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Interview Schedule

Avinashilingam Institute for Home Science and Higher Education for Women Climate Change and Crop Diversification in Selected Study Blocks of Coimbatore District

1. Address:

2. Name of the Village/Block:

3. Details of farmer's family

S. No	Name	Age	Gender	Education	Marital status	Occupation	Income in Rs
1	Head						
2	Spouse/Partner						
3	Brother/ Sister						
4	Father/ Mother						
5	Son in law/ daughter in law						
6	Granddaughter/ Grand son						
7	Others						

4. Total number of earning members in the family?

5. Type of Family: Joint Family Nuclear Family

6. Religion: Hindu Christian Muslim Others -----

7. Community: SC ST OBC OC

15. Nature of the Land: Wet Dry Orchards Others

16. Type of Land: Own Tenant Both

17. Size of land: (in acres)

18. Type of Soil: Red Black Grey Red and Grey Sandilione
Alluvial

19. Details of Land holdings

S.No	Particulars	Acres			Present Value of Land
		Owned	Leased In	Leased Out	
1	Irrigated				
2	Unirrigated				

20. Total Value of Land Holdings in Rs -----

21. How long have you been involved in farming? _____(In number of years)

22. How many times do you cultivate in a year? Once Twice Thrice

23. Details of land

S.No	Particulars		Arable	Non Arable	Orchards	Total
1	Size of Land	Past				
		Present				
2	Fallow Land	Past				
		Present				
3	Net Irrigated area	Past				
		Present				
4	Gross Irrigated area	Past				
		Present				
5	Operational area	Past				
		Present				
6	Value of Land	Past				
		Present				

24. If the land is fallow then what is the reason?

S.No	Particulars	Yes	No
1	Lack of water		
2	Lack of Finance		
3	Lack of Labour		
4	Change in cropping pattern		
5	Crop failure		
6	Any other reason (Specify...)		

25. How much fertilizer you use per acre? (In Kg.) N P K Organic Manure

26. How much pesticides you use per acre?----- (In Kg.)

27. How much fertile is your farming land? Less fertile Fertile Highlyfertile
Infertile

28. Water resources is from

Lake River Pond Canal Reservoirs

29. Type of well from

Open well Bore well Open with bore well

30. How much distance covered from the water resources to agriculture land?-----

31. Types of Irrigation ?

Drip Irrigation Sprinkler Irrigation Canal
 Surge Irrigation Flood Irrigation Tube well

32. Climate Change

S.No	Particulars	Yes	No	Does't Know	Can't answer
1	Do you feel that climate/weather in your area is changing over the last thirty years in your area?				
2	Have you noticed any long-term changes in the mean temperature over the last 10-15 years?				
3	What have you noticed about number of hot days over the last 10-15 years?				
4	Have you noticed any long-term changes in the mean rainfall over the last 10-15 years?				
5	What have you noticed about number of rainfall days over the last 30-35 years?				
6	Do you think the frequency of drought has increased in your area over the last 10 -15 years?				
7	Do you think the frequency of floods have increased in your area over the last thirty-thirty five years?				
8	Do you think the intensity of rainfall have increased in your area over the last thirty- thirty five years?				
9	What do you think about the number of pests affecting your primary crop over the last 10-15 years?				
10	Do you think the timing of raining has changed over the last 10 -15 years?				
11	What do you think about the length of the growing season in recent years?				
12	Do you think there have been any changes in the timing of monsoon rainfall (June-sep) over the last 10-15 years?				
13	Do you think there have been any changes in the timing of post-monsoon (Oct-Dec) over the last 10-15 years?				
14	Do you think there have been any changes in the timing of pre-monsoon (Jan-May) over the last 10 -15 years?				

33. What are the important climate risks you are facing? Rank in order of importance

S.No	Particulars	Rank
1	Drought	
2	Less rainfall	
3	Flood	
4	Heat waves	
5	Intense rainfall	
6	Water scarcity	

34. What was problem faced by the farmers due to climate change

Factors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Low Rainfall					
High Temperature					
Less Yield					
Less Production					
Low Quality					
Low Quantity					
Drought					
Flood					
Crop Disease					

35. Factors affecting farmers

Particulars	Yes	No	Rank
Size of land holdings			
Seeds			
Manures, Fertilizers and Biocides			
Irrigation			
Lack of Mechanisation			
Soil Erosion			
Agriculture Marketing			
Inadequate storage facilities			
Inadequate transport			
Scarcity of capital			

36. Problems of Farmer facing due to Climate Change

S.No	Particulars	Expectation		Realization		
		Yes	No	Fully	Partially	Not at all
1	Inadequate Rainfall					
2	High Temperature					
3	Monsoon failure					
4	Change in cropping pattern					
5	Migration					
6	Change in farm income					
7	Unemployment					
8	Seasonal Unemployment					
9	Disguised Unemployment					
10	Land sales					
11	Other Purposes					

37. Major Crops

Kharif		Rhabi	
Jowar		Jowar	
Groundnut		Black Gram	
Maize		Sugarcane	
Sugarcane		Green gram	
Onion		Banana	
Turmeric		Cotton	
Banana		Flowers	
Fruits		Vegetables	
Others			

38. Cropping pattern and Crop diversification

Past				Present			
Kharif		Rhabi		Kharif		Rhabi	
Cropping Pattern	Crop Diversification	Cropping Pattern	Crop Diversification	Cropping pattern	Crop Diversification	Cropping Pattern	Crop Diversification

39. Area wise crop under cultivation and yield rate?

Crops	Types		Area	Yield(q/acre)	Irrigated(Y/N)
	HYV	Traditional			
Jowar					
Groundnut					
Maize					
Sugarcane					
Onion					
Turmeric					
Banana					
Fruits					
Black Gram					
Green gram					
Cotton					
Flowers					
Vegetables					
Others					

40. Soil and Water Conservation Measures (area/size)

S.No	Particulars	No		Total cost	
		Past	Present	Past	Present
1	Farm Pond				
2	Percolation pond				
3	Renovation of tank				
4	Rejuvenation of wells				
5	Summer ploughing				
6	Contour bunding				
7	Land leveling				
8	Others Specify				

41. Receiving rainfall during the seasons

S.No	Particulars	Open Well		Dug Well		Bore Well	
		Past	Present	Past	Present	Past	Present
1	Water level in Monsoon Period						
	(i) SWM						
	(ii) NEM						
	(iii) Summer						
	(iv) Winter						
2	Number of Wells						
3	Year of Construction						
4	Depth of well						
5	Depth of Water in Land						
6	Construction Cost						
7	Others Specify						

44. Details of cost of input to maintain crops

Particulars		Preparatory cultivation		Plants and Planting		Pesticides and Fertilizes		Inter cultivation		Harvesting		Total	
		Past	Present	Past	Present	Past	Present	Past	Present	Past	Present	Past	Present
Bullock Labour	Pair days												
	Wages (Rs)												
Human Labour	Hours												
	Charge(Rs)												
Machine Labour	Man days												
	Wages (Rs)												
Cost of input													
Total													

45. Did had Agriculture loan/ agriculture credit system,

S.No	Particulars	Name of the Bank	Short term	Medium term	Long term	Amount
1	Land lords					
2	Government bank					
3	Private bank					
4	Co- operative bank					
5	Commercial bank					
6	Canara bank					
7	NABARD					
8	Others Specify					

