COVID-19, which, from 25 March, has ordered the nationwide shutdown of its 1.3 billion people by 21 days. The lockdown was subsequently extended three more times until 31 May. India, except in containment zones, was unlocked on 1 June. In India, the latest corona virus affected numbers as reported were 2, 17,000 on 4 June, and very little death. However, with the growing number of COVID-19 cases, the disease's potential spread and impact are of major significance. India must be ready for a surge in the future. In the spread of COVID-19 in 2019, the government observes a similar pattern to the flu pandemic of H1N1. The prevalence of remote areas and smaller towns and municipalities is less common and concentrated in many major cities and states.

Adhikari et al., (2021) studied the impacts of COVID-19 crisis in agriculture and food systems in Nepal and assessed the effectiveness of measures to deal with this crisis. The study draws policy implications, especially for farming systems resilience and the achievement of SDGs 1 and 2. The findings are based on (i) three panel discussions over six months with policy makers and experts working at grassroots to understand and manage the crisis, (ii) key informants' interviews, and (iii) an extensive literature review. Results revealed that the lockdown and transport restrictions have had severe consequences, raising questions on the achievement of SDGs 1 and 2, especially in the already vulnerable regions dependent on food-aid. This crisis has also exposed the strengths and limitations of both subsistence and commercial farming systems in terms of resiliency, offering important lessons for policy makers. Traditional subsistence farming appears to be somewhat resilient, with a potential to contribute to key pillars of food security, especially access and stability, though with limited contributions to food availability because of low productivity. On the other hand, commercial farming - limited to the periphery of

market centers, cities, and emerging towns and in the accessible areas - was more impacted due to the lack of resilient supply networks to reach even the local market. Lower resiliency of commercial farming was also evident because of its growing dependence on inputs (mainly seeds and fertilizer) on distant markets located in foreign countries. The observation of crisis over eight months unleashed by the pandemic clearly revealed that wage laborers, indigenous people, and women from marginalized groups and regions already vulnerable in food security and malnutrition suffered more due to COVID-19 as they lost both external support and the coping mechanisms. The findings have implications for policies to improve both subsistence and commercial farming systems – in particular the former by improving the productivity through quality inputs and by diversifying, promoting and protecting the indigenous food system, while the latter through sustainable intensification by building reliant supply network linking farming with markets and guarantying the supply of inputs.

Streimikiene et al., (2021) attempted to study about the Covid-19 pandemic provided many negative effects on world economies and people around the world. The covid-19 creates many threats to sustainability of agriculture sector which is very sensitive because of food supply security needs. First of all, it is necessary to analyze and comprehend the immediate consequences of current pandemic on agricultural and food systems in order to develop necessary actions. The risks, vulnerability, resilience and systemic shifts of agricultural systems need to be better understood in order to adapt to covid-19 pandemic. The aim of this paper is to analyze the negative impacts of covid-19 on agriculture and food systems by applying vulnerability and resilience approach by treating covid-19 like global disaster. The concepts of 'vulnerability', and 'resilience' which dominates disaster studies historically initiated after the World War II were applied to systematize literature review. The main input of this paper is systematization and grouping of the main measures to enhance resilience of agriculture systems in the face of covid-19 pandemic based on recent scientific studies published in 2020. The future research guidelines are also provided based on conducted systematic literature review.

IV. OTHER RELATED STUDIES:

Rakshit et al., (2020) examined the COVID-19 pandemic has affected different sectors of the economy in an unprecedented way, and also the study attempt to analyse the economic effect of the outbreak in India. However, before we assess the economic cost associated with the pandemic, we economists fully consider the outbreak as a human tragedy. There has not been any econometric technique that can account the countless human sufferings that the crisis has brought. Through this article, we address several important research questions and demonstrate India's strength to stay immune to combat COVID-19 pandemic. The research questions are as follows. First, what will be the effect of COVID-19 on the Indian economy and how does it affect the different sectors of the economy? Second, how does the pandemic affect the bilateral trade relation between India and China? Third, we question the role of the public health system in dealing with the outbreak of the virus in India. This article also presents the growth projection of the Indian economy by different economic agents. We finally conclude the article by mentioning a few policy recommendations for the Indian economy.

Debata et al., (2020) reviews the (a) existing knowledge on corona virus disease (b) policy responses to it, and (c) its impact on the people, economic activities, and environment of India. The pandemic has increased a sense of fear and insecurity among people due to probable job and pay loss. As well, the nationwide lockdown imposed by the government has increased cases of domestic violence and child abuse. The industrial sectors—tourism, aviation, agriculture, construction, retail, hotels, textile, gems/jeweller, fast moving consumer goods (FMCG), manufacturing, and start-ups are temporarily closed leading to a significant revenue loss. Consequently, existence of many sectors and employability of a sizable number of employees is at stake. Despite the economic slowdown, the lockdown has become a boon for the environment to revive due to less pollution and reduced discharge of effluents to water from factories. The policy formulators should consider this as wakeup call and thereby align the people, economy, and environment strategically.

Biswal et al., (2020) assessed the COVID-19 pandemic and the associated lockdown for a long period have created a significant adverse impact on different sectors, including that of the agriculture and other allied sub-sectors in India and several other countries. The study aimed to

depict the impact of this pandemic and the lockdown on the livestock and poultry sectors in the country, which has been one of the fastest-growing sectors in recent years. Inadequacy of country-wide information has been a major bottleneck for having a thorough understanding of the impact of the prolonged lockdown on different sub-sectors of livestock and poultry. In the present case, an in-depth analysis of the subject has been made through the collation of available published materials and information collected through public contacts. The pandemic and the associated lockdown has not only caused enormous distress to the millions of poor and marginal farmers for saving their crops and/or livestock and thereby assuring their livelihoods but also impacted the overall poultry, dairy, and other livestock production systems and associated value chains, nutrition and health care, and labor availability. The paper highlights various dimensions of the impacts, namely, reduction in demand of different commodities, wastage of the produce due to the closure of transport and market chains, distress sale of the produce, and labor shortage and revival strategies taken by the government and associated enterprises. The present impact study although gives a picture about the overall present scenario, a systematic study through the collection of primary data from all over the country is suggested, which will provide a holistic view of the impact on each of the sub-sectors and the associated value chains.