46. What coping strategies are you willing to adopt as future adaptation measures for less rainfall?

S.No	Particulars	Yes	No
1	Drought Resistant Crop Varieties		
2	Crop diversification		
3	Livestock diversification		
4	Early mature crop Varieties		
5	High Yielding varieties		
6	Irrigated crops		
7	Labour migration		
8	Selling assets		
9	Water use changes		
10	Water storage method		
11	Food storage		
12	Assistance from relatives		
13	Assistance from government		
14	Assistance from NGOs		

47. What are the barriers to adaptation to climate variability?

S.No	Particulars	Yes	No
1	Lack of Information about weather		
2	Lack of Information on climate change		
3	Lack of Information on adaptation		
4	Lack of credit or savings		
5	Lack of irrigation facilities		
6	Lack of access to water		
7	Lack of seeds		
8	Adaptation not cost effective		
9	Insecure property rights		
10	Lack of markets		
11	Lack of Government support		
12	Others		
13	No barriers to adaptation		

54.Expectation and Realization of ICT and Agriculture

S.No	Particulars	Expectation		Realization		
		Yes	No	Fully	Partially	Not at all
1	Weather forecasting					
2	Regional language					
3	Free cost					
4	Timely advice					
5	Market information					
6	Easy access					
7	Pricing control					
8	Warning alerts					
9	Production control					
10	Knowledge database					
11	Distribution Management					
12	Market Access Improvement					

55. Consumption Expenditure of the farmers

Food Items	In Rupees
Rice	
Wheat	
Cereals	
Pulses	
Oil and Spices	
Vegetables	
Others	
Total expenses for food items	
Non Food Items	
Health	
Clothing	
Education	
Shelter	
Electricity	
Fuel	
Cosmetics	
Communication	
Total Non Food Items	
Total Expenditure	

APPENDIX- L2



Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD) Re-accredited with A+ Grade by NAAC. Recognised by UGC Under Section 12 B Coimbatore-641 043, Tamil Nadu, India

(Item No. 5 of Check List) Details of Research Publications

S.No	Article	Journal	Other Details Vol. / No. / Page No. / Year	Published in UGC-CARE / Scopus Indexed / Web of Science (*List of Journals in that category including the particular Journal to be attached)
1	Climate Change and Crop Diversification in Selected Farm Households	ANVESAK ISSN: 0378-4568	Volume 51, Issue 2 July-December 2021 Pp: 180-188	UGC Care List Group I Journal
2	Impact of Covid-19 on Agriculture in selected farm households	Turkish Online Journal of Qualitative Inquiry (TOJQI)	Volume 12, Issue 7 July 2021 Pp: 12867 - 12874	Scopus

*Proof of list of Journals from Internet to be attached along with copies of reprints.

Scholar : *Sucanya.A*

Supervisor : *[Signature]*
24/12/2021

m. Manmai
24/12/2021
Checked By: HoD/Dean

[Signature]
24/12/21

checked and verified in UGC care list of journals.
Both the journals are indexed in UGC care list
as on 24.12.2021.

J. Jignili
24-12-2021

CLIMATE CHANGE AND CROP DIVERSIFICATION IN SELECTED FARM HOUSEHOLDS

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ABSTRACT

Climate change has become the single most difficult issue in the agricultural sector. Climatic worries aid agriculture in the same way that human efforts do; some adjustment in climatic concerns is bound to have a significant impact on crop yields and inventiveness. Agriculture was a vital sector that contributed significantly to the development of agricultural economies. Climate change's overall effects on agriculture are expected to have a negative, aggressive impact on global food security. Agriculture is sensitive to short-term weather variations as well as seasonal, yearly, and longer-term climate variations. The occurrence of adequate reasoning and adaptive interferences ensures climate change. Because the study relied heavily on primary data, the study's sampling respondents were chosen using multistage systematic stratified sampling approaches. Diversification and growth hypothesis and evidence Several hypotheses have examined the relationship between diversification and development, with varying conclusions about the sign and direction of Casualty. Agriculture expansion was an essential condition for economic development, and modern farming knowledge with considerable increases in production/yield and low levels of instability was good for agriculture's long-term development. To encourage agricultural growth and development, the government should allocate greater money to agricultural research. Crop diversification was a method of redistributing resources among crops based on their comparative value.

Key Words: Climate Change, Agriculture, Crop Diversification, Mitigation and Government Intervention.

INTRODUCTION

The United Nations Framework Convention on Climate Change (UNFCCC) defines that climate change as “ a change in temperature which is capable directly or indirectly to social exploit that varies the alignment of the global atmosphere and in which accumulation to regular climate changeability perceived over similar period”. Climate change denotes an extensive series of comprehensive events made primarily by burning fossil fuels, which add heat-trapping gases to the Earth’s atmosphere leads to increase in temperature trends termed as global warming may also include deviations in sea-level rise and severe weather events. Climate change denotes to the long-term provincial or global average temperature, humidity, and rainfall patterns over seasons, years, or decades (**Shahid, 2010**).

Agriculture was a critical sector that aided in the development of agricultural economies. The overview of contemporary technology during the green revolution in the agriculture sector in the mid-1960s in India has seen considerable variances due to the influence of climate change. If India's green revolution is to develop the economy by achieving a significant uptrend in cereals-based cropping patterns rather than the less profitable prevailing crop-mix (**BiswajitSen et al., 2017**), then the gross cropped area will increase in high dynamic foremost cereal crops, owing to a cropping pattern that is heavily skewed to cereal-based farming, resulting in a low degree of diversification. In unique agriculture, instability was crucial. Natural elements such as unanticipated fluctuations in rainfall and temperature, as well as man-made ones such as technical variance, quantity, and value of efforts, irrigation, and so on, all had an impact (**Asis Kumar Senapati and Phanindra Goyari, 2019**). Similarly, it was anticipated that improving crop production would be beneficial. To improve crop production, modern agricultural techniques such as contributions of better seeds, fertilizers, irrigation, and agronomic practices were assumed to support agricultural growth as an effect of

widespread acceptance of modern technologies. Changes in weather conditions, insect pests, and diseases may cause a decrease in agricultural growth.

STATEMENT OF THE PROBLEM

Climate change has recently become the only hot topic in the agricultural sector? What about the plight of farmers? What about suicides among farmers? What about the safety of the food? What about the impact of insecticide use on one's health? What about the worrying rate of depletion of groundwater?' Certainly, all of these issues are already part of the agricultural situation, and the "difficult truth" is that climate change is only likely to exacerbate many, if not all, of these issues (Swaminathan and S. Muraligopal, 2016). As a result, climatic issues are direct inputs to agriculture; any change in climatic issues will almost certainly have a significant impact on crop yields and production. Furthermore, when food crops are diverted to more profitable or high-value crops, the implications of climate change frequently blur the lines between food security and poverty. It has become increasingly important for farmers, in general, to adapt to the repercussions of climate change.

NEED FOR THE STUDY

The presence of adequate mitigation and adaptation actions determines climate change. On-farm efficiency benefits both directly and indirectly. Furthermore, by disseminating information on crop and livestock practices, optimal input use, and direct consultation with farmers on specific production problems, interventions facilitate a shift to more efficient production methods. These agricultural interventions not only speed up the adoption of new kinds and technology, but they also increase farmers' managerial abilities, as well as contribute to the efficient use of existing technologies by increasing farmers' technical knowledge. Farmers are increasingly valuing interventions that are comprehensive, real-time, and unique, as opposed to the more generic or fragmentary information typically offered by public and private extension agencies.