Upadhyay et al., (2020) analysed although COVID-19 pandemic pose a serious threat to mankind and staggered the economic activities, but on the other hand it is considered as "Blessing in Disguise" where pollution is reducing and nature seems to be busy in reclaiming its space in the absence of constant flurry of human activities. This positive impact on environment seems to be short, but have great positive impact on biodiversity so government rather than all human beings learn to reduce the pollution in the long run for the sustainable development. Most of the Indian farmer's depends upon informal labor for harvesting and other agricultural sector but lockdown and other social distancing measures hugely disruptive the labors. The present review deals with the effects of lockdown on agriculture and society biodiversity.

Sahoo et al., (2020) examined the global pandemic of Covid-19 that originated in the Wuhan province of China has stretched its arms in the entire world affecting each and every sector of the economy. This has led to a fall in the world economy especially in developing countries like India. India with its apt governance has however tried its best to combat this crisis with a country wide lockdown to prevent the health implications. But agriculture being the backbone of the

country and the GDP has been impacted in a negative way with huge disruptions in the supply chain and cropping decisions for upcoming agricultural seasons. All these have a negative implication on the farming community that is and will be undergoing heavy financial and mental losses.

Pulubuhu et al., (2020) attempted to study about the COVID-19 pandemic in Indonesia began to be confirmed in early February 2020, it affects many various economic sectors, including agriculture. The COVID-19 created challenges for socio-economic issues. This short note focuses on the impact of COVID-19 outbreak on the agricultural sector. The COVID-19 outbreak had a wide-ranging impact, so that agricultural commodities continued to decline. The government's call to not leave the house resulted in many farmers not doing their activities so that it has an impact on declining farmers' income. The field officers also could not optimally carry out their work as a result the development of farming was not optimal. Various efforts have been made by the government to support the agricultural sector such as building e-marketing and training in processing yields for farmers.

Nendissa et al., (2021) attempted to study about the Covid-19 pandemic that occurred in Indonesia had a major impact on all sectors of life, especially health and the economy, including the supply chain of chicken meat. This study aims to examine the socio-economic impacts caused by the Covid-19 pandemic on the chicken supply chain in Indonesia. This study was conducted using a qualitative approach. The data used are statistical data obtained from the Central Bureau of Statistics in the form of secondary data from March 2019–July 2020 and supported by literature studies. Data analysis techniques use descriptive statistics. The results of the study found that the spread of Covid-19 had a major economic and social impact on the sustainability of businesses in the livestock sector especially attacking the logistics system as a means of providing food for the community. As a result, price disparities among the regions are large, price movements are extreme and pattern less (uncertainty), consumption and production decline sharply, imported products are blocked, and labor has decreased drastically. The supply chain system is disrupted due to obstruction by the distribution system so that production accumulates at the producer level; prices decrease while demand also decreases due to decreasing purchasing power, however, in areas with stable demand, high prices and lower purchasing power as a result of the layoffs of many workers. The average share received by

breeders of broiler chicken meat in 2018 and 2019 ranged between 46.64% and 47.89%. However, during the Covid-19 period between June-July 2020 the breeders share was around 49.59%. The economic impact due to the Covid-19 pandemic was in the form of oversupply which led to a decrease in the price of chicken on the market. In addition to having a massive economic impact, the social impact of the spread of the Covid-19 virus on chicken farming has implications, especially for conventional breeders/farmers. This Covid-19 pandemic can be momentum for conventional breeders/farmers to make changes to more modern marketing strategies, but still comply with government policies to carry out social and physical distancing.

Dunggio et al., (2021) described the corona virus disease Covid-19 is a deadly virus and was first discovered in Wuhan, China. This virus has spread throughout the world and has an impact on the environment and Agriculture. The impact on the environment is an increase in waste congeries, a decrease in energy consumption, a decrease in air pollution, while the impact of Covid-19 on the Indonesian economy includes negative economic growth, an increase in the number of poor people and an increase in unemployment. This study aims to analyze the impact of Covid-19 on the environment and agriculture in Gorontalo Province. This study uses a qualitative approach where data is collected from interviews and literature searches from official sources. The results showed that the impact of Covid-19 on environmental conditions in Gorontalo Province, among others, was an increase in waste production by 9.17% during Covid-19 in 2020, and an increase in the use of medical waste for Covid-19 by 33.3% in the fourth quarter of 2020.The use of electrical energy has increased by 6.7% during the Covid-19 pandemic in 2020. As for impact on agriculture contribution of the agricultural sector to GDP was relatively stable, rice production increase 4.1%, but fish production fell by 0.18% and coconut fell 0.11%. This condition can rise farmers term of trade during the 3rd and 4th quarters in 2020.

Surendran Arumugam et al., (2021) studied the Covid-19 pandemic created a massive socio-economic panic in all sectors across the world. The agricultural sector is among the most important and crucial part of developing economics in the world. Therefore, the disruption in agriculture and food systems has significant impacts on the livelihood of a large section of people in the world. With this background, this paper performs an inclusive assessment of the effect of Covid-19 on agriculture and food systems in the major part of the impacted countries. A

detailed review was made on reports, scientific publications, press releases, and organizational statements etc. This review addresses and highlights the direct impacts of Covid-19 on global food systems, market access for agricultural produce, food and nutritional security, global economy, labor availability and migration, agricultural input-output connectivity, initiatives to avert the crisis and importance of information technology (IT) system in agriculture. Further, this paper suggests mitigation and coping mechanisms that could be useful to improve and sustain the livelihoods of the people.

Malav et al., (2020) attempted to study about theCOVID-19 is a highly contagious disease. As the pandemic left deep wounds all over the globe, India was able to predict the extent of the socio-economic damage that the pandemic could soon inflict. Due to the contagion of COVID-19, a nationwide lockdown was imposed. COVID-19 has created a threat to our health and also imposed a risk for hunger due to imposed lockdown, which is the only mean of restricting the spread of this virus in the community. People are forced to stay indoors, and many industries and offices are shut down, leaving many migrant and landless workers impoverished, adding to the suffering of job losses and food uncertainty. This article discusses the serious impacts on the agriculture sector and food security.