REVIEW OF THE LITERATURE

According to Merlin Mathew et al., (2017), the Cobb-Douglas production function revealed that seeds, fertilizers, and manures on small farms, fertilizers and manures on large farms, and seeds, plant protection chemicals, and manures on the entire pool of farms might all help enhance ginger yield. Purushottam Sharma et al., (2018) investigated the adoption of enhanced soybean technologies, their yield effects, and the factors that influence their acceptance. The study discovered that while modern technologies boost crop output and farm profit, they are mostly limited to economically well-off, better-informed, and educated large farmers. VarshaKhandker and Vasant P Gandhi (2018) sought to explore Indian farmers' post-adoption experiences with hybrid rice technology and how this influenced their degree of satisfaction and willingness to continue using the technology. A variety of elements, such as agronomic potential, agro economic potential, and successful management, were discovered in the study. Farmers' levels of satisfaction and willingness to continue cultivating hybrid rice are influenced by a variety of characteristics, including agronomic potential, agro economic potential, effective demand, distribution, location, geography, and cropping pattern, according to the study. Chittaranjan Nayak and Chinmaya Ranjan Kumar (2019) looked at the nuances of agricultural diversification in Odisha, an eastern Indian state, by looking at spatial trends across 30 districts and crop diversification factors. Crop diversification was gradual and unequal in the study, which looked at data from 1993-94 to 2012-13. Crop concentration was driven by the adoption of high-yielding crop types and availability to irrigation, whereas crop diversification was influenced by rural roads and income.

METHODOLOGY

The study relied heavily on primary data, the study's sampling respondents were chosen using multistage systematic stratified sampling approaches. Anamalai, Annur, Karamadai, Kinathukadavu, Madukkarai, Periyanaickenpalayam, Pollachi North, Pollachi South, Sarkarasamakulam, Sulthanpet,

Sulur, and Thondamuthur were among the 12 blocks of Coimbatore's first stage. The researcher chose the per cent of irrigated land to total cultivable area from among the 12 blocks. The researcher first identified the higher and lower percentage of irrigated land to the total cultivable area while selecting sample families. Thondamuthur block, with 10 villages, had a higher percentage of irrigated land to the total cultivable area, while Annur block had a lower percentage of irrigated area to total cultivable area, with 22 villages. In the Thondamuthur block, there were 330 farm households, while in the Annur block, there were 330 agricultural households.

MAJOR FINDINGS OF THE STUDY

CROPPING PATTERN

An area's cropping pattern takes into account physical, economic, and institutional considerations. The actual cropping pattern should, in principle, be closely matched to physical conditions and evolve an appropriate cropping pattern (Pal and Asthana, 1985). Several physical and socioeconomic variables influence the area's agricultural production. Agricultural productivity is a result of the interaction of physical and cultural elements, and it presents itself in terms of per hectare productivity and total production.

A cropping pattern refers to the percentage of land under different yields at a given period in time. Cereals account for 3.6 percent of the land area in India, whereas pulses account for 5.9 percent (Economic survey, 2015). In Tamil Nadu, food grains account for 62.4 percent of the total, with 1.0 percent farming pulses and 3.4 percent cereals (Season and Agricultural Crop Report, Tamil Nadu, 2019).

TABLE-1 DETAILS OF MAJOR CROPS CULTIVATION IN SELECTED FARM HOUSEHOLDS

S.No	Particulars	Thondamuthur				Annur				
		SF	MF	LF	ALL	SF	MF	LF	ALL	
1	Cereals	N	22	12	1	35	30	7	1	38
		C	9.52	14.29	6.67	10.61	12.60	8.97	7.14	11.51
2	Pulses	N	28	11	2	41	25	4	1	30
		C	12.12	13.09	13.33	12.42	10.50	5.12	7.14	9.09
3	Sugarcane	N	11	2	1	14	8	1	1	10
		C	4.76	2.38	6.67	4.24	3.36	1.28	7.14	3.03
4	Spices and Condiments	N	23	5	2	30	25	8	2	35
		C	9.96	5.95	13.33	9.09	10.50	10.25	14.28	10.60
5	Curry leaves	N	8	1	1	10	35	13	1	49
		C	3.46	1.19	6.67	3.03	14.71	16.67	7.14	14.85
6	Vegetables	N	48	18	1	67	18	8	1	27
		C	20.78	21.43	6.67	20.30	7.56	10.25	7.14	8.18
7	Fruits	N	21	12	1	34	22	11	2	35
		C	9.09	14.29	6.67	10.30	9.24	14.10	14.29	10.60
8	Flowers	N	15	8	1	24	25	10	1	36
		C	6.49	9.52	6.67	7.27	10.50	12.82	7.14	10.90
9	Groundnut	N	11	1	1	13	19	5	1	25
		C	4.76	1.19	6.67	3.94	7.98	6.41	7.14	7.58
10	Coconut	N	31	5	2	38	18	6	1	25
		C	13.42	5.95	13.33	11.51	7.56	7.69	7.14	7.58
11	Cotton	N	5	1	1	7	12	5	1	18
		C	2.16	1.19	6.67	2.12	5.04	6.41	7.14	5.45
12	Medicinal Plants	N	8	8	1	17	1	0	1	2
		C	3.46	9.52	6.67	5.15	0.42	0	7.14	0.60
14	ALL	N	231	84	15	330	238	78	14	330
		C	100	100	100	100	100	100	100	100

Source: Field Survey, (2019) N is Number stated, C is column total percentage, SF- Small Farmers, MF-Marginal Farmers, LF Large Farmers. Cereals- Cholam, Cumbu, Maize, Pulses- Bengal gram, Red gram, Green gram, Black gram, Horse gram, Spices and Condiments-Chilli, Coriander, Turmeric, Tamarind, Arecanut, Fruits- Mango, Guava, Grapes, Lemon, Banana, Sapota, Amla Vegetables- Tapioca, Onion, Brinjal, Lady finger, Tomato, Cauli flower, Medicinal plants- Aloe vela, Thulasi

Vegetables (20.30 percent), Pulses (12.42 percent), Coconut (11.51 percent), Cereals (10.61 percent), Fruits (10.30 percent), Spices and condiments (9.09 percent), Flowers (7.27 percent), Medicinal plants (5.15 percent), Sugarcane (5.15 percent) are among the crops grown in the Thondamuthur block and in the Annur block Curry leaves (14.85 percent), Cereals (11.51 percent), Flowers (10.90 percent), Fruits and Spices and Condiments (10.60 percent), Pulses (9.09 percent), vegetables (8.18 percent), Coconut and Groundnut (7.58 percent), Cotton (5.45 percent), and Medicinal plants (5.45 percent) are among the cropping patterns (5.15 percent). Farmers' farming patterns have changed proportionately as a result of climate change.

PROBLEM OF CLIMATE CHANGE

Agriculture is predominantly exposed to environmental change. Climate change and agriculture are constant events, both of which take place on a global scale. Temperature increases eventually decrease yields of required crops while encouraging weed and pest production. Variations in rainfall patterns increase the likelihood of short-run crop failures and long-run production declines. The overall impacts of climate change on agriculture require predictable agricultural can allow reasonable differences in the climatic mean. Agriculture is essentially penetrating to climate conditions and is the most exposed segment to the risks and influences of climate change (Sagun, 2009).