Chauhan and Unnati (2020) analysed the progressing wellbeing emergency around COVID-19 has influenced varying society. Protecting the life of individuals experiencing the infection just as bleeding-edge welfare responders has been the need of countries. Governments have swung into activities since the Corona virus assault made an extraordinary circumstance. Rules gave by the Ministry of Home Affairs, Government of India on 15 April 2020 after the expansion of lockdown till 10 May 2020, excluded agribusiness, agriculture, creature farming, poultry, and fishery, and partnered exercises from lockdown limitations; workers can go to work, markets are to open, acquirement is to occur and Agri-input shops and agro handling focuses are to work. MNREGS work will likewise initiate. Powerful spread of the rules and usage on the ground will be urgent, as ranchers gather the rabbi yield and start arrangements for the Kharif season. Going ahead, one can predict numerous difficulties as ranchers and homestead workers set out to modify their lives and jobs. This has led to a fall in the world economy especially in developing countries like India. India with its suitable control has however tried its best to combat this crisis with a country wide lockdown to prevent the health implications. But agriculture being the

backbone of the country and the GDP has been impacted in a negative way with enormous disruption in the provide series and cropping decisions for imminent agricultural seasons.

Balamurugan et al., (2021) assessed the COVID-19 pandemic has disrupted daily activities across multiple sectors globally. The extent of its impact on the global economy and its key sectors, especially water, wastewater, and associated sectors such as agriculture, is still unclear. In this paper, the preliminary impacts of COVID-19 on water resources of India, especially on the river water quality, water usage in domestic and commercial sectors, wastewater treatment sector, and agriculture sector, are discussed. The limitations in the functioning of the existing system and management of water resources are identified. The need for improvements to strengthen the water resources monitoring and developing process-based models are highlighted. This paper also discusses the need for further investigation to identify the extent of impact and contributing factors to improve our understanding of the natural system for preparing, monitoring, and implementing the policies to manage the water resources during any pandemic/epidemics in the future.

CHAPTER - III

METHODOLOGY

The methodology adopted in the present study is discussed under the following heads:

- Profile of the study area
- Selection of the sample
- Database of the study
- Period of study
- Techniques of analysis

➢ Profile of the study area

Salem is one of districts of Tamil Nadu in India; Salem district population in 2022 is 3,679,398. There are thirteen taluks in this district viz., Attur, Gangavalli, Idappadi, Kadayampatti, Mettur, Omalur, Peddanayakkanpalayam, Salem, Salem south, Salem West, Sankagiri, Vazhapadi, Yercaud. There are four revenue divisions viz., Salem, Attur, Mettur, and Sankagiri. Salem is the head- quarters of this district. There are one municipal corporation, six municipalities, twenty one revenue blocks and thirty two town panchayats in Salem districts.

According to 2011 census, Salem district had a population of 3,482,056 with a sex- ratio of 954 females for every 1,000 males, much above the national average of 929. A total of 344,960 were under the age of six, constituting 180,002 males and 164,958 females. Scheduled castes and scheduled tribes accounted for 16.67% and 3.43% of the population respectively. The average literacy of the district was 72.86% compared to the national average of 72.99%. The district had a total of 915,967 households. There were a total of 1,694,160 workers, comprising 247,011 cultivators, 396,158 main agricultural laborers, 132,700 in household industries, 785,161 other workers, 133,130 marginal workers, 9,993 marginal cultivators, 58,052 marginal

agricultural laborers, 8,803 marginal workers in household industries and 56,282 other marginal workers.

- **Selection of the sample**

Agriculture continues to be the most predominant sector of the district economy, as 30 percent of the population is engaged in agriculture and allied activities for their livelihood. The district has as an area of 520530 ha with net cultivated area of around 2201138 ha. The government policy and objectives have been to ensure stability in agricultural production and to increase the agricultural production in a sustainable manner to meet the food requirement of growing population and also to meet the raw material needs of agro based industries, thereby providing employment opportunities to the rural population.

Salem district has all along been one of the districts in the state with a creditable performance in agricultural production with the farmers relatively more responsive and receptive to changing technologies and market forces.

The agriculture department has taken up the challenge to achieve higher growth rate in agriculture by implementing several development schemes and also propagation of relevant technologies to step up the production. Intensive integrated farming system-NMSA, massive wasteland development programme, Mission on sustainable dry land agriculture, collective farming, comprehensive watershed development activities, water management through micro irrigation systems, soil health improvement through bio-fertilizer including green manuring, sustainable sugarcane initiative, organic farming, adoption of integrated nutrient management and integrated pest management technologies are given priority through various programmes, besides crop diversification to fetch better return and value addition to agricultural produce are also given priority to improve the economic status of the farming community of the district.

The study adopted multi stage sampling techniques in selecting the sample. In the first stage Salem district was selected based on highest crops production. In the second stage sankagiritaluka was selected based on the highest market area. In the third stage vaigundam village was selected which is a village located in sankagiritaluka of Salem district. The village was selected for identifying the problems faced by the farmers.

- **Database of the study**

Relevant and required data for the present study was collected from primary data source by administering well-structured questionnaire to analyse the impact of COVID-19 on agriculture.

- **Period of study**

The data collection for the study was carried out during the period from February 2022 to March 2022.

- **Techniques of Analysis**

The collected data were tabulated and analysed for the purpose of giving precise and concise information. Besides percentage and graphs, Henry Garrett ranking technique was used to evaluate the "Farming issues that best fits the COVID-19 pandemic on farming operations and to know the level of concern with regard to COVID-19 by the respondents.

HENRY GARRETT RANKING TECHNIQUE:

Garrett's ranking technique was used to rank the Farming issues that best fits the COVID-19 pandemic on farming operations and to know the level of concern with regard to COVID-19 by the respondents. As per this method, respondents have been asked to assign the rank for all factors and the outcomes of such ranking have been converted into score value with the help of the following formula:

$$\text{Percent position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

Where

R_{ij} = Rank given for the i^{th} variable by j^{th} respondents

N_j = Number of variable ranked by j^{th} respondents

With the help of Garrett's table, the percent position was estimated and converted into scores. Then for each factor, the scores of each individual were added and then total value of scores and mean values of scores was calculated. The features having highest mean value is considered to be the most important factor.

CHAPTER - IV

RESULTS AND DISCUSSION

The major findings of the study are presented and discussed under the following heads.

1) Socio- economic profile of the respondents
2) Impact of COVID-19 on farming operations

I. SOCIO ECONOMIC PROFILE OF THE RESPONDENTS:

Socio –Economic status is the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation. Assessment of socio-economic status often reveals inequities in access to resources. A clear insight into the socio-economic is of paramount significance to establish the influence of the socio-economic factors on the life and activities of the respondents.