TABLE-2 : DETAILS OF PROBLEMS OF CLIMATE CHANGE

Particulars	Thondamuthur				Annur				
	SF	MF	LF	ALL	SF	MF	LF	ALL	
CLIMATE CHANGE OBSERVED IN LAST 10 YEARS									
Yes	N	213	80	13	306	225	72	13	310
	C	92.21	95.2 4	86.6 7	92.7 3	94.5 4	92.3 1	92.8 6	93.94
No	N	18	4	2	24	8	6	1	15
	C	7.79	4.76	13.3 3	7.27	5.46	7.69	7.14	4.56
TYPE OF VARIABILITY									
Drought	N	8	4	1	13	6	2	1	9
	C	3.46	4.76	6.67	3.94	2.52	2.56	7.14	2.73
Flood	N	0	1	0	1	1	0	1	2
	C	0	1.19	0	0.30	0.42	0	7.14	0.61
Less rainfall	N	58	22	3	83	51	18	2	71
	C	25.10	26.1 9	20.0 0	25.1 5	21.4 3	23.0 8	14.2 9	21.51
High Temperature	N	65	21	4	90	67	21	2	90
	C	28.13	25.0 0	26.6 7	27.2 7	28.1 5	26.9 2	14.2 9	27.27
Monsoon Failure	N	100	36	7	143	113	37	8	158
	C	43.29	42.8 6	46.6 7	43.3 3	47.4 8	47.4 4	57.1 4	47.88

Source: Field Survey, (2019) SF- Small Farmers, MF-Marginal Farmers, LF Large Farmers.

In the Thondamuthur block, most farmers are affected by soil erosion of 18.79 percent, irrigation of 17.58 percent, scarcity of capital of 11.82 percent, inadequate transport of 11.21 percent,

agriculture marketing of 10.30 percent, and other factors of less than 10 per cent. In the Annur block, most farmers are affected by soil erosion of 18.79 percent, irrigation of 17.58 percent, lack of mechanization of 11.82 percent, and other factors of less than 10 per cent. Soil degradation in the Annur block and a lack of mechanization in the Thondamuthur block harmed the majority of the farmers.

SCALING TECHNIQUE

OPINION OF THE FARMERS ON IMPACT OF CLIMATE CHANGE ON AGRICULTURE

If global warming has a negative impact on agriculture, it could jeopardize India's food security. Despite the fact that rising CO₂ concentrations would improve plant net primary output, changes in climate and the disturbance regimes that accompany them may result in either higher or decreased net ecosystem productivity. Temperature increases are expected to reduce the potential yield in many tropical and subtropical locations (Krupa, 2003). Snowmelt, spatial and temporal rainfall variability, irrigation availability, frequency and intensity of inter-and intra-seasonal droughts and floods, soil organic matter transformations, soil erosion, pest profiles, the decline in arable areas due to coastal land submergence, and energy availability may all have significant indirect effects on land use. All of this has the potential to have a huge impact on climate change and agriculture.

In this study, participants were asked to rank the various perspectives about agriculture performance based on expectation and realization in order of priority. The individual scores were determined on a scale of 100 points using Garrett's rating system after the ranks were converted to per cent position from percent position. Table-3 displays the average scores and ranks for each objective.

TABLE-3 : DETAILS ON OPINION OF THE FARMERS ON IMPACT OF CLIMATE CHANGE AND AGRICULTURE IN SELECTED FARM HOUSEHOLDS

Factors	Thondamuthur				Annur			
	Expectation		Realization		Expectation		Realization	
	Scores	Rank	Scores	Rank	Scores	Rank	Scores	Rank
Inadequate Rainfall	71.44	2	68.29	3	78.36	2	76.29	2
High Temperature	70.56	3	69.72	2	82.03	1	69.98	3
Monsoon failure	75.23	1	72.69	1	72.56	3	79.31	1
Change in cropping pattern	69.27	4	52.36	5	67.58	5	69.20	5
Migration	15.23	9	11.03	9	9.63	9	29.35	9
Change in farm income	58.69	5	57.29	4	69.89	4	71.65	4
Unemployment	44.10	6	42.96	6	38.26	8	62.36	6
Land Sale	21.05	7	17.53	8	59.32	6	42.03	7
Other Purposes	18.69	8	26.39	7	42.16	8	36.23	8

Source: Field Survey, (2019) SF- Small Farmers, MF-Marginal Farmers, LF Large Farmers.

In this part, the influence of climate change on agriculture productivity in Thondamuthur was ranked and examined using two criteria: expectation and realization. Monsoon failure was ranked first among the expectation criteria, followed by Inadequate Rainfall (2nd rank), High Temperature (3rd rank), Change in cropping pattern (4th rank), Change in farm income (5th rank), other Purposes (6th rank), Unemployment (7th rank), Land Sale (8th rank), and Migration (9th rank), all of which are various factors expected by farmers as a result of climate change. This section ranked and evaluated the farmers' views on the influence of climate change on agriculture productivity using two criteria: expectation and realization. High Temperature, Inadequate Rainfall (2nd rank), Monsoon Failure (3rd rank), Change in agricultural revenue (4th rank), Change in cropping pattern (5th rank), Land Sale (6th rank), and Other Purposes were listed first among the expectation criteria. Unemployment (7th rank), migration (9th rank), and other issues are all predicted to have an impact on climate change. Meanwhile, farmers have ranked certain viewpoints on the impact of climate change based on the realization criteria, which are listed and ranked as follows: Monsoon failure (first place), insufficient rainfall (second place), high temperatures (third place), change in farm

revenue (fourth place), change in cropping pattern (fifth place), unemployment (sixth place), land sale (seventh place), other purposes (eighth place), migration (ninth place) (9th rank).

Meanwhile, farmers have ranked certain viewpoints on the impact of climate change based on the realization criteria, which are listed and ranked as follows: Monsoon failure (first place), insufficient rainfall (second place), high temperatures (third place), change in farm revenue (fourth place), change in cropping pattern (fifth place), unemployment (sixth place), land sale (seventh place), other purposes (eighth place), migration (ninth place) (9th rank). Climate change's impact on agricultural productivity was unanimous in expressing the same opinion under expectation and realization criteria. Changes in farm revenue (4th rank), cropping patterns (5th rank), other Purposes (8th rank), and migration (9th rank) are some of the projected and realized effects of climate change on agriculture productivity in the Annur block. Jimjel.Zalkuwi and colleagues (2015) Ravi Kumar is a writer who lives in India (2016) Garrett's Ranking Technique was utilized by Munishet.al., (2020) to rank the issues faced by farmers in agriculture production.

THEORETICAL FRAMEWORK

Long-run growth can be influenced by production patterns at the early phases of development that are partly triggered by the geographic endowment. Theory and evidence on diversification and growth several ideas have been proposed to explain the relationship between diversity and development, each having different implications for the sign and direction of Casualty. Why does this study concentrate on the impact of the Agricultural Diversification Guide, which is covered in this part, on the relationship between diversification and overall growth in the country?