TABLE – 4.1

GENDER WISE CLASSIFICATIONOF THE RESPONDENTS

Gender	**Frequency**	**Percentage**
Male	20	26.7
Female	55	73.3
Total	**75**	**100.0**

Source: Field Survey, 2021

Out of 75 respondents surveyed about 26.7% of the respondents were male and 73.3% of the respondents were female.

TABLE - 4.2

AGE WISE CLASSIFICATIONOF THE RESPONDENTS

Age is an important aspect in determining the various conditions of a person. The age details of the selected respondents are given in the following table.

Age	Frequency	Percentage
Below 30	45	60.0
30-39	19	25.3
Above 40	11	14.7
Total	**75**	**100.0**

Source: Field Survey, 2021

It is clear from the above table that majority (60 percent) of the respondents were under the age group of below 30, around 25 percent of respondents were in the age group of 30 to 39 and about 14.7% of the respondents were above 40 years of age.

TABLE - 4.3

RELIGION WISE CLASSIFICATION OF THE RESPONDENTS

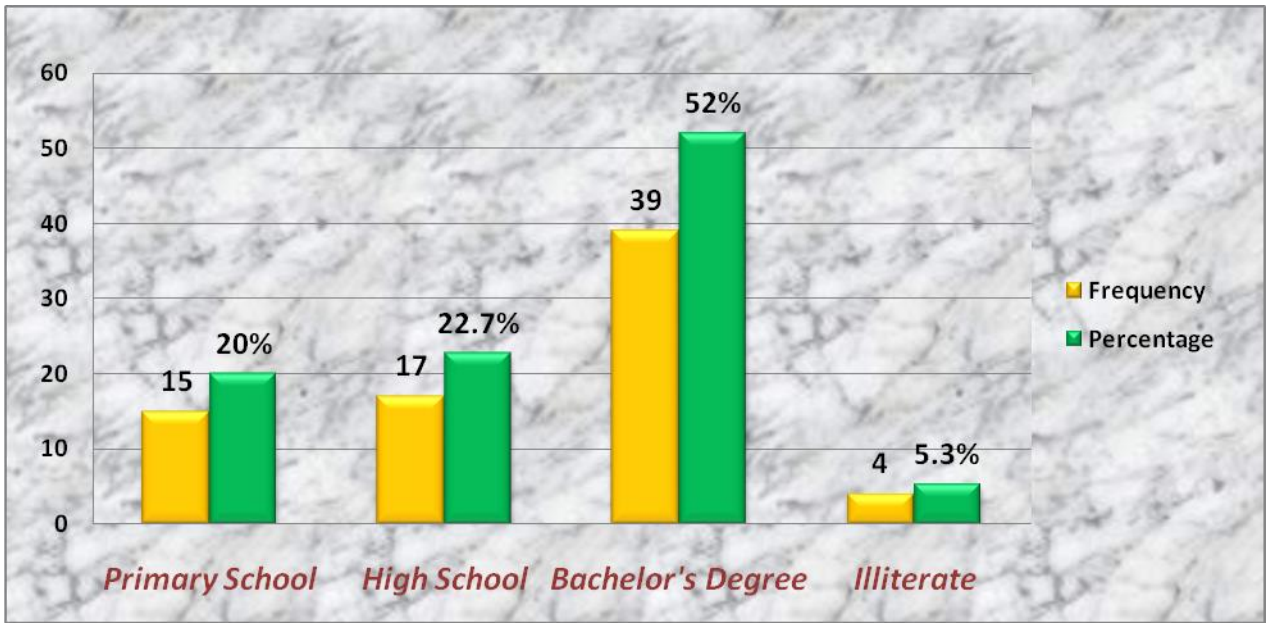
Religion	Frequency	Percentage
Hindu	68	90.7
Muslim	2	2.7
Christian	5	6.7
Total	**75**	**100.0**

Source: Field Survey, 2021

The data related to religious status of the respondents reveals that about 90.7% of the respondents were belonged to Hindu religion, 2.7% of the respondents were belonged to Muslim and the remaining 6.7% of the respondents were belonged to Christian.

FIGURE - 4.1

LEVEL OF EDUCATION



Source: Field Survey, 2021

Around 20% of the respondents have studied primary school, 22.7% of the respondents were completed high school, 52% of the respondents were completed bachelor's degree and only 5.3% of the respondents were illiterate.

TABLE - 4.4

ANNUAL HOUSEHOLD INCOME

Annual Household Income (in Rs.)	Frequency	Percentage
Below Rs. 50,000	36	48.0
Rs.50,000 to Rs.75,000	29	38.7
Above Rs. 1,00,000	10	13.3
Total	75	100.0

Source: Field Survey, 2021

Table – 4.4 represents the annual household income of the selected respondents. It reveals that about 48% of the respondents were earning below Rs 50,000, 38.7% of the respondents were earning between Rs 50,000 to Rs. 75,000 and about 13.3% of the respondents were earning above Rs 1,00,000.

TABLE - 4.5

FARMING OPERATION OF THE RESPONDENTS

Full Time Farm operation	Frequency	Percentage
Yes	28	37.3
No	47	62.7
Total	**75**	**100.0**

Source: Field Survey, 2021

The survey revealed that 37.3% of the respondents were doing full time farm operation and about 62.7% of the respondents were not doing farm operation full time.

TABLE - 4.6

OFF FARM EMPLOYMENT STATUS OF THE RESPONDENTS

Employment Status	Frequency	Percentage
Employed Full Time	11	14.7
Employed Part Time	31	41.3
Seeking Opportunity	24	32.0
Retire	9	12.0
Total	**75**	**100.0**

Source: Field Survey, 2021

Table – 4.6 revealed that 14.7% of the respondents were employed full time, 41.3% of the respondents were employed part time, 32% of the respondents were seeking opportunity and 12% of the respondents were retired.

TABLE - 4.7

LAND HOLDING STATUS

Land holding status	Frequency	Percentage
10-19 Acre	39	52.0
20-29 Acre	24	32.0
30-39 Acre	10	13.3
50-59 Acre	2	2.7
Total	**75**	**100.0**

Source: Field Survey, 2021

Table 4.7 represents that the majority of the respondents (52%) were having 10-19 acres of land, 32% of the respondents were possessing 20-29 acres of land, 13.3% of the respondents were possessing 30-39 acres and 2.7% of the respondents were possessing 50-59 acres of land.

TABLE - 4.8

TOTAL INCOME FROM FARMING OPERATION

Income from Farming Operation	Frequency	Percentage
Below 15,000	21	28.0
15,000-25,000	34	45.3
25,000-30,000	12	16.0
More than 30,000	8	10.7
Total	**75**	**100.0**

Source: Field Survey, 2021

From the above table it is observed that 28% of the respondents were getting below Rs 15,000, 45.3% of the respondents were getting between Rs 15,000 – 25,000, 16% of the respondents were getting Rs 25,000 – 30,000 and 10.7% of the respondents were getting more than 30,000.

TABLE – 4.9

AGRICULTURAL COMMODITY GROUPS AFFECTED BY COVID-19

AGRICULTURAL COMMODITY GROUPS	Frequency	Percentage
Field Crops	28	37.3
Horticultural Crops (greenhouse and nursery)	7	9.3
Vegetables, melons and potatoes	16	21.3
Fruits and nuts	7	9.3
Livestock	5	6.7
Animal products	7	9.3
Others	5	6.7
Total	**75**	**100.0**

Source: Field Survey, 2021

Table 4.9 reveals that around 37% of the field crops were affected by COVID-19, 9.3% of the horticultural crops were affected by COVID-19, 21.3% of the vegetables, melons and potatoes were affected by COVID-19, 9.3% of the fruits and nuts were affected by COVID-19, 6.7% of the livestock were affected by COVID-19, 9.3% of the animal products were affected by COVID-19 and 6.7% of the other commodities affected by COVID-19.

TABLE – 4.10

FIELD CROPS AFFECTED BY COVID-19

Field crops	Frequency	Percentage
Rice	25	33.3
Corn(grain)	11	14.7
Sugarcane	11	14.7
Wheat	10	13.3
Sunflower	5	6.7
Other field crops	13	17.3
Total	**75**	**100.0**

Source: Field Survey, 2021

The selected farmers were stated that about 33.3% of the rice was affected by COVID-19, 14.7% of the corn was affected by COVID-19, 14.7% of the sugarcane was affected by COVID-19, 13.3% of the wheat was affected by COVID-19, and 6.7% of the sunflower was affected by COVID-19 and 17.3% of the other field crops were affected by COVID-19.

TABLE – 4.11

HORTICULTURAL CROPS AFFECTED BY COVID-19

Horticultural Crops	Frequency	Percentage
Flower or vegetable seeds	27	36.0
Flowering plants, potted	14	18.7
Mushrooms	11	14.7
Bulbs, Corns, Rhizomes & Tubers	7	9.3
Aquatic plants	5	6.7
Others	11	14.7
Total	**75**	**100.0**

Source: Field Survey, 2021

Table 4.11 represents that the 36% of the flower or vegetable seeds were affected by COVID-19, 18.7% of the flowering plants, potted were affected by COVID-19, 14.7% of the mushrooms were affected by COVID-19, 9.3% of the bulbs, corns, rhizomes & tubers were affected by COVID-19, 6.7% of the aquatic plants were affected by COVID-19 and about 14.7% of the other horticultural crops were affected by COVID-19.

TABLE – 4.12

VEGETABLES, MELONS OR POTATOES AFFECTED BY COVID-19

Vegetables, Melons or Potatoes	Frequency	Percentage
Beans	13	17.3
Cabbage	9	12.0
Cauliflower	11	14.7
Carrots	6	8.0
Onions	23	30.7
Tomatoes	13	17.3
Total	**75**	**100.0**

Source: Field Survey, 2021

Table 4.12 indicates that around 17% of the beans were affected by COVID-19, 12% of the cabbages were affected by COVID-19, 14.7% of the cauliflowers were affected by COVID-19, 8% of the carrots were affected by COVID-19, 30.7% of the onions were affected by COVID-19, and 17.3% of the tomatoes were affected by COVID-19.

TABLE – 4.13

FRUITS AND NUTS AFFECTED BY COVID-19

Fruits and Nuts	Frequency	Percentage
Apples	8	10.7
Bananas	23	30.7
Grapes	11	14.7
Guavas	13	17.3
Oranges	6	8.0
Other	14	18.7
Total	**75**	**100.0**

Source: Field Survey, 2021

It is clear from the table 4.13 that about 10.7% of the apples were affected by COVID-19, 30.7% of the bananas were affected by COVID-19, 14.7% of the grapes were affected by COVID-19, 17.3% of the guavas were affected by COVID-19, 8% of the oranges were affected by COVID-19 and around 18.7% of the other fruits and nuts were affected by COVID-19.

TABLE – 4.14

LIVESTOCK AFFECTED BY COVID-19

Livestock	Frequency	Percentage
Alpacas	10	13.3
Bison	12	16.0
Cattle, Dairy	25	33.3
Chickens	11	14.7
Fish	9	12.0
Other	8	10.7
Total	75	100.0

Source: Field Survey, 2021

Table 4.14 reveals that around 13% of the alpacas were affected by COVID-19, 16% of the bison were affected by COVID-19, 33.3% of the cattle, dairy were affected by COVID-19, 14.7% of the chickens were affected by COVID-19, 12% of the fish were affected by COVID-19 and 10.7% of the other were affected by COVID-19.

TABLE – 4.15

ANIMAL PRODUCTS AFFECTED BY COVID-19

Animal Products	Frequency	Percentage
Eggs	11	14.7
Honey	9	12.0
Milk	30	40.0
Poultry	8	10.7
Pork	6	8.0
Others	11	14.7
Total	75	100.0

Source: Field Survey, 2021

The above table represents that 14.7% of eggs were affected by COVID-19, 12% of honey were affected by COVID-19, 40% of milk were affected by COVID-19, 10.7% of poultry were affected by COVID-19, 8% of pork were affected by COVID-19 and 14.7% of other animal products were affected by COVID-19.

TABLE - 4.16

LOSS IN REVENUE DUE TO COVID – 19 PANDEMIC

Loss in Revenue	Frequency	Percentage
Yes	70	93.3
No	5	6.7
Total	75	100.0

Source: Field Survey, 2021

It’s clear from the above table that about 93.3% of the respondents were sated that they had revenue loss during lockdown and about 6.7% of the respondents were had revenue loss during lockdown.