The Hirschman-Herfindhal diversification index was used to assess crop diversity in the past and present as a result of climate change. $D1=1-H$ was used to generate the diversification index, where H refers to the Hirschman-Herfindhal diversification index.

$$H = \sum [(CP_{ij} / \sum P_{ij})]^2$$

P_{ij} is the worth of the i th crop's production for the j th farmer. The higher the diversity index, the more crop diversity there is in the production pattern. This is a strategy for lowering individual farm income risk. Three reasons have been noted by Timmer (1990) for policymakers to pay more attention to agricultural diversification:

Well-diversified and flexible agriculture produces steadier farm income when output prices are highly volatile.

ii) Rural economic diversification is an important source of income growth for rural residents; it improves living standards and reduces rural-urban migration.

iii) A varied cropping pattern is more long-term sustainable than intensive cultivation of a single crop. The Hirschman-Herfindhal index was used to determine the crop diversification index for the various crops cultivated in the selected block, as shown in table-4. The Herfindhal Index was used to diversify the crops.

TABLE-4 :HIRSCHMAN-HERFINDHAL DIVERSIFICATION INDEX IN THONDAMUTHUR

Crops	Past				Present			
	SF	MF	LF	ALL	SF	MF	LF	ALL
Thondamuthur								
Cereals	0.999	0.857	0.963	0.991	0.967	0.875	0.984	0.999*
Pulses	0.954	0.977	0.892	0.989	0.924	0.998	0.847	0.998*
Sugarcane	0.897	0.866	0.760	0.764	0.867	0.755	0.680	0.757
Spices and Condiments	0.986	0.823	0.990	0.982	0.965	0.893	0.987	0.963
Curry leaves	0.951	0.879	0.852	0.941	0.953	0.996	0.843	0.879
Vegetables	0.994	0.921	0.953	0.986	0.976	0.995	0.937	0.999*
Fruits	0.651	0.876	0.952	0.768	0.890	0.934	0.950	0.991*
Flowers	0.992	0.996	0.668	0.875	0.756	0.669	0.833	0.942
Groundnut	0.990	0.851	0.852	0.684	0.674	0.682	0.837	0.739

Coconut	0.964	0.754	0.654	0.984	0.951	0.964	0.953	0.997*
Cotton	0.684	0.964	0.741	0.874	0.950	0.983	0.854	0.730
Medicinal Plants	0.725	0.867	0.684	0.626	0.758	0.885	0.756	0.754
Annur								
Cereals	0.864	0.953	0.992	0.953	0.837	0.752	0.953	0.992*
Pulses	0.961	0.853	0.954	0.843	0.910	0.874	0.951	0.954
Sugarcane	0.834	0.853	0.854	0.684	0.776	0.945	0.853	0.854
Spices and Condiments	0.784	0.864	0.934	0.959	0.963	0.874	0.845	0.997*
Curry leaves	0.853	0.974	0.981	0.921	0.925	0.997	0.996	0.998*
Vegetables	0.941	0.682	0.932	0.992	0.968	0.854	0.850	0.885
Fruits	0.888	0.973	0.911	0.982	0.684	0.956	0.940	0.991*
Flowers	0.987	0.857	0.835	0.861	0.852	0.684	0.668	0.991*
Groundnut	0.777	0.831	0.687	0.897	0.995	0.997	0.891	0.662
Coconut	0.753	0.887	0.759	0.941	0.741	0.684	0.753	0.870
Cotton	0.954	0.915	0.954	0.973	0.611	0.781	0.953	0.754
Medicinal Plants	0.268	0.452	0.412	0.521	0.368	0.478	0.445	0.547

Source: Field Survey, (2019) N is Number stated, C is column total percentage, SF- Small Farmers, MF-Marginal Farmers, LF Large Farmers. Cereals- Cholam, Cumbu, Maize, Pulses- Bengal gram, Red gram, Green gram, Black gram, Horse gram, Spices and Condiments-Chilli, Coriander, Turmeric, Tamarind, Arecanut, Fruits- Mango, Guava, Grapes, Lemon, Banana, Sapota, Amla Vegetables- Tapioca, Onion, Brinjal, Lady finger, Tomato, Cauli flower, Medicinal plants- Aloe vela, Thulasi

The diversification index calculation in the Thondamuthur block clearly demonstrates that the present has more diversification than the past, which had a diversification index of 0.986 for vegetables, but the present has 0.999. In cereals, contemporary diversification was 0.991, but past diversification was only 0.999. Small farmers in the selected block had the most crop diversification, mostly in grains (0.99), flowers (0.992), coconut (0.996), and spices and condiments (0.996). (0.993).

The diversification index calculation in the Annur block clearly demonstrates that the present has more diversification than the past, which had a diversification value of 0.986 for curry leaves, whereas the present has 0.999. In cereals, contemporary diversification was 0.991, but past diversification was only 0.999. Small farmers in the selected block had the most crop diversification, mostly in grains (0.99), flowers (0.992), coconut (0.996), and spices and condiments (0.996). (0.993).

We can see from this research that crop diversification benefits present adopters more than Past adopters, implying that Presents are more significant in increasing agricultural productivity.

MODIFIED ENTROPY INDEX

Modified Entropy Index (MEI) uses a log term of the inverse of the respective shares to weigh the shares of a farm's activities. When the farm is entirely specialized, it has a value of zero, and when diversity is excellent, it has a value of maximum. As a result, M4 should be increased in order to promote diversification. Larger activities are given less weight in this score than in the Herfindhal index. We take a look at eight micro-level elements that affect agriculture diversity. The term "diversification" refers to agricultural production only. Farm size (area), farmer experience (age), farmer net worth (wealth), time devoted to farming (labour input), agricultural insurance, geographical or climatic and soil characteristics of the farm (location), innovation methods (in terms of types of labour used), and adoption of new technology are all micro-level factors.

The Modified Entropy Index (MEI) is used to determine the dispersion level and concentration of various crops at a given point in time and space.

This index's definition is as follows:

$$I=n$$

$$MEI= -\sum Pi \log N (Pi)$$

The modified entropy index has a value of 1 and reaches a value of 0 at maximum specialization. As a result, in the current study, this measure was utilized to rank the various crop indicators. The MEI was calculated using the principal crops cultivated in the research area. The calculated crop diversification indices in the selected study region are shown in the table below.

TABLE –5 :MODIFIED ENTROPY INDEX IN SELECTED FARM HOUSEHOLDS

Crops	Past				Present			
	SF	MF	LF	ALL	SF	MF	LF	ALL
Thondamuthur								
Cereals	0.008	0.006	0.015	0.024	0.007	0.005	0.008	0.002
Pulses	0.005	0.011	0.009	0.016	0.005	0.009	0.007	0.002
Sugarcane	0.009	0.021	0.016	0.021	0.006	0.007	0.008	0.012
Spices and Condiments	0.011	0.008	0.007	0.011	0.002	0.008	0.010	0.001
Curry leaves	0.006	0.007	0.012	0.040	0.001	0.009	0.008	0.010
Vegetables	0.009	0.008	0.008	0.008	0.004	0.005	0.007	0.001
Fruits	0.009	0.001	0.008	0.009	0.008	0.001	0.011	0.006
Flowers	0.010	0.021	0.007	0.013	0.007	0.008	0.009	0.008
Groundnut	0.008	0.028	0.015	0.012	0.009	0.002	0.002	0.016
Coconut	0.009	0.001	0.004	0.006	0.008	0.007	0.005	0.001
Cotton	0.017	0.008	0.009	0.016	0.007	0.004	0.006	0.012
Medicinal Plants	0.023	0.012	0.015	0.019	0.009	0.011	0.009	0.011
Annur								
Cereals	0.010	0.023	0.008	0.019	0.008	0.009	0.002	0.009
Pulses	0.002	0.004	0.009	0.009	0.010	0.005	0.007	0.004
Sugarcane	0.021	0.010	0.032	0.029	0.011	0.006	0.005	0.008
Spices and Condiments	0.011	0.009	0.022	0.013	0.009	0.007	0.009	0.003
Curry leaves	0.009	0.014	0.019	0.020	0.005	0.008	0.010	0.001
Vegetables	0.012	0.009	0.012	0.012	0.013	0.010	0.002	0.002
Fruits	0.008	0.011	0.009	0.024	0.017	0.009	0.007	0.003
Flowers	0.021	0.030	0.011	0.010	0.009	0.001	0.006	0.004
Groundnut	0.020	0.010	0.021	0.011	0.007	0.012	0.008	0.005
Coconut	0.011	0.002	0.017	0.022	0.015	0.011	0.011	0.008
Cotton	0.008	0.012	0.009	0.026	0.020	0.018	0.009	0.005
Medicinal Plants	0.023	0.032	0.012	0.032	0.015	0.021	0.019	0.021