TABLE - 4.17

ANNUAL SALES LOSS OF THE RESPONDENTS

ANNUAL SALES LOSS	Frequency	Percentage
No loss	5	6.7
Less than Rs. 5,000	24	32.0
Rs 5,000-25,000	24	32.0
Rs 25,000-50,000	16	21.3
Rs 50,000-75,000	4	5.3
More than Rs 1,00,000	2	2.7
Total	**75**	**100.0**

Source: Field Survey, 2021

The table 4.17 represents that about 6.7% of the respondents had no loss in their annual sales, 32% of the respondents had loss less than Rs 5,000 in their annual sales, 32% of the respondents had loss between Rs 5,000-25,000 in their annual sales, 21.3% of the respondents had loss between Rs. 25,000-50,000 in their annual sales, 5.3% of the respondents had loss between Rs 50,000-75,000 in their annual sales and 2.7% of the respondents had loss more than Rs 1, 00,000 in their annual sales.

TABLE- 4.18

PARTICIPATION IN RELIEF PROGRAMS

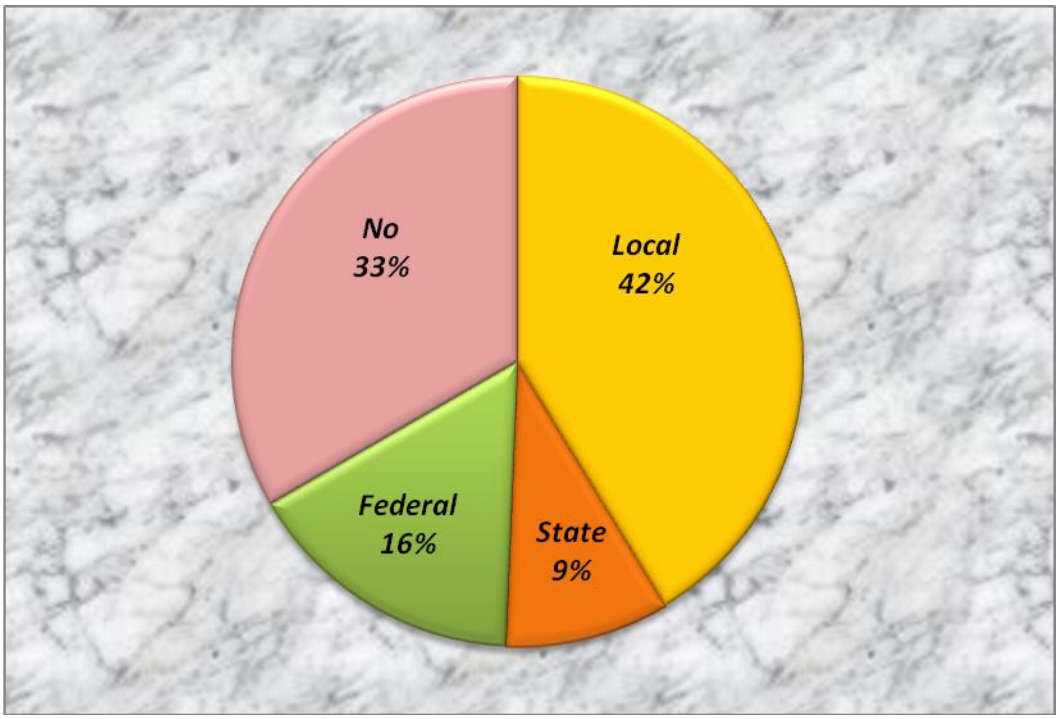
PARTICIPATION IN RELIEF PROGRAMS	Frequency	Percentage
Yes	51	68.0
No	24	32.0
Total	**75**	**100.0**

Source: Field Survey, 2021

Table 4.18 represents that 68% of the respondents were participated in relief programmes and 32% of the respondents are not getting any relief to their business.

FIGURE – 4.2

PARTICIPATION IN RELIEF PROGRAMS



From the above chart it is clear that 42% of the respondents were participated in local relief programs, 9% of the respondents were participated in state relief programs, 16% of the respondents were participated in federal relief programs and 33% of the respondents were not participated in any relief programs.

GARRETT'S RANKING TECHNIQUE

Garrett's ranking technique was used to rank the Farming issues that best fits the COVID-19 pandemic on farming operations and to know the level of concern with regard to COVID-19by the respondents.

Farming Issues during COVID – 19 Pandemic:

On the basis of the ranks assigned by the sample respondents, the farming issues that best fit the COVID-19 pandemic on farming operations is analysed through Garrett Ranking Technique.

TABLE - 4.19

FARMING ISSUES DURING COVID-19 PANDEMIC

S.NO	Factors	Total score	Garrett Mean score	Mean Rank
1	Low price	3500	46.67	I
2	Lack of markets	3462	46.16	II
3	Access to capital	3282	43.76	III

Source: Estimation based on Field Survey, 2021

It is evident from above table reveals that low price (46.67 score) was the main farming issues that best fit the COVID-19 pandemic on farming operation, followed by lack of markets (46.16 score) and access to capital (43.76 score)

Level of concern with regard to COVID-19:

On the basis of the ranks assigned by the sample respondents, the levels of concern with regard to COVID-19 are analysed through Garrett Ranking Technique.

TABLE – 4.20

LEVEL OF CONCERN WITH REGARD TO COVID-19

S.NO	Factors	Total Score	Garrett Mean score	Mean Rank
1	Becoming sick with COVID-19	4347	57.96	II
2	Financial impact of COVID-19	4464	59.52	I
3	Emotional impact of COVID-19	4291	57.21	III

Source: Estimation based on Field Survey, 2021

It is evident from above table reveals that financial impact of COVID-19 (59.52 score) was the main level of concern with regard to COVID-19, followed by becoming sick with COVID-19 (57.96 score) and emotional impact of COVID-19 (57.21 score)

CHAPTER-V

SUMMARY AND CONCLUSION

The novel Corona virus (COVID-19) pandemic has rapidly spread across the world, adversely affecting the lives and livelihoods of millions across the globe. India reported its first infection on 30 January 2020, prompting the authorities to soon initiate various measures to contain the spread of the epidemic. Given that the disease is highly contagious, the much-needed nation-wide lockdown was enforced starting 25 March 2020 in order to contain the spread of COVID-19 pandemic.

Agriculture is the art and science of cultivating the soil, growing crops and raising livestock. It includes the preparation of plant and animal products for people to use and their distribution to markets. Agriculture provides most of the world's food and fabrics. Cotton, wool, and leather are all agricultural products. Agriculture also provides wood for construction and paper products. These products, as well as the agricultural methods used, may vary from one part of the world to another.