Source: Field Survey, (2019) N is Number stated, C is column total percentage, SF- Small Farmers, MF-Marginal Farmers, LF Large Farmers. Cereals- Cholam, Cumbu, Maize, Pulses- Bengal gram, Red gram, Green gram, Black gram, Horse gram, Spices and Condiments-Chilli, Coriander, Turmeric, Tamarind, Arecanut, Fruits- Mango, Guava, Grapes, Lemon, Banana, Sapota, Amla Vegetables- Tapioca, Onion, Brinjal, Lady finger, Tomato, Cauli flower, Medicinal plants- Aloe vela, Thulasi

The crop diversification was explained in Table 18 using the Modified Entropy Index, which compared the indices of both current and past cropping patterns in chosen blocks. When the result is closest to 0, the Modified Entropy Index reaches a significance level. In comparison to previous adopters, the Modified Entropy Index computation clearly showed that current adopters have more diversification. In the Thondamuthur block, the current diversification index for vegetables is 0.001, whereas the previous one was 0.008. Cereals and condiments ranked second with 0.002 and 0.00% diversification, whereas past cereals and condiments ranked third with 0.024 and 0.014 percent. Small farmers in the Thondamuthur block had the most crop diversification, primarily vegetables (0.004), cereals (0.007), pulses (0.005), and fruits (0.005). (0.006). The fruits ranked 3rd with a 0.006 diversification index, compared to 0.008 in the prior.

In the Annur block, the present has a 0.001 diversification index for curry leaves ranking first, whereas the past has a 0.020 diversification value. The present pulses and flowers had 0.002 and 0.002 diversification, respectively, and the past had 0.062 and 0.011 percent. Small farmers in the Annur block had the most crop diversification, with curry leaves (0.005), cereals (0.009), pulses (0.010), and fruits being the most common (0.008). We discovered that crop diversification benefits present adopters more, with a special focus on small farmers, using the Modified Entropy Index among the selected farm households. The preceding argument clearly demonstrated that the present plays a critical role in improving agricultural practices.

CONCLUSION

Agriculture development was a dynamic situation for economic development, and contemporary agricultural technology with substantial growths in production/yield and low levels of variability was good for agriculture's long-term development. To encourage agricultural growth and development, the government should assign greater money to cultivated research. Crop diversification was a method of reallocating resources among crops based on their proportional value. It was generally seen as a move from lower-value to higher-value crops, as well as an imperative avenue for agricultural progress (Chittaranjan Nayak and Chinmaya Ranjan Kumar 2019). It also advances farmers' elasticity to peripheral shocks and adopts agricultural independence and sustainability. Crop variety becomes even more significant in the WTO-led globalized basis, which restricts the use of charge as motivation to boost production. Farmers will remain to be at a difficulty except they change to market indications. Higher costs for actions such as preparing and harvesting, problems in using equipment, high costs of fertilizers and pesticides, high costs of editing crop loans, and a lack of knowledge about integrated nutrient and pest management practises are all factors that contribute to the adoption of improved technologies. More policy interventions from the government are required to enhancement yields, such as cultivating the outreach and efficacy of extension services, strengthening input supply, and improving farmers' access to institutional financing.

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Research Article

Impact Of Covid-19 On Agriculture In Selected Farm Households

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Abstract

On the impact of COVID 19 has interrupted the financial accomplishments besides the resources limits considerably. In Indian economy agriculture sector alone will provide more than the contribution of other sector. The effect of COVID 19 has intimate the rural sector on the part of rural supply chain. Though the government has allotted to permits the transports allowing them to provide fodders, fruits and cereals a huge amount of carriers are but to acquire grip of their authorizations. This is prominent interval occupied for the farm yields to reach the market. In this background the major objective of the study were (i) COVID-19 and Agriculture sector in India, (ii) COVID-19 and role of government and (iii) Impact of COVID-19 and crop diversification in selected farm households. The study was conducted on both the primary and secondary data with Multistage random sampling technique was adopted. The Coimbatore district was selected and the district can be divided into 12 blocks and the total sample size was 100 Thondamuthur and Annur block. Through the analysis we clearly demonstrate that crop diversification with COVID-19 in selected farm households. The Indian government, in aidenticalsubstantialchange, has reported to ignoreeffort for agriculturalists, agriculture laborers and accumulating and sowing- related machines after the purview of lockdown.

KEY WORDS: COVID-19, Agriculture, Crop Diversificationand Role of Government.

INTRODUCTION

Economic development is necessary for apprasing the growth of a country. The prominence of a nation is contingent mainly on the financial development attained and growth possible it retain for upcoming growth. Economic development is an actual ancient and highly deliberated issue since all nations through the world irrespective of their growth attempt to raise their gross domestic product (GDP). In India industrial, amenities, farming sectors play a major part in financial growth. According to

the Economic Survey of India 2018-19 report being an initial rising economy is developing in faster manner in last five years about 7 to 5 per cent of average growth per annum and 4.5 per cent of average annual inflation (Manjushree et.al., 2020). Indian economy, moderately sustained by International Monetary Fund (IMF) assessed that one of the fastest growing economics in the World. Despite the predictions, surprisingly the economy has not fared well since in 2018-19 (5.8 per cent) indicating a slowdown economy.