Agriculture in India is the primary source of income for about 58 % of the population. Indian agriculture commodities' contribution to the world food trade is increasing year by year. Nowadays, Indian farmers are getting all the opportunities and government schemes for fulfilling their dreams. For that farmers get benefits and they produce advanced quality commodities and supply them in Indian markets and some commodities exported in foreign countries.

Agriculture in India today is growing gradually with the advancement in technology. Mainly agriculture commodities are routine food and animals produced by the farmers on farms. In India, various agriculture commodities are grains, dairy, livestock, and others that

are consumed by users across the world. Various agricultural commodities were used for both a source of food and an industrial sector. Practically every person depends on agriculture somehow or another. We all want food for a living, and that food is called agriculture commodities, i.e., fruits, grains, vegetables, and livestock. And, agriculture commodities used to make clothes from wool and cotton. We used vehicles that had tires made from rubber.

The agriculture sector plays an important role in influencing migratory patterns. Transhumant pastoral populations are likely to be hard hit by any border closures, as they rely on seasonal movements of livestock for their food and income. The disruption of traditional and western patterns and the creation of new ones may lead to tensions and even violent conflicts between resident and pastoralist communities, resulting in local displacement and increased levels of poverty and food insecurity.

Agriculture plays a significant role in the Indian economy and provides employment and livelihood to a large section of the Indian population. Generally, Agriculture has been facing numerous problems related to inputs, infrastructure, production, finance, marketing and others. Since 2019, (COVID – 19) pandemic situation the Indian farmers face a variety of multiple stresses while practicing agricultural operations, these stresses had been further compounded by two times lockdown led by Corona virus. In this study an attempt was made to study about the problems faced by farmers during COVID – 19 pandemic in Salem District with the following objectives.

- To study about the socio economic status of the respondents and
- To assess the impact of COVID-19 on farming operations among the selected farmer's in the study area

METHODOLOGY:

Salem district has all along been one of the districts in the State with a creditable performance in agricultural production with the farmers relatively more responsive and receptive to changing technologies and market forces. The study adopted multi stage sampling techniques in selecting the sample. In the first stage Salem district was selected based on highest crops production. In the second stage Sankagiritaluka was selected based on the highest market area. In the third stage Vaigundam village was selected which is a village located in Sankagiritaluka of Salem district. The village was selected for identifying the problems faced by the farmers.

Relevant and required data for the present study was collected from primary data source by administering well-structured questionnaire to analyse the impact of COVID-19 on agriculture. The data collection for the study was carried out during the period from February 2022 to March 2022.

The collected data were tabulated and analysed for the purpose of giving precise and concise information. Besides percentage and graphs, Henry Garrett's ranking technique was used to rank the Farming issues that best fits the COVID-19 pandemic on farming operations and to know the level of concern with regard to COVID-19 by the respondents.

MAJOR FINDINGS:

SOCIO ECONOMIC PROFILE OF THE RESPONDENTS:

- Out of 75 respondents surveyed about 26.7% of the respondents were male and 73.3% of the respondents were female.
- It is clear from the above table that majority (60 percent) of the respondents were under the age group of below 30, around 25 percent of respondents were in the age group of 30 to 39 and about 14.7% of the respondents were above 40 years of age.

- The data related to religious status of the respondents reveals that about 90.7% of the respondents were belonged to Hindu religion, 2.7% of the respondents were belonged to Muslim and the remaining 6.7% of the respondents were belonged to Christian.
- Around 20% of the respondents have studied primary school, 22.7% of the respondents were completed high school, 52% of the respondents were completed bachelor's degree and only 5.3% of the respondents were illiterate.
- Annual household income of the selected respondents reveals that about 48% of the respondents were earning below Rs 50,000, 38.7% of the respondents were earning between Rs 50,000 to Rs. 75,000 and about 13.3% of the respondents were earning above Rs 1, 00,000.

IMPACT OF COVID-19 ON FARMING OPERATION:

- The survey revealed that 37.3% of the respondents were doing full time farm operation and about 62.7% of the respondents were not doing farm operation full time.
- The occupation status of the respondents revealed that 14.7% of the respondents were employed full time, 41.3% of the respondents were employed part time, 32% of the respondents were seeking opportunity and 12% of the respondents were retired.
- Majority of the respondents (52%) were having 10-19 acres of land, 32% of the respondents were possessing 20-29 acres of land, 13.3% of the respondents were possessing 30-39 acres and 2.7% of the respondents were possessing 50-59 acres of land.
- About 28% of the respondents were getting below Rs 15,000, 45.3% of the respondents were getting between Rs 15,000 – 25,000, 16% of the respondents were getting Rs 25,000 – 30,000 and 10.7% of the respondents were getting more than 30,000.

- Around 37% of the field crops were affected by COVID-19, 9.3% of the horticultural crops were affected by COVID-19, 21.3% of the vegetables, melons and potatoes were affected by COVID-19, 9.3% of the fruits and nuts were affected by COVID-19, 6.7% of the livestock were affected by COVID-19, 9.3% of the animal products were affected by COVID-19 and 6.7% of the other commodities affected by COVID-19.
- The selected farmers were stated that about 33.3% of the rice was affected by COVID-19, 14.7% of the corn was affected by COVID-19, 14.7% of the sugarcane was affected by COVID-19, 13.3% of the wheat was affected by COVID-19, and 6.7% of the sunflower was affected by COVID-19 and 17.3% of the other field crops were affected by COVID-19.
- Around 36% of the flower or vegetable seeds were affected by COVID-19, 18.7% of the flowering plants, potted were affected by COVID-19, 14.7% of the mushrooms were affected by COVID-19, 9.3% of the bulbs, corns, rhizomes & tubers were affected by COVID-19, 6.7% of the aquatic plants were affected by COVID-19 and about 14.7% of the other horticultural crops were affected by COVID-19.
- Around 17% of the beans were affected by COVID-19, 12% of the cabbages were affected by COVID-19, 14.7% of the cauliflowers were affected by COVID-19, 8% of the carrots were affected by COVID-19, 30.7% of the onions were affected by COVID-19, and 17.3% of the tomatoes were affected by COVID-19.
- About 10.7% of the apples were affected by COVID-19, 30.7% of the bananas were affected by COVID-19, 14.7% of the grapes were affected by COVID-19, 17.3% of the guavas were affected by COVID-19, 8% of the oranges were affected by COVID-19 and around 18.7% of the other fruits and nuts were affected by COVID-19.