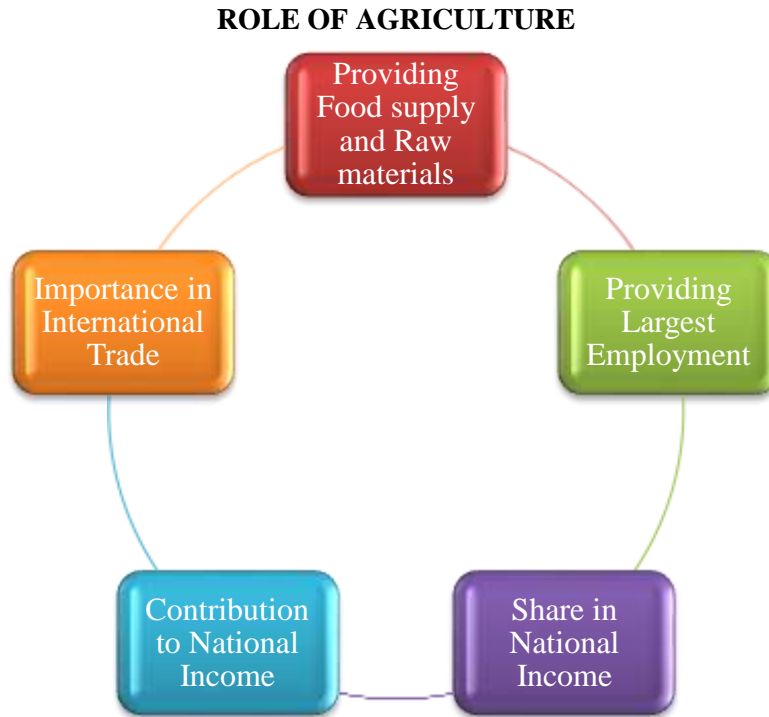


FIGURE:1

STATEMENT OF THE PROBLEM

The health crises at present about COVID19 has pretentious all walks of life. Protective survives of individuals' distress from the disease as well as forefront wellbeing responders have remained the importance of the countries. Government has fluctuated into activities since the corona virus occurrence made a unique condition. India stated a three week countrywide lock down till mid- April in the original phase, which has consequently ban prolonged till May 3 for attaining acceptance restraint of the virus spread. Though the exciting periods, in what way ensures the agriculture situation in India reactto the emergencies and whether the government measures would affect 140 million of agriculture holders through the country and later effect the country is very essentialfor the developing country in the world. Agriculture sector faced the instant challenges from COVID 19 to recover that certain measures to adopt the sustainable food system after the health crises period.

BACKGROUND OF THE STUDY

Arumugamet.al., (2020) concentrated on the activities of government on context of unexpected situation in corona virus in various circumstances. The study mainly focused mainly on role of government and ministry of Home Affairs provided the instruction on the extend from april 2020 to May 2020 provided to maintain agriculture sector and food supply. **Mahandra Dev. S and RajeswariSengupta (2020)** identified the risk undertaken by various aspects like agriculture production, labor force and chain of food supply. **PrangyaParamitaSahoo and SuvangiRath (2020)** assessed the agribusiness and impact of COVID 19 and found that there is trouble in financial way due to lockdown. **Shankaraghattaet.al., (2020)** pointed out that estimation of government activities under agriculture sector in India. The study investigated that food framework in pre and post period of Indian Agriculture in COVID 19.

MATTERS AND MATERIALS

The poorest portion of the impressive community limitation was that it overlapped with the nation's peak of production at period of a diversity of yields at season. Seasonal crops were grown were ready for harvest that may hit adversely the farmers but there was a critical situation to complete the harvest. The study has been intended to study the agriculture sector and COVID 19. In this background the major objective of the study (i) COVID-19 and Agriculture sector in India, (ii) COVID-19 and role of government and (iii) Impact of COVID-19 and crop diversification in selected farm households. The study made by data on primary and secondary adopting the multistage random sampling technique. The Coimbatore district was selected at the first stage and the district can be divided into 12 blocks and then few blocks can be selected on the basis of irrigated area. At the second stage the chosen blocks can be further sub divided into the number of villages and the sample of few villages can be selected from the villages chosen. Thus at each stage the size of the farm households has become smaller and the total sample size was 100.

MAJOR FINDING OF THE STUDY

COVID-19 AND AGRICULTURE SECTOR IN INDIA

In recent period agriculture situation in India has handling well. In terms of production and geographical coverage has increased in the period of 2012-2017 (AbimanyuJhahria, et.al., 2020). The estimated growth of agricultural production in 2019-20 is valued at 4 per cent. Food grain production is 296.65 million tonnes (4.08 per cent higher than 2018-19) estimated by fourth advance, where in the third advance estimates (2019-20), the horticultural production is probable to be 320.67 million tonnes in 2019-20 as equaled to 310.74 million tonnes in 2018-19, which is 3.19 per cent higher than 2018-19. The normal deviation in rabi crops has interrupted on the impact of late rains on the impact of climate change. According to the Food Corporation of India in September 2020 compiled that there is an optional stock to ensure the adequate food supply in the country.

In COVID 19 during lockdown which is particularly affected the food supply chains. COVID-19 globally affected the millions of people and the death toll is increasing fast. It is predictable that the lockdown actions would level the contamination turn shortly, critical financial events and facilities shall be retained. In the period of COVID 19 there is an economic slowdown in India and also there is demand for food supply by agriculture sector. The government has taken several safety measures and policies for the development.

The global economic system has struck deep where India is not any expectation of COVID-19, there will be restrictions like weak financial quarters, activity losses, profits cuts and lower income margins (JyotiPrakeshShao and KailashSamal. 2020). Today, everybody is talking about the impact of COVID-19, however simplest from a countrywide attitude or urban centric angle. Unfortunately, not an awful lot has been spoken approximately COVID-19 affected the rural sector; there is a big of the economic system and standard consumption across product categories within the country. According to the United Nations document (2019) the population of India living in rural areas is 69 per cent, which constitutes to extra than seven hundred individuals, covering agriculturalists.

According to COVID- 19 the first impact is inside the rural quarter is food supply-chain. Government takes action permits to trucks to deliver agriculture production. This has prominent the phase occupied for the agriculture products to reach the market. In the opposite hand, there's a reasonable effect on the demand aspect as the cafes were ordered to close down for the period in between period. This is causing a vast sales loss to many farmers across states. As per a posted report, the railway ministry shows that freight loading has dipped from a regular 10,000 cargo rakes in keeping with day to pretty much three thousands to four thousands now. As a result, the farmer has to sell his crop at a less expensive price, settle with a lower profit.

Secondly the COVID-19 affected the harvest practices in which unavailability of merchandise of agriculture production.

At thirdly COVID-19 is the predicted change in the region of agriculture. The government allotted 9 crores by the government to farmers for landless agricultural labor, although the agriculturalist could remain getting comfort since the government at once, latter is sited in a tough function at this period.

At Fourth it affected the exports of India was the first experts of vegetation and as consistent with Agricultural and Processed Food Products Expert Development Authority, the average exports of India (2018-19) is of Rs 685 billion. Currently all of the ports were locked and huge stock takes assembled a way through buyers and farmers.

The small scale industries were affected, to manipulate the respectable dimension of stock then hire frequent labors.

At next it affects the estimate the feeble depletion movement in after COVID-19. After matters arrival towards usual at mainly responsiveness to human beings could remain protected profession then become the groups profitable. Throughout the period each people then companies resolve to maintain rigorous forms preceding the expenditure.

At present can similarly the obstacle of growth strategies at worldwide/ countrywide manufacturer's titans the constituency. They will take time earlier than reassessing the access the marketplace. This may not be possible towards uniform position of approximate discern form of financials mashat rurally might yielding of corona virus.

ROLE OF GOVERNMENT

In India the COVID 19 predicaments has fallout in agriculture production, Where the agriculture sector is predictable to decline at -1.3 per cent in 2020 (April to June). In Indian economy the impact of

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agriculture sector is about 17 per cent where it is larger contribution of industrial sector (The Statistica, 2020), where the per cent of 0.52 is contributed by the agriculture sector on the growth of Indian economy. According to the Food and Agriculture Organization (FAO, 2020) has indicated that COVID 19 is affected the demand and supply of agriculture production. The NITI Aayog indicated that 0.3 per cent rise in agriculture sector reveals 0.5 per cent of gross domestic product, when compared to non-agriculture sector the contribution sector is grown at more than 60 per cent. In India has increased the agriculture production is about 3.67 per cent (10.46 million tons) in between the year of 2018-19.