- Around 13% of the alpacas were affected by COVID-19, 16% of the bison were affected by COVID-19, 33.3% of the cattle, dairy were affected by COVID-19, 14.7% of the chickens were affected by COVID-19, 12% of the fish were affected by COVID-19 and 10.7% of the other were affected by COVID-19.
- About 14.7% of eggs were affected by COVID-19, 12% of honey were affected by COVID-19, 40% of milk were affected by COVID-19, 10.7% of poultry were affected by COVID-19, 8% of pork were affected by COVID-19 and 14.7% of other animal products were affected by COVID-19.
- About 93.3% of the respondents were sated that they had revenue loss during lockdown and about 6.7% of the respondents were had revenue loss during lockdown.
- About 6.7% of the respondents had no loss in their annual sales, 32% of the respondents had loss less than Rs 5,000 in their annual sales, 32% of the respondents had loss between Rs 5,000-25,000 in their annual sales, 21.3% of the respondents had loss between Rs. 25,000-50,000 in their annual sales, 5.3% of the respondents had loss between Rs 50,000-75,000 in their annual sales and 2.7% of the respondents had loss more than Rs 1, 00,000 in their annual sales.
- Around68% of the respondents were participated in relief programmes and 32% of the respondents are not getting any relief to their business.
- About 42% of the respondents were participated in local relief programs, 9% of the respondents were participated in state relief programs, 16% of the respondents were participated in federal relief programs and 33% of the respondents were not participated in any relief programs.

- On the basis of the ranks assigned by the sample respondents, the farming issues that best fit the COVID-19 pandemic on farming operation are analysed through Garrett Ranking Techniques. It is observed that low price (46.67 score) was the main farming issue that best fit the COVID-19 pandemic on farming operation, followed by lack of markets (46.16 score) and access to capital (43.76 score).
- Garrett Ranking Technique regarding the level of concern reveals that financial impact of COVID-19 (59.52 score) was the main level of concern with regard to COVID-19, followed by becoming sick with COVID-19 (57.96 score) and emotional impact of COVID-19 (57.21 score)

CONCLUSION

To conclude that COVID-19 pandemic has made a serious impact on agriculture and it affects all aspects of agriculture; crop, livestock, vegetables, animal products and fisheries have been affected by this pandemic. The pandemic has deeply affected the human life. And also, most of the migrant, informal, seasonal farm workers were loosed their jobs which may affect the demand for food. However, prices of agriculture inputs were mainly rising due to disruption in supply chain and closure of shops and markets. The Indian government has taken extensive measures to feed the whole nation and protect its lives and a livelihood from the corona virus's spread.

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ANNEXURE

QUESTIONNAIRE ON IMPACT OF COVID – 19 ON FARMING OPERATION IN SALEM DISTRICT

I. SOCIO – ECONOMIC PROFILE OF THE SELECTED RESPONDENTS:

1. Name of the respondent:

2. Gender

A) Male

B) Female

3. Age

A) Below 30

B) 30-39

C) Above 40

4. Religion

A) Hindu

B) Muslim

C) Christian

D) Others

5. What is the highest degree or level of education you have completed?

A) Primary school

B) High school

C) Bachelor's Degree

D) Others please specify

6. What is your annual household income?

A) Below rs.50, 000

B) Rs.50, 000 to 75,000

C) Above Rs. 1, 00,000

II. IMPACT OF COVID – 19 ON FARMING OPERATIONS

7. Are you doing farming operation full time?

A) YES

B) NO

8. If you do not farm full time, indicate you're off farm employment status?

A) Employed full time

B) Employed part time

C) Seeking opportunities

D) Retired

9. How many acres are in your total farming operation?

A) 10 - 19 acres

B) 20 - 29 acres

C) 30 - 39 acres

D) 50 – 59 acres

E) More than 60 acres

10. How much total income you get from your farming operation?

A) Below Rs.15, 000

B) Rs.15, 000 – 25,000

C) Rs.25, 000 – 30,000

D) More than Rs.30, 000

11. Which of the following agricultural commodity groups on your farm are being affected by the covid-19 pandemic?

A) Field crops

B) Horticultural crops (greenhouse and nursery)

C) Vegetables, Melons, and Potatoes.

D) Fruits and Nuts

E) Livestock

F) Animal Products

G) Others

12. Which of the following agricultural commodity groups on your farm are being affected by the COVID-19 pandemic?

A) Field crops

Select the field crops that are affected

- Rice
- Corn (grain)
- Sugarcane
- Wheat
- Sunflower
- Other field crops

B) Horticultural crops (greenhouse and nursery)

Select the horticultural crops that are affected

- Flower or vegetables seds
- Flowering plants, potted
- Mushrooms
- Bulbs, Corns, Rhizomes & Tubers
- Aquatic plants
- Others

C) Vegetables, Melons, and Potatoes.

Select the vegetables, melon or potato crops that are affected

- Beans
- Cabbage
- Cauliflower
- Carrots

- Onions
- Tomatoes

D) Fruits and Nuts

Select the fruits or nuts crops that are affected

- Apples
- Bananas
- Grapes
- Guavas
- Oranges
- Others

E) Livestock

Select the livestock that are affected

- Alpaces
- Bison
- Cattle, Dairy
- Chickens
- Fish
- Others

F) Animal products

Select the animal products that are affected

- Eggs
- Honey
- Milk
- Poultry

- Pork
- Others

13. Has your farming operation currently observed losses in revenue as a result of the COVID-19 pandemic?

A) Yes

B) No

14. What do you estimate your total 2020 annual sales loss will be that can be attributed to COVID-19, if any?

A) No Loss

B) Less than 5,000

C) 5,000 – 25,000

D) 25,000- 50,000

E) 50,000 – 75,000

F) More than 1, 00,000

15. Please rank the Farming issues that best fits the COVID-19 pandemic on your farming operation.

Low prices

Lack of markets

Access to working capital

16. Are you participating in any COVID-19relief programs?

A) Yes

B) No

If yes, which kind of relief program?

A) Local

B) State

C) Federal

D) No

17. Rank your level of concern with the following statement with regard to covid-19?

Becoming sick with COVID-19

Financial impact of COVID-19

Emotional impact of COVID-19