TABLE-1

DETAILS OF FUND ALLOCATED FOR AGRICULTURE SECTOR ON COVID-19

Rs in lakhs and Crores

S.No	Particulars	Amount
1	Production and marketing avenues	20 lakhs
2	Agri Infrastructure Fund	1 lakh
3	Formalisation of Micro Food Enterprises (MFE)	10,000
4	Fishermen	20,000
5	National Animal Disease Control Programme	13,343
6	Animal Husbandry Infrastructure Development Fund	15,000
7	Promotion of herbal cultivation	4,000
8	Addition facilities	500

Source: Government of India, (2020).

There is a negative impact on COVID 19 and agriculture production due to the accessibility of market to access the food supply, where there is fragile to local system in India. The social media played an significant role in 2019 under pandemic situation of COVID 19 (Mejia et.al. 2020).

In agriculture food system the migrants played an important role where the procedures affect the people move at nation and worldwide has ensured on shortages of labor has resulted in worth of agriculture market chain and food availability of market at worldwide (Food and Agriculture Organization FAO, 2020). The contribution total working population in informal sector frequently there is a daily wage workers includes agriculture workers, migrant and other labors. In India population of 263 million people has contributed in agriculture sector in the part of agriculture labors had work for wages even though they had no land, involved in crop production and also supply the crops in the various markets. The rural population had faced several situation faced in harvest period in COVID 19 pandemic crisis.

SOCIO-ECONOMIC CHARACTERISTICS OF SELECTED FARM HOUSEHOLDS

The general characteristics include community, sex, education; marital status and annual income were expressed in the selected farm households. The selected farm households are mostly headed by males. The percentages are being 80 in the Thondamuthur and 74 in the Annur. The data on the age of the selected farm households in the farm households in both the farmer groups reveal that about 42-50 in the age group of 20-40. But in Annur range from 55-60 per cent medium farmers and large farmers belong to

51-55 age groups. The percentages of farmers with no formal education were 4 in the Thondamuthur and 2 in Annur. In both the farmer groups nearly 57-63 per cent head of the families had either high school or higher secondary education. In the Thondamuthur farmer groups 7 per cent were completed UG and PG. In both the farmer group 57 per cent and 45 per cent of large farmer in Thondamuthur and medium farmer in Annur earning Rs 1,00,000 to Rs 2,00,000 of annual income. In Thondamuthur 25 per cent and 35 per cent of them are medium farmers and large farmers in Annur 30 per cent of them are large farmers belonging to Rs 2, 00,000 and above.

CROP DIVERSIFICATION

Crop diversification during the before and after COVID-19 was measured using the Hirschman-Herfindhal diversification index. The diversification index was calculated as D1=1-H in the Hirschman-Herfindhal diversification index is measured as,

$$H = \sum [(CP_{ij} / \sum P_{ij})^2]$$

P_{ji} being the value of production of the ith crop for the jth farmer. The higher diversity index indicates greatest crop diversity in production pattern. This is a mean towards decrease threat happening in positions under different tranche earnings threat. Through simply single or else dual sustenance yields, grange earnings is considerable increase towards usual risks than through a further differentiated harvesting method (Healey, 1987). Timmer (1990) revealed the three causes for procedure for producers to reimbursement additional devotion to cultivated modification:

- i) Once production values remain extremely unbalanced, a well-diversified then elastic cultivation delivers additional steady farmer earnings.
- ii) Modification of rural economy is an important foundation of revenue development for country people; it offers enhanced existing ethics and falling countryside to town passage.
- iii) In the extended path, an expanded harvesting design is extra maintainable than the concentrated Farming of a particular yield. The crop diversification index for the different crops cultivated in the selected block were calculated using the Hirschman-Herfindhal index and are shown in the following table-2.

**TABLE - 2
DETAILS ON CROP DIVERSIFICATION INDEX IN THONDAMUTHUR
FARM HOUSEHOLDS**

Farmers \ Crops	Before COVID-19				After COVID-19			
	SF	MF	LF	All	SF	MF	LF	All
Millets	0.912	0.920	0.932	0.920	0.997	0.991	0.995	0.995***
Tomato	0.942	0.931	0.912	0.927	0.996	0.994	0.996	0.996**
Fruits	0.914	0.918	0.926	0.918	0.993	0.992	0.989	0.992
Turmeric	0.913	0.926	0.918	0.919	0.989	0.994	0.996	0.991
Onion	0.924	0.926	0.923	0.925	0.999	0.997	0.995	0.998*

Source: Field Survey, (2020).

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The table-2 explains the crop diversification using Herfindhal Index and it had compared the indices of both before and after COVID-19. The Herfindhal Index attains significance level when the result is nearest to 1. The diversification index calculation clearly explains that before COVID-19 has more diversification comparatively to after COVID-19. After COVID-19 have 0.998 diversification index for onion wherein before COVID-19 have 0.925. In Tomato After COVID-19 had 0.995 diversification and before COVID-19 attained only 0.927. In the Thondamuthurblock, among the farm households small farmers had maximum crop diversification mainly in Onion (0.998), Tomato (0.996), Millets (0.995) and Fruits (0.992). In Turmeric before COVID-19 had 0.991 diversification index wherein after had 0.919. Through this analysis we clearly demonstrate that crop diversification favors to before COVID-19 rather than after COVID-19, so after COVID-19 are more important in enhancing crop production.

TABLE -3
DETAILS ON CROP DIVERSIFICATION INDEX IN ANNUR SELECTED FARM HOUSEHOLDS

Farmers Crops	Before COVID-19				After COVID-19			
	SF	MF	LF	All	SF	MF	LF	All
Brinjal	0.912	0.922	0.934	0.922	0.996	0.992	0.998	0.995
Onion	0.942	0.930	0.911	0.927	0.995	0.997	0.997	0.997
Flowers	0.914	0.919	0.925	0.918	0.992	0.994	0.986	0.993
Curry leaves	0.913	0.926	0.917	0.917	0.988	0.997	0.999	0.992
Tomato	0.924	0.925	0.929	0.925	0.999	0.994	0.995	0.999

Source: Field Survey, (2020).

The table- 3 explains the crop diversification using Herfindhal Index and it had compared the indices of both before and after COVID-19. The Herfindhal Index attains significance level when the result is nearest to 1. The diversification index calculation clearly explains that before COVID-19 has more diversification comparatively to after COVID-19. After COVID-19 have 0.999 diversification index for tomato wherein before COVID-19 have 0.925. In onion after COVID-19 had 0.997 diversification and before COVID-19 attained only 0.927. In the selected block, among the farm households small farmers had maximum crop diversification mainly in brinjal (0.995), curry leaves (0.992) and flowers (0.993). Through this analysis we clearly demonstrate that crop diversification favors to after COVID-19 are more important in enhancing crop production.

CONCLUSION

COVID-19 has affected the growth of India Economy particularly in various sectors. Under the situation the primary sector faced challenging situation, where the government has different responsible initiatives to under taken the pandemic situation. The impact of COVID 19 and primary sector has faced the problems like labors, harvesting, transport, marketing, etc., thus the government has undertaken the situation also to control the pandemic situation. Even operational of the source sequence, with suitable safety processes for the individuals involved, is of dominant reputation. Transport of public distribution system (PDS) items to late mile distribution representatives, mutually rail and road, has to be safeguarded by particular Government interventions. Supply of the commodities to vulnerable population, while

upholding recommended procedures and practice, mainly of social distancing, must be effectively monitored.

